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Argonne National Laboratory

PROGRAM CATALOG WITH PERMUTED DESCRIPTION INDEX FOR CDC CO-OP COMPUTERS

by

N. J. Purcell

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ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, Illinois 60440

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PERMUTED DESCRIPTION INDEX FOR
CDC CO-OP COMPUTERS

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N. J. Purcell

Applied Mathematics Division

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PROGRAM CATALOG WITH PERMUTED DESCRIPTION INDEX
FOR CDC CO-OP COMPUTERS

N. J. Purcell

INTRODUCTION

The purpose of this report is to provide an effective catalog of current program descriptions for Control Data Corporation large scale computers. The Permuted Description Index was prepared on the CDC-3600.

The difficulty with classification schemes, as they have existed, is they are insufficient for the purpose of retrieving an arbitrary class of programs. Consider the situation where one wishes to inspect all programs written in FORTRAN 63 or where one is interested only in programs written for the CDC-1604 or the case where only the title of the program is known. These are functions one may reasonably expect an information retrieval mechanism to perform. This catalog does perform these functions and more.

The Permuted Description Index may be described as follows: Each source entry represents one line of printed matter and is permuted in an end-around fashion so that one line of printing results for each significant word in the entry (the classification code and installation field are excluded from this permutation and remain fixed). The entire list is then sorted according to the collating sequence specified in Appendix II. Appendix III contains a list of words which are not sorted.

The result is that a program may be recovered by knowing only one non-trivial word from the description field or one of the other fields.

The source entry is divided into eight subfields.

Title: This is the exact program title, which may contain as many as eight characters.

Machine: The identifying model number of the computer the program was written for is placed into this field of four characters.

Language: The source language and version where applicable is allowed a field of seven characters.

Material Available: This field contains the four letters WLSB when the write-up, listing, source deck and binary deck respectively are on hand.

System: The name of the operating system may contain as many as eight characters.

Date: The date the program was added to the index is placed in this field.

Description: This field may contain as many as 77 characters.

Classification Code and Installation: This field contains a classification code as listed in Appendix I and the CO-OP identification code of the submitting installation except in the case where the program was written at Argonne, in which case this field contains the word ARGONNE.

Where the information is unavailable, the field is left blank.

An asterisk is added to each line just previous to the first word of the title.

As an example, consider a listing of only one source entry.

ANL-B051 3600 COMPASS	SCOPE	FEB-65 DOUBLE PRECISION ABSOLUTE VALUE	
PRECISION ABSOLUTE VALUE *ANL-B051	3600 COMPASS	SCOPE FEB-65 DOUBLE	BO ANL
SCOPE FEB-65 DOUBLE PRECISION	ABSOLUTE VALUE *ANL-B051 3600 COMPASS		BO ANL
DOUBLE PRECISION ABSOLUTE VALUE	ANL-B051 3600 COMPASS	SCOPE FEB-65	BO ANL
ABSOLUTE VALUE *ANL-B051	COMPASS SCOPE FEB-65 DOUBLE PRECISION		BO ANL
3600 COMPASS SCOPE FEB-65	DOUBLE PRECISION ABSOLUTE VALUE *ANL-B051		BO ANL
*ANL-B051 3600 COMPASS SCOPE	FEB-65 DOUBLE PRECISION ABSOLUTE VALUE		BO ANL
COMPASS SCOPE FEB-65 DOUBLE	PRECISION ABSOLUTE VALUE *ANL-B051 3600		BO ANL
VALUE *ANL-B051 3600 COMPASS	SCOPE FEB-65 DOUBLE PRECISION ABSOLUTE		BO ANL
FEB-65 DOUBLE PRECISION ABSOLUTE	VALUE *ANL-B051 3600 COMPASS	SCOPE	BO ANL

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FILE	(FORTRAN TAPE FILE SEARCH)	*FILE	Q3	UCSD
1604 MULTIPLE REGRESSION NO. 3	(MODIFIED 06)	*BIMC29 1604	N	G2 NPGS
NOV 64 CROSS TABULATION NO. 3	(MODIFIED 23)	*BIMD32 1604 F-63		G9 NPGS
CROSS TABULATION NO. 3	(MODIFIED-23)	*BIMD32 F-60 1604		G9 NPGS
MULTIPLE REGRESSION NO. 3	(MODIFIED 05)	*BIMC29 F-60 1604		G2 NPGS
1604 TRACE (PAPER TAPE OUTPUT)		*TRACPT 1604		N1 CODA
DOUBLE PRECISION ARITHMETIC (SIX ROUTINES)		*WRAP F-63 1604		A1 UTEX
TEDE REGRESSION ANALYSIS PROGRAM	(WRAP)	*BIMC29 F-60 1604		G2 SAND
IPLE REGRESSION NO. 3 (MODIFIED 05)		*BIMC29 1604		G2 NPGS
PLE REGRESSION NO. 3 (MODIFIED 06)		088LOAD 1604		G2 NPGS
OCTAL DUMP S-C 4020 AND	1000	OCTAL OR COLUMN BINARY CARD LOADER	NOV 64	I9 COMC
ST BCD TAPE ON S-C 4020 AND C-C	1000	*LISTSC 1604	1604	J2 WADD
4 POINT PLOT TAPE GENERATOR FOR	160 TO 165 PLOTTER	*PLOT WLS F-60 1604		M4 UTEX
AXES TAPE GENERATOR FOR THE CDC	160 TO CDC 165 PLOTTER	*AXES WLS F-60 1604	LI 160	M4 UTEX
*CLOUD F-63	1604	GAMMA-RAY DOSE RATE FROM A CLOUD		Y2 CODA
*TAPRR 1604	1604	WADD TABLE PREPARATION		M4 WADD
*GAM-I F-60	1604	SLOWING DOWN SPECTRUM CODE		Y2 UOFM
*RANDM F-63	1604	RANDOM NUMBER GENERATOR		G5 UCSD
*EQUIPOIS F-63	1604	TWO-DIMENSIONAL TWO-GROUP DIFFUSION CODE FOR SLAB OR CYLINDER GEOMET		Y2 CODA
*PMT 1604	1604	PREPARE MASTER TAPE		M1 LMSD
*DTF F-63	1604	ONE-DIMENSIONAL SN CALCULATIONS SLAB CYLINDER OR SPHERE		Y2 UNC
*SCAPRODB 1604	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT		F1 UTEX
*AIREK3 F-63	1604	GENERALIZED REACTOR KINETICS CODE		Y2 CODA
*CECS F-62	1604	CIVIL ENGINEERING COMPUTATION SYSTEM		Y1 CODS
*ZUT F-63	1604	RESOLVED RESONANCE INTEGRAL		Y2 CODA
*INPUT 1604	1604	GENERALIZED INPUT		I9 LMSD
*WHIRLWAY F-63	1604	THREE-DIMENSIONAL TWO-GROUP XYZ DIFFUSION CODE		Y2 CODA
*GRAFPLT F-62	1604	1604 GRAPH PLOTTING SUBROUTINE		Q4 NPGS
*FUGUE F-63	1604	STEADY STATE ANALYSIS IN CLOSED CHANNELS		Y2 CODA
*ASINF 1604	1604	FLOATING POINT ARCSINE - ARCCOSINE		B1 CODA
*TEMPEST F-63	1604	TEMPEST II		Y2 CODA
*INTOR 1604	1604	MANUAL INTERRUPT AND RESTORE		N2 WADD
*ARES-1 F-63	1604	RESONANCE INTEGRAL CODE		Y2 CODA
*IOVERP 1604	1604	DECODE OVERPUNCHES		M4 NBSB
*MURGATRO F-63	1604	MSRE KINETICS CODE		Y2 ORNL
*SAMPLE 1604	1604	SAMPLE		Z CODA
*FAIM F-63	1604	ONE-DIMENSIONAL MULTI-GROUP DOWN SCATTER DIFFUSION CODE		Y2 CODA
*SIMDUB F-60	1604	DOUBLE INTEGRATION BY SIMPSONS RULE		O1 UCSD
*FOG F-63	1604	ONE-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR SLAB CYLINDER OR SPHERE		Y2 CODA
*TMAC 1604	1604	TAPE MERGE AND COPY		M1 LMSD
*TUZ F-63	1604	UNRESOLVED RESONANCE INTEGRAL		Y2 CODA
*RANDOM2 1604	1604	FAST RANDOM NUMBER GENERATOR		G5 UCSD
*FORTSNG F-63	1604	FORTRAN SNG CODE		Y2 CODA
*650S 1604	1604	650 SIMULATOR		O2 NBSB
*GRACE1 F-63	1604	SLAB GAMMARAY ATTENUATION CODE		Y2 CODA
*CMD F-60	1604	MULTIPLICATION AND DIVISION OF COMPLEX NUMBERS		A2 UTEX
*S4CYCELL F-63	1604	S4 CYLINDRICAL GEOMETRY CELL CODE		Y2 CODA
*ACCT 1604	1604	1604 ACCEPTANCE TEST		Z NBSB
*FORM F-63	1604	FORTRAN MUFT A FOURIER TRANSFORM SLOWING DOWN, FAST SPECTRUM CODE		Y2 CODA
*GP PLOT F-62	1604	GENERAL PURPOSE X-Y PLOTTER		J7 UCSD
*GAM-I F-63	1604	SLOWING DOWN SPECTRUM CODE		Y2 CODA
*DMP 1604	1604	OCTAL-DECIMAL CORE DUMP		N2 CODA
*20GRAND F-60	1604	TWO-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR SLAB OR CYLINDER GEOMET		Y2 UOFM
*MANYCOR 1604	1604	CORRELATION ANALYSIS		G2 NBSB
D OVER AN*HAFEVER F-63	1604	HAUSER FESHBACH GOLDMAN INELASTIC SCATTERING CROSS-SECTION INTEGRATE		Y2 CODA
*MERGEIT F-63	1604	DEC 64 BINARY PROGRAM TAPE MERGE AND EDIT		K3 CODS
*GRACE2 1604	1604	CYLINDER OR SLAB GAMMARAY ATTENUATION CODE		Y2 CODA
*OPBIPT 1604	1604	DUMP BINARY PAPER TAPE		J1 CODA
*AIREK2 F-63	1604	REACTOR KINETICS CODE WITH MATH. BY E.R.COHEN		Y2 CODA
*EDITLIB 1604	1604	EDITING ROUTINE FOR A FORTRAN LIBRARY		M1 NBSB
*PERT WL F-63	1604	ONE-DIMENSIONAL PERTURBATION CALCULATION FOR AIM AND FOG		Y2 CODA
*NPOA F-62	1604	NORMAL PROBABILITY FUNCTION		C3 UCSD
*DYSAC 1604	1604	ANALOG SOLUTIONS OF DIFFERENTIAL EQUATIONS		O1 NSAR
*EXFAULT 1604	1604	EXFAULT		P CODA
*20GRAND F-63	1604	TWO-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR SLAB OR CYLINDER GEOMET		Y2 CODA
*BIMD17 F-60	1604	FACTOR ANALYSIS		G8 NPGS
*DUMPC 160				

	*RKLEQ	F-62	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
	*SLIP	F-63	1604	SLIP	M5	NSAR
	*GP PLOT	F-60	1604	GENERAL PURPOSE X-Y PLOTTER	J7	UCSD
	*IDENTIFY	F-62	1604	IDENTIFY	Z	UCSD
	*ALLROOT	F-60	1604	ZEROS OF ARBITRARY FUNCTIONS	C2	UTEX
	*ITIME	F-63	1604	CURRENT TIME ROUTINE	Q	UCSD
	*ARIAR2		1604	CONVERT AR1 TO AR2	M4	CODA
	*IPL-V		1604	INFORMATION PROCESSING LANGUAGE V	M5	UTEX
	*BIMDO6	F-60	1604	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO.1	G2	NPGS
	*CDAPCOMP		1604	CODAP TO COMPASS TRANSLATOR	Z1	CODA
	*BIMD19	F-60	1604	ROTATION OF A FACTOR MATRIX	G8	NPGS
	*COMPRESS	F-63	1604	COMPRESS	Q9	CODA
	*SINCOSF		1604	FLOATING POINT SINE OR COSINE	B1	CODA
	*FILE		1604	FILE (FORTRAN TAPE FILE SEARCH)	Q3	UCSD
ARY FUNCTION			1604	*MIN WL F-63 1604	H2	SAND
	*PERIPROG		1604	FORTRAN PERIPROG SYSTEM	O1	NBSB
	*SIMDUB	F-62	1604	DOUBLE INTEGRATION BY SIMPSON'S RULE	D1	UCSD
	*TRACMT3		1604	MAGNETIC TAPE TRACE	N1	CODA
	*UNPACK		1604	FLOATING NUMBER TO FRACTION AND EXPONENT	M4	LMSO
	*COMPCHK		1604	1604-3604 COMPATIBILITY CHECK	Z1	CODA
	*LAGUER	WLS	1604	LAGUERRE POLYNOMIAL	C1	CODA
	*ITIME		1604	CURRENT TIME ROUTINE	Q	UCSD
	*CDM3	F-62	1604	LINEAR PROGRAMMING SYSTEM 3	H1	CODA
	*CLRMEM		1604	CLEAR SELECTED MEMORY RANGE	Q1	CODA
	*MATALG	F-63	1604	FORTRAN SIMULTANEOUS LINEAR EQUATIONS SUBROUTINE	F4	CODA
	*INSCH		1604	TYPEWRITER INSPECT AND CHANGE	N1	WADD
	*RANUM	F-60	1604	POSITIVE FIXED POINT RANDOM NUMBER GENERATOR	G5	UTEX
	*TRACPT		1604	TRACE (PAPER TAPE OUTPUT)	N1	CODA
	*CMSQRT		1604	36-BIT PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	A2	UTEX
	*COMPCOMP	F-63	1604	COMPASS PLUS CODAP TO COMPASS TRANSLATOR	Z1	NBSB
	*DPOCPT		1604	DUMP OCTAL PAPER TAPE	J2	CODA
	*E LANGUAGE PROGRAMS		1604		Z1	UCSD
	*PADE	F-62	1604	PADE APPROXIMANT, RATIONAL APPROXIMATION OF FUNCTIONS	E1	UCSD
	*TRACMT		1604	MAGNETIC TAPE TRACE	N1	WADD
TS	*XY PLOT	F-60	1604	XY PLOTTER	J7	UCSD
	*VIETA	WL	1604	EXPLICIT SOLUTION OF THE GENERAL CUBIC EQUATION WITH REAL COEFFICIENTS	C2	UCSD
	*DPFMU	F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*DUMPL	F-60	1604	LISTABLE DUMP	N2	LMSO
	*BCDOCT		1604	BCD TO OCTAL CONVERSION	M4	LMSO
	*IDENTIFY	F-60	1604	IDENTIFY	Z	UCSD
	*GENLSQ	F-63	1604	CURVE FITTING BY THE METHOD OF LEAST SQUARES	E2	SAND
	*TRACE	F-62	1604	TRACE	N1	UCSD
	*CYPTPT		1604	COPY PAPER TAPE	M4	CODA
NT	*DISASMBL	WLS	1604	DISASMBL	N2	NSAR
	*BESSEL	F-63	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR REAL ORDER REAL ARGUMENT	C3	UCSD
	*GRAFPLT	F-63	1604	1604 GRAPH PLOTTING SUBROUTINE	Q4	NPGS
RE GEOMET	*DECLD		1604	DECIMAL AND OCTAL LOAD-PAPER TAPE OR TYPEWRITER	I9	WADD
	*AIM-6	F-63	1604	ONE-DIMENSIONAL MULTI-GROUP DIFFUSION CODE FOR SLAB CYLINDER OR SPHE	Y2	CODA
	*DPMATS	F-60	1604	DOUBLE PRECISION MATRIX INVERSION	F1	UCSD
	*CORE		1604	MEMORY DUMP	N2	LMSO
	*CBIRBI		1604	COLUMN BINARY TO ROW BINARY CONVERSION	M4	CODA
	*TRADER		1604	TRADE NAMES	Z1	NBSB
	*SINE		1604	FLOATING POINT SINE COSINE	B1	CODA
	*SIGTAU	F-60	1604	NUMBER AND SUM OF DIVISORS OF N	U0	CODA
	*SYMEDIT		1604	SYMBOLIC EDIT	L2	CODA
	*DUMPR		1604	RESTORABLE DUMP	N2	LMSO
	*BIMD	F-60	1604	MULTIPLE REGRESSION AND CORRELATION ANALYSIS	G2	UCSD
	*TIMER		1604	FORTRAN PROGRAM TIMER	Q	UCSD
	*BIMD21	F-60	1604	PERIODIC REGRESSION	G7	NPGS
	*BTD		1604	BINARY TAPE DUMP	N2	CODA
	*GAA		1604	NORMAL PROBABILITY FUNCTION	C3	NYU
	*DOCUMENT	F-62	1604	DOCUMENTATION OF FORTRAN SOURCE LANGUAGE PROGRAMS	Z1	UCSD
	*KLIST		1604	MOVE A VARIABLE TO A LIST OF WORDS	M4	CODS
	*GCD	F-60	1604	GREATEST COMMON DIVISOR	U0	CODA
	*RKLEQ	WLS	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
	*DUMPA	F-63	1604	ANELEX PRINTER DUMP	N2	CODA
	*BIBOI		1604	BINARY CARD LOAD	I1	LMSO
		*BIMD29	1604	NOV 64 MULTIPLE REGRESSION NO. 3 (MC DIFIED 06)	G2	NPGS
	*SPHERE	F-60	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*LCM	F-60	1604	THE LEAST COMMON MULTIPLE	U0	CODA
SDC	*JOVIAL		1604	PROCEDURE-ORIENTED COMPILER	L2	SDCS
	*DUMP	F-60	1604	DUMP	N2	UCSD
	*SIMCON	F-60	1604	QUADRATURE BY SIMPSON'S RULE	D1	UCSD
	*PHI	WL	1604	EULERS PHI FUNCTION	U0	CODA
	*BCDBIN		1604	BCD TO BINARY CONVERSION	M4	CODA
	*SIZZLE	F-63	1604	ONE-DIMENSIONAL MULTI-GROUP BURNUP CODE BASED ON DIFFUSION THEORY	Y2	CODA

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*HERMIT	F-60	1604	HERMITE POLYNOMIAL GENERATOR	C1	UCSD
*BIM030	F-60	1604	ASYMPTOTIC REGRESSION	G7	NPBS
*MATEQ	F-60	1604	FORTTRAN SIMULTANEOUS LINEAR EQUATIONS SUBROUTINE	F4	CODA
*TDUMP		1604	TYPEWRITER DUMP	J2	WADD
*LEGEND WLS	F-63	1604	LEGENDRE POLYNOMIAL GENERATOR	C1	UCSD
*BIBOT		1604	BINARY TAPE LOAD	I1	LMSD
*BIM007	F-60	1604	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO.2	G2	NPBS
*CMPKA		1604	COMPARE AN ARRAY WITH A VARIABLE	M4	CODS
*SQARTFRC		1604	NON-FLOATING SQUARE ROOT	B4	NBSB
*GP PLOT WLS	F-63	1604	GENERAL PURPOSE X-Y PLOTTER	J7	UCSD
*1EIGEN	F-62	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	F2	UCSD
*BIM030	F-60	1604	TIME SERIES ANALYSIS NO. 2	G7	NPBS
*COMAG	F-60	1604	MODULUS OF A COMPLEX NUMBER	A2	UTEX
*DAPROC		1604	WADD OFF-LINE DATA PROCESSOR	L3	WADD
*LSQPOL	F-60	1604	LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
*RABII		1604	RELOCATABLE OR ABSOLUTE BINARY TAPE LOAD	I1	WADD
*SPHERE	F-62	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
*MOVE		1604	MOVE N WORDS FROM A LIST TO AN ARRAY	M4	CODS
*CORRO	F-60	1604	PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS	G2	UTEX
*STRAH		1604	SIMULTANEOUS TAPE READ AND WRITE	K3	CODA
*DIVROFX		1604	FRACTIONAL FIXED-POINT ROUNDED DIVISION	A1	UTEX
*HOLERITH		1604	BCI TO CARD IMAGE, VARIABLE LENGTH WORDS	M4	NBSB
*SIMCON	F-62	1604	QUADRATURE BY SIMPSON'S RULE	D1	UCSD
*TUKEY	F-60	1604	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA	G7	UCSD
*HERMIT	F-62	1604	HERMITE POLYNOMIAL GENERATOR	C1	UCSD
*BIM018	F-60	1604	SUBROUTINE ROTATE	G9	NPBS
*DETF		1604	FORTTRAN FUNCTION FOR DETERMINANT EVALUATION, DETF(A,N)	F3	CODA
*TRNSFR		1604	MOVE N WORDS FROM ONE ARRAY TO ANOTHER	M4	CODS
*ASIN		1604	FLOATING POINT ARCSINE	B1	LMSD
*LDOOPT		1604	LOAD OCTAL PAPER TAPE	I2	CODA
*SIMEQ		1604	SOLUTION OF SIMULTANEOUS EQUATIONS	F4	LMSD
*CDM2	F-60	1604	LINEAR PROGRAMMING SYSTEM 2	H1	CODA
*BESSELR	F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR REAL ORDER REAL ARGUMENT	C3	UCSD
*FLOAT		1604	FIXED TO FLOATING BINARY CONVERSION	M4	LMSD
*BIM029	F-60	1604	MULTIPLE REGRESSION NO. 3 (MODIFIED 05)	G2	NPBS
*BIM022	F-60	1604	CROSS TABULATION NO. 1	G9	NPBS
*COMAG	CODAP-1	1604	MODULUS OF A COMPLEX NUMBER	A2	UTEX
*INSERT		1604	INSERT A CHARACTER INTO A WORD	M4	CODS
*ERRORF		1604	ERRORF	G4	CODA
*ORDER	F-60	1604	ORDERING OF POINTS FOR SCATTER-PLOTTING	M1	UCSD
*ATAN1		1604	FLOATING POINT ARCTANGENT	B1	LMSD
*TUKEY	F-62	1604	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA	G7	UCSD
*MATINV	F-63	1604	MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	F1	NBSB
*DUPTAPE		1604	DUPTAPE-DUPLICATE TAPE	K3	UTEX
*DPFSB	F-60	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
*BIM023	F-60	1604	CROSS TABULATION NO. 2	G9	NPBS
*AUTOCROS		1604	AUTO- AND CROSS-LAG INTERCORRELATIONS	G2	UTEX
*ORDER	F-62	1604	ORDERING OF POINTS FOR SCATTER-PLOTTING	M1	UCSD
*HERMIT WLS	F-63	1604	HERMITE POLYNOMIAL GENERATOR	C1	UCSD
*ADDPORG		1604	ADD PROGRAM TO LIBRARY	K3	WADD
*ONEPASS		1604	ONE PASS SIMULTANEOUS EQUATIONS	F4	NBSB
*OCLD		1604	OCTAL CARD OR OCTAL MAG TAPE LOAD	I2	LMSD
*CDFN W S		1604	NORMAL CUMULATIVE DISTRIBUTION FUNCTION AND ERROR FUNCTION	C3	UOFM
*CMPAL		1604	COMPARE AN ARRAY TO A LIST	M4	CODS
*BIM014	F-60	1604	GENERAL LINEAR HYPOTHESIS FOR ANOVA	G4	NPBS
*BIM024	F-60	1604	DATA SCREENING NO. 3	G9	NPBS
*DBLCMSQT		1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	A2	UTEX
*BINBCO		1604	BINARY TO BCD CONVERSION	M4	CODA
*BIM008	F-60	1604	POLYNOMIAL REGRESSION	G2	NPBS
*TUKEY	F-63	1604	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA	G7	UCSD
*ATAN2		1604	FLOATING POINT ARCTANGENT	B1	LMSD
*CMPKL		1604	COMPARE A CONSTANT TO A LIST	M4	CODS
*INTERP		1604	POLYNOMIAL INTERPOLATION	E1	CODA
*AR-2		1604	LOCKHEED ASSEMBLY ROUTINE	L1	LMSD
*RCPGAMR	F-60	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	C3	UCSD
*LDBIPT		1604	LOAD BINARY PAPER TAPE	I1	CODA
*TRAP		1604	TRAPEZOIDAL RULE INTEGRATION	D1	UCSD
*BITSHIFT		1604	BIT TRANSFER	K2	CODA
*DBLREAD		1604		A1	UTEX
*SORT	F-62	1604	INTERNAL SORT	M1	UCSD
*LSQPOL	F-63	1604	LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
*CMPLL		1604	COMPARE TWO LISTS OF ITEMS	M4	CODS
*LAGUER	F-60	1604	LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
*BIM032	F-60	1604	CROSS TABULATION NO. 3 (MODIFIED-23)	G9	NPBS
*SOLVEQ		1604	SOLUTION OF SIMULTANEOUS EQUATIONS	F4	SAND
*STRING2		1604	MOVE N CHARACTERS FROM ARRAY A TO ARRAY B	K2	CODS

*DPFSB	F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
*MTC		1604	MASTER TAPE CONTROL	K3	LMSD
*BIMD09	F-60	1604	STEPWISE MULTIPLE REGRESSION	G2	NPGS
*ABLD		1604	ABSOLUTE BINARY LOAD	I1	LMSD
*COMP	CODAP-1	1604	FORTAN-63 COMPLEX ROUTINES	B5	NYU
*CLOAD		1604	1610 OCTAL-BINARY CARD LOAD	I9	CODA
*BIMD11	F-60	1604	ANALYSIS OF VARIANCE NO. 1	G4	NPGS
*PLOT		1604	MICROFILM RECORDER AND CHARACTER PLOT	J9	WADD
*DPI		1604	DOUBLE PRECISION ARITHMETIC	A3	CODA
*BIMD01	F-60	1604	LIFE TABLE AND SURVIVAL RATE	G9	NPGS
*ROM2F		1604	ROMBERG INTEGRATION WITH ERROR CONTROL	D1	UOFM
*ARLPT		1604	OCTAL PAPER TAPE OUTPUT FOR ASSEMBLER	L1	CODA
*COS		1604	FLOATING POINT COSINE	B1	LMSD
*BIMD27	F-60	1604	GENERAL PLOT	G9	NPGS
*JACOBI	F-60	1604	MATRIX EIGENVALUE AND EIGENVECTOR	F2	UOFM
*BIMD10	F-60	1604	FORTAN SUBROUTINE-MULTIPLE REGRESSION AND CORRELATION	G8	NPGS
*RCPGAMR	F-62	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	C3	UCSD
*CDTAP		1604	CARD TO TAPE	I9	CODA
*ORTHON		1604	LEAST SQUARES OR REGRESSION WITH ARBITRARY FUNCTIONS	E2	UOFM
*IXTRAC		1604	EXTRACT A CHARACTER	M4	COOS
*LAGUER	F-62	1604	LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
*PLOT	WLS	1604	1604 POINT PLOT TAPE GENERATOR FOR 160 TO 165 PLOTTER	M4	UTEX
*GERIAC	F-60	1604	GAUSSIAN ELIMIN WITH ROW INTERCHANGE AND CORRECTIONS	F4	SAND
*BIMD28	F-60	1604	GENERAL CHI-SQUARE	G9	NPGS
*LSCF		1604	LEAST SQUARE CURVE FIT	C1	CODA
*BITPCPY		1604	BINARY TAPE COPY	K3	WADD
*BIMD20	F-60	1604	ANALYSIS OF COVARIANCE NO. 2	G2	NPGS
*KARRAY		1604	MOVE A VARIABLE TO AN ARRAY	M4	COOS
*ACOS		1604	FLOATING POINT ARCCOSINE	B1	LMSD
*BIMD03	F-60	1604	REGRESSION ON PRIMARY PRINCIPAL COMPONENTS	G8	NPGS
*BIMD13	F-60	1604	ANALYSIS OF COVARIANCE	G4	NPGS
*BITREV		1604	REVERSE THE ORDER OF THE BITS IN A WORD	M4	CODA
*CMPLXADD	F-60	1604	FLOATING POINT COMPLEX ADD	A3	NBSB
*GNLD		1604	GENERAL LOAD ROUTINE	I9	LMSD
*ROMIF		1604	NUMERICAL INTEGRATION USING THE ROMBERG METHOD	D1	UOFM
*THRSIM		1604	TYPEWRITER SIMULATOR	J5	WADD
*SQRT		1604	FLOATING POINT SQUARE ROOT	B4	CODA
*ARLMM		1604	LOAD ASSEMBLY LISTING	L1	CODA
OLD-JACOB *JCBFIX		1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX CYCLICTHRESH	F2	UTEX
*DITP		1604	ONE INCH TAPE PROCESSOR	M4	WADD
*ARCTAN	F-63	1604	ARCTANGENT	B1	UCSD
*TP		1604	BCD OUTPUT	J4	UCSD
*RKLOEQ	F-60	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
*BIMD04	F-60	1604	DISCRIMINANT ANALYSIS - SEVERAL GROUPS	G8	NPGS
*LAGUER	WLS	1604	LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
*SEARCH		1604	BISECTION SEARCH	M1	CODA
*LSCFWOP	F-60	1604	LEAST SQUARES CURVE FITTING WITH ORTHOGONAL POLYNOMIALS	E2	UTEX
*ARPTMT		1604	CODAP PAPER TAPE INPUT	L1	CODA
*DOBLPREC		1604	DOUBLE PRECISION ARITHMETIC PACKAGE	A1	NBSB
*PRA		1604	PRINT BCD TAPE ON ANELEX PRINTER	J9	CODA
*MXTRID		1604	SOLUTION OF TRIPLE DIAGONAL SYSTEM	F4	UOFM
*BIMD26	F-60	1604	DATA PATTERNS - POLYCHOTOMY	G9	NPGS
*PMULT	F-60	1604	POLYNOMIAL MULTIPLY	C1	CODA
*MIN	WL	1604	MINIMUM OF AN ARBITRARY FUNCTION	H2	SAND
*BIMD31	F-60	1604	GENERAL LINEAR HYPOTHESIS	G2	NPGS
*SORT	F-60	1604	INTERNAL SORT	M1	UCSD
*CMPLXINV	F-60	1604	FLOATING POINT COMPLEX INVERT	A3	NBSB
*BIMD02	F-60	1604	COMPONENT ANALYSIS	G8	NPGS
*HOUSE SR	F-60	1604	EIGENVALUES AND EIGENVECTORS OF REAL SYMMETRIC MATRICES	F2	SAND
*CODAP		1604	CONTROL DATA ASSEMBLY PROGRAM	L1	CODA
*SINX		1604	FLOATING POINT SINE-COSINE	B1	LMSD
*FIX		1604	FLOATING POINT TO FIXED POINT CONVERSION	M4	LMSD
*NM12		1604	NUMERICAL INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS	D2	CODA
*CMPAA		1604	COMPARE TWO ARRAYS	M4	COOS
*LOG		1604	FLOATING POINT LOGARITHM	B2	CODA
*ANPR		1604	ANELEX OUTPUT	J9	CODA
OLD-JACOB *JCBFLO		1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX CYCLICTHRESH	F2	UTEX
*AXES	WLS	1604	AXES TAPE GENERATOR FOR THE CDC 160 TO CDC 165 PLOTTER	M4	UTEX
*LEGEND	F-60	1604	LEGENDRE POLYNOMIAL GENERATOR	C1	UCSD
*BIMD15	F-60	1604	DATA SCREENING NO. 1	G9	NPGS
*WRAP	F-63	1604	WEIGHTED REGRESSION ANALYSIS PROGRAM (WRAP)	G2	SAND
*GCIR		1604	GENERALIZED CARD INTERPRETATION	M4	LMSD
*BES	F-60	1604	BESSEL FUNCTION	C3	UCSD
*ARLICD		1604	OCTAL CARD OUTPUT FOR ASSEMBLER	L1	CODA
*GAUSS2		1604	SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS	F4	UTEX
*OUTPUT		1604	GENERALIZED LISTABLE OUTPUT	J9	LMSD

1604

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	*TANX		1604	FLOATING POINT TANGENT	
	*DESCA		1604	DECIMAL DUMP-PAPER TAPE OR TYPEWRITER	
	*T MATRX	F-62	1604	TEXT MATRIX GENERATOR	
	*TAPETCD		1604	TAPE TO CARD	
	*CMPLXSQR	F-60	1604	FLOATING POINT COMPLEX SQUARE	
	*DPOCCD		1604	DUMP CCTAL CARDS	
	*LSCFWOP WL	F-63	1604	LEAST SQUARES CURVE FITTING WITH ORTHOGONAL POLYNOMIALS	
	*BIM025	F-60	1604	DATA PATTERNS - DICHOTOMY	
	*BFFGH	F-60	1604	SPHERICAL BESSEL FUNCTION	
	*BIM005	F-60	1604	DISCRIMINANT ANALYSIS - TWO GROUPS	
	*1EIGEN	F-60	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	
	*BIBOCONV		1604	BINARY DECK CONVERSION	
	*BES	F-62	1604	BESSEL FUNCTION	
	*FLOATBIN		1604	FLOAT FIXED POINT NUMBER	
	*NM11		1604	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	
	*BINHOL		1604	ROW BINARY TO HOLLERITH CONVERSION	
	*LEGEND	F-62	1604	LEGENDRE POLYNOMIAL GENERATOR	
	*BARO		1604	BOULDER ASSEMBLY ROUTINE	
	*INTERP1		1604	DIVIDED DIFFERENCE INTERPOLATION OR EXTRAPOLATION	
	*XY PLOT WLS	F-62	1604	XY PLOTTER	
	*ARCTAN	F-60	1604	ARCTANGENT	
	*OCLDR		1604	RELOCATABLE OCTAL LOADER	
	*DTERM	F-60	1604	DETERMINANT OF A REAL MATRIX	
	*TRANSFIN		1604	TRANSFER LIBRARY SUBROUTINES	
	*LEGEND WLS		1604	LEGENDRE POLYNOMIAL	
	*DTCORR		1604	WADD DATA CORRECTOR	
	*MATSUB	F-60	1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NON-HERMITIAN MATRICES	
	*DECOCT		1604	BCD TO BINARY CONVERSION	
	*CMPLXMUL	F-60	1604	FLOATING POINT COMPLEX MULTIPLY	
	*BIM016	F-60	1604	DATA SCREENING NO. 2	
	*LINEGN	F-60	1604	SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS	
	*PLOT		1604	PLOT	
	*BES	F-63	1604	BESSEL FUNCTION	
	*LISTSC		1604	LIST BCD TAPE ON S-C 4020 AND C-C 1000	
	*RNDEV		1604	PSEUDO-RANDOM DEViate GENERATOR	
	*REMOVE		1604	MOVE ARRAY TO A LIST	
	*ARCTAN	F-62	1604	ARCTANGENT	
	*AGOUT		1604	GENERALIZED LISTABLE OUTPUT WITH MICROFILM	
	*EIGENVAL		1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	
	*088LOAD		1604	OCTAL OR COLUMN BINARY CARD LOADER	
	*PAOD		1604	POLYNOMIAL ADDITION	
	*OKFI	F-62	1604	OUT OF FILTER NETWORK FLOW ROUTINE ONE	
	*MATINV WL	F-63	1604	MATRIX INVERSION WITH SOLUTION OF LINEAR EQUATIONS	
	*OCCHOP		1604	OCTAL DUMP S-C 4020 AND 1000	
	*TANX		1604	FLOATING POINT TANGENT	
	*OCTBCD		1604	BINARY TO BCD CONVERSION	
	*ADAMS	F-60	1604	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	
ARGUMENT	*SEARCHMT		1604	MAGNETIC TAPE SEARCH	
	*BESSEL WLS	F-63	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER COMPLEX	
	*TTEXT		1604	TYPE TEXT	
	*BIMD	F-63	1604	MULTIPLE REGRESSION AND CORRELATION ANALYSIS	
	*COLD		1604	CO-OP LOADER	
	*CMPLXSUB	F-60	1604	FLOATING POINT COMPLEX SUBTRACT	
	*MAGTPT		1604	CONVERT SYMBOLIC MAGNETIC TAPE TO PAPER TAPE	
	*MXOPRP		1604	MATRIX OPERATIONS PACKAGE	
	*SIMRUN	F-63	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	
	*RKGN		1604	RUNGE-KUTTA-GILL DIFFERENTIAL EQUATION SOLVER	
	*POLYVAL		1604	POLYNOMIAL EVALUATORS	
	*SCAPROCM		1604	36-BIT PRECISION, COMPLEX SUMMATION WITH HIGH ACCURACY	
	*EXP		1604	FLOATING POINT EXPONENTIAL	
	*RAN1		1604	UNIFORMLY DISTRIBUTED RANDOM NUMBER GENERATOR	
	*BESSELL	F-62	1604	BESSELL FUNCTION	
	*MPROD		1604	MATRIX MULTIPLY	
	*ELLPT	F-60	1604	COMPUTATION OF COMPLETE ELLIPTIC INTEGRALS-K-AND-E	
	*COLTCHEB WL	F-63	1604	COLLAPSE TCHEBYCHEV POLYNOMIALS	
	*DPFAD	F-60	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	
	*MILNE	F-60	1604	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	
	*DPFDV	F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	
X ROTATIO	*FACT	F-60	1604	INTERCORRELATION, PRINCIPAL 1X9S FACTOR ANALYSIS, NORMALIZED VARIMA	
ARGUMENT	*BESSEL	F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER COMPLEX	
	*CDTERM	F-60	1604	DETERMINANT OF A COMPLEX MATRIX	
	*RANMUL		1604		
	*MTRANS		1604		
	*F-63CP		1604		
	*EXTREM WL	F-62	1604	MATRIX TRANSPOSE	
	*EXP		1604	FORTTRAN-63 COMPLEX ROUTINES	
				MULTIDIMENSIONAL EXTREMUM SEEKER	
				FLOATING POINT EXPONENTIAL	

B1 LMSD
 J3 WADD
 F1 UCSD
 J9 CODA
 A3 NBSB
 J2 CODA
 E2 UTEX
 G9 NPGS
 C3 UCSD
 G8 NPGS
 F2 UCSD
 M4 CODA
 C3 UCSD
 M4 LMSD
 D2 NPGS
 M4 CODA
 C1 UCSD
 L1 NBSB
 E1 CODA
 J7 UCSD
 B1 UCSD
 I2 CODA
 F3 UTEX
 K3 NBSB
 C1 CODA
 M4 WADD
 F2 UTEX
 M4 LMSD
 A3 NBSB
 G9 NPGS
 F4 UTEX
 J9 CODA
 C3 UCSD
 M4 WADD
 G5 CODA
 M4 CODS
 B1 UCSD
 J9 WADD
 F2 NBSB
 I9 CDMC
 C1 CODA
 H1 CODA
 F1 CODA
 J2 WADD
 B1 CODA
 M4 LMSD
 D2 SAND
 K3 WADD
 C3 UCSD
 J9 WADD
 G2 UCSD
 I9 CODA
 A3 NBSB
 M4 CODA
 F1 UOFM
 D1 UCSD
 D2 UOFM
 C1 UOFM
 F1 UTEX
 B2 CODA
 G5 NPGS
 C3 UCSD
 F1 CODA
 C3 SAND
 E1 CODA
 A3 UCSD
 D2 SAND
 A3 UCSD
 G2 UTEX
 C3 UCSD
 F3 UTEX
 A1 UTEX
 F1 CODA
 B5 CODA
 D5 UCSD
 B2 LMSD

ISION ARI*	DBLGAUS	F-60	1604	MATRIX INVERSION BY METHOD OF GAUSSIAN ELIMINATION USING DOUBLE-PREC	F1	UTEX
	*TRAPZ		1604	TRAPEZOIDAL RULE INTEGRATION, FORTRAN	D1	NBSB
	*MATIN		1604	MATRIX INVERSION	F1	LMSD
	*GAMMA	F-60	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	F3	UCSD
	*BIGPACK		1604	EIGENVALUE PACKAGE	F2	UCSD
	*DPFAD	F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*IINTEG	F-60	1604	NUMERICAL SOL OF ORDINARY 2ND ORDER DIFFERENTIAL EQUATIONS	D2	UCSD
	*LOG		1604	FLOATING POINT LOGARITHM	B2	LMSD
	*RKAMPDP	S F-60	1604	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	D2	UTEX
	*POLYRT	F-60	1604	POLYNOMIAL SOLUTION	C2	UCSD
	*MTXMPY		1604	MATRIX MULTIPLY	F1	LMSD
	*BFFGH	F-62	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*REGANAL	F-60	1604	MULTIPLE CORRELATION AND REGRESSION ANALYSIS	G2	UTEX
Y ARGUMEN*	BESSELI	WLS F-63	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER IMAGINAR	C3	UCSD
	*SBELLI	F-60	1604	RANDOM NUMBER GENERATOR	G5	SAND
	*EXPONDES		1604	NON-FLOATING DESCENDING EXPONENTIAL	B2	NBSB
	*HPMINV	F-60	1604	HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*SPHERE	F-63	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*MATINV		1604	MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	F1	NBSB
	*POLYMUL	F-60	1604	ROOTS OF POLYNOMIAL EQUATIONS BY MULLERS METHOD	G2	UTEX
	*TVAMRCA		1604	MULTIPLE REGRESSION, COMPREHENSIVE ANALYSIS	G2	NBSB
	*DPFDV	F-60	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*GAUSS3	F-60	1604	MATRIX INVERSION BY GAUSS METHOD	F1	UTEX
	*BFFGH	F-63	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*ABSTRAC		1604	COMPLETE FACTOR ANALYSIS AND FACTOR-SCORE COMPUTATION	G2	UTEX
	*GAMMALN	F-60	1604	LN GAMMA(X) FOR X GREATER THAN 0	C3	SAND
	*RANDM	F-62	1604	RANDOM NUMBER GENERATOR	G5	UCSD
	*CDFNI	WL	1604	INVERSE OF THE NORMAL CUMULATIVE DISTRIBUTION FUNCTION	C3	UCSD
	*AUTOCOR		1604	AUTO-CORRELATION ANALYSIS	G2	NBSB
	*ARCSIN		1604	FLOATING POINT ARCSINE - ARCCOSINE	B1	CODA
	*SCANOVA	F-60	1604	SINGLE CLASSIFICATION ANALYSIS OF VARIANCE	G4	UTEX
	*NPOA	F-60	1604	NORMAL PROBABILITY FUNCTION	C3	UCSD
	*EXTREM	F-60	1604	MULTIDIMENSIONAL EXTREMUM SEEKER	D5	UCSD
	*RCPGAMI	F-60	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
Y ARGUMEN*	T MATRX	F-60	1604	TEXT MATRIX GENERATOR	F1	UCSD
	BESSELI	F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER IMAGINAR	C3	UCSD
	*LEIGEN	F-63	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	F2	UCSD
	*F-63DP	CODAP-1	1604	FORTAN-63 DOUBLE-PRECISION ROUTINES	B5	CODA
LINKAGE	*CORMAT		1604	BASIC STATISTICS, INTERCORRELATION TETRACHORIC ESTIMATION ELEMENTARY	G2	UTEX
	*NEWTN	F-60	1604	NUMERICAL INTEGRATION BY NEWTON-COTES QUADRATURE	D1	SAND
	*RKAM	WL F-63	1604	SOLUTION OF N SIMULTANEOUS FIRST ORDER	D2	UTEX
	*TCHEBY	F-62	1604	TCHEBYSHEV POLYNOMIAL GENERATOR	C1	UCSD
	*RANF	W	1604	UNIFORMLY DISTRIBUTED PSEUDO-RANDOM NUMBER GENERATOR	G5	CODA
	*RCPGAMI	F-62	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*ITPFI		1604	NTH ORDER FLOATING POINT LAGRANGIAN INTERPOLATION	E1	CODA
	*EXTDPREC	F-60	1604	EXTENDED PRECISION ARITHMETIC PACKAGE	A1	NBSB
	*OPMATS	F-62	1604	DOUBLE PRECISION MATRIX INVERSION	F1	UCSD
	*RANSUB		1604		A1	UTEX
	*PARAME1		1604	BASIC DESCRIPTIVE STATISTICS	G1	UTEX
	*GAMMA	F-63	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*SBELL2	F-60	1604	NORMAL DEViate TABLE CONSTRUCTION	G5	SAND
	*STEFF		1604	FOURIER STEP	C3	NBSB
	*HPMINV	F-62	1604	HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*TCHEBY	WL F-63	1604	TCHEBYSHEV POLYNOMIAL GENERATOR	C1	UCSD
	*MATINT		1604	MATRIX LOOKUP	E1	CODA
	*CSQRT		1604	SQUARE ROOT OF A COMPLEX NUMBER	B4	UTEX
	*TMATRX	F-63	1604	TEXT MATRIX GENERATOR	F1	UCSD
	*ERFN	W S	1604	NORMAL CUMULATIVE DISTRIBUTION FUNCTION AND ERROR FUNCTION	C3	UCSD
	*COMPILE		1604	FREQUENCY DISTRIBUTIONS AND DESCRIPTIVE STATISTICS	G1	UTEX
	*RANADD	F-60	1604	DOUBLE PRECISION ARITHMETIC (SIX ROUTINES)	A1	UTEX
	*RKAMSUB	F-63	1604	RKAMSUB	D2	UTEX
	*MAXMIN	WL F-60	1604	A MAXIMUM OR A MINIMUM OF CERTAIN ARBITRARY FUNCTIONS	C3	UTEX
	*RANDOM		1604	RANDOM NUMBER GENERATOR	G5	NBSB
	*SQRT		1604	FLOATING POINT SQUARE ROOT	B4	LMSD
	*HPMINV	F-63	1604	HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*BESSEL	F-63	1604	MODIFIED BESSEL FUNCTION	C3	UCSD
	*LSQPOL	F-62	1604	LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
	*SQRTFX		1604	FRACTIONAL FIXED-POINT SQUARE ROOT	B4	UTEX
	*PADE	F-60	1604	PADE APPROXIMANT, RATIONAL APPROXIMATION OF FUNCTIONS	E1	UCSD
	*DPFEMU	F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*MATVBC	F-60	1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NON-HERMITIAN MATRICES	F2	UTEX
	*MULTPARC		1604	MULTIPLE PRECISION ARITHMETIC	A1	CODA
	*SIMCON	F-63	1604	QUADRATURE BY SIMPSON'S RULE	D1	UCSD
	*POLEV		1604	POLYNOMIAL EVALUATION	C1	LMSD
	*PODIV	F-60	1604	POLYNOMIAL DIVIDE	C1	CODA
	*GAUSSN	F-60	1604	NUMERICAL INTEGRATION BY GAUSSIAN QUADRATURE	D1	SAND

Program Name	Language	Version	Description	Program Name	Language	Version	Description	Program Name	Language	Version	Description
*SIN	F-63	1604	FLOATING POINT SINE	*SIN	F-63	1604	FLOATING POINT SINE	*SIN	F-63	1604	FLOATING POINT SINE
*RCPGAMR	F-63	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	*RCPGAMR	F-63	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	*RCPGAMR	F-63	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT
*GAMMA	F-62	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	*GAMMA	F-62	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	*GAMMA	F-62	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT
*ATAN		1604	FLOATING POINT ARCTANGENT	*ATAN		1604	FLOATING POINT ARCTANGENT	*ATAN		1604	FLOATING POINT ARCTANGENT
*LSQFFT		1604	LEAST SQUARE CURVE FIT	*LSQFFT		1604	LEAST SQUARE CURVE FIT	*LSQFFT		1604	LEAST SQUARE CURVE FIT
*SIMRUN	F-60	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	*SIMRUN	F-60	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	*SIMRUN	F-60	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE
*TANH		1604	FLOATING POINT HYPERBOLIC TANGENT	*TANH		1604	FLOATING POINT HYPERBOLIC TANGENT	*TANH		1604	FLOATING POINT HYPERBOLIC TANGENT
*PSUB	F-60	1604	POLYNOMIAL SUBTRACT	*PSUB	F-60	1604	POLYNOMIAL SUBTRACT	*PSUB	F-60	1604	POLYNOMIAL SUBTRACT
*BESSEL	F-60	1604	MODIFIED BESSEL FUNCTION	*BESSEL	F-60	1604	MODIFIED BESSEL FUNCTION	*BESSEL	F-60	1604	MODIFIED BESSEL FUNCTION
*TCHEB	WL	1604	TCHEBYCHEV POLYNOMIAL	*TCHEB	WL	1604	TCHEBYCHEV POLYNOMIAL	*TCHEB	WL	1604	TCHEBYCHEV POLYNOMIAL
*RCPGAMI	F-63	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	*RCPGAMI	F-63	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	*RCPGAMI	F-63	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT
*ARTYX		1604	ARCTANGENT OF A QUOTIENT	*ARTYX		1604	ARCTANGENT OF A QUOTIENT	*ARTYX		1604	ARCTANGENT OF A QUOTIENT
*SIMRUN	F-62	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	*SIMRUN	F-62	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	*SIMRUN	F-62	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE
*TCHEBY	F-60	1604	TCHEBYCHEV POLYNOMIAL GENERATOR	*TCHEBY	F-60	1604	TCHEBYCHEV POLYNOMIAL GENERATOR	*TCHEBY	F-60	1604	TCHEBYCHEV POLYNOMIAL GENERATOR
*RANDIV		1604	HERMITE POLYNOMIAL	*RANDIV		1604	HERMITE POLYNOMIAL	*RANDIV		1604	HERMITE POLYNOMIAL
*HERM	WLS	1604	NORMAL PROBABILITY FUNCTION	*HERM	WLS	1604	NORMAL PROBABILITY FUNCTION	*HERM	WLS	1604	NORMAL PROBABILITY FUNCTION
*NPOA	F-63	1604		*NPOA	F-63	1604		*NPOA	F-63	1604	
*DBLPRT		1604		*DBLPRT		1604		*DBLPRT		1604	
1604				1604				1604			
*SCAPRODB		1604	ACCEPTANCE TEST	*SCAPRODB		1604	ACCEPTANCE TEST	*SCAPRODB		1604	ACCEPTANCE TEST
*DABS		1604	ALGOL	*DABS		1604	ALGOL	*DABS		1604	ALGOL
*DSQRT		1604	CODAP-1	*DSQRT		1604	CODAP-1	*DSQRT		1604	CODAP-1
*DABS		1604	CODAP-1	*DABS		1604	CODAP-1	*DABS		1604	CODAP-1
*SINH		1604	CODAP-1	*SINH		1604	CODAP-1	*SINH		1604	CODAP-1
*ANLB150		1604	COMPASS	*ANLB150		1604	COMPASS	*ANLB150		1604	COMPASS
*NUCY	F-63	1604		*NUCY	F-63	1604		*NUCY	F-63	1604	
*BIMD19	F-63	1604		*BIMD19	F-63	1604		*BIMD19	F-63	1604	
*ARGUS	F-63	1604		*ARGUS	F-63	1604		*ARGUS	F-63	1604	
*BIMD11	F-63	1604		*BIMD11	F-63	1604		*BIMD11	F-63	1604	
*BIMC17	F-63	1604		*BIMC17	F-63	1604		*BIMC17	F-63	1604	
*BIMC22	F-63	1604		*BIMC22	F-63	1604		*BIMC22	F-63	1604	
*DPMATS64	F-63	1604		*DPMATS64	F-63	1604		*DPMATS64	F-63	1604	
*BIMD1C	F-63	1604		*BIMD1C	F-63	1604		*BIMD1C	F-63	1604	
*BIMC21	F-63	1604		*BIMC21	F-63	1604		*BIMC21	F-63	160	

NUMERICAL SOL OF ORDINARY		2ND ORDER DIFFERENTIAL EQUATIONS	*IINTEG	F-60	1604	D2 UCSD
1604		36-BIT PRECISION, COMPLEX SUMMATION WITH HIGH ACCURACY			*SCAPROCH	F1 UTEX
S OF HERMITIAN MATRICES		36-BIT PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT			*CMSQRT	A2 UTEX
*ANL-F150		JAN 65 HOUSEHOLDER REDUCTION ON COMPLEX MATRICES + EIGENSYSTEM				ARGONNE
*ANL-F450		JAN 65 CROUT LINEAR EQN SOLVER				ARGONNE
*ANL-B151		JAN 65 TANGENT COTANGENT				ARGONNE
*ANL-B453		JAN 65 DOUBLE PRECISION CUBE ROOT				ARGONNE
*ANL-B451		JAN 65 DOUBLE-PRECISION SQUARE ROOT				ARGONNE
*ANL-C351		JAN 65 BESSEL FUNCTIONS				ARGONNE
*ANL-G550		JAN 65 RANDOM NUMBER GENERATOR				ARGONNE
*ANL-N250		JAN 65 FORTRAN CALLED SNAPSHOT DUMP				ARGONNE
*ANL-F151		JAN 65 ACCUMULATE INNER-PRODUCT				ARGONNE
*ANL-C352		JAN 65 INCOMPLETE GAMMA FUNCTION				ARGONNE
*ANL-B051		JAN 65 DOUBLE PRECISION ABSOLUTE VAL				ARGONNE
*ANL-B150		JAN 65 ARCSINE ARCCOSINE				ARGONNE
*ANL-B350		JAN 65 NATURAL LOG				ARGONNE
*ANL-C355		JAN 65 COMPLETE ELLIPTIC INTEGRAL E				ARGONNE
*ANL-B450		JAN 65 SQUARE ROOT				ARGONNE
*ANL-C350		JAN 65 GAMMA FUNCTION				ARGONNE
*ANL-C354		JAN 65 COMPLETE ELLIPTIC INTEGRAL K				ARGONNE
*ANL-B452		JAN 65 CUBE ROOT				ARGONNE
4	LIST OCTAL DUMP S-C	4020 AND 1000			*OCCHDP	J2 WADD
B	1604 F-63	DEC 64 ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	*LISTSC	1604	*SCAPROD	M4 WADD
B	1604 ALGOL	DEC 64 ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ			*SCAPROD	F1 UTEX
	1604 F-63	NOV 64 ANALYSIS OF COVARIANCE			*BIMD13	G4 NPGS
	1604 F-63	NOV 64 ANALYSIS OF VARIANCE NO. 2			*BIMD12	G4 NPGS
	1604 F-63	NOV 64 ANALYSIS OF COVARIANCE NO. 2			*BIMD20	G2 NPGS
	1604 F-63	NOV 64 ANALYSIS OF VARIANCE NO. 1			*BIMD11	G4 NPGS
	1604 F-63	NOV 64 ASYMPTOTIC REGRESSION			*BIMD30	G7 NPGS
T	1604	OCT 64 AX-I COUPLED NEUTRONICS - HYDRODYNAMICS CALCULATIONS			*AX-I	C CODA
	1604 F-63	DEC 64 BINARY PROGRAM TAPE MERGE AND EDIT			*MERGED1	K3 CODS
S	1604	DEC 64 CALCULATES TRANSIENT TEMPERATURES IN ANY CONCENTRIC CYLINDRICAL CONFIGURATION			*ARGUS	Y2 ANL
	1604 F-63	NOV 64 COMPRESS			*COMPRES	Q9 CODA
	1604 F-63	NOV 64 CROSS TABULATION NO. 1			*BIMD22	G9 NPGS
	1604 F-63	NOV 64 CROSS TABULATION NO. 2			*BIMD23	G9 NPGS
	1604 F-63	NOV 64 CROSS TABULATION NO. 3 (MODIFIED 23)			*BIMD32	G9 NPGS
	1604 F-63	NOV 64 DATA SCREENING NO. 2			*BIMD16	G9 NPGS
	1604 F-63	NOV 64 DATA PATTERNS - POLYCHOTOMY			*BIMD26	G9 NPGS
	1604 F-63	NOV 64 DATA SCREENING NO. 3			*BIMD24	G9 NPGS
	1604 F-63	NOV 64 DATA SCREENING NO. 1			*BIMD15	G9 NPGS
	1604 F-63	NOV 64 DATA PATTERNS - DICHOTOMY			*BIMD25	G9 NPGS
4	1604 F-63	NOV 64 DISCRIMINANT ANALYSIS - TWO GROUPS			*BIMD05	G8 NPGS
	1604 CODAP-1	NOV 64 DOUBLE PRECISION MATRIX INVERSION			*DPMATS6	F1 UCSD
	1604 F-63	NOV 64 DOUBLE PRECISION SQUARE ROOT			*DSQRT	B4 UOFM
	1604 COMPASS	NOV 64 FACTOR ANALYSIS			*BIMD17	G8 NPGS
	1604 F-63	OCT 64 FLOATING POINT ARCSINE ARCCOSINE			*ANLB150	B1 ANL
	1604 F-63	NOV 64 FORTRAN SUBROUTINE-MULTIPLE REGRESSION AND CORRELATION			*BIMD10	G9 NPGS
	1604 F-63	NOV 64 GENERAL LINEAR HYPOTHESIS FOR AVOVA			*BIMD14	G4 NPGS
	1604 F-63	NOV 64 GENERAL CHI-SQUARE			*BIMD28	G9 NPGS
	1604 F-63	NOV 64 GENERAL LINEAR HYPOTHESIS			*BIMD31	G2 NPGS
	1604 F-63	NOV 64 GENERAL FORMAT-FREE INPUT ROUTINE			*RDNUM	I9 UCSD
	1604 F-3600	OCT 64 HOLLOMAN GENERAL PLCT PROGRAM			*PLOT01	J7 HOLL
	1604 F-63	NOV 64 INTERNAL SORT			*SORT	M1 UCSD
	1604 F-63	NOV 64 LIFE TABLE AND SURVIVAL RATE			*BIMD01	G9 NPGS
	1604 F-63	NOV 64 MULTIDIMENSIONAL EXTREMUM SEEKER			*EXTREM	D5 UCSD
	1604	NOV 64 MULTIPLE REGRESSION NO. 3 (MODIFIED 06)			*BIMD29	G2 NPGS
	1604 F-63	NOV 64 MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 1			*BIMD06	G2 NPGS
	1604 F-63	DEC 64 NUCY			*NUCY	Y2 ORNL
	1604 F-63	NOV 64 NUMERICAL SOL OF ORDINARY 2ND ORDER DIFF EQUATIONS			*I INTEG	D2 UCSD
	1604 F-63	NOV 64 PADE APPROXIMANT, RATIONAL APPROXIMATION OF FUNCTIONS			*PADE	B1 UCSD
	1604 F-63	NOV 64 PERIODIC REGRESSION			*BIMD21	G7 NPGS
	1604 F-63	NOV 64 POLYNOMIAL REGRESSION			*BIMD08	G2 NPGS
	1604 F-63	NOV 64 ROTATION OF A FACTOR MATRIX			*BIMD19	G8 NPGS
	1604 F-63	NOV 64 STEPWISE MULTIPLE REGRESSION			*BIMD09	G2 NPGS
	1604 F-63	NOV 64 SUBROUTINE ROTATE			*BIMD18	G9 NPGS
	1604 F-63	NOV 64 TRACE SUBROUTINE ENTRIES AND EXITS			*TRACER	N1 UCSD
1	3600 COMPASS	JAN 65 ACCUMULATE INNER-PRODUCT			*ANL-F15	ARGONNE
0	3600 COMPASS	JAN 65 ARCSINE ARCCOSINE			*ANL-B15	ARGONNE
1	3600 COMPASS	JAN 65 BESSEL FUNCTIONS			*ANL-C35	ARGONNE
4	3600 COMPASS	JAN 65 COMPLETE ELLIPTIC INTEGRAL K			*ANL-C35	ARGONNE
5	3600 COMPASS	JAN 65 COMPLETE ELLIPTIC INTEGRAL E			*ANL-C35	ARGONNE
0	3600 ALGOL	JAN 65 CROUT LINEAR EQN SOLVER			*ANL-F45	ARGONNE
2	3600 COMPASS	JAN 65 CUBE ROOT			*ANL-B45	ARGONNE
1	3600 COMPASS	JAN 65 DOUBLE-PRECISION SQUARE ROOT			*ANL-B45	ARGONNE
3	3600 COMPASS	JAN 65 DOUBLE PRECISION CUBE ROOT			*ANL-B45	ARGONNE

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NO	NAME	DATE	DESCRIPTION	NO	NAME	DATE	DESCRIPTION	NO	NAME	DATE	DESCRIPTION	NO	NAME	DATE	DESCRIPTION	NO	NAME	DATE	DESCRIPTION
1	3600	COMPASS	JAN 65	DOUBLE PRECISION ABSOLUTE VAL	6505	SIMULATOR	1604	6505	SIMULATOR	1604	6505	SIMULATOR	1604	6505	SIMULATOR	1604	6505	SIMULATOR	1604
0	3600	COMPASS	JAN 65	FORTTRAN CALLED SNAPSHOT DUMP	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT	1604	84-BIT-PRECISION, FLOATING-POINT COMPLEX SQUARE ROOT
0	3600	COMPASS	JAN 65	GAMMA FUNCTION	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.
0	3600	ALGOL	JAN 65	HOUSEHOLDER REDUCTION ON COMPLEX MATRICES + EIGENSYSTEMS OF HERMITIAN MATRICES	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.	1604	ABSOLUTE VAL.
2	3600	COMPASS	JAN 65	INCOMPLETE GAMMA FUNCTION	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD	1604	ABSOLUTE BINARY TAPE LOAD
0	3600	COMPASS	JAN 65	NATURAL LOG	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD	1604	ABSOLUTE BINARY LOAD
0	3600	COMPASS	JAN 65	RANDOM NUMBER GENERATOR	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT	1604	ABSTRACT
0	3600	COMPASS	JAN 65	SQUARE ROOT	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST	1604	ACCEPTANCE TEST
1	3600	COMPASS	JAN 65	TANGENT COTANGENT	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS
					ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS	1604	ACCOMPANYING SOLUTION OF LINEAR EQUATIONS
					ACCT	1604	ACCT	1604	ACCT	1604	ACCT	1604	ACCT	1604	ACCT	1604	ACCT	1604	ACCT
					ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT	1604	ACCUMULATE INNER-PRODUCT
					ACCURACY	1604	ACCURACY	1604	ACCURACY	1604	ACCURACY	1604	ACCURACY	1604	ACCURACY	1604	ACCURACY	1604	ACCURACY
					ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ
					ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT
					ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	1604	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ
					ACOS	1604	ACOS	1604	ACOS	1604	ACOS	1604	ACOS	1604	ACOS	1604	ACOS	1604	ACOS
					ADAMS	1604	ADAMS	1604	ADAMS	1604	ADAMS	1604	ADAMS	1604	ADAMS	1604	ADAMS	1604	ADAMS
					ADD	1604	ADD	1604	ADD	1604	ADD	1604	ADD	1604	ADD	1604	ADD	1604	ADD
					ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY	1604	ADD PROGRAM TO LIBRARY
					ADDITION	1604	ADDITION	1604	ADDITION	1604	ADDITION	1604	ADDITION	1604	ADDITION	1604	ADDITION	1604	ADDITION

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	BIMD30	1604	F-63		NOV
	BIMD30		F-60	1604	
	BIMD30		F-60	1604	
	BIMD31	1604	F-63		NOV
	BIMD31		F-60	1604	
	BIMD32	1604	F-63		NOV
	BIMD32		F-60	1604	
	BINARY	CARD FORMAT	DUMP		
	BINARY	CONVERSION			
	BINARY	CONVERSION			
	BINARY	CARD LOAD			
	BINARY	CONVERSION			
	BINARY	CARD LOADER			
	BINARY	CONVERSION			
	BINARY	DECK CONVERSION			
	BINARY	LOAD			
	BINARY	PROGRAM TAPE MERGE AND EDIT			
	BINARY	PAPER TAPE			
	BINARY	PAPER TAPE			
	BINARY	TAPE DUMP			
	BINARY	TO BCD CONVERSION			
	BINARY	TAPE LOAD			
	BINARY	TAPE COPY			
	BINARY	TO BCD CONVERSION			
	BINARY	TAPE LOAD			
	BINARY	TO ROW BINARY CONVERSION			
	BINARY	TO HOLLERITH CONVERSION			
	BINBCD		1604		
	BINHOL		1604		
	BISECTION SEARCH				
	BIT TRANSFER				
	BITPCPY		1604		
	BITREV		1604		
	BITS IN A WORD				
	BITSHIFT		1604		
	BOMM	F-63			
	BOOLEAN SHIFT FUNCTION				
	BOULDER ASSEMBLY ROUTINE				
	BTD		1604		
	BURNUP CODE BASED ON DIFFUSION THEORY				
	C-C 1000				
	CALCULATION FOR AIM AND FOG				
	CALCULATIONS				*
	CALCULATES TRANSIENT TEMPERATURES IN				
	CALCULATIONSLAB CYLINDER OR SPHERE				
	CALL SEQ				*SCAPR
	CALL SEQ				*SCAPR
	CALLED SNAPSHOT DUMP				
	CARD				
	CARD FORMAT DUMP				
	CARD IMAGE, VARIABLE LENGTH WORDS				
	CARD INTERPRETATION				
	CARD LOAD				
	CARD LOAD				
	CARD LOADER				
	CARD OR OCTAL MAG TAPE LOAD				
	CARD OUTPUT FOR ASSEMBLER				
	CARD TO TAPE				
	CARDS				
	CBIRBI		1604		
	CDAPCOMP		1604		
	CDC 160 TO CDC 165 PLOTTER				
	CDC 165 PLOTTER				
	CDFN	WS	1604		
	CDFNI	WL	1604		
	CLOAD		1604		
	CDM2	F-60	1604		
	CDM3	F-62	1604		
	CDTERM	F-60	1604		
	COTTAPE		1604		
	CECS	F-62	1604		
	CELL CODE				
	CERTAIN ARBITRARY FUNCTIONS				
	CHANNELS				
	CHARACTER				
	CHARACTERS FROM ARRAY A TO ARRAY B				

NOV 64 ASYMPTOTIC REGRESSION
TIME SERIES ANALYSIS NO. 2
NOV 64 ASYMPTOTIC REGRESSION
GENERAL LINEAR HYPOTHESIS
GENERAL LINEAR HYPOTHESIS
NOV 64 CROSS TABULATION NO. 3 (MODIFIED 23)
CROSS TABULATION NO. 3 (MODIFIED-23)

*DUMPC 1604
*FLOAT
*CBIRBI 1604
*088LOAD
*BCOBBIN 1604
*ABLD
*MERGEDIT 1
*CPBIPT
*LDBIPT
*BTD
*BINBCD 1604
*BITPCPY
*OCTBCD
*8IBOT
*CBIRBI
*BINHOL

BINARY TO BCD CONVERSION
ROW BINARY TO HOLLERITH CONVERSION

*SEARCH
*BITSHIFT

BINARY TAPE COPY
REVERSE THE ORDER OF THE BITS IN A WORD
*BITREV 1604
BIT TRANSFER
A SYSTEM OF PROGRAMS TO PERFORM ARITHMETIC OPERATIONS
*SHIFTR
*BARO

BINARY TAPE DUMP
*SIZZLE F-63 1604
*LISTSC 1604
*PERT WL F-63 1604
*AX-I OCT 64 AX-I COU
IN ANY CONCENTRIC CYLINDRICAL CONFIGURATION *ARGUS 1
*CTF F-63 1604
APRODB 1604 ALGOL DEC 64 ACCURATE REAL,
APRODB 1604 F-63 DEC 64 ACCURATE REAL,
*ANL-N250 3600 COMP
*TAPETCD
*DUMPC
*HOLLERITH
*GCIR
*BIBOI 1604
*088LOAD 1604
*CCLOAD
*OCLD
*ARLICD
*CDDTAPE

*DPOCCD
COLUMN BINARY TO ROW BINARY CONVERSION
CODAP TO COMPASS TRANSLATOR
*AXES WLS F-60 1604 AXES TA
NORMAL CUMULATIVE DISTRIBUTION FUNCTION AND ER
INVERSE OF THE NORMAL CUMULATIVE DISTRIBUTION
1610 OCTAL-BINARY CARD LOAD
LINEAR PROGRAMMING SYSTEM 2
LINEAR PROGRAMMING SYSTEM 3
DETERMINANT OF A COMPLEX MATRIX
CARD TO TAPE
CIVIL ENGINEERING COMPUTATION SYSTEM
*S4CYCELL F-63 1604
*MAXMIN WL F-60 1604
*FUGUE F-63 1604
*IXTRAC
*STRING2

G7 NPGS
G7 NPGS
G7 NPGS
G2 NPGS
G2 NPGS
G9 NPGS
G9 NPGS
N2 LMSD
M4 LMSD
M4 LMSD
I1 LMSD
M4 CODA
I9 CDMC
M4 CODA
M4 CODA
I1 LMSD
K3 CODS
J1 CODA
I1 CODA
N2 CODA
M4 CODA
I1 WADD
K3 WADD
M4 LMSD
I1 LMSD
M4 CODA
M4 CODA
M4 CODA
M1 CODA
K2 CODA
K3 WADD
M4 CODA
M4 CODA
K2 CODA
G7 UCSD
Z1 NBSB
L1 NBSB
N2 CODA
Y2 CODA
M4 WADD
Y2 CODA
C CODA
Y2 UNC
Y2 ANL
F1 UTEX
F1 UTEX
F1 ARGONNE
J9 CODA
N2 LMSD
M4 NBSB
M4 LMSD
I1 LMSD
I9 CODA
I9 CDMC
I2 LMSD
L1 CODA
I9 CODA
J2 CODA
M4 CODA
Z1 CODA
M4 UTEX
M4 UTEX
C3 UOFM
C3 UOFM
I9 CODA
H1 CODA
H1 CODA
F3 UTEX
I9 CODA
Y1 CODS
Y2 CODA
C3 UTEX
Y2 CODA
M4 CODS
K2 CODA

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TICS	PROCEDURE-ORIENTED	1604	COMPACHEK	1604	1604-3604 COMPATIBILITY CHECK	1604	Z1 CODA
600 COMPASS	JAN 65	1604	COMPACHEK	1604	COMPASS PLUS CODAP TO COMPASS TRANSLATOR	1604	Z1 NBSB
600 COMPASS	1604	1604	COMPACHEK	1604	COMPASS PLUS CODAP TO COMPASS TRANSLATOR	1604	G1 UTEX
4	COMPUTATION OF	1604	COMPACHEK	1604	FREQUENCY DISTRIBUTIONS AND DESCRIPTIVE STATIS	1604	L2 SDCS
JAN 65	HOUSEHOLDER REDUCTION ON	1604	COMPACHEK	1604	*JOVIAL	1604	ARGONNE
EIGENVALUES AND EIGENVECTORS OF	FLOATING POINT	1604	COMPACHEK	1604	INFORMATION AVAILABLE FROM DOBRUSKY OF SDC	1604	G2 UTEX
4	DETERMINANT OF A	1604	COMPACHEK	1604	ELLIPTIC INTEGRAL K	1604	ARGONNE
1604	FORTAN-63	1604	COMPACHEK	1604	ELLIPTIC INTEGRAL E	1604	C3 SAND
4	36-BIT PRECISION, FLOATING POINT	1604	COMPACHEK	1604	ELLIPTIC INTEGRALS-K-AND-E	1604	ARGONNE
EIGENVALUES AND EIGENVECTORS OF	4-BIT PRECISION, FLOATING POINT	1604	COMPACHEK	1604	COMPLEX MATRICES + EIGENSYSTEMS OF HERMITIAN	1604	F2 UTEX
NS OF FIRST AND SECOND KIND FOR	NS OF FIRST AND SECOND KIND FOR	1604	COMPACHEK	1604	MATRICE*ANL-F150 3600 ALGOL	1604	A3 NBSB
NS OF FIRST AND SECOND KIND FOR	GAMMA FUNCTION FOR	1604	COMPACHEK	1604	*MATSUB	1604	F3 UTEX
NS OF FIRST AND SECOND KIND FOR	NS OF FIRST AND SECOND KIND FOR	1604	COMPACHEK	1604	F-60 1604	1604	B5 CODA
D SECOND KIND FOR COMPLEX ORDER	MODULUS OF A	1604	COMPACHEK	1604	*CDTERM	1604	F1 UTEX
604	RECIPROCAL GAMMA FUNCTION FOR	1604	COMPACHEK	1604	*F-63CP	1604	A3 NBSB
MULTIPLICATION AND DIVISION OF	SQUARE ROOT OF A	1604	COMPACHEK	1604	*SCAPROCM	1604	F2 UTEX
4	RECIPROCAL GAMMA FUNCTION FOR	1604	COMPACHEK	1604	*CMPLXMUL	1604	A2 UTEX
6-8 BIT PRECISION, FLOATING-POINT	RECIPROCAL GAMMA FUNCTION FOR	1604	COMPACHEK	1604	F-60 1604	1604	C3 UCSD
604	MODULUS OF A	1604	COMPACHEK	1604	*MATVBC	1604	C3 UCSD
4	FLOATING POINT	1604	COMPACHEK	1604	*DBLCMSQT	1604	C3 UCSD
1604	FORTAN-63	1604	COMPACHEK	1604	F-62 1604	1604	C3 UCSD
4	FLOATING POINT	1604	COMPACHEK	1604	F-63 1604	1604	C3 UCSD
D SECOND KIND FOR COMPLEX ORDER	FLOATING POINT	1604	COMPACHEK	1604	*GAMMA	1604	C3 UCSD
4	F-60 1604	1604	COMPACHEK	1604	F-62 1604	1604	C3 UCSD
REGRESSION ON PRIMARY PRINCIPAL	MULTIPLE REGRESSION,	1604	COMPACHEK	1604	F-63 1604	1604	C3 UCSD
604	F-63 1604	1604	COMPACHEK	1604	*RCPGAMI	1604	C3 UCSD
4	NOV 64	1604	COMPACHEK	1604	*CMD	1604	C3 UCSD
ACTOR ANALYSIS AND FACTOR-SCORE	F-60 1604	1604	COMPACHEK	1604	*CSQRT	1604	C3 UCSD
F-63	1604	1604	COMPACHEK	1604	*GAMMA	1604	C3 UCSD
S TRANSIENT TEMPERATURES IN ANY	S IN ANY CONCENTRIC CYLINDRICAL	1604	COMPACHEK	1604	F-63 1604	1604	C3 UCSD
1604	COMPARE A	1604	COMPACHEK	1604	*RCPGAMI	1604	C3 UCSD
4	NORMAL DEVIATE TABLE	1604	COMPACHEK	1604	*CMSQRT	1604	C3 UCSD
ROMBERG INTEGRATION WITH ERROR	MASTER TAPE	1604	COMPACHEK	1604	*RCPGAMI	1604	C3 UCSD
04	BINARY TO BCD	1604	COMPACHEK	1604	F-60 1604	1604	C3 UCSD
1604	BINARY DECK	1604	COMPACHEK	1604	*COMAG	1604	C3 UCSD
4	FLOATING POINT TO FIXED POINT	1604	COMPACHEK	1604	*CMPLXINV	1604	C3 UCSD
604	BCD TO OCTAL	1604	COMPACHEK	1604	*GAMMA	1604	C3 UCSD
04	BCD TO BINARY	1604	COMPACHEK	1604	*COMP	1604	C3 UCSD
04	BCD TO BINARY	1604	COMPACHEK	1604	*CMPLXSUB	1604	C3 UCSD
4	FIXED TO FLOATING BINARY	1604	COMPACHEK	1604	*CMPLXSQR	1604	C3 UCSD
04	BINARY TO BCD	1604	COMPACHEK	1604	BESSEL FUNCTIONS OF FIRST AN	1604	C3 UCSD
ROW BINARY TO HOLLERITH	COLUMN BINARY TO ROW BINARY	1604	COMPACHEK	1604	*BIMC02	1604	C3 UCSD
1604	1604	1604	COMPACHEK	1604	*CECS	1604	C3 UCSD
4	TAPE MERGE AND	1604	COMPACHEK	1604	F-62 1604	1604	C3 UCSD
1604	BINARY TAPE	1604	COMPACHEK	1604	*TVAMRCA	1604	C3 UCSD
04	OCTAL-DECIMAL	1604	COMPACHEK	1604	*COMPRESS	1604	C3 UCSD
ESTIMATION ELEMENTARY LINKAGE	1						

1604	ROUTINE-MULTIPLE REGRESSION AND CORRELATION	*BIMD10	1604 F-63	*DTCORR	M4	WADD
ROUTINE-MULTIPLE REGRESSION AND CORRELATION	*BIMD10	1604 F-60	NOV 64	NOV 64	G9	NPGS
NOV 64	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 1	*BIMD06	1604 F-63	F-60	G8	NPGS
	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 1	*BIMD06	1604 F-60	1604	G2	NPGS
	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 2	*BIMD	1604 F-63	1604	G2	UCSD
	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 2	*BIMD07	1604 F-60	1604	G2	NPGS
	PEARSON PRODUCT-MOMENT CORRELATION ANALYSIS	*BIMD	1604 F-60	1604	G2	UCSD
1604	MULTIPLE CORRELATION AND REGRESSION ANALYSIS	*CORRC	1604 F-60	1604	G2	UTEX
	COS			*MANYCOR	G2	NBSB
	FLOATING POINT SINE			*REGRANAL	G2	UTEX
4	FLOATING POINT SINE				B1	LMSD
ASS	FLOATING POINT SINE OR COS				B1	CODA
	JAN 65 TANGENT				B1	LMSD
	OCT 64 AX-1				B1	CODA
1604	NOV 64 ANALYSIS OF COUPLER NEUTRONICS - HYDRODYNAMICS CALCULATIONS					ARGONNE
1604	NOV 64 ANALYSIS OF COUPLER NEUTRONICS - HYDRODYNAMICS CALCULATIONS					C CODA
1604	NOV 64 ANALYSIS OF COUPLER NEUTRONICS - HYDRODYNAMICS CALCULATIONS					G4 NPGS
	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA					G2 NPGS
	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA					G2 NPGS
	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA					G4 NPGS
604 F-63	NOV 64 CROSS TABULATION NO. 2					G7 UCSD
604 F-60	NOV 64 CROSS TABULATION NO. 2					G7 UCSD
604 F-63	NOV 64 CROSS TABULATION NO. 3 (MODIFIED 23)					G7 UCSD
604 F-60	NOV 64 CROSS TABULATION NO. 3 (MODIFIED 23)					G9 NPGS
604 F-63	NOV 64 CROSS TABULATION NO. 1					G9 NPGS
604 F-60	NOV 64 CROSS TABULATION NO. 1					G9 NPGS
1604	AUTO- AND CROSS-LAG INTERCORRELATIONS					G9 NPGS
CH GOLDMAN	INELASTIC SCATTERING					G2 UTEX
600 ALGOL	JAN 65					Y2 CODA
600 COMPASS	JAN 65 DOUBLE PRECISION					ARGONNE
XPLICIT SOLUTION OF THE GENERAL	CUBIC EQUATION WITH REAL COEFFICIENTS					ARGONNE
XPLICIT SOLUTION OF THE GENERAL	CUBIC EQUATION WITH REAL COEFFICIENTS					ARGONNE
	INVERSE OF THE NORMAL					C2 UCSD
1604	NORMAL					C2 UCSD
1604	NORMAL					C3 UOFM
F-63	1604					C3 UOFM
04	LEAST SQUARES					C3 UOFM
604	LEAST SQUARE					Q2 UCSD
04	LEAST SQUARES					Q2 UCSD
TORS OF A REAL SYMMETRIC MATRIX	CYCLIC THRESHOLD-JACOBI*JCBFIX					F2 UTEX
TORS OF A REAL SYMMETRIC MATRIX	CYCLIC THRESHOLD-JACOBI*JCBFLO					F2 UTEX
ROUP DIFFUSION CODE FOR SLAB OR	CYLINDER GEOMETRY					Y2 CODA
ROUP DIFFUSION CODE FOR SLAB OR	CYLINDER OR SPHERE GEOMETRY*AIM-6					Y2 CODA
F-63	1604					Y2 CODA
W-GROUP DIFFUSION CODE FOR SLAB	CYLINDER GEOMETRY					Y2 CODA
-DIMENSIONAL SN CALCULATIONS	CYLINDER OR SPHERE GEOMETRY*FOG					Y2 CODA
ROUP DIFFUSION CODE FOR SLAB OR	CYLINDER OR SPHERE					Y2 CODA
F-63	1604					Y2 CODA
TEMPERATURES IN ANY CONCENTRIC	CYLINDER GEOMETRY					Y2 CODA
	CYLINDRICAL GEOMETRY CELL CODE					Y2 CODA
	CYLINDRICAL CONFIGURATION*ARGUS					Y2 CODA
	CYPTPT					Y2 CODA
	DABS					Y2 CODA
	DABS					Y2 CODA
	DAPROC					Y2 CODA
1604	CONTROL					Y2 CODA
1604	WADD					Y2 CODA
604 F-63	NOV 64					Y2 CODA
604 F-60	NOV 64					Y2 CODA
604 F-63	NOV 64					Y2 CODA
604 F-60	NOV 64					Y2 CODA
04	WADD OFF-LINE					Y2 CODA
604 F-63	NOV 64					Y2 CODA
604 F-60	NOV 64					Y2 CODA
604 F-63	NOV 64					Y2 CODA
604 F-60	NOV 64					Y2 CODA
	DATA ASSEMBLY PROGRAM					Y2 CODA
	DATA CORRECTOR					Y2 CODA
	DATA PATTERNS - POLYCHOTOMY					Y2 CODA
	DATA PATTERNS - DICHOTOMY					Y2 CODA
	DATA PATTERNS - DICHOTOMY					Y2 CODA
	DATA PATTERNS - POLYCHOTOMY					Y2 CODA
	DATA PROCESSOR					Y2 CODA
	DATA SCREENING NO. 2					Y2 CODA
	DATA SCREENING NO. 1					Y2 CODA
	DATA SCREENING NO. 3					Y2 CODA
	DATA SCREENING NO. 3					Y2 CODA
	DATA SCREENING NO. 1					Y2 CODA
	DATA SCREENING NO. 1					Y2 CODA
	DATA SCREENING NO. 2					Y2 CODA

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REDUCTION ON COMPLEX MATRICES +	EIGENSYSTEMS OF HERMITIAN MATRIX	*ANL-F150 3600 ALGOL	JAN 65 HOUSEHOLDER	ARGONNE
F-62 1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-62 1604	F2 UCSD
F-60 1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-60 1604	F2 UCSD
1604	EIGENVALUE PACKAGE	*BIGPACK	1604	F2 UCSD
1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	CYCLICTHRESHOLD-JACOB	1604	F2 UTEX
F-60 1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	CYCLICTHRESHOLD-JACOB	1604	F2 UTEX
F-60 1604	EIGENVALUES AND EIGENVECTORS OF REAL SYMMETRIC MATRICES	*HOUSE SR	1604	F2 SAND
F-60 1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NCN-HERMITIAN MATRICES	*MATVBC	1604	F2 UTEX
1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*EIGENVAL	1604	F2 NBSB
IC MATRIX	EIGENVAL	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETR	F2 NBSB
0 1604	MATRIX	EIGENVALUE AND EIGENVECTOR	*JACOBIN	F2 UOFM
F-63 1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-60 1604	F2 UCSD
F-60 1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NCN-HERMITIAN MATRICES	*MATSUB	1604	F2 UTEX
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-62 1604	F2 UCSD
EIGENVALUES AND	EIGENVECTORS OF REAL SYMMETRIC MATRICES	*HOUSE SR	F-60 1604	F2 SAND
EIGENVALUES AND	EIGENVECTORS OF COMPLEX NCN-HERMITIAN MATRICES	*MATSUB	F-60 1604	F2 UTEX
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-60 1604	F2 UCSD
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*1EIGEN	F-63 1604	F2 UCSD
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	*EIGENVAL	1604	F2 NBSB
MATRIX EIGENVALUE AND	EIGENVECTOR	*JACOBIN	F-60 1604	F2 UOFM
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	CYCLICTHRESHOLD-JACOB	1604	F2 UTEX
EIGENVALUES AND	EIGENVECTORS OF COMPLEX NCN-HERMITIAN MATRICES	*MATVBC	F-60 1604	F2 UTEX
EIGENVALUES AND	EIGENVECTORS OF A REAL SYMMETRIC MATRIX	CYCLICTHRESHOLD-JACOB	1604	F2 UTEX
RELATION TETRACHORIC ESTIMATION	ELEMENTARY LINKAGE	*CORMAT	1604	G2 UTEX
1604	LIMIN WITH ROW INTERCHANGE AND CORRECTIONS		F-60 1604	F4 SAND
INVERSION BY METHOD OF GAUSSIAN	ELIMINATION USING DOUBLE-PRECISION ARI	*DBLGAUS	F-60 1604	F1 UTEX
SS	ELLIPTIC INTEGRAL E			ARGONNE
COMPUTATION OF COMPLETE	ELLIPTIC INTEGRALS-K-AND-E	*ELLPT	F-60 1604	C3 SAND
SS	ELLIPTIC INTEGRAL K			ARGONNE
ND-E	ELLPT	F-60 1604	COMPUTATION OF COMPLETE ELLIPTIC INTEGRALS-K-A	C3 SAND
62 1604	ENGINEERING COMPUTATION SYSTEM		*CECS	F-60 1604
NOV 64 TRACE SUBROUTINE	ENTRIES AND EXITS		*TRACER	1604 F-63
JAN 65 CROUT LINEAR	EQN SOLVER		*ANL-F450 3600 ALGOL	ARGONNE
NALOG SOLUTIONS OF DIFFERENTIAL	EQUATIONS	*1 INTEG	1604 F-63	A D1 NSAR
SOL OF ORDINARY 2ND ORDER DIFF	EQUATIONS	*GAUSS2	1604	D2 UCSD
F SIMULTANEOUS LINEAR ALGEBRAIC	EQUATIONS	*VIETA	WL F-62 1604	F4 UTEX
T SOLUTION OF THE GENERAL CUBIC	EQUATION WITH REAL COEFFICIENTS	*VIETA	F-60 1604	C2 UCSD
T SOLUTION OF THE GENERAL CUBIC	EQUATION WITH1 VEL COEFFICIENTS			C2 UCSD
FORTTRAN SIMULTANEOUS LINEAR	EQUATIONS SUBROUTINE	*MATEQ	F-60 1604	F4 CODA
ROOTS OF POLYNOMIAL	EQUATIONS BY MULLERS METHOD	*POLYMUL	F-60 1604	C2 UTEX
RATION OF ORDINARY DIFFERENTIAL	EQUATIONS	*SOLVEQ	1604	D2 CODA
SOLUTION OF SIMULTANEOUS	EQUATIONS	*MATALG	F-62 1604	F4 SAND
FORTTRAN SIMULTANEOUS LINEAR	EQUATIONS SUBROUTINE	*RKLDQC	F-63 1604	F4 CODA
-KUTTA-GILL LINEAR DIFFERENTIAL	EQUATION SOLVER	*RKGNH	1604	D2 UCSD
RUNGE-KUTTA-GILL DIFFERENTIAL	EQUATION SOLVER	*RKLDQC	WL F-63 1604	D2 UOFM
-KUTTA-GILL LINEAR DIFFERENTIAL	EQUATIONS SOLVER	*MATINV	F-60 1604	F1 CODA
VERSION WITH SOLUTION OF LINEAR	EQUATIONS SOLVER	*RKLDQC	F-60 1604	D2 UCSD
-KUTTA-GILL LINEAR DIFFERENTIAL	EQUATIONS	*MILNE	F-60 1604	D2 SAND
LUTION OF ORDINARY DIFFERENTIAL	EQUATIONS	*ADAMS	F-60 1604	D2 SAND
LUTION OF ORDINARY DIFFERENTIAL	EQUATIONS			F4 NBSB
ONE PASS SIMULTANEOUS	EQUATIONS	*NM11	1604	D2 NPGS
LUTION OF ORDINARY DIFFERENTIAL	EQUATIONS	*LINEQN	F-60 1604	F4 UTEX
F SIMULTANEOUS LINEAR ALGEBRAIC	EQUATIONS	*RKAMPDP	S F-60 1604	F4 LMSD
SOLUTION OF SIMULTANEOUS	EQUATIONS	*IINTEG	F-60 1604	D2 UTEX
LUTION OF ORDINARY DIFFERENTIAL	EQUATIONS	*MATINV	1604	D2 UCSD
ORDINARY 2ND ORDER DIFFERENTIAL	EQUATIONS	*MATINV	F-63 1604	F1 NBSB
ACCOMPANYING SOLUTION OF LINEAR	EQUATIONS			F2 NBSB
ACCOMPANYING SOLUTION OF LINEAR	EQUATIONS			Y2 CODA
LAB OR CYLINDER GEOMETRY	EQUIPOIS	F-63 1604	TWO-DIMENSIONAL TWO-GROUP DIFFUSION CODE FOR S	C3 UOFM
ROR FUNCTION	ERFN	W S	NORMAL CUMULATIVE DISTRIBUTION FUNCTION AND ER	D1 UOFM
ROMBERG INTEGRATION WITH	ERROR CONTROL			C3 UOFM
ATIVE DISTRIBUTION FUNCTION AND	ERROR FUNCTION	*ERFN	W S	C3 UOFM
ATIVE DISTRIBUTION FUNCTION AND	ERROR FUNCTION	*COFN	1604	G4 CODA
1604	ERROR			G4 CODA
S, INTERCORRELATION TETRACHORIC	ESTIMATION ELEMENTARY LINKAGE	*CORMAT	1604	G2 UTEX
L F-60 1604	MULERS PHI FUNCTION			U0 CODA
ORTRAN FUNCTION FOR DETERMINANT	EVALUATION, DET(A,N)	*CETF	1604	F3 CODA
F-62 1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT			C3 UCSD
F-63 1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT			C3 UCSD
1604	EVALUATION			C1 LMSD
F-60 1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT			C3 UCSD
1604	EVALUATORS			C1 UOFM
	EXFAULT			P CODA
	EXFAULT			P CODA
64 TRACE SUBROUTINE ENTRIES AND	EXITS	1604	EXFAULT	N1 UCSD
			*TRACER	1604 F-63
				NOV

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	*BIMD19	F-60	1604	ROTATION OF A FACTOR MATRIX	G8	NPGS
	*SCANOVA	F-60	1604	SINGLE CLASSIFICATION ANALYSIS OF VARIANCE	G4	UTEX
	*BIMD02	F-60	1604	COMPONENT ANALYSIS	G8	NPGS
	*CMD	F-60	1604	MULTIPLICATION AND DIVISION OF COMPLEX NUMBERS	A2	UTEX
	*BIMD30	F-60	1604	TIME SERIES ANALYSIS NO. 2	G7	NPGS
	*BIMD31	F-60	1604	GENERAL LINEAR HYPOTHESIS	G2	NPGS
	*BIMD01	F-60	1604	LIFE TABLE AND SURVIVAL RATE	G9	NPGS
	*SPHERE	F-60	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*ORDER	F-60	1604	ORDERING OF POINTS FOR SCATTER-PLOTTING	M1	UCSD
	*GERIAC	F-60	1604	GAUSSIAN ELIMIN WITH ROW INTERCHANGE AND CORRECTIONS	F4	SAND
	*BIMD05	F-60	1604	DISCRIMINANT ANALYSIS - TWO GROUPS	G8	NPGS
	*RCPGAMR	F-60	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	C3	UCSD
	*BIMD17	F-60	1604	FACTOR ANALYSIS	G8	NPGS
	*BIMD08	F-60	1604	POLYNOMIAL REGRESSION	G2	NPGS
	*ARCTAN	F-60	1604	ARCTANGENT	B1	UCSD
ES	*MATVBC	F-60	1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NON-HERMITIAN MATRIC	F2	UTEX
	*ALLROOT	F-60	1604	ZEROS OF ARBITRARY FUNCTIONS	C2	UTEX
	*LSQPOL	F-60	1604	LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
BLE-PRECISION AR	*CMPLXADD	F-60	1604	FLOATING POINT COMPLEX ADD	A3	NBSB
	*DBLGAUS	F-60	1604	MATRIX INVERSION BY METHOD OF GAUSSIAN ELIMINATION USING DOU	F1	UTEX
	*HERMIT	F-60	1604	HERMITE POLYNOMIAL GENERATOR	C1	UCSD
	*IINTEG	F-60	1604	NUMERICAL SOL OF ORDINARY 2ND ORDER DIFFERENTIAL EQUATIONS	D2	UCSD
	*NEWTN	F-60	1604	NUMERICAL INTEGRATION BY NEWTON-COTES QUADRATURE	D1	SAND
	*BIMD11	F-60	1604	ANALYSIS OF VARIANCE NO. 1	G4	NPGS
	*PSUB	F-60	1604	POLYNOMIAL SUBTRACT	C1	CODA
	*BIMD09	F-60	1604	STEPWISE MULTIPLE REGRESSION	G2	NPGS
	*MAXMIN	F-60	1604	A MAXIMUM OR A MINIMUM OF CERTAIN ARBITRARY FUNCTIONS	C3	UTEX
	*JACOBI	F-60	1604	MATRIX EIGENVALUE AND EIGENVECTOR	F2	UOFM
	*GAMMALN	F-60	1604	LN GAMMA(X) FOR X GREATER THAN 0	C3	SAND
	*SBELL1	F-60	1604	RANDOM NUMBER GENERATOR	G5	SAND
	*LEGEND	F-60	1604	LEGENDRE POLYNOMIAL GENERATOR	C1	UCSD
EFFICIENTS	*HOUSE SR	F-60	1604	EIGENVALUES AND EIGENVECTORS OF REAL SYMMETRIC MATRICES	F2	SAND
	*VIETA	F-60	1604	EXPLICIT SOLUTION OF THE GENERAL CUBIC EQUATION WITH VEL CO	C2	UCSD
	*COTERM	F-60	1604	DETERMINANT OF A COMPLEX MATRIX	F3	UTEX
	*DPFSB	F-60	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*HPMINV	F-60	1604	HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*POIV	F-60	1604	POLYNOMIAL DIVIDE	C1	CODA
D VARIMAX ROTATIO	*FACT	F-60	1604	INTERCORRELATION, PRINCIPAL 1X9S FACTOR ANALYSIS, NORMALIZE	G2	UTEX
	*TCHEBY	F-60	1604	TCHEBYSHEV POLYNOMIAL GENERATOR	C1	UCSD
	*ADAMS	F-60	1604	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	D2	SAND
	*GAMMA	F-60	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*BIMD29	F-60	1604	MULTIPLE REGRESSION NO. 3 (MODIFIED 05)	G2	NPGS
	*ELLIPINT	F-60	1604	COMPUTATION OF COMPLETE ELLIPTIC INTEGRALS-K-AND-E	C3	SAND
	*LSCFWOP	F-60	1604	LEAST SQUARES CURVE FITTING WITH ORTHOGONAL POLYNOMIALS	E2	UTEX
	*CMPLXMUL	F-60	1604	FLOATING POINT COMPLEX MULTIPLY	A3	NBSB
	*SBELL2	F-60	1604	NORMAL DEVIATE TABLE CONSTRUCTION	G5	SAND
	*POLYRT	F-60	1604	POLYNOMIAL SOLUTION	C2	UCSD
	*BIMD13	F-60	1604	ANALYSIS OF COVARIANCE	G4	NPGS
	*DPFMU	F-60	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*EXTREM	F-60	1604	MULTIDIMENSIONAL EXTREMUM SEEKER	D5	UCSD
	*LAGUER	F-60	1604	LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
	*LEIGEN	F-60	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	F2	UCSD
	*RANADD	F-60	1604	DOUBLE PRECISION ARITHMETIC (SIX ROUTINES)	A1	UTEX
	*LINEQN	F-60	1604	SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS	F4	UTEX
	*CMPLXINV	F-60	1604	FLOATING POINT COMPLEX INVERT	A3	NBSB
	*SIMDUB	F-60	1604	DOUBLE INTEGRATION BY SIMPSON'S RULE	D1	UCSD
	*PMULT	F-60	1604	POLYNOMIAL MULTIPLY	C1	CODA
	*RKLDEQ	F-60	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
	*NPOA	F-60	1604	NORMAL PROBABILITY FUNCTION	C3	UCSD
	*CORRD	F-60	1604	PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS	G2	UTEX
	*BFFGH	F-60	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*DTERM	F-60	1604	DETERMINANT OF A REAL MATRIX	F3	UTEX
	*GAUSS3	F-60	1604	MATRIX INVERSION BY GAUSS METHOD	F1	UTEX
	*BIMD20	F-60	1604	ANALYSIS OF COVARIANCE NO. 2	G2	NPGS
	*DPMATS	F-60	1604	DOUBLE PRECISION MATRIX INVERSION	F1	UCSD
	*IDENTIFY	F-62	1604	IDENTIFY	Z	UCSD
	*GP PLOT	F-62	1604	GENERAL PURPOSE X-Y PLOTTER	J7	UCSD
	*DOCUMENT	F-62	1604	DOCUMENTATION OF FORTRAN SOURCE LANGUAGE PROGRAMS	Z1	UCSD
	*HPMINV	F-62	1604	HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*CECS	F-62	1604	CIVIL ENGINEERING COMPUTATION SYSTEM	Y1	CODS
	*ORDER	F-62	1604	ORDERING OF POINTS FOR SCATTER-PLOTTING	M1	UCSD
	*TRAVERSE	F-62	1604	TRAVERSE CLOSURE	Y1	CPAD
COMPLEX ARGUMENT	*BESSEL	F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER	C3	UCSD
	*GRAFPLOT	F-62	1604	1604 GRAPH PLOTTING SUBROUTINE	G4	NPGS
	*CDM3	F-62	1604	LINEAR PROGRAMMING SYSTEM 3	H1	CODA
EFFICIENTS	*VIETA	F-62	1604	EXPLICIT SOLUTION OF THE GENERAL CUBIC EQUATION WITH REAL CO	C2	UCSD

	*EXTREM	WL	F-62	1604	MULTIDIMENSIONAL EXTREM SEEKER	D5	UCSD
	*TRACE		F-62	1604	TRACE	N1	UCSD
	*OKFI		F-62	1604	OUT OF FILTER NETWORK FLOW ROUTINE ONE	H1	CODA
	*SPHERE		F-62	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*XY PLOT	WLS	F-62	1604	XY PLOTTER	J7	UCSD
	*SIMDUB		F-62	1604	DOUBLE INTEGRATION BY SIMPSONS RULE	D1	UCSD
	*SORT		F-62	1604	INTERNAL SORT	M1	UCSD
	*DPFMU		F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*TUKEY		F-62	1604	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA	G7	UCSD
	*SIMCON		F-62	1604	QUADRATURE BY SIMPSONS RULE	D1	UCSD
	*NPOA		F-62	1604	NORMAL PROBABILITY FUNCTION	C3	UCSD
	*T MATRX		F-62	1604	TEXT MATRIX GENERATOR	F1	UCSD
	*BES		F-62	1604	BESSEL FUNCTION	C3	UCSD
	*LSQPOL		F-62	1604	LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
	*SIMRUN		F-62	1604	TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSONS RULE	D1	UCSD
	*RKLOEQ		F-62	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
	*RCPGAMI		F-62	1604	RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*RANDOM		F-62	1604	RANDOM NUMBER GENERATOR	G5	UCSD
	*DPFDV		F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*PADE		F-62	1604	PADE APPROXIMANT, RATIONAL APPROXIMATION OF FUNCTIONS	E1	UCSD
	*BFFGH		F-62	1604	SPHERICAL BESSEL FUNCTION	C3	UCSD
	*DPMATS		F-62	1604	DOUBLE PRECISION MATRIX INVERSION	F1	UCSD
	*RCPGAMR		F-62	1604	EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	C3	UCSD
	*EIGEN		F-62	1604	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	F2	UCSD
	*TCHEBY		F-62	1604	TCHIBYSHEV POLYNOMIAL GENERATOR	C1	UCSD
	*HERMIT		F-62	1604	HERMITE POLYNOMIAL GENERATOR	C1	UCSD
	*ARCTAN		F-62	1604	ARCTANGENT	B1	UCSD
L ARGUMENT	*BESSELR		F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR REAL ORDER	C3	UCSD
	*DPFAD		F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
	*LAGUER		F-62	1604	LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
	*DPFSB		F-62	1604	DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINE	A3	UCSD
IMAGINARY ARGUMENT	*GAMMA		F-62	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*BESSEL1		F-62	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER	C3	UCSD
	*LEGEND		F-62	1604	LEGENDRE POLYNOMIAL GENERATOR	C1	UCSD
	*BESSELL		F-62	1604	BESSELL FUNCTION	C3	UCSD
	*DTF		F-63	1604	ONE-DIMENSIONAL SN CALCULATIONS	Y2	UNC
	*DPMATS64	1604	F-63	1604	DOUBLE PRECISION MATRIX INVERSION	F1	UCSD
	*FUGUE		F-63	1604	STEADY STATE ANALYSIS IN CLOSED CHANNELS	Y2	CODA
	*RANDOM2		F-63	1604	FAST RANDOM NUMBER GENERATOR	G5	UCSD
	*NUCY	1604	F-63	1604	NUCY	Y2	ORNL
R GEOMETRY	*TRACER	1604	F-63	1604	TRACE SUBROUTINE ENTRIES AND EXITS	N1	UCSD
	*EQUIPOIS		F-63	1604	TWO-DIMENSIONAL TWO-GROUP DIFFUSION CODE FOR SLAB OR CYLINDER	Y2	CODA
	*RKLOEQ	WLS	F-63	1604	RUNGE-KUTTA-GILL LINEAR DIFFERENTIAL EQUATION SOLVER	D2	UCSD
	*GRACE1		F-63	1604	SLAB GAMMARAY ATTENUATION CODE	Y2	CODA
	*BIMD18	1604	F-63	1604	SUBROUTINE ROTATE	G9	NPGS
	*CLOUD		F-63	1604	GAMMA-RAY DOSE RATE FROM A CLOUD	Y2	CODA
	*TUKEY		F-63	1604	TUKEY SPECTRUM, CROSS SPECTRA AND POWER SPECTRA	G7	UCSD
	*TEMPEST		F-63	1604	TEMPEST II	Y2	CODA
	*BIMD31	1604	F-63	1604	GENERAL LINEAR HYPOTHESIS	G2	NPGS
	*AIREK2		F-63	1604	REACTOR KINETICS CODE WITH MATH. BY E.R.COHEN	Y2	CODA
	*GAMMA		F-63	1604	GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
	*AIREK3		F-63	1604	GENERALIZED REACTOR KINETICS CODE	Y2	CODA
	*BIMD21	1604	F-63	1604	PERIODIC REGRESSION	G7	NPGS
	*ARES-1		F-63	1604	RESONANCE INTEGRAL CODE	Y2	CODA
	*RANDOM		F-63	1604	RANDOM NUMBER GENERATOR	G5	UCSD
	*S4CYCELL		F-63	1604	S4 CYLINDRICAL GEOMETRY CELL CODE	Y2	CODA
ION IN A LATTICE	*BIMD12	1604	F-63	1604	ANALYSIS OF VARIANCE, NO. 2	G4	NPGS
	*THERMOS		F-63	1604	COMPUTES THE THERMAL NEUTRON SPECTRUM AS A FUNCTION OF POSIT	Y2	CODA
INTEGRATED OVER AN	*WRAP		F-63	1604	WEIGHTED REGRESSION ANALYSIS PROGRAM (WRAP)	G2	SAND
	*HAFFEVER		F-63	1604	HAUSER FESHBACH GOLDMAN INELASTIC SCATTERING CROSS-SECTION I	Y2	CODA
	*I-INTG	1604	F-63	1604	NUMERICAL SOL OF ORDINARY 2ND ORDER DIFF EQUATIONS	D2	UCSD
	*FORTSNG		F-63	1604	FORTSNG CODE	Y2	CODA
	*GP PLOT	WLS	F-63	1604	GENERAL PURPOSE X-Y PLOTTER	J7	UCSD
	*PERT	WL	F-63	1604	ONE-DIMENSIONAL PERTURBATION CALCULATION FOR AIM AND FOG	Y2	CODA
	*PADE	1604	F-63	1604	PADE APPROXIMANT, RATIONAL APPROXIMATION OF FUNCTIONS	B1	UCSD
COMPLEX ARGUMENT	*FATM		F-63	1604	ONE-DIMENSIONAL MULTI-GROUP DOWN SCATTER DIFFUSION CODE	Y2	CODA
R SPHERE GEOMETRY	*BESSEL2	WLS	F-63	1604	BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER	C3	UCSD
	*FOG		F-63	1604	ONE-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR SLAB CYLINDER O	Y2	CODA
	*BIMD32	1604	F-63	1604	CROSS TABULATION NO. 3 (MODIFIED 23)	G9	NPGS
	*WHIRLWAY		F-63	1604	THREE-DIMENSIONAL TWO-GROUP XYZ DIFFUSION CODE	Y2	CODA
	*MIN	WL	F-63	1604	MINIMUM OF AN ARBITRARY FUNCTION	H2	SAND
E SERIES	*BOMM		F-63	1604	A SYSTEM OF PROGRAMS TO PERFORM ARITHMETIC OPERATIONS ON TIM	G7	UCSD
	*BIMD19	1604	F-63	1604	ROTATION OF A FACTOR MATRIX	G8	NPGS
	*GRACE2		F-63	1604	CYLINDER OR SLAB GAMMARAY ATTENUATION CODE	Y2	CODA
	*MATINV	WL	F-63	1604	MATRIX INVERSION WITH SOLUTION OF LINEAR EQUATIONS	F1	CODA
M CODE	*FORM		F-63	1604	FORTAN MUFT A FOURIER TRANSFORM SLOWING DOWN, FAST SPECTRU	Y2	CODA

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*BIMD30	1604	F-63		NOV 64	ASYMPTOTIC REGRESSION	G7	NPGS
*MURCATRO		F-63	1604		MSRE KINETICS CODE	Y2	ORNL
*RCPGAMI		F-63	1604		RECIPROCAL GAMMA FUNCTION FOR COMPLEX ARGUMENT	C3	UCSD
*ZUT		F-63	1604		RESOLVED RESONANCE INTEGRAL	Y2	CODA
*BIMD13	1604	F-63		NOV 64	ANALYSIS OF COVARIANCE	G4	NPGS
*TUZ		F-63	1604		UNRESOLVED RESONANCE INTEGRAL	Y2	CODA
*SIMCON		F-63	1604		QUADRATURE BY SIMPSON'S RULE	D1	UCSD
CAL CONFIGURATION	*ARGUS	1604	F-63	DEC 64	CALCULATES TRANSIENT TEMPERATURES IN ANY CONCENTRIC CYLINDRI	Y2	ANL
R GEOMETRY	*RDNUM	1604	F-63	NOV 64	GENERAL FORMAT-FREE INPUT ROUTINE	I9	UCSD
	*20GRAND		F-63		TWO-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR SLAB OR CYLINDE	Y2	CODA
	*ARCTAN		F-63		ARCTANGENT	B1	UCSD
	*GAM-I		F-63		SLOWING DOWN SPECTRUM CODE	Y2	CODA
	*BIMD09	1604	F-63	NOV 64	STEPWISE MULTIPLE REGRESSION	G2	NPGS
	*MATALG		F-63		FORTTRAN SIMULTANECUS LINEAR EQUATIONS SUBROUTINE	F4	CODA
	*SORT	1604	F-63	NOV 64	INTERNAL SORT	M1	UCSD
	*LEGEND	WLS	F-63		LEGENDRE POLYNOMIAL GENERATOR	C1	UCSD
	*SCAPRODB	1604	F-63	DEC 64	ACCURATE REAL, FLOATING-POINT SCALAR PRODUCT, CALL SEQ	F1	UTEX
OR SPHERE GEOMET	*GENLSQ		F-63		CURVE FITTING BY THE METHOD OF LEAST SQUARES	E2	SAND
	*AIM-6		F-63		ONE-DIMENSIONAL MULTI-GROUP DIFFUSION CODE FOR SLAB CYLINDER	Y2	CODA
	*SPHERE		F-63		SPHERICAL BESSEL FUNCTION	C3	UCSD
ONS	*BIMD10	1604	F-63	NOV 64	FORTTRAN SUBROUTINE-MULTIPLE REGRESSION AND CORRELATION	G9	NPGS
	*MATINV		F-63		MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF LINEAR EQUETI	F1	NBSB
IMAGINARY ARGUMEN	*BIMD22	1504	F-63	NOV 64	CROSS TABULATION NO. 1	G9	NPGS
	*BESSEL I	WLS	F-63		BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR COMPLEX ORDER	C3	UCSD
	*BIMD06	1604	F-63	NOV 64	MULTIPLE REGRESSION AND CORRELATION ANALYSIS NO. 1	G2	NPGS
	*IMATRX		F-63		TEXT MATRIX GENERATOR	F1	UCSD
	*BIMD08	1604	F-63	NOV 64	POLYNOMIAL REGRESSION	G2	NPGS
	*NPOA		F-63		NORMAL PROBABILITY FUNCTION	C3	UCSD
	*BIMD25	1604	F-63	NOV 64	DATA PATTERNS - DICHOTOMY	G9	NPGS
	*RKAMSUB		F-63		RKAMSUB	D2	UTEX
	*BIMD11	1604	F-63	NOV 64	ANALYSIS OF VARIANCE NO. 1	G4	NPGS
	*BESSEL		F-63		MODIFIED BESSEL FUNCTION	C3	UCSD
	*IDEFINE		F-63		IDEFINE	Q9	UNC
	*HPMINV		F-63		HIGH PRECISION MATRIX INVERSION	F1	UCSD
	*BIMD28	1604	F-63	NOV 64	GENERAL CHI-SQUARE	G9	NPGS
	*SIMRUN		F-63		TABULAR INTEGRAL OF A TABULAR FUNCTION BY SIMPSON'S RULE	D1	UCSD
	*GRAFPLCT		F-63		1604 GRAPH PLOTTING SUBROUTINE	Q4	NPGS
	*RKAM	WL	F-63		SOLUTION OF N SIMULTANECUS FIRST ORDER	D2	UTEX
	*BIMD17	1604	F-63	NOV 64	FACTOR ANALYSIS	G8	NPGS
	*BFFGH		F-63		SPHERICAL BESSEL FUNCTION	C3	UCSD
	*BIMD23	1604	F-63	NOV 64	CROSS TABULATION NO. 2	G9	NPGS
	*LSCFWOP	WL	F-63		LEAST SQUARES CURVE FITTING WITH ORTHOGONAL POLYNOMIALS	E2	UTEX
	*ITIME		F-63		CURRENT TIME ROUTINE	Q	UCSD
	*TCHEBY	WL	F-63		TCHEBYSHEV POLYNOMIAL GENERATOR	C1	UCSD
	*EXTREM	1604	F-63	NOV 64	MULTIDIMENSIONAL EXTREMUM SEEKER	D5	UCSD
	*LSQPOL		F-63		LEAST SQUARES POLYNOMIAL FITTING	E2	UCSD
	*BIMD01	1604	F-63	NOV 64	LIFE TABLE AND SURVIVAL RATE	G9	NPGS
	*HERMIT	WLS	F-63		HERMITE POLYNOMIAL GENERATOR	C1	UCSD
	*BIMD14	1604	F-63	NOV 64	GENERAL LINEAR HYPOTHESIS FOR AVOVA	G4	NPGS
	*EIGEN		F-63		EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX	F2	UCSD
	*BIMD24	1604	F-63	NOV 64	DATA SCREENING NO. 3	G9	NPGS
HEORY	*LAGUER	WLS	F-63		LAGUERRE POLYNOMIAL GENERATOR	C1	UCSD
	*SIZZLE		F-63		ONE-DIMENSIONAL MULTI-GROUP BURNUP CODE BASED ON DIFFUSION T	Y2	CODA
	*BIMD		F-63		MULTIPLE REGRESSION AND CORRELATION ANALYSIS	G2	UCSD
	*BIMD20	1604	F-63	NOV 64	ANALYSIS OF COVARIANCE NO. 2	G2	NPGS
	*BES		F-63		BESSEL FUNCTION	C3	UCSD
	*BIMD16	1604	F-63	NOV 64	DATA SCREENING NO. 2	G9	NPGS
	*COLTCHB	WL	F-63		COLLAPSE TCHEBYCHEV POLYNOMIALS	E1	CODA
	*SLIP		F-63		SLIP	M5	NSAR
	*RCPGAMR		F-63		EVALUATION OF RECIPROCAL GAMMA FUNCTION REAL ARGUMENT	C3	UCSD
	*COMPCOMP		F-63		COMPASS PLUS CODAP TO COMPASS TRANSLATOR	Z1	NBSB
L ARGUMENT	*BESSEL	WLS	F-63		BESSEL FUNCTIONS OF FIRST AND SECOND KIND FOR REAL ORDER REA	C3	UCSD
	*COMPRESS		F-63		COMPRESS	Q9	CODA
	*BIMD15	1604	F-63	NOV 64	DATA SCREENING NO. 1	G9	NPGS
	*BIMD05	1604	F-63	NOV 64	DISCRIMINANT ANALYSIS - TWO GROUPS	G8	NPGS
	*BIMD26	1604	F-63	NOV 64	DATA PATTERNS - POLYCHOTOMY	G9	NPGS
			F-63CP		FORTTRAN-63 COMPLEX ROUTINES	B5	CODA
IS , NORMALIZED VARIMAX ROTATIO			F-63DP		FORTTRAN-63 DOUBLE-PRECISION ROUTINES	B5	CODA
604 F-63			FACT	NOV 64	INTERCORRELATION, PRINCIPAL 1X9S FACTOR ANALYS	G2	UTEX
F-60	1604		CODAP-1	1604		G8	NPGS
INTERCORRELATION, PRINCIPAL 1X9S			F-60	1604		G8	NPGS
1604						G2	UTEX
NOV 64						G2	UTEX
NOV 64						G8	NPGS
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NOV 64						G2	UTEX
NOV 64						G8	NPGS
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NOV 64						G2	UTEX
NOV 64						G8	NPGS
NOV 64					</		

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04	F-3600	ROW BINARY TO	HOLERITH	1604	BCI TO CARD IMAGE, VARIABLE LENGTH WORDS	M4 NBSB
	MATRICES	OCT 64	HOLLERITH CONVERSION		*BINHOL	M4 CODA
600	ALGOL	JAN 65	HOLLOMAN GENERAL PLCT PROGRAM		*PLOT01	J7 HOLL
			HOUSE SR F-60 1604		EIGENVALUES AND EIGENVECTORS OF REAL SYMMETRIC	F2 SAND
			HOUSEHOLDER REDUCTION ON COMPLEX MATRICES		+ EIGENSYSTEMS OF HERMITIAN MATRICES*ANL-F150 3	ARGONNE
			HPMINV F-62 1604		HIGH PRECISION MATRIX INVERSION	F1 UCSD
			HPMINV F-63 1604		HIGH PRECISION MATRIX INVERSION	F1 UCSD
			HPMINV F-60 1604		HIGH PRECISION MATRIX INVERSION	F1 UCSD
T 64	AX-I	COUPLED NEUTRONICS -	HYDRODYNAMICS CALCULATIONS		*AX-I	C CODA
604	CODAP-1		HYPERBOLIC SINE OF A REAL ARG.			B3 NYU
4		FLOATING POINT	HYPERBOLIC TANGENT		*TANHF	B1 CODA
1604		GENERALIZED	HYPERGEOMETRIC FUNCTIONS		*BEAUTY	C3 NBSB
	NOV 64	GENERAL LINEAR	HYPOTHESIS FOR AVCVA		*BIMD14 1604 F-63	G4 NPGS
4		GENERAL LINEAR	HYPOTHESIS FOR ANOVA		*BIMD14 F-60 160	G4 NPGS
	NOV 64	GENERAL LINEAR	HYPOTHESIS		*BIMD31 1604 F-63	G2 NPGS
4		GENERAL LINEAR	HYPOTHESIS		*BIMD31 F-60 160	G2 NPGS
	F-63 1604		IDEFINE F-63 1604	IDEFINE		Q9 UNC
	F-60 1604		IDENTIFY		*IDEFINE	Q9 UNC
	F-62 1604		IDENTIFY F-62 1604	IDENTIFY	*IDENTIFY	Z UCSD
			IDENTIFY F-60 1604	IDENTIFY	*IDENTIFY	Z UCSD
1604		TEMPEST	II			Z UCSD
AL EQUATIONS			IINTEG F-60 1604		*TEMPEST F-63	Y2 CODA
1604		BCI TO CARD	IMAGE, VARIABLE LENGTH WORDS		*HOLERITH	D2 UCSD
D SECOND KIND FOR COMPLEX ORDER			IMAGINARY ARGUMENT*BESSELI F-62 1604	NUMERICAL SOL OF ORDINARY 2ND ORDER DIFFERENTI		M4 NBSB
D SECOND KIND FOR COMPLEX ORDER			IMAGINARY ARGUMENT*BESSELI WLS F-63 1604	BESSEL FUNCTIONS OF FIRST AN		C3 UCSD
1604		ONE	INCH TAPE PROCESSOR	BESSEL FUNCTIONS OF FIRST AN		C3 UCSD
600	COMPASS	JAN 65	INCOMPLETE GAMMA FUNCTION	*OITP	*ANL-C352 3	M4 WADD
	HAUSER FESHBACH GOLDMAN	1604	INELASTIC SCATTERING CROSS-SECTION INTEGRATED OVER AN*HAFEVER	F-63 1604	*IPL-V	ARGONNE
	PROCEDURE-ORIENTED COMPILER	JAN 65	INFORMATION PROCESSING LANGUAGE V			Y2 CODA
	1604	ACCUMULATE	INFORMATION AVAILABLE FROM DOBRUSKY OF SOC	*JOVIAL	1604	M5 UTEX
	CODAP PAPER TAPE		INNER-PRODUCT		*ANL-F151 3600 COMPASS	L2 SDOS
			INPUT		1604	ARGONNE
1604		GENERALIZED	INPUT 1604	GENERALIZED INPUT	*ARPTMT	L1 CODA
	NOV 64	GENERAL FORMAT-FREE	INPUT ROUTINE		*RCNUM 1604 F-63	I9 LMSD
			INSCH 1604	TYPEWRITER INSPECT AND CHANGE		I9 LMSD
	1604		INSERT 1604	INSERT A CHARACTER INTO A WORD		I9 UCSD
1604		TYPEWRITER	INSERT A CHARACTER INTO A WORD		*INSERT	N1 WADD
			INSPECT AND CHANGE			M4 CODS
NS		*1	INTOR 1604	MANUAL INTERRUPT AND RESTORE		M4 CODS
	UNRESOLVED RESONANCE		INTEG 1604 F-63	NOV 64 NUMERICAL SOL OF ORDINARY 2ND ORDER DIFF EQUATIO		N1 WADD
	JAN 65	COMPLETE ELLIPTIC	INTEGRAL		*TUZ F-63 1604	N2 WADD
		RESOLVED RESONANCE	INTEGRAL K		*ANL-C354 3600 COMPASS	O2 UCSD
	1604	TABULAR	INTEGRAL		*ZUT F-63 1604	Y2 CODA
	JAN 65	COMPLETE ELLIPTIC	INTEGRAL OF A TABULAR FUNCTION BY SIMPSONS RULE		*SIMRUN F-62	O1 UCSD
	1604	RESONANCE	INTEGRAL CODE		*ARES-1 F-63	Y2 CODA
	1604	TABULAR	INTEGRAL E		*ANL-C355 3600 COMPASS	ARGONNE
OMPUTATION OF COMPLETE ELLIPTIC			INTEGRAL OF A TABULAR FUNCTION BY SIMPSONS RULE		*SIMRUN F-60	D1 UCSD
1604			INTEGRALS-K-AND-E *ELLPINT	F-60 1604		C3 SAND
LASTIC SCATTERING CROSS-SECTION			INTEGRAL OF A TABULAR FUNCTION BY SIMPSONS RULE		*SIMRUN F-63	O1 UCSD
			INTEGRATED OVER AN*HAFEVER F-63 1604		HAUSER FESHBACH GOLDMAN INE	Y2 CODA
	1604	NUMERICAL	INTEGRATION		*TRAP 1604	D1 UCSD
	1604	NUMERICAL	INTEGRATION BY NEWTON-COTES QUADRATURE		*NEWTN F-60	O1 SAND
	1604	NUMERICAL	INTEGRATION USING THE ROMBERG METHOD		*ROMIF	O1 UOFM
	1604	NUMERICAL	INTEGRATION, FORTRAN		*TRAPZ 1604	O1 NBSB
	2	DOUBLE	INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS		*NM12	O2 CODA
0	1604	DOUBLE	INTEGRATION BY GAUSSIAN QUADRATURE		*GAUSSN F-60	O1 SAND
	1604	DOUBLE	INTEGRATION BY SIMPSONS RULE		*SIMDUB F-6	D1 UCSD
	1604	ROMBERG	INTEGRATION BY SIMPSONS RULE		*SIMDUB F-6	D1 UCSD
	GAUSSIAN ELIMIN WITH ROW		INTERCHANGE AND CORRECTIONS		*ROMZF	D1 UOFM
	F-60 1604		INTERCORRELATION, PRINCIPAL 1X9S FACTOR ANALYSIS, NORMALIZED VARIMAX ROTATIO*FACT		F-60 1604	F4 SAND
			INTERCORRELATION TETRACHORIC ESTIMATION ELEMENTARY LINKAGE *CORMAT		1604	G2 UTEX
604	F-63	NOV 64	INTERCORRELATIONS	*AUTOCROS	1604	G2 UTEX
	F-62 1604		INTERNAL SORT			M1 UCSD
	F-60 1604		INTERNAL SORT		*SORT	M1 UCSD
			INTERNAL SORT		*SORT	M1 UCSD
ION			INTERP 1604	POLYNOMIAL INTERPOLATION		E1 CODA
ORDER FLOATING POINT LAGRANGIAN			INTERP1 1604	DIVIDED DIFFERENCE INTERPOLATION OR EXTRAPOLAT		E1 CODA
1604			INTERPOLATION		1604	E1 CODA
4			INTERPOLATION		*INTERP	E1 CODA
			INTERPOLATION		*AITKFN	E1 UOFM
			INTERPOLATION OR EXTRAPOLATION		*INTERP1 1604	E1 CODA
			INTERPRETATION		*GCIR 1604	M4 LMSD

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LYNOMIALS	LSCFWOP WL F-63 1604	LEAST SQUARES CURVE FITTING WITH ORTHOGONAL PO	E2 UTEX
	LSQFFT 1604	LEAST SQUARE CURVE FIT	C1 LMSD
	LSQPOL F-60 1604	LEAST SQUARES POLYNOMIAL FITTING	E2 UCSD
	LSQPOL F-62 1604	LEAST SQUARES POLYNOMIAL FITTING	E2 UCSD
	LSQPOL F-63 1604	LEAST SQUARES POLYNOMIAL FITTING	E2 UCSD
OCTAL CARD OR OCTAL	MAG TAPE LOAD	*OCLD 1604	I2 LMSD
1604	MAGNETIC TAPE TRACE	*TRACMT3	N1 CODA
1604	MAGNETIC TAPE SEARCH	*SEARCHMT	K3 WADD
1604	MAGNETIC TAPE TRACE	*TRACMT	N1 WADD
CONVERT SYMBOLIC	MAGNETIC TAPE TO PAPER TAPE	*MAGTPT 1604	M4 CODA
1604	MAGTPT 1604	CONVERT SYMBOLIC MAGNETIC TAPE TO PAPER TAPE	M4 CODA
	MANUAL INTERRUPT AND RESTORE	*INTDR	N2 WADD
1604	MANYCOR 1604	CORRELATION ANALYSIS	G2 NBSB
	MASTER TAPE	*PMT	M1 LMSD
1604	MASTER TAPE CONTRGL	*MTC -	K3 LMSD
NE	MATALG F-63 1604	FORTTRAN SIMULTANEOUS LINEAR EQUATIONS SUBROUTI	F4 CODA
NE	MATEQ F-60 1604	FORTTRAN SIMULTANEOUS LINEAR EQUATIONS SUBROUTI	F4 CODA
REACTOR KINETICS CODE WITH	MATH. BY E.F.COHN	*AIREK2 F-63 1604	Y2 CODA
	MATIN 1604	MATRIX INVERSION	F1 LMSD
LINEAR EQUATIONS	MATINT 1604	MATRIX LOOKUP	E1 CODA
LINEAR EQUATIONS	MATINV 1604	MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF	F1 NBSB
IONS	MATINV F-63 1604	MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF	F1 NBSB
CES + EIGENSYSTEMS OF HERMITIAN	MATINV WL F-63 1604	MATRIX INVERSION WITH SOLUTION OF LINEAR EQUAT	F1 CODA
HOUSEHOLDER REDUCTION ON COMPLEX	MATRICE*ANL-F150 3600 ALGOL	JAN 65 HOUSEHOLDER REDUCTION ON COMPLEX MATRI	ARGONNE
EIGENVECTORS OF REAL SYMMETRIC	MATRICES + EIGENSYSTEMS OF HERMITIAN	MATRICE*ANL-F150 3600 ALGOL	ARGONNE
EIGENVECTORS OF COMPLEX NON-HERMITIAN	MATRICES	*HOUSE SR F-60 1604	F2 SAND
EIGENVECTORS OF COMPLEX NON-HERMITIAN	MATRICES	*MATSUB F-60 1604	F2 UTEX
NOV 64 ROTATION OF A FACTOR	MATRICES	*MATVBC F-60 1604	F2 UTEX
ROTATION OF A FACTOR	MATRIX	*BIMD19	G8 NPGS
DETERMINANT OF A REAL	MATRIX	*BIMD19	F3 UTEX
DETERMINANT OF A REAL SYMMETRIC	MATRIX	*DTERM	F3 UCSD
DETERMINANT OF A COMPLEX	MATRIX	*COTERM	F3 UCSD
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	*EIGEN	F2 UCSD
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	*EIGEN	F2 UCSD
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	*EIGEN	F2 NBSB
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	*EIGENVAL	F2 UTEX
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	CYCLICTHRESHOLD-JACOB*JCBFLO	F2 UTEX
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	CYCLICTHRESHOLD-JACOB*JCBFLO	F2 UTEX
EIGENVECTORS OF A REAL SYMMETRIC	MATRIX	EIGENVALUE AND EIGENVECTOR	F2 UTEX
-62 1604	MATRIX GENERATOR	*JACOBIN	F2 UOFM
-63 1604	MATRIX GENERATOR	*T MATRIX	F1 UCSD
-60 1604	MATRIX GENERATOR	*T MATRIX	F1 UCSD
NOV 64 DOUBLE PRECISION	MATRIX INVERSION	*T MATRIX	F1 UCSD
4 F-60 1604	MATRIX INVERSION	*DPMATS64 1604 F-63	F1 UCSD
4 F-60 1604	MATRIX INVERSION	*HPMINV	F1 UTEX
4 F-63 1604	MATRIX INVERSION	*GAUSS3	F1 UCSD
	MATRIX INVERSION	*MATINV	F1 UTEX
	MATRIX INVERSION	*HPMINV	F1 NBSB
	MATRIX INVERSION	*MATIN	F1 UCSD
	MATRIX INVERSION	*CPMATS	F1 LMSD
	MATRIX INVERSION	*CPMATS	F1 UCSD
L F-63 1604	MATRIX INVERSION	*MATIN W	F1 UCSD
4 1604	MATRIX INVERSION	*MATIN	F1 CODA
	MATRIX LOOKUP	*MATINT	F1 UCSD
	MATRIX MULTIPLY	*MTXMPY	F1 CODA
	MATRIX MULTIPLY	*MPROD	F1 LMSD
	MATRIX OPERATIONS PACKAGE	*MXOPRP	F1 CODA
	MATRIX TRANSPOSE	*MTRANS	F1 UOFM
*T	MATRIX F-60 1604	TEXT MATRIX GENERATOR	F1 CODA
*T	MATRIX F-62 1604	TEXT MATRIX GENERATOR	F1 UCSD
RMITIAN MATRICES	MATSUB F-60 1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NON-HE	F1 UCSD
RMITIAN MATRICES	MATVBC F-60 1604	EIGENVALUES AND EIGENVECTORS OF COMPLEX NON-HE	F2 UTEX
F-60 1604	MAXIMUM OF A MINIMUM OF CERTAIN ARBITRARY	FUNCTIONS	F2 UTEX
NCTIONS	MAXMIN WL F-60 1604	A MAXIMUM OR A MINIMUM OF CERTAIN ARBITRARY FU	C3 UTEX
4 1604	MEMORY DUMP	*CORE	C3 UTEX
	MEMORY RANGE	*CLRMEM	N2 LMSD
DEC 64 BINARY PROGRAM TAPE	MERGE AND EDIT	*MERGEDIT 1604	K1 CODA
1604 TAPE	MERGE AND COPY		Q3 CODS
	MERGEDIT 1604		M1 LMSD
L INTEGRATION USING THE ROMBERG	METHOD	DEC 64 BINARY PROGRAM TAPE MERGE AND EDIT	K3 CODS
POLYNOMIAL EQUATIONS BY MULLERS	METHOD	*ROMIF 1604	D1 UOFM
MATRIX INVERSION BY GAUSS	METHOD	*POLYMUL F-60 1604	C2 UTEX
1604	METHOD	*GAUSS3 F-60 1604	F1 UTEX
	METHOD	*AITKENF F-60 1604	E1 UOFM
	METHOD	INTERPOLATION	F1 UTEX
	METHOD	OF GAUSSIAN ELIMINATION USING DOUBLE-PRECISION ARI*DBLGAUS	F1 UTEX
	METHOD	OF LEAST SQUARES	E2 SAND
		*GENLSQ F-63 1604	

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1604	NOV 64 MULTIPLE	REGRANAL	F-60	1604	MULTIPLE CORRELATION AND REGRESSION ANALYSIS	G2	UTEX
	NOV 64 ASYMPTOTIC	REGRESSION NO. 3 (MODIFIED 06)			*BIMD29	1604	G2
1604	NOV 64 MULTIPLE	REGRESSION			*BIMD30	F-60	G7
	NOV 64 POLYNOMIAL	REGRESSION AND CORRELATION ANALYSIS			*BIMD30	1604 F-63	G7
	FORTTRAN SUBROUTINE-MULTIPLE	REGRESSION			*BIMC	F-63	G2
	NOV 64 PERIODIC	REGRESSION AND CORRELATION			*BIMD08	1604 F-63	G2
1604	NOV 64 MULTIPLE	REGRESSION, COMPREHENSIVE ANALYSIS			*BIMD21	1604 F-63	G8
	NOV 64 PERIODIC	REGRESSION AND CORRELATION ANALYSIS NO. 1			*TVAMRCA	1604 F-63	G7
1604	NOV 64 SUBROUTINE-MULTIPLE	REGRESSION			*BIMC06	1604 F-63	G2
64	NOV 64 SUBROUTINE-MULTIPLE	REGRESSION AND CORRELATION			*BIMD21	F-60	G7
1604	NOV 64 MULTIPLE	REGRESSION AND CORRELATION ANALYSIS				F-60	G9
	NOV 64 STEPWISE MULTIPLE	REGRESSION ON PRIMARY PRINCIPAL COMPONENTS			*BIMD09	1604 F-63	G2
F-60	1604	REGRESSION ANALYSIS			*BIMD08	*BIMC03	G2
1604	MULTIPLE CORRELATION AND	REGRESSION ANALYSIS			*BIMD08	F-60	G8
1604	MULTIPLE	REGRESSION AND CORRELATION ANALYSIS NO.1			*BIMD06	F-60	G2
1604	WEIGHTED	REGRESSION ANALYSIS PROGRAM (WRAP)			*WRAP	F-63	G2
1604	MULTIPLE	REGRESSION AND CORRELATION ANALYSIS NO.2			*BIMD07	F-60	G2
	STEPWISE MULTIPLE	REGRESSION			*BIMC09	F-60	G2
1604	MULTIPLE	REGRESSION NO. 3 (MODIFIED 05)			*BIMD29	1604	G2
	LEAST SQUARES OR	REGRESSION WITH ARBITRARY FUNCTIONS			*ORTHON	1604	G2
1604	1604	RELOCATABLE OCTAL LOADER					G2
1604	1604	RELOCATABLE OR ABSOLUTE BINARY TAPE LOAD					G2
	F-63	REMOVE					G2
F-63	1604	RESOLVED RESONANCE INTEGRAL					G2
1604	1604	RESONANCE INTEGRAL CODE					G2
1604	RESOLVED	RESONANCE INTEGRAL					G2
	UNRESOLVED	RESONANCE INTEGRAL					G2
	1604	RESTORABLE DUMP					G2
	1604	RESTORE					G2
	MANUAL INTERRUPT AND	REVERSE THE ORDER OF THE BITS IN A WORD					G2
	1604	RKAM	WL	F-63			G2
		RKAMPDP	S	F-60			G2
		RKAMSUB		F-63			G2
		RKAMSUB					G2
		RKGMH					G2
		RKLEQ	WLS	F-63			G2
		RKLEQ		F-60			G2
		RKLEQ		F-62			G2
		RNDEV					G2
		ROM1F					G2
		ROM2F					G2
	1604	ROMBERG INTEGRATION WITH ERROR CONTROL					G2
	NUMERICAL INTEGRATION USING THE	ROMBERG METHOD					G2
	OMPASS	ROOT					G2
	FLOATING-POINT COMPLEX SQUARE	ROOT					G2
	JAN 65 DOUBLE-PRECISION SQUARE	ROOT					G2
	FRACTIONAL FIXED-POINT SQUARE	ROOT					G2
	JAN 65 DOUBLE-PRECISION CUBE	ROOT					G2
	NON-FLOATING SQUARE	ROOT					G2
	PASS	ROOT					G2
	FLOATING-POINT COMPLEX SQUARE	ROOT					G2
	NOV 64 DOUBLE-PRECISION SQUARE	ROOT					G2
	FLOATING POINT SQUARE	ROOT					G2
	1604	ROOT OF A COMPLEX NUMBER					G2
OV 64	GENERAL FORMAT-FREE INPUT	ROUTINE					G2
F-60	1604	ROOTS OF POLYNOMIAL EQUATIONS BY MULLERS METHOD					G2
	NOV 64 SUBROUTINE	ROTATE					G2
1604	SUBROUTINE	ROTATE					G2
R ANALYSIS ,	NORMALIZED VARIMAX	ROTATION*FACT	F-60	1604			G2
604 F-63	NOV 64	ROTATION OF A FACTOR MATRIX					G2
F-60	1604	ROTATION OF A FACTOR MATRIX					G2
	FRACTIONAL FIXED-POINT	ROUNDED DIVISION					G2
604	CURRENT TIME	ROUTINE					G2
604	GENERAL LOAD	ROUTINE					G2
	EDITING	ROUTINE FOR A FORTRAN LIBRARY					G2
1604	BOULDER ASSEMBLY	ROUTINE					G2
604	CURRENT TIME	ROUTINE					G2
	OUT OF KILTER NETWORK FLOW	ROUTINE ONE					G2
	LOCKHEED ASSEMBLY	ROUTINE					G2
	FORTTRAN-63 COMPLEX	ROUTINES					G2
	FORTTRAN-63 DOUBLE-PRECISION	ROUTINES					G2
	DOUBLE PRECISION ARITHMETIC (SIX	ROUTINES)					G2

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DECIMAL AND OCTAL LOAD-PAPER	DECIMAL DUMP-PAPER	TAPE OR TYPEWRITER	*DECLC	*CESCA	1604	1604	J3	WADD
604 1604 1604 1604	TRACE (PAPER)	TAPE OR TYPEWRITER					I9	WADD
	OCTAL PAPER	TAPE OUTPUT					N1	CODA
	ONE INCH	TAPE OUTPUT FOR ASSEMBLER					L1	CODA
	SIMULTANEOUS	TAPE PROCESSOR					M4	WADD
	MAGNETIC	TAPE READ AND WRITE					K3	CODA
		TAPE SEARCH					K3	WADD
		TAPE TO CARD					J9	CODA
		TAPE TO PAPER TAPE					M4	CODA
		TAPE TRACE					N1	WADD
		TAPE TRACE					N1	CODA
		TAPETCO					J9	CODA
		TAPRR					M4	WADD
		TCHEB WL					C1	CODA
		TCHEBY WL F-63					C1	UCSD
		TCHEBY F-62					C1	UCSD
		TCHEBY F-60					C1	UCSD
		TCHEBYCHEV FOLYNOMIALS					E1	CODA
		TCHEBYCHEV FOLYNOMIAL					C1	CODA
		TCHEBYSHEV FOLYNOMIAL GENERATOR					C1	UCSD
		TCHEBYSHEV FOLYNOMIAL GENERATOR					C1	UCSD
		TCHEBYSHEV FOLYNOMIAL GENERATOR					C1	UCSD
		TDUMP					J2	WADD
		TEMPERATURES IN ANY CONCENTRIC CYLINDRICAL CONFIGURATION					Y2	ANL
		TEMPEST II					Y2	CODA
		TEMPEST F-63 1604					Y2	CODA
		TEST					Z	NBSB
		TETRACHORIC ESTIMATION ELEMENTARY LINKAGE					G2	UTEX
		TEXT					J9	WADD
		TEXT MATRIX GENERATOR					F1	UCSD
		TEXT MATRIX GENERATOR					F1	UCSD
		TEXT MATRIX GENERATOR					F1	UCSD
		THEORY					Y2	CODA
		THERMAL NEUTRON SPECTRUM AS A FUNCTION OF POSITION IN A LATTICE					Y2	CODA
		THERMOS F-63					Y2	CODA
		THREE-DIMENSIONAL TWO-GROUP XYZ DIFFUSION CODE					Y2	CODA
		TIME ROUTINE					Q	UCSD
		TIME ROUTINE					Q	UCSD
		TIME SERIES					G7	UCSD
		TIME SERIES ANALYSIS NO. 2					G7	UCSD
		TIMER					Q	UCSD
		TIMER					Q	UCSD
		TMAC					M1	LMSD
		TMATRX F-63					F1	UCSD
		TP					J4	UCSD
		TRACE					N1	CODA
		TRACE					N1	UCSD
		TRACE					N1	UCSD
		TRACE (PAPER TAPE OUTPUT)					N1	WADD
		TRACE SUBROUTINE ENTRIES AND EXITS					N1	CODA
		TRACER 1604 F-63					N1	UCSD
		TRACMT					N1	UCSD
		TRACMT3					N1	CODA
		TRACPT					N1	CODA
		TRADE NAMES					Z1	NBSB
		TRADER					Z1	NBSB
		TRANSFER LIBRARY SUBROUTINES					K3	NBSB
		TRANSFER					K2	CODA
		TRANSFIN					K3	NBSB
		TRANSFORM SLOWING DOWN, FAST SPECTRUM CODE					Y2	CODA
		TRANSIENT TEMPERATURES IN ANY CONCENTRIC CYLINDRICAL CONFIGURATION					Y2	ANL
		TRANSLATOR					Z1	CODA
		TRANSLATOR					Z1	NBSB
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PROGRAM
ABSTRACTS

CO-OP PROGRAM ABSTRACTS

A1 CODA MULTPARC Multiple Precision Arithmetic
Perform arithmetic, transmissive, shift and skip operations on fixed point integers requiring more than one word for storage, 703 locations plus temporary storage.

A1 NBSB DUBLPREC Double Precision Arithmetic Package
Provides double precision (27 digits) floating point in arithmetic FORTRAN, it is compatible with EXTPREC (13 digits) in that both routines use the same calling sequences. Accuracy: 91 bits unrounded (27 decimal places).

A1 NBSB EXTPREC Extended Precision Arithmetic Package F-60
Provides extended precision floating point arithmetic in FORTRAN. Later packages using the same calling sequences will use double or triple precision. Accuracy: 46 bits unrounded.

A1 UTEX DIVRDFX Fractional Fixed Point Rounded Division
Divides and rounds a 96-bit dividend by a 48-bit fractional divisor, 28 locations. Accuracy: 48 bits, 600 microseconds. Configuration: Minimum CO-OP 1604 computer.

A1 UTEX RANADD Double Precision Arithmetic (Six Routines) F-60

A1 UTEX RANDIV

A1 UTEX RANMUL

A1 UTEX RANSUB

ALUTEX DBLREAD

A1 UTEX DBLPRNT

FORTRAN. RANADD-SUB-MUL-DIV given 2 floating point binary numbers consisting of 12-bit EXPC and 84-bit COEF, will compute result in same floating point format. The 6 programs are separate callable FORTRAN subroutines with arguments. DBLREAD transfers up to 27 significant digit decimal numbers from cards to binary floating point. DBLPRNT transfers any number in this form to 27 decimal digits on printed page.

A2 NYU DABS (No abstract available)

A2 UTEX CMD Multiplication and Division of Complex Numbers F-60
FORTRAN. A package of subroutines for computing products and quotients of complex numbers.

A2 UTEX CMSQRT (No abstract available)

A2 UTEX COMAG Modulus of a Complex Number F-60

A2 UTEX COMAG Modulus of a Complex Number CODAP-1

FORTRAN. Compute the modulus of a complex number and set error flag when exponential overflow occurs.

A2 UTEX DBLCMSQRT (No abstract available)

A3 CODA DRIP Double Precision Arithmetic

Perform double precision floating point arithmetic in 1604 language. Timing: (average), add-500 microseconds, subtract-500 microseconds, multiply 1000 microseconds, divide-1500 microseconds.

A3 NBSB CMPLXADD Floating Point Complex Add F-60
 Compute the sum of two floating point complex numbers. 9 locations, 173.6 microseconds, average.

A3 NBSB CMPLXINV Floating Point Complex Invert F-60
 Compute the inverse of a complex number. 11 locations, 353.2 microseconds, average.

A3 NBSB CMPLXMUL Floating Point Complex Multiply F-60
 Compute the product of two floating point complex numbers. 12 locations, 353.6 microseconds, average.

A3 NBSB CMPLXSQR Floating Point Complex Square F-60
 Compute the square of a complex number. 13 locations, 232.8 microseconds, average.

A3 NBSB CMPLXSUB Floating Point Complex Subtract F-60
 Compute the difference between two floating point numbers. 9 locations, 173.6 microseconds, average.

A3 UCSD DPFAD Double Precision Floating Point Arithmetic Subroutine F-60

A3 UCSD DPFAD Double Precision Floating Point Arithmetic Subroutine F-62

A3 UCSD DPFBS Double Precision Floating Point Arithmetic Subroutine F-60

A3 UCSD DPFBS Double Precision Floating Point Arithmetic Subroutine F-62

A3 UCSD DPFMU Double Precision Floating Point Arithmetic Subroutine F-60

A3 UCSD DPFMU Double Precision Floating Point Arithmetic Subroutine F-62

A3 UCSD DPFDV Double Precision Floating Point Arithmetic Subroutine F-60

A3 UCSD DPFDV Double Precision Floating Point Arithmetic Subroutine F-62

FORTTRAN. These routines allow a moderate amount of double precision floating point calculation to be made in the FORTRAN system. Add, subtract, multiply and divide. 419 locations.

B0 ANL B050 DABSF

Finds the absolute value of a double precision variable. COMPASS coded, 3600 FORTRAN compatible. Space required: 5 locations. Machine: standard CO-OP CDC 3600.

B1 ANL ANLB150 ASINF - Floating Point Arcsine-Arccosine

Evaluates the arcsine or arccosine of a floating point argument x , for $|x| < 1$. COMPASS coded, 3600 FORTRAN compatible. Space required: $(101)_{10}$. Machine: standard CO-OP CDC 3600. The approximation used is a Chebyshev approximation generated by Stoer's version of the Remez algorithm. The error is generally less than four units in the last octal digit of the mantissa.

B1 ANL ANLB151 TANF,COTF

Evaluates the tangent or cotangent of a floating point argument X . COMPASS coded, 3600 FORTRAN compatible. Space required: $(89)_{10}$ locations. Machine: standard CO-OP CDC 3600. In the primary range $[-\pi/4, \pi/4]$, results were correct to within four units in the last octal digit of the mantissa, for the 10,000 random arguments tested. In the range $[\pi/4, \infty]$, the tests of 10,000 random arguments indicate there is a minimum of 30 bits of accuracy.

B1 CODA ARCSIN Floating Point Arcsine-Arccosine

Computes the arcsine or arccosine of a single-precision floating point argument, Arcsine-997 microseconds, Arccosine-1080 microseconds, 87 locations.

B1 CODA ASINF Floating Point Arcsine-Arccosine

Computes the Arcsine or Arccosine of a single-precision floating point argument. Space required: 96 locations. Accuracy: at least 34 bit accuracy. Timing: average 849 microseconds for ASINF, 889 microseconds for ACOSF. Configuration: minimum CO-OP computer.

B1 CODA ATAN Floating Point Arctangent

Compute the floating point arctangent in radians of a floating point argument. 557 microseconds, 45 locations.

B1 CODA SINCOSF Sine/Cosine Function for FORTRAN-63

Computes the floating point sine and cosine of floating point arguments. Space required: 128 decimal locations. Accuracy: average accuracy exceeds 35 bits. The worst known case is 34 bits.

B1 CODA SINE Floating Point Sine Cosine

Compute the sine or cosine of a floating point argument X. Sine - 707.4 microseconds, Cosine - 719 microseconds. 36 locations.

B1 CODA TANHF Floating Point Hyperbolic Tangent

Computes the Hyperbolic tangent of a single-precision floating point argument. Space required: 67 locations. Accuracy: at least 34 bit accuracy. Timing: average 784 microseconds. Configuration: Minimum CO-OP, 1604/1604A.

B1 CODA TANX Floating Point Tangent

Compute the floating point tangent of a floating point argument in radians. 597 microseconds, 50 locations.

B1 LMSD ACOS Floating Point Arccosine

Compute the arccosine of a floating point argument, 1685 microseconds, 103 locations.

B1 LMSD ARTYX Arctangent of a Quotient

Computes the arctangent of the quotient (Y/X) and positions the resulting angle in the proper quadrant. Accuracy: 34 bits up to a 500.0 quotient, minimum 25 bits. Timing: 1137 microseconds.

B1 LMSD ASIN Floating Point Arcsine

Compute Arcsine of a floating point argument. 1610 microsec., 103 locations.

B1 LMSD ATAN1 Floating Point Arctangent

Compute the arctangent of a floating point argument, 985 microsec., 103 locations.

B1 LMSD ATAN2 Floating Point Arctangent

Compute arctangent of Y/X, Y and X are floating point numbers, 1135 microsec., 103 locations.

B1 LMSD COS Floating Point Cosine

Computes the cosine of a floating point argument X. Accuracy: 34 bits until the argument approaches $\pi/2$, minimum 25 bits. Timing: 985 microseconds (average).

B1 LMSD SIN Floating Point Sine

Computes the sine of a floating point argument X. Timing: 964 Microseconds (average). Uses subroutines FLOATBIN and UNPACK.

B1 LMSD SINX (No abstract available)

B1 LMSD TANX (No abstract available)

B1 UCSD ARCTAN Arctangent F-60
 B1 UCSD ARCTAN Arctangent F-62
 B1 UCSD ARCTAN Arctangent F-63

Given the pair X,Y ARCTAN finds the ARCTANGENT of Y/X in radians. The result lies between 0 and 2π radians. A machine language FORTRAN subroutine. Space required: 61 cells. Timing: average .394 ms. Accuracy: at least 10 significant decimal digits. Equipment configuration: standard CO-OP computer.

B2 CODA EXP Floating Point Exponential
 Compute the exponential to the base E of a single precision floating point argument. 540 microseconds, 32 locations.

B2 CODA LOG Floating Point Logarithm
 Compute the natural logarithm of a single-precision floating point argument. 560 microseconds, 37 locations.

B2 LMSD EXP Floating Point Exponential
 Compute the exponential of a floating point argument, 717 microsec., 53 locations.

B2 LMSD LOG Floating Point Logarithm
 Compute natural logarithm of a floating point argument, 677 microsec., 37 locations.

B2 NBSB EXPONDES Non-Floating Descending Exponential
 Compute non-floating descending exponentials by use of a truncated Taylor series, 375 microseconds, 18 locations.

B3 ANL ANLB350 LOGF, 3600 FORTRAN Systems Routine for Natural Logarithms
 Evaluates the logarithm of a floating point argument X. COMPASS coded, 3600 FORTRAN compatible. Space required: $(60)_{10}$ locations. Machine: standard CO-OP CDC 3600. Results correct to within three units in the last octal digit of the mantissa for the 120,000 arguments tested.

B3 NYU SIMH (No abstract available)

B4 ANL ANLB450 SQRTF
 Evaluates the square root of a normalized single precision floating point argument x for $x \geq 0$. COMPASS coded, 3600 FORTRAN compatible. Space required: $(31)_{10}$. Machine: standard CO-OP CDC 3600. Accuracy: mantissa correct to 35 bits for the 10,000 random arguments tested.

B4 ANL ANLB451 DSQRT
 Evaluates the square root of a normalized double precision floating point argument x , $x \geq 0$. COMPASS coded, 3600 FORTRAN compatible. Space required: $(37)_{10}$. Machine: standard CO-OP CDC 3600. Accuracy: mantissa was correct to 83 bits for the 10,000 random arguments tested.

B4 ANL ANLB452 CUBERTF

Evaluates the cube root of a normalized floating point number. COMPASS coded, 3600 FORTRAN compatible. Space required: $(43)_{10}$ locations. Machine: standard CO-OP CDC 3600. Results were correct to within two units in the last octal digit of the mantissa for the 10,000 random arguments tested.

B4 ANL ANLB453 DCUBRT

Evaluates the double precision cube root of a normalized double precision variable. COMPASS coded, 3600 FORTRAN compatible. Space required: (55)₁₀. Machine: standard CO-OP CDC 3600. Results were correct to 83 bits for the 10,000 random arguments tested.

B4 CODA SQRT Floating Point Square Root

Compute the square root of a floating point argument, 472 microseconds (Aug.) 27 locations.

B4 LMSD SQRT Floating Point Square Root

Compute square root of a floating point number. 475 microsec., 30 locations.

B4 NBSB SQARTFRC Non-Floating Square Root

Compute the square root of a non-floating number. 550 microseconds, 16 locations.

B4 UOFM DSQRT (No abstract available)

B4 UTEX CSQRT Square Root of a Complex Number

Computes that square root as a complex number whose imaginary part has the same sign as that of an imaginary part of the argument.

B4 UTEX SQRTFX Fixed Point Square Root

Computes square root of single-precision fixed point argument, 33 locations, 460bit accuracy, 6.8 milliseconds. Configuration: minimum CO-OP 1604 computer.

B5 CODA F-63CP FORTRAN-63 Complex Routines

This is a package of FORTRAN-63 complex routines written in CODAP-1. The following routines are included:

CATAN - computes the square root of a complex number,
 CSQRT - computes the square root of a complex number,
 CABS - Computes the magnitude or modulus of a complex number,
 CEXP - computes the natural exponential of a complex number,
 CSIN - computes the sine of a complex number,
 CCOS - computes the cosine of a complex number,
 CLOG - computes the natural logarithm of a complex number,
 CANG - computes the angle associated with a complex number,
 CONJG - computes the conjugate of a complex number.

B5 CODA F-63DP FORTRAN-63 Double Precision Routines

This is a package of FORTRAN-63 double-precision routines written in CODAP-1. The following routines are included:

Q2Q07222 - Computes $D^{**}D$, $D^{**}R$, or $R^{**}D$, where D is type double and R is type real.
 DLOG - computes the double precision natural logarithm of a double precision floating point argument.
 DEXP - computes the double precision natural exponential of a double precision argument.
 DSQRT - computes the double precision square root of a double precision argument
 DSIN - computes the double precision sine of a double precision argument in radians.
 DCOS - computes the double precision cosine of a double precision argument in radians.
 DCUBRT - computes the double precision cube root of a double precision argument
 DATAN - computes the double precision arc tangent of a double precision argument

B5 NYU COMP (No abstract available)

C1 CODA HERM Hermite Polynomial

Evaluate the Hermite polynomial for any real argument X and any order N, 138 + 165 (N-1) microseconds, 24 locations.

C1 CODA LAGUER Laguerre Polynomial

Evaluates the Laguerre polynomial for any real argument X and any order N, 138 + 238 (N-1) microseconds, 24 locations.

C1 CODA LEGEND Legendre Polynomial

Evaluate the Legendre polynomial for any real argument X and any order N, 123 + 247 (N-1) microseconds, 25 locations.

C1 OCDA LSCF Least Square Curve Fit

Simultaneously fit polynomials of a given arbitrary degree to several sets of data consisting of discrete points for the dependent variables, $141 + N(M+1) - M - 2$ locations, M-rank of matrix, $N = M +$ the number of dependent variables.

C1 CODA PADD Polynomial Addition

Given 2 polynomials $a_n X^n + \dots + a_1 X + a_0$, $b_m X^m + \dots + b_1 X + b_0$ find their sum defined by $A_0 + A_1 X + \dots + A_p X^p$, where $A_i = a_i + b_i$, $i = 0, p$

C1 CODA PDIV Polynomial Divide F-60

Given 2 polynomials A, B, compute $A/B = Q + R$.

C1 CODA PMULT Polynomial Multiply F-60

Given 2 polynomials, A, B, both having real floating point coefficients, find the product polynomial $P = AXB$.

C1 CODA PSUB Polynomial Subtract F-60

Finds the difference of two polynomials, $A - B = D$. FORTRAN.

C1 CODA TCHEB Tchebyshev Polynomial

Evaluate the Tchebyshev Polynomial for any real argument X and any order N, $10^9 + 81$ (N-1) microseconds, 16 locations.

C1 LMSD LSQPFT Least Square Curve Fit

Fits an Nth-degree polynomial by the method of least squares. Uses routines POLEV and SIMEQ. Accuracy: 34 bits. Timing: 3 minutes per point.

C1 LMSD POLEV Polynomial Evaluation

Evaluate an Nth degree polynomial at M points, or the first derivative of an Nth degree polynomial at M points. 43 locations.

C1 UCSD HERMIT Hermite Polynomial Generator F-60

C1 UCSD HERMIT Hermite Polynomial Generator F-62

C1 UCSD HERMIT Hermite Polynomial Generator F-63

Computes the values of a hermite polynomial of given order for a given argument. Space required: 19 locations. Timing: average $90 + 200(N+3)$ microseconds for $N \geq 2$, where N represents the order of the polynomial to be evaluated. Equipment configuration: standard CO-OP.

C1 UCSD LAGUER Laguerre Polynomial Generator F-60
 C1 UCSD LAGUER Laguerre Polynomial Generator F-62
 C1 UCSD LAGUER Laguerre Polynomial Generator F-63

Computes the value of a laguerre polynomial of given order for a given argument. Space required: 21 locations. Timing: average 90+200 (N+3) microseconds for N ≥ 2, when N represents the order of the polynomial to be evaluated. Equipment configuration: standard CO-OP.

C1 UCSD LEGEND Legendre Polynomial Generator F-60
 C1 UCSD LEGEND Legendre Polynomial Generator F-62
 C1 UCSD LEGEND Legendre Polynomial Generator F-63

Computes the value of a legendre polynomial of given order for a given argument. Space required: 23 storage locations. Timing: average 90+200 (N+3) microseconds for N ≥ 2, when N represents the order of the polynomial to be evaluated. Equipment configuration: standard CO-OP.

C1 UCSD TCHEBY Chebyshev Polynomial Generator F-60
 C1 UCSD TCHEBY Chebyshev Polynomial Generator F-62
 C1 UCSD TCHEBY Chebyshev Polynomial Generator F-63

FORTTRAN. To compute the value of a Chebyshev polynomial of given order, for a given argument, 17 locations.

C1 UOFM POLYVAL (No abstract available)

C2 UCSD POLYRT Polynomial Solution F-60 or F-62

FORTTRAN. Determines the roots of a polynomial with arbitrary complex coefficients. Each root is located approximately by the Lemmer method and then improved upon by Newtons method. Then a reduced polynomial is obtained by removing this root. This process is repeated until all of the roots are removed. Space required: 1970 unique, 624 common. Configuration: standard CO-OP 1604 computer.

C2 UCSD VIETA Explicit Solution of the General Cubic Equation F-60

C2 UCSD VIETA Explicit Solution of the General Cubic Equation F-62

Uses the Vieta substitution to find the 3 roots of the general cubic equation with real coefficients. Requires 166 locations plus required subroutines. Timing: MTYPE = -1 9.4 millisecs, MTYPE = 0 4.3 millisecs, MTYPE = 1 7.7 milliseconds.

C2 UTEX ALLROOT (No abstract available)

C2 UTEX POLYMUL Roots of Polynomial Equations by Mullers Method F-60

FORTTRAN. To find, using Mullers method, all the roots of a polynomial equation having arbitrary complex coefficients.

C3 ANL ANLC350 GAMMA(X) - Gamma Function

This routine evaluates

$$\Gamma(X) = \int_0^{\infty} e^{-u} u^{X-1} du$$

where X is a real argument presented in single precision floating point format. COMPASS coded, 3600 FORTRAN compatible. Space required: (58)₁₀. Machine: standard CO-OP CDC 3600. A rational Tschebyshev approximation due to John R. Rice is used in the fundamental range 2 ≤ X ≤ 3. The standard recursion relation for Γ functions is used for X outside this fundamental interval. Accuracy for 2 ≤ X ≤ 3 is ~2 bits in the least significant place.

C3 ANL ANLC351 Single Precision Floating Point Bessel Functions

BESSEL computes the sequence $\{F_{v+n}^*\}_{n=0}^N$ ($F^*=J, Y, e^x K, e^{-x} I$) by recursion and addition formulae together with the phrase-amplitude technique described by M. Goldstein and R. M. Thaler for argument $x > 0$ and index $v \in [0, 1]$. It is COMPASS coded, 3600 FORTRAN compatible, 786₁₀ locations in length, and requires a standard 3600 machine configuration. Processes exponent underflow through SCOPE internal interrupt.

C3 ANL ANLC352 GAMIN-Single Precision Incomplete Gamma Function

Evaluates incomplete gamma function $\Gamma(\alpha, X)$ for X non-negative and α arbitrary except for singular points; X and α are single precision floating point numbers. This routine requires $(377)_8 = (255)_{10}$ locations of storage. No common storage is required. The 3600 FORTRAN systems tape must be available. The routine GAMIN uses the 3600-FORTRAN routines Q8QERROR, Q8QENTRY, LOGF, EXPF, and SINF.

C3 ANL ANLC354 ELLIPK-Complete Elliptic Integral K Floating Point Routine

Evaluates the complete elliptic integral $K(k)$ for $0 \leq k^2 < 1$. COMPASS coded, 3600 FORTRAN compatible. Space required: $(51)_{10}$ locations. Machine: standard CO-OP CDC 3600. The approximation used is a Chebyshev approximation of the Hastings form for the complete elliptic integral K . The error is less than three units in the last octal digit of the mantissa for arguments tested.

C3 ANL ANLC355 ELLIPE-Complete Elliptic Integral E

Evaluates the complete elliptic integral $E(k)$ for $0 \leq k^2 \leq 1$. COMPASS coded, 3600 FORTRAN compatible. Space required: $(51)_{10}$. Machine: standard CO-OP CDC 3600. The approximation used is a Chebyshev approximation of the Hastings form for the complete elliptic integral E . The error is less than two units in the last octal of the mantissa for arguments tested.

C3 NBSB BEAUTY Generalized Hypergeometric Functions

Evaluates a hypergeometric function. Space required: 2491 locations. Accuracy: depends on EP.

C3 NBSB STEPF Fourier Step

Evaluates the fourier unit step function. Space required: 8 locations. Timing: 37 microseconds average.

C3 SAND ELLPINT (No abstract available)

C3 SAND GAMMALN (No abstract available)

C3 NYU GAA (No abstract available)

C3 UCSD BES Bessel Function F-60

C3 UCSD BES Bessel Function F-62

C3 UCSD BES Bessel Function F-63

Evaluates for a given X and N , where X is a normalized floating point number and N is a fixed point integer. Space required: 220 locations. Accuracy: largest discrepancy found was ± 1 in the 9th significant figure.

C3 UCSD BESSELC (No abstract available)

C3 UCSD BESSELI (No abstract available)

C3 UCSD BESSELR (No abstract available)

C3 UCSD BESSEL Modified Bessel Function F-60
 C3 UCSD BESSEL Modified Bessel Function F-62
 C3 UCSD BESSEL Modified Bessel Function F-63

Computes the modified bessel function, $Z = I_A(X)$, for floating point order A and floating point argument X. FORTRAN. Space required: 103 locations. Timing: approximately $1700 + 300 N$ microseconds where N = number of iterations for convergence. Accuracy: the routine stops iterating when successive values of Z differ by a quantity equal to or less than 10 to the -11 power. Equipment configuration: standard CO-OP 1604.

C3 UCSD BFFGH Spherical Bessel Function F-60
 C3 UCSD BFFGH Spherical Bessel Function F-62
 C3 UCSD BFFGH Spherical Bessel Function F-63

Calculates the spherical bessel function of the first kind and of the second kind together with the first and second derivatives for a given argument. Space required: 1022 locations. Timing: about 1 ms for low order calls, about 5 ms for order 10 and about 10 ms for order 20. Accuracy: output up to order of 50 agrees to the sixth decimal place with table in Watson.

C3 UCSD GAMMA Gamma Function for Complex Argument F-60
 C3 UCSD GAMMA Gamma Function for Complex Argument F-62
 C3 UCSD GAMMA Gamma Function for Complex Argument F-63

Computes the complex value of the gamma function of a complex argument, requires 462 cells in F-62, 619 cells in F-60. Configuration: minimum 1604.

C3 UCSD NPOA Normal Probability Function F-60
 C3 UCSD NPOA Normal Probability Function F-62
 C3 UCSD NPOA Normal Probability Function F-63

Computes the ordinate (derivative) and/or area of either of two normal probability functions. The area of either function can be obtained in five different forms of areal segments, namely, 1. central, 2. semi central, 3. two-tail, 4. single-tail, 5. cumulative from $-\infty$. FORTRAN subroutine. Space required: 317 locations. Timing: ordinate and area - 35 milliseconds. Accuracy: relative error for ordinate, less than $3(10)$ to the -9 power, for area, less than $15(10)$ to the -8 power.

C3 UCSD RCPGAMI Reciprocal Gamma Function for Complex Argument F-60
 C3 UCSD RCPGAMI Reciprocal Gamma Function for Complex Argument F-62
 C3 UCSD RCPGAMI Reciprocal Gamma Function for Complex Argument F-63

Computes the complex value of the reciprocal gamma function of a complex argument $Z = X + iY$, where $-1 \leq X \leq 1$, $-1 \leq Y \leq 1$. FORTRAN. Space required: 173 locations. Timing: 10 milliseconds average. Accuracy: minimum of 10 decimal digits. Equipment configuration: standard CO-OP computer.

C3 UCSD RCPGAMR Evaluation of Reciprocal Gamma Function Real Argument F-60
 C3 UCSD RCPGAMR Evaluation of Reciprocal Gamma Function Real Argument F-62
 C3 UCSD RCPGAMR Evaluation of Reciprocal Gamma Function Real Argument F-63

Computes the floating point reciprocal gamma function of a real argument, $Z = \text{GAMMA}(X)$. FORTRAN. Space required: 130 locations. Timing: for $-10 < X < 90$, average execution time is 5.667 milliseconds for integers and 8.167 milliseconds for non-integers. Accuracy: maximum error found was 3×10 to the -9 power.

C3 UCSD SPHEBE Spherical Bessel Function F-60

C3 UCSD SPHEBE Spherical Bessel Function F-62

C3 UCSD SPHEBE Spherical Bessel Function F-63

Evaluates a spherical bessel function routine. FORTRAN. Space required: 203 locations. Timing: if LEL is positive, $(6.35 + .54 (M))$ milliseconds, if LEL is negative, $(.08 + .63 |LEL|)$ milliseconds. LEL equals the order of the function and M equals the array size. Accuracy: some answers differ from the tabular values by ± 1 in the 10th significant digit. Otherwise, complete agreement exists. Equipment configuration: standard CO-OP computer.

C3 UOFM CDFN (No abstract available)

C3 UOFM ERFN (No abstract available)

C3 UOFM CDFNI (No abstract available)

C3 UTEX BESSEL (No abstract available)

C3 UTEX MAXMIN A Maximum or a Minimum of Certain Arbitrary Functions F-60

Determines a maximum or a minimum of an arbitrary function of 1 to 10 variables. Requires 931 locations. Configuration: minimum 1604.

D1 NBSB TRAPZ Trapezoidal Rule Integration, FORTRAN

Evaluates the integral of $F(X)DX$ for a succession of $F(X)$'s by the trapezoidal rule. Space required: 164 locations. Timing: 850 microseconds average.

D1 NSAR DYSAC (No abstract available)

D1 SAND GAUSSN (No abstract available)

D1 SAND NEWTN (No abstract available)

D1 UCSD SIMCON Quadrature by Simpson's Rule F-60

D1 UCSD SIMCON Quadrature by Simpson's Rule F-62

D1 UCSD SIMCON Quadrature by Simpson's Rule F-63

Error in approximation is determined by a relative difference used in calling sequence, 141 locations. Configuration: minimum CO-OP 1604 computer.

D1 UCSD SIMDUB Double Integration by Simpson's Rule F-60

D1 UCSD SIMDUB Double Integration by Simpson's Rule F-62

D1 UCSD SIMDUB Double Integration by Simpson's Rule F-63

Error in approximation is determined by user in calling sequence, 422 locations. Configuration: minimum CO-OP 1604 computer.

D1 UCSD SIMRUN Tabular Integral of a Tabular Function by Simpson's Rule F-60

D1 UCSD SIMRUN Tabular Integral of a Tabular Function by Simpson's Rule F-62

D1 UCSD SIMRUN Tabular Integral of a Tabular Function by Simpson's Rule F-63

The integral $F(X)DX$ is approximated by Simpson's rule for the tabular function F. Space required: 66 cells.

D1 UCSD TRAP Trapezoidal Rule Integration F-60

D1 UCSD TRAP Trapezoidal Rule Integration F-62

FORTTRAN-60 or 62, 38 locations, timing $107.4 + 11.8(IN=2)$ microseconds where IN is integral number of values in F array. Configuration: minimum CO-OP 1604 computer.

D1 UOFM ROM1F (No abstract available)

D1 UOFM ROM2F (No abstract available)

D2 CODA NMI2 Numerical Integration of Ordinary Differential Equations
Integrate a set of N simultaneous first order differential equations. Either Runge-Kutta or Adams-Moulton integration scheme. 700 locations plus 610 locations required by J5 LMSD OUTPUT.

D2 NPGS NMI1 Numerical Solution of Ordinary Differential Equations
Integrates a system of N first order differential equations using the Runge-Kutta-Gill method. 79 locations.

D2 SAND APAMS (No abstract available)

D2 SAND MILNE (No abstract available)

D2 UCSD 1INTEG Numerical Sol of Ordinary 2nd Order Diff Equations F-60
D2 UCSD 1INTEG Numerical Sol of Ordinary 2nd Order Diff Equations F-63
FORTRAN. This routine integrates a second-order differential equations using a Runge-Kutta fourth-order method. The interval of integration is easily changed although the change is not automatic. 740 locations.

D2 UCSD RKLDEQ Runge-Kutta-Gill Linear Differential Equation Solver F-60
D2 UCSD RKLDEQ Runge-Kutta-Gill Linear Differential Equation Solver F-62
D2 UCSD RKLDEQ Runge-Kutta-Gill Linear Differential Equation Solver F-63
Solves a system of N first order ordinary differential equations by the Runge-Kutta-Gill fourth-order method. FORTRAN subroutine. Space required: 135 locations. Timing: approximately 560 + 820 N microseconds where N equals the number of equations. Accuracy: depends on the differential equation and the step size used. Equipment configuration: standard CO-OP computer.

D2 UOFM RKGHN (No abstract available)

D2 UTEX RKAM (No abstract available)

D2 UTEX RKAMPDP Numerical Solution of Ordinary Differential Equations F-60
FORTRAN. Solve over a given interval using a given set of initial conditions a system of N simultaneous differential equations using Adams-Moulton procedure with Runge-Kutta starter and some partial double precision arithmetic.

D2 UTEX RKAMSUB (No abstract available)

D5 UCSD EXTREM Multidimensional Extremem Seeker F-60
D5 UCSD EXTREM Multidimensional Extremem Seeker F-62
D5 UCSD EXTREM Multidimensional Extremem Seeker F-63
Finds maxima, minima or saddle points for a single function of up to 20 parameters. Suitable only for sufficiently smooth functions whose extrema can be reached from the starting point by sequences of parabolic extrapolations. Space required: 1196 locations plus requirement for function SURF. Timing: SURF is executed (IND1+1) times and MATINV twice per iteration. IND1 is the number of parameters to be adjusted. Accuracy: capable of obtaining about 10 decimal places in the value of SURF at the extremum. Equipment configuration: standard CO-OP computer.

E1 CODA COLTCHEB (No abstract available)

E1 CODA INTERP Polynomial Interpolation

Approximate the value of an argument by a polynomial interpolation. 86 plus order of interpolation locations.

E1 CODA INTERP1 Divided Difference Interpolation or Extrapolation

Approximate the functional value of a floating point argument from a table of M values of polynomial interpolation and extrapolation.

E1 CODA ITPF1 Nth Order Floating Point Lagrangian Interpolation

Pass a polynomial of specified degree through N points, evaluate the polynomial at a given argument. 57 + N locations.

E1 CODA MATINT Matrix Lookup

Find $Z=F(X,Y)$ by double linear interpolation on a given set of Z values. Approximately $1100+55(N+M)/2$ microseconds. 85 locations

E1 UCSD PADE Pade Approximant, Rational Approximation of Functions F-60

E1 UCSD PADE Pade Approximant, Rational Approximation of Functions F-62

E1 UCSD PADE Pade Approximant, Rational Approximation of Functions F-63

Represented by formal power series. Computes the (D,N) pade approximant to a function represented by a formal power series. Evaluates the pade approximant at a table of value, computes the location of the roots of the numerator and denominator, and residue at the real roots of the denominator, and the reciprocal of the residue of the reciprocal of the pade approximant at the real roots of the numerator. FORTRAN. Space required: about 4000 locations and about a dozen FORTRAN subroutines. Accuracy: double precision (about 21 decimal places). Equipment configuration: standard CO-OP computer.

E1 UOFM AITKENF (No abstract available)

E2 SAND GENLSQ (No abstract available)

E2 UCSD LDQPOL Least Squares Polynomial Fitting F-60

E2 UCSD LDQPOL Least Squares Polynomial Fitting F-62

E2 UCSD LDQPOL Least Squares Polynomial Fitting F-63

Given X ($X_1, X_2, \dots, X_M$) and F ($F_1, F_2, \dots, F_M$) where F_1 is the observed dependent variable and X_1 is the observed independent variable, the polynomial $Y = B_1 + B_2 X + \dots + B_{K+1} X^K$ is fitted for all degrees K, $1 \leq K \leq K_{MAX}$ with certain options. FORTRAN. Space required: 1874 locations. Timing: roughly two seconds per degree of fit for 30 data points. Accuracy: floating point, single precision. Equipment configuration: standard CO-OP computer.

E2 UOFM ORTHON (No abstract available)

E2 UTEX LSCFWOP Least Squares Curve Fitting with Orthogonal Polynomials F-60

E2 UTEX LSCFWOP Least Squares Curve Fitting with Orthogonal Polynomials F-63

Computes method of least squares using polynomial degree K ($K \neq 100$) which fit $M(M \neq 4000)$ data points. Configuration: minimum CO-OP 1604 computer.

F1 ANL ANLF150 Package of Routine to Perform the Householder Reduction on Complex Matrices and to Calculate Eigensystems or Hermitian Matrices

This package contains ALGOL procedures and equivalent FORTRAN 3600 subroutines that accept a complex square matrix and use Householder's method to reduce it to upper Hessenberg form (i.e. an element in row i and column j is equal to zero if $j < i-1$). The routines include an additional unitary similarity that causes the elements of the lower subdiagonal of the reduced matrix to become real. Routines are also included for transforming the eigenvectors of the intermediate real symmetric tridiagonal matrix to those of the original hermitian matrix. These routines will also transform the eigenvectors (however obtained) of the upper Hessenberg matrix to those of the original nonhermitian matrix. Routines are written in both ALGOL for the 3600 and in FORTRAN 3600. Machine: standard CO-OP CDC 3600.

F1 ANL ANLF151 Accumulating Inner Product

Computes an inner product plus an extra term with intermediate results in double precision. COMPASS coded, for use by ALGOL programs compiled by the 3600 ALDAP compiler. By the use of call by name, this procedure can do inner products of vectors; rows, columns, or diagonals of matrices; or indeed any functions of an integer variable. Space required: $(40)_{10}$.

F1 CODA MATINV Matrix Inversion with Solution of Linear Equations F-63

This is a revision of F1 NBSB MATINV, modified to use the variable dimension facility of FORTRAN-63. It solves the matrix equation $AX=B$, where A is a square coefficient matrix and R is a matrix of constant vectors. The inverse and the determinant of A are also computed. Space required: 384 locations. Accuracy: accuracy depends on the condition of the input matrix. Timing: approximately $1/5 (N/10)$ cubed secs. to invert a 50×50 matrix would then take 25 secs. Configuration: standard CO-OP computer using FORTRAN-63.

F1 CODA MPROF Matrix Multiply

Compute the product of two rectangular matrices of elements in single precision floating point. $((77N+31)K+12) M+400$ microsec. 101 locations.

F1 CODA MTRANS Matrix Transpose

Transpose a rectangular matrix whose elements are single precision numbers. $25 + 2 (M \times N)$ locations.

F1 LMSD MATIN Matrix Inversion

Invert an N by N matrix of floating point terms. $55 (2 N \text{ cubed} + N)$ microsec. per iteration. $160 \text{ plus } 2 N \text{ squared} + N + 31$ locations.

F1 LMSD MTXMPY Matrix Multiply

Multiply an M by N matrix by an N by R matrix. 31 locations

F1 NBSB MATINV Matrix Inversion with Accompanying Solution of Lin. Equ.

Solves the matrix equation $AX=B$, where A is a square coefficient matrix and B is a matrix of constant vectors. The inverse A^{*-1} and the determinant of A are also computed. Space required: $505 + N$ locations.

F1 UCSD DPMATS Double Precision Matrix Inversion F-60

F1 UCSD DPMATS Double Precision Matrix Inversion F-62

F1 UCSD DPMATS Double Precision Matrix Inversion F-63

Solves the matrix equation $AX=B$, using double precision arithmetic where A is a square coefficient matrix and B is a matrix of constant vectors. The determinant of A, and A to the -1 are obtained. FORTRAN. Space required: $1160_8 (624)_{10}$ unique, $+147_8 (103)_{10}$ common. Timing: when using program without double precision arithmetic, running time is approximately proportional to N^3 , for $N=75$ approximately 4.5 minutes, to this estimate add time proportional to $3.3 N^3$ milliseconds for double precision arithmetic.

F1 UCSD HPMINV High Precision Matrix Inversion F-60

F1 UCSD HPMINV High Precision Matrix Inversion F-62

F1 UCSD HPMINV High Precision Matrix Inversion F-63

Computes a high precision inverse from an $N \times N$ matrix by first forming the approximate inverse and then by successive iterations, enriches the inverse by geometric progression. FORTRAN. Space required: 5552 locations. Timing: approximately $(700 + 550M) N^3$ microseconds. (M=number of iterations). Accuracy: depends upon number of iterations. Equipment configuration: standard CO-OP computer.

F2 UOFM JACOBIN Matrix Eigenvalue and Eigenvector F-60
 FORTRAN-60, symbolic calculates eigenvalues and eigenvectors optionally of symmetric matrix A with elements A(I,J). Jacobin is independent of dimension statement. 233 locations. 75x75-AB matrix. Timing: 6.75 min. Configuration: minimum CO-OP 1604 computer.

F2 UTEX JCBFIX (No abstract available)

F2 UTEX MATSUB Eigenvalues and Eigenvectors of Complex Non-Herm, Matrices F-60
 FORTRAN subroutine. Given a square matrix with real or complex elements, not necessarily Hermitian, find all eigenvalues and one eigenvector for each eigenvalue.

F2 UTEX MATVEC Eigenvalues and Eigenvectors of Complex Non-Herm, Matrices F-60
 FORTRAN program. Given a square matrix with real or complex elements, not necessarily Hermitian, find all eigenvalues and one eigenvector for each eigenvalue. Executable as a main program.

F3 CODA DETF FORTRAN Function for Determinant Evaluation, DETF(A,N)
 Evaluates the determinant of an arbitrary matrix. Space required: variable.
 Timing: $T(N) = 47.3 + 25.5N$ N^{**2} microseconds. Accuracy: at least 9 significant decimal digits for well conditioned matrices or orders 50 and larger.

F3 UTEX CDTERM Determinant of a Complex Matrix F-60
 FORTRAN. Compute the determinant of an N-th order complex matrix by the Gauss method of elimination with row pivoting.

F3 UTEX DTERM Determinant of a Real Matrix F-60
 FORTRAN. Compute the determinant of an N-th order real matrix by the Gauss method of elimination with row pivoting.

F4 ANL ANLF450 LINEARSYSTEM, Crout with Equilibration and Iteration
 Solves the matrix equation $AX=B$ where A is n by n and B and X are n by m. Equilibrates the system first, then uses the Crout algorithm to factor A into upper and lower triangular factors, then after solving for X, iterates to improve the solution. ALGOL coded for the 3600. Space requirements: about (709)₁₀ when run externally, somewhat less as an internal procedure. Requires ANLF151, AIP.

F4 CODA MATALG (No abstract available)

F4 CODA MATEQ FORTRAN Simultaneous Linear Equations Subroutine F-60
 Solves systems of simultaneous linear equations or inverts an arbitrary matrix. Accuracy: at least 9 significant decimal digits for well conditioned matrices of orders 50 and larger. Timing: $T(N) = (152 + 90.9N)N^{**2}$ for a matrix inversion. $T(N,NV) = (47.3 + 78.1 NV + 25.5N)N^{**2}$, for simultaneous equations.

F4 LMSD SIMEQ Solution of Simultaneous Equations
 Solve an N by N system of simultaneous equations of floating point terms, 56 (N cubed + 3 + 2 N squared + 8 N + 8) microsec. 95 plus (N + 1) squared locations.

F4 NBSB ONEPASS One Pass Simultaneous Equations
 Solves a set of linear simultaneous equations with any number of right hand sides within limits set by space (presently 330 columns). Space required: all memory. Timing: less than $50(N^{**3})$ microseconds where N is the number of columns. Input and output must be added to the above time.

F4 SAND GERIAC Gaussian Elimination with Row Interchange and Corrections
Solves a system of simultaneous linear algebraic equations or to invert a matrix.
Space required: about 1150 exclusive of the working arrays A, B, X, and INT.
Accuracy: depends on the condition of the coefficient matrix.

F4 SAND SOLVEQ Solution of Simultaneous Equations
Solves MxM system of floating point number simultaneous equations, or reduces set of equations to ECHELON form for diagnosis. 146 locations. Configuration: minimum CO-OP 1604 computer.

F4 UOFM MATRID (No abstract available)

F4 UTEX GAUSS2 (No abstract available)

F4 UTEX JCBFLO Eigenvalues and Eigenvectors of a Real Symmetric Matrix
By the Cyclic-Threshold-Jacobi method. 227 locations. Timing: approx. proportional to N^3 . Configuration: minimum CO-OP 1604 computer.

F4 UTEX LINEQN Solution of Simultaneous Linear Algebraic Equations F-60
FORTRAN. Solution of linear algebraic equations is accomplished by the Gauss method of elimination with row pivoting and rack substitution.

G1 UTEX COMPILE Frequency Distribution and Descriptive Statistics
Produces frequency distribution, means, standard deviations for series of integer variables. Configuration: minimum CO-OP 1604 computer.

G1 UTEX PARAMET Basic Descriptive Statistics
Computes means, standard deviations, variances, standard errors of means, and critical ratios for Skewness and Kurtosis for a series of variables. Configuration: minimum CO-OP 1604 computer.

G2 NBSB AUTOCOR Auto-Correlation Analysis
Given a series of values $X(1)$, $X(2)$, this program will compute the product-moment correlation coefficient (auto-correlation) between successive terms, where the LAG(K) goes from 0, 1, ..L. Space required: 1.781 locations.

G2 NBSB MANYCOR Correlation Analysis
Given M sets of data, this program calculates the mean, corrected sum of squares, variance, and standard deviation for each set. Also computes the regression coefficients, (linear) correlation coefficients, and the standard error of estimate for all possible combinations of sets of data. Requires 9.153 locations.

G2 NBSB TVAMRCA Multiple Regression, Comprehensive Analysis
Incorporates all normal phases of statistical regression analysis. The standard statistical coefficients, standard errors, sums of squares, and averages are computed and printed. Predictions and residual errors for each item in the data are computed and printed. Program includes two optional features. 1. A list of synthetic observations may be prepared in advance and added to the list of observations used in fitting. 2. The regression equation may be re-evaluated with any number of any combination of variables excluded. Space required: 6.726 locations.

G2 NPGS BIMD06 Multiple Regression and Correlation Analysis No. 1 F-60-63
The maximum number of variables is 30. The upper limitation on sample size is 9999. The lower limitation is two greater than the number of variables. Any variable in the set of the original variables can be named the dependent variable. There is no limit to the number of replacements. The maximum number of independent variables which can be deleted at one time is 28. There is no limit to the number of deletions of different sets of independent variables.

G2 NPGS BIMD07 Multiple Regression and Correlation Analysis No. 2 F-60-63
Performs multiple regression and correlation analyses by selecting different combinations of subsample data that are obtained from the same population. The maximum number of subsamples is 28. There is no limit to the number of selections of various combinations of subsamples. Subsamples must be arranged in blocks. The largest number of variables allowed is 30. The upper limitation on the total sample size of all subsamples combined is 32,000.

G2 NPGS BIMD08 Polynomial Regression F-60-63
Computes polynomial regressions successively up to the degree specified in the problem card. The highest degree polynomial regression which can be computed is 10th degree polynomial regression. The upper limitation on sample size is 500.

G2 NPGS BIMD09 Stepwise Multiple Regression F-60-63
Performs a multiple linear regression upon input data consisting of N sets of data containing P independent variables and one dependent variable.

G2 NPGS BIMD20 Analysis of Covariance No. 2 F-60-63
Performs an analysis of covariance with a single variable of classification and unequal sample sizes. Subsets and combinations of subsets can be selected from the data. The maximum number of groups is 705. As many as 999 replicates are allowed. The upper limitation on the total sample size of all replicates is 32,000. The maximum number of subset specifications is 500. There is no limit to the number of combinations of subsets. The maximum number of subsets in a combination is 23.

G2 NPGS BIMD29 Multiple Regression No. 3 (Modified 06) F-60-63
A modification and extension of BIMD 06. The primary modification is that the independent variables are listed in the order of their importance based on the reduction of sum of squares of the dependent variable attributable successively to each independent variable. Additional output includes cumulative - (1) standard errors of estimate, (2) Sums of squares, (3) proportions of variance, (4) F-values, and (5) Multiple correlation coefficient. BIMD09 and 34 also order the independent variables but on different bases. The maximum number of variables is 60. The upper limitation on sample size is 99,999, and the lower limitation is two greater than the number of variables.

G2 NPGS BIMD31 General Linear Hypothesis F-60-63
Similar to BIMD14 in that analysis of the statistical significance of independent variables (for those experimental designs that can be formulated in terms of the general linear hypothesis model) is performed. Handles balanced or unbalanced analysis-of-variance and covariance type designs. Computes as many contrasts as desired and the corresponding hypotheses may be tested.

G2 UCSD BIMD Multiple Regression and Correlation Analysis F-60-63
 FORTRAN. This program performs multiple regression and correlation analysis on a maximum of 30 variables. The maximum number of independent variables that can be deleted at one time is 28. The number of replacements is not limited. The program can make a log base 10, square root, or square transformation on any or all of the variables as desired. 17,572 unique storage locations, 4,958 common storage locations.

G2 UTEX ABSTRIC (No abstract available)

G2 UTEX AUTOCROS (No abstract available)

G2 UTEX CORMAT Basic Statistics, Intercorrelation, Tetrachoric Estimation and Elementary Linkage Analysis F-60
 Computes means, standard deviations, and intercorrelations for K variables, options for computation of tetrachoric estimates from PHI coefficients and elementary linkage (cluster) analysis of variables, 20,500 locations. FORTRAN. Configuration: minimum CO-OP 1604 computer.

G2 UTEX CORRD Pearson Product-Moment Correlation Coefficients F-60
 FORTRAN. Computes means, standard deviations and correlation coefficients for K variables on N cases, 10,500 locations. Configuration: standard CO-OP computer plus on-line card reader and printer.

G2 UTEX FACT Intercorrelation, Principal 1X9S Factor Analysis and normalized Varimax rotation F-60
 FORTRAN. Determines means, standard deviations and intercorrelation coefficients among K variables, extracts principal axis factor loading from correlation matrix, to rotate axes orthogonally using normalized varimax method, 30,000 locations. Configuration: minimum CO-OP 1604 computer with a 32 K memory.

G2 UTEX REGRANEL (No abstract available)

G4 CODA ERRORF ERRORF
 Allow computation of error deviation, eliminating the need for error deviation table, 1625 microseconds. 42 locations.

G4 NPGS BIMD11 Analysis of Variance No. 1 F-60-63
 This program computes - (1) analysis of variance for a complete factorial design, (2) a breakdown of sums of squares into orthogonal components for as many as 4 variables. For these variables, tables consisting of interaction means bordered by column and row means are involved. 8 variables may be processed. There is no limitation on the number of replicates. The number of categories or levels of any one variable cannot exceed 999, and input data in one replicate cannot exceed 12,490.

G4 NPGS BIMD12 (No abstract available)

G4 NPGS BIMD13 Analysis of Covariance F-60-63
 Computes analysis of covariance. Two to six analysis of variance variables may be processed with as many as eight covariates. 999 replicates are allowed, the number of categories or levels of any one variable cannot exceed 999, and input data in one replicate cannot exceed 11,655.

G4 NPGS BIMD14 General Linear Hypothesis for Anova F-60-63

Analyzes the statistical significance of independent variables for those experimental designs that can be formulated in terms of the general linear hypothesis model. The variables that may be analyzed are of two general types: classification or analysis of variance variables, and regression variables or covariates, the program can analyze unbalanced analysis of variance and covariance designs according to stated hypotheses. As many as 9 hypotheses may be stated. The program can perform a transformation of the input data by means of a designation in the problem card. Allows trans-generation.

G4 UTEX SCANOVA Single Classification Analysis of Variance

Computes and prints group means, standard deviations, sum X , and N , intermediate terms, F-ratios and intraclass correlation coefficients for a series of variables. Requires 20,500 locations. Configuration: minimum 1604.

G5 ANL ANLG550 RANF

Produces a uniformly distributed sequence of random numbers. Statistical distribution improved over that for current 3600 systems routine. Returns full 36 bit random mantissa in floating point, 47 bit fixed point number or 47 bit integer. COMPASS coded, 3600 FORTRAN compatible. Space required (36)₁₀. Machine: standard CO-OP CDC 3600.

G5 CODA RANF Uniformly Distributed Pseudo-Random Number Generator F-63

Repeated use of RANF generates a uniformly distributed sequence of random numbers in either fixed or floating point format. If floating is used, the numbers range from 0 to 1. If fixed point is used, the range is 0 to 1 (if interpreted as a fraction) or 1 to 2 to the 47th - 1 (if interpreted as an integer), RANFGET allows one to extract the current generative number, and RANFSET enables one to replace it. Space required: 22 locations (decimal). Timing: floating point, approximately 90 microseconds, fixed point, about 75 microseconds. Configuration: a standard CO-OP 1604 computer using FORTRAN-63.

G5 CODA RNDEV Pseudo-Random Deviate Generator

Generate Pseudo-Random floating point numbers according to Gauss distribution, mean-0, variance-1, 1400 microseconds, 21 locations.

G5 NBSB RANDOM Random Number Generator

Generates Pseudo-Random numbers uniformly distributed between zero and one.

G5 NPGS RAN1 Uniformly Distributed Random Number Generator

Produce a sequence of random numbers in the range 0 less than N less than 1. Output available in A in floating point or in Q as a binary fraction. 10 locations.

G5 SAND SBELL1 Subroutine SBELL1 F-60

Generates 16 digit octal numbers by geometric progression, multiplication is by shifts, multiplier is 100000005. It also converts the output to normalized floating point form, uniform, on the interval (0.1). Space required: 20 cells. Timing: 270 milliseconds per random number. This includes subroutine entry and exit time.

G5 SAND SBELL2 SBELL2 F-60

Generates 16 digit octal numbers uniformly distributed on (0,1) and random standard normal deviates. Space required: 17 cells plus 129 constants. Timing: 230 milliseconds/deviate. (Includes subroutine entry and exit time.)

G5 UCSD RANDOM2 Fast Random Number Generator F-63

Provides for rapid production of uniformly distributed pseudo random numbers in floating point form. One pseudo random, floating point number is produced for each call of the subroutine random (R). The numbers are uniformly distributed in the interval $0 < R < 1$. The program is a FORTRAN function written in machine format. The value of the pseudo random number is returned to the main program in cell R and may also be used in the arithmetic statement which calls for the execution of the function. Space required: 12 decimal locations. Timing: 179 microseconds (average of 100,000 calls). Accuracy: only the four most significant digits should be considered to be uniformly distributed. Equipment configuration: standard CO-OP computer.

G5 UCSD RANDM Random Number Generator F-62 or F-63

Produces Pseudo-Random numbers in either floating point or integer form. The floating point numbers range between zero and 1 and the integers are 47-bit numbers. A provision is included to allow the programmer to continue the string of random numbers between separate runs rather than starting at the same point each time. Space required (decimal):- 27 (FORTRAN 62) 29 (FORTRAN 63). Timing: approximately 220 microseconds. Configuration: standard CO-OP computer.

G5 UTEX RANUM Positive Fixed Point Random Number Generator

Generates a series of random positive fixed-point numbers within a specific range. Configuration: minimum 1604.

G7 NPGS BIMD21 Periodic Regression

Performs periodic or harmonic regression analysis. Computes the periodic regressions successively up to the harmonic (N) specified in the problem card, it may stop well short of this, if a good fit is achieved with fewer terms. Computes and prints out an analysis of variance table after each harmonic, successively, for analysis of covariance, only a single covariate is allowed at one time. There is no limit to the number of covariates that can be processed singly. The number of harmonics in the analysis of covariance is the same as that determined by the direct analysis of the dependent variable.

G7 NPGS BIMD30 Asymptotic Regression F-60-63

Performs asymptotic regression analysis. As many as 99 different regression fits can be analyzed with an original set of data by using different transformations (and combinations of transformations) on the dependent variable Y, output includes: estimates of parameters, their standard errors, their variance-covariance matrix, an analysis of variance table, and a table of predicted and observed values for each curve fitted.

G7 NPGS BIMD35 Time Series Analysis No. 2 F-60

Cross-correlation and cross-spectral analysis of several series.

G7 UCSD TUKEY TUKEY Spectrum, Cross Spectra and Power Spectra F-60

G7 UCSD TUKEY TUKEY Spectrum, Cross Spectra and Power Spectra F-62

G7 UCSD TUKEY TUKEY Spectrum, Cross Spectra and Power Spectra F-63

FORTRAN. This time series analysis program contains three basic subroutines, the first two, filter and removal of trend, prepare the data for the spectrum analysis subprogram. TUKEY spectrum computes for the two simultaneous time series the cross (co-and quadrature-) spectra and the two power spectra. Phase and coherence are calculated. 15,000 locations.

G8 NPGS BIMD02 Component Analysis F-60

This program computes: (1) correlation coefficients. (2) eigen-values, including the cumulative proportion of total variance. (3) eigen-vectors (principal components of standardized data). (4) rank order of each standardized case, ordered by size of each principal component separately. The maximum number of variables is 25. The upper limitation on sample size is 145 cases. Allows trans-generation.

G8 NPGS BIMD03 Regression on Primary Principal Components F-60

This program computes: (1) correlation coefficients. (2) eigen-values including cumulative proportion of total variance. (3) eigen-vectors (principal components of standardized data). (4) rank order of each standardized case ordered by size of each principal component separately. (5) coefficients of regression equations using orthogonal components as independent variables for each dependent variable. (6) reduction in sum of squares of the residuals due to using orthogonal components. (7) coefficients of the regression equation when only first, first two, first three and all components are used as independent variables where each component is expressed in terms of the standardized data. Maximum number of independent variables and dependent variables are 25 and 20 respectively. The upper limitation on sample size is 150 cases. Allows trans-generation.

G8 NPGS BIMD04 Discriminant Analysis - Several Groups F-60

This program computes: (1) mean scores. (2) matrix of cross products of deviation from means. (3) dispersion matrix. (4) inverse of dispersion matrix. (5) coefficients and constants. (6) evaluation of classification function for each individual. (7) classification matrix. The largest number of groups which can be processed is 5. The maximum number of variables which can be processed is 25. The variables must be the same for all groups. The upper limitation on group size is 150. The sample size may be different from one group to another. Allows trans-generation.

G8 NPGS BIMD05 Discriminant Analysis - Two Groups F-60-63

Computes a linear function of N variables measured on each individual of two groups which in a certain sense serves as a test index for discrimination between the groups. The criterion of best is that the difference between the mean indices for the two groups divided by a pooled standard deviation of the indices should be as large as possible. Only two population groups can be processed. The maximum number of variables which can be processed is 25. The variables must be the same for both groups. The upper limitation on group size is 200. The size may be different from one group to another. Allows trans-generation.

G8 NPGS BIMD17 Factor Analysis F-60-63

This program computes: (1) means and standard deviations. (2) correlation coefficients. (3) eigenvalues including cumulative proportions of total variance. (4) eigenvectors. (5) factor matrix. (6) factor check matrix. (7) rotated factor matrix. (8) original and successive variances. (9) check on communalities. The maximum number of variables which can be processed is 80, and there is no limit on sample size. Performs a different transformation of each variable, if desired, according to the code specified in the transformation card.

G8 NPGS BIMD19 Rotation of a Factor Matrix F-60-63

This program computes an orthogonal rotation of a factor matrix. (Kaiser Variamx). 100 variables and 75 factors are allowed. The program output includes the variances and the rotated matrix after each iteration cycle of rotations, the communalities are checked at the end of the computation for agreement with original values. The maximum number of iteration cycles is 49.

G9 NPGS BIMD01 Life Table and Survival Rate F-60-63

Computes a selected period survival rate, its standard error and effective sample size. Also computes selected period survival rates and their standard errors with combinations of several cohorts. After the program computes these items, it can also compute survival rates and their standard errors for successively reduced periods if desired. The largest period or survival rate(s), single period or successively reduced periods, which can be computed by this program is 50 time intervals.

G9 NPGS BIMD10 FORTRAN Subroutine-Multiple Regression and Correlation F-60-63

This subroutine computes: inverse of a simple correlation coefficients matrix. Multiple correlation coefficient, standard error of estimate, intercept, joint regression coefficients. Standard deviations of regression coefficients, T-values. This subroutine may be called from any FORTRAN program that was the required dimension statement.

G9 NPGS BIMD15 Data Screening No. 1 F-60-63

Tests input data which may be used for statistical analyses in later stages to find the form of their distributions, frequencies, and possible outliers. This program can perform a different transformation of any variable, if desired, according to the code specified in the selection card. A listing of the transformed and untransformed data is provided if desired. This feature of the program is independent from trans-generation. To process numbers of any size, the data for two selected variables are converted into the standardized form before they are screened and cross-tabulated. Extreme values in the data are identified and printed in the output. Allows trans-generation.

G9 BPGS BIMD16 Data Screening No. 2 F-60-63

Computes: (1) frequency distributions, (2) means, variances, standard deviations, and standard errors of means for a specified set of variables conditioned on one variable within the set, (3) correlation coefficients for the specified set of variables. Can perform a different transformation of any variable, if desired, according to the code specified in the transformation card. This feature of the program is in addition to and independent from trans-generation. Allows trans-generation.

G9 NPGS BIMD18 Subroutine Rotate F-60-63

This subroutine computes an orthogonal normal varimax solution as described by Kaiser, and is used in BIMD17.

G9 NPGS BIMD22 Cross Tabulation No. 1 F-60-63

Performs cross-tabulations of input data, which may be used in later statistical analyses, to find the form of their distributions, outliers, etc., input data may consist of observations in the form of positive integers on P variables for a sample of N individuals. Generates a continuous range for each variable from which a frequency matrix is computed on any two variables but prints out only those rows and columns which have entries. Designation of abscissa or ordinate is arbitrary within the above restrictions. Allow trans-generation.

G9 NPGS BIMD23 Cross Tabulation No. 2 F-60-63

Performs cross-tabulation of input data which may be used for statistical analyses in later stages to find the form of their distribution and frequencies. Input data may consist of measurements on P variables for a sample of M individuals. Allows trans-generation.

G9 NPGS BIMD24 Data Screening No. 3 F-60-63

This program is the expansion of BIMD15, data screening no. 1. It tests input data which may be used for statistical analyses in later stages to find the form of their distributions, frequencies, and possible outliers. It also computes simple regression and correlation coefficients. Performs a different transformation of any variable, if desired, according to the code specified in the selection card. A listing of the transformed and untransformed data is provided if desired. This feature is in addition to and separate from trans-generation. Allows trans-generation.

G9 NPGS BIMD25 Data Patterns - Dichotomy F-60-63

Finds frequency and patterns of distribution of missing values in input data which may be used for later statistical analyses. Patterns of dichotomous data may also be desired for symptoms, complications, etc.

G9 NPGS BIMD26 Data Patterns - Polychotomy F-60-63

It is necessary sometimes to reclassify data which have been coded in a certain way. The maximum number of new codes is ten, and each one of them must be a single digit integer, (0-9).

G9 NPGS BIMD27 General Plot F-60

Provides a method by which graphs and histograms can be produced. Two methods of plotting are available. (1) the first method gives a one-page graph which has 50 units vertically and 100 units horizontally. The points are automatically scaled to conform to these dimensions and a scale is printed both horizontally and vertically. The points (data cards) need be in no special order. (2) the second method gives a multiple-page graph with as many units vertically as there are values of the base variable. The values of the base variable (data cards) must be ordered and consecutive. The base variable is not scaled. The cross variables are scaled by the computer to conform to a horizontal dimension of 100 units.

G9 NPGS BIMD28 General Chi-Square F-60-63

This program computes the chi-square and maximum likelihood ratio (MLR) on two-way frequency tables. The frequency table may be the original input data or generated from the original input data by optional selections of variables two at a time. The selected variables will be cross-tabulated with each pair forming a frequency table. For generated frequency tables the maximum number of columns (or intervals) is 20, and the maximum number of rows (or intervals) is 25. The user must specify either the number or size of intervals for generated frequency tables.

G9 NPGS BIMD32 Cross Tabulation No. 3 (Modified 23) F-60-63

An expansion of BIMD23. Performs cross-tabulation of input data which may be used for statistical analyses in later stages to find out the form of their distribution and frequencies. Performs a different transformation on any variable and creates new variables if desired, according to the code specified in the trans-generation card.

H1 CODA CDM2 Linear Programming System 2 F-60

FORTTRAN-60. Handles straight linear programming and separable programming problems. Uses revised simplex method, inverse is in product form, handles problems up to 200 rows, 599 variables and 69 sets of special variables, 3486 non-zero matrix entries and 14,000 transformation entries, arithmetic is single precision floating point. Configuration: 1607 tape unit, on-line card reader and printer.

H1 CODA CDM3 Linear Programming System 3 F-62

Handles straight linear programming and separable programming problems, uses revised simplex method. Inverse is in product form, handles problems up to 400 rows, 999 variables and 69 sets of special variables, 4000 non-zero matrix entries and 10,000 transformation entries, arithmetic is single precision floating point. Configuration: I/O requirements of CO-OP monitor.

H2 SAND MIN MIN F-60 or F-63

Determines a minimum of an arbitrary function of N variables (also useful for) finding zeros of functions, least squares fits, solving non-linear systems, etc. Space required: 191 words in FORTRAN-60 and 154 words in FORTRAN-63. Configuration: computer with a FORTRAN compiler

I1 CODA LDBIPT Load Binary Paper Tape

Load biocatal data into core locations from paper tape. 30 locations.

I1 LMSD ABLD Absolute Binary Load

Load binary cards on-line, or card images on mag. tape prepared off-line, 126 locations.

I1 LMSD BIBO1 Binary Card Load

Load column binary card through on-line card reader. 69 locations.

I1 LMSD BIBOT Binary Tape Load

Load binary records from mag. tape in AR format. 52 locations.

I1 WADD RABIL Relocatable or Absolute Binary Tape Load

Load either relocatable or absolute binary records from magnetic tape written in CODAP language. 146 locations.

I2 CODA LDOCPT Load Octal Paper Tape

Load fixed or relocatable octal paper tape. 161 locations.

I2 CODA OCLDR Relocatable Octal Loader

Load fixed or relocatable octal data from punched cards online or from mag. tape containing card images. 286 locations.

I2 LMSD OCLD Octal Card or Octal Magnetic Tape Load

Load from punched card on line or mag. tape containing card format records. 229 locations.

I9 CDMC O88LOAD Octal or Column Binary Card Loader

Loads octal or column binary cards from the O88 reader or from magnetic tape. When loading from the card reader, the deck may contain mixed octal and column binary cards. Requires 644 locations. Configuration: minimum CO-OP 1604 with O88 on channel 1.

I9 CODA CDLOAD 1610 Octal-Binary Card Load

Read fixed and relocatable cards in either octal or binary format. Permits mixed formats when reading from the IBM O88 card reader. 597 locations.

I9 CODA CDTTAPE Card to Tape

Produce card images on magnetic tape via the 1610 adaptor, on-line, cards may be Hollerith, column binary or intermixed. 410 locations.

I9 CODA COLD CO-OP Loader

Loads octal records, decimal (fixed and floating) records of variable length and alpha-numeric records from magnetic tape, variable timing. 650 locations.

I9 LMSD GNLD General Load Routine
(Lockheed) load octal, decimal and alphanumeric records from 80-column cards or card images on magnetic tape. 229 locations.

I9 LMSD INPUT Generalized Input
A generalized input routine capable of accepting and converting to various binary number systems information which is punched on cards or prepared as binary coded records on tape. 300 locations.

I9 UCSD RDNUM (No abstract available)

I9 WADD DECLD Decimal and Octal Load-Paper Tape or Typewriter
Load decimal and octal numbers from either paper tape or the typewriter, converting the numbers to binary in either fixed or floating format. 404 locations.

J1 CODA DPBIPT Dump Binary Paper Tape
Dump core locations onto paper tape in biocatal format. 21 locations.

J2 CODA DPOCCD Dump Octal Cards
Dump selected core locations onto octal card or onto mag tape in octal card images. 127 locations.

J2 CODA DROCPT Dump Octal Paper Tape
Dump selected range of core onto seven level paper tape. 74 locations.

J2 WADD OCCHDP Octal Dump S-C 4020 and 1000
Dump a section of memory which will be displayed on either the Stromberg-Carlson microfilm printer-plotter (S-C 4020) or on the Stromberg-Carlson charactron (S-C 1000). 269 locations.

J2 WADD TDUMP Typewriter Dump
Dump selected range in core via console typewriter. 30 locations.

J3 WADD DESCA Decimal Dump-Paper Tape or Typewriter
Convert binary numbers to decimal and output on paper tape or the typewriter. 292 locations.

J4 UCSD TP BCD Output
Lists BCD output tape on the 1612 printer with pre-skip carriage control. Machine subroutine written in mixed FORTRAN and FORTRAN symbolic. Space required: about 300 cells. Timing: 500 lines per minute. Equipment configuration: standard CO-OP computer with 1612 on channel 7.

J5 WADD TWPSIM Typewriter Simulator
Record alpha-numeric characters on microfilm and/or display on charactron.

J7 HOLL PLOT01 (No abstract available)

J7 UCSD GP PLOT General Purpose X-Y Plotter F-60
J7 UCSD GP PLOT General Purpose X-Y Plotter F-62
J7 UCSD GP PLOT General Purpose X-Y Plotter F-63

Takes a set of X values and corresponding Y(X) values and plots them in one of four ways:

1. X - natural scale, Y - natural scale
2. X - natural scale, Y - log, base 10, scale
3. X - log, base 10, scale, Y - natural scale
4. X - log, base 10, scale, Y - log, base 10, scale

Requires 463 locations plus an array of up to 6060 locations. Timing: average of .06 sec. per point plotted. Configuration: minimum 1604.

J7 UCSD XY PLOT XY Plotter F-60

J7 UCSD XY PLOT XY Plotter F-62

FORTRAN. This routine plots X vs. Y where X and Y are arrays of data read in from cards or generated from equations within a program. Attached subroutines may be used to set the scales. 1438 locations without attached subroutines. 1544 locations with both subroutines. Print out on the IBM 407 printer.

J9 CODA ANPR Anelex Output

Print a 120 char. BCD image in the 1604 memory on the Anelex printer. 409 locations.

J9 CODA PLOT PLOT

Graph an equation or equations. 1057 locations.

J9 CODA PRA Print BCD Tape on Anelex Printer

Print BCD tape records of 120 characters or less on Anelex printer. 1000 lines per minute. 498 locations.

J9 CODA TAPETCD Tape to Card

Punch information stored on mag. tape on cards via the 1610 adaptor, card image on tape may be Hollerith or column binary. 397 locations.

J9 LMSD OUTPUT Generalized Listable Output

Set up for on-line printing, writing on tape or relocating in core. Optional indexing. 615 locations.

J9 WADD AGOUT Generalized Listable Output with Microfilm

Extend J9 LMSD OUTPUT to the S-C 4020 and the S-C 1000. 886 locations.

J9 WADD PLOT Microfilm Recorder and Charactron Plot

Record floating point coordinate plot on microfilm and/or display on charactron. 6.1 milliseconds + 1.3 milliseconds per optimized scaling (two max.) + .45 milliseconds per optimized origin (two max) + .9 milliseconds per point plotted. 633 + N locations (N=number of points plotted).

J9 WADD TTEXT Type Text

Type on-line print-outs and alarms on the console typewriter. 24 locations.

K2 CODA BITSHIFT Bit Transfer

Obtains a string of from one to 48 consecutive bits from a one word quantity V1, and inserts the string into an equal number of consecutive bit positions of a one word quantity V2. The location of the bit string in V1 and those bits in V2 where the string is to be placed, and the length of the string, are input parameters. Requires 45 locations. Timing: less than 520 microseconds. Configuration: minimum 1604.

K2 CODS STRING2 Move N Characters From Array A to Array B

Takes a string of N 6-bit characters from the jth char. position and moves this string to the kth char. position relative to the array B, characters are numbered from left to right.

K3 CODA MERGEDIT (No abstract available)

K3 CODA STRAW Simultaneous Tape Read and Write

Program of mag. tape subroutines for read, write, rewind, skip forward, backspace, write EOF. Buffered for simultaneous operation. 337 locations.

K3 LMSD MTC Master Tape Control

Provides for read-in of service programs from the master tape. 683 locations.

K3 NBSB TRANSFTN Transfer Library Subroutines

Allows subroutines to be transferred from one tape to another, even if the read tape has the write-lockout ring removed. Space required: 48 locations.

K3 UTEX DUPTAPE (No abstract available)**K3 WADD ADDPROF Add Program to Library**

Add a program with ID onto mag. tape in format used by K3 WADD SEARCHMT.

K3 WADD BITPCPY Binary Tape Copy

Copy N records from a binary mag. tape, or copy to the end of file. 69 locations plus space to hold the largest file to be copied.

K3 WADD SEARCHMT Magnetic Tape Search

Load programs or program packages from a special library tape into core, perform sum-check. 107 locations.

L1 CODA ARLICD Octal Card Output for Assembler

Convert AR2 assembler into octal cards or octal card images on mag. tape. 245 locations.

L1 CODA ARLIMM Load Assembly Listing

Load AR-2 listing tape into core. 144 locations.

L1 CODA ARLIPT Octal Paper Tape Output for Assembler

Convert one file of the AR-2 assembler listing to octal paper tape.

L1 CODA ARPTMT CODAP Paper Tape Input

Paper-to-mag. tape conversion for use as input to AR-2 assembler. 256 locations.

L1 CODA EDSMF Edit Symbolic Tape

Add, change or delete instructions on AR-2 or CODAP symbolic tape. 541 locations.

L1 CODA SYMEDIT Symbolic Edit

Performs various editing functions on CODAP programs stored as symbolic images on mag. tape. The symbolic images are read from an input master tape, the specified editing is performed, and the edited program is written on an output master tape with simultaneous assembly if assembly is desired. Programs may be re-sequenced, copied, edited (insertion, replacement, and deletion of individual card images), assembled, and added to the output master tape using the allowable operations. Space required: 2513 locations.

L1 LMSD AR-2 Lockheed Assembly Routine

Convert symbolic programs on cards or tapes with card images to machine language programs. Output is either BCD mag. tape, or binary mag. tape or cards. 10683 locations.

L1 NBSB BARO Boulder Assembly Routine

Convert programs from symbolic notation on punched cards or card images on mag. tape to fixed or relocatable machine-language programs on mag. tape. Approximately 1200 entries per minute. 9659 locations.

L2 SDCS JOVIAL Procedure-Oriented Programming Language

A procedure-oriented largely computer-independent programming language designed by SDC for computer-based command/control systems. Derived from ALGOL 58, with the addition of an input-output notation, a more elaborate data-description capability, and the ability to manipulate symbolic and other non-numeric values. Configuration for the compilation of a jovial program - 1604 with 32K memory, 2 - 1607 tape cabinets, and typewriter. Configuration for the execution of a jovial program using I/O components 088 reader, 523 punch, 1606 or 1612 printer. Send distribution requests to SDCS - W. R. Dobrusky

System Development Corporation
2500 Colorado Avenue
Santa Monica, California

L3 WADD DAPROC WADD Off-line Data Processor

Sort and process data recorded in special format on one-inch mag. tape. Output in tabular or graphical form on either mag. tape or microfilm. Optional output on S-C 1000. Full 16K memory necessary.

M1 CODA SEARCH Bisection Search

Samples and ordered list at points of bisection to find the first term which exceeds a given term. $153.2 + 75.6N$ microseconds (avg). 23 locations.

M1 LMSD PMT Prepare Master Tape

Prepares new master tape, deletes, changes, or copies existing master tape and produces a monitor tape of changes and new programs. 2457 locations.

M1 LMSD TMAC Tape Merge and Copy

Merge, copy or delete portions of mag. tapes. 537 locations plus longest record.

M1 NBSB EDITLIB Editing Routine for a FORTRAN Library

Takes as input a library tape (FORTRAN format), and correction cards in a restricted map language, and produces a corrected library on an output tape. Space required: 350 locations of unique storage. Temporary storage: 256 locations of common storage. Timing: same as alternately reading cards and writing a library tape record, by means of FORTRAN resident.

M1 UCSD ORDER Ordering of Points for Scatter-Plotting F-60

M1 UCSD ORDER Ordering of Points for Scatter-Plotting F-62

Rearranges randomly distributed points into a relatively efficient order. The points are ordered in strips parallel to the Y axis, the number of points in the strips is a parameter, in each strip the points are arranged in order of increasing Y coordinate. Requires 163 locations. Timing: to order 1000 pairs of points, by call order (X,Y,100,1000). Takes 15 seconds. Configuration: minimum 1604.

M1 UCSD SORT Internal Sort F-60

M1 UCSD SORT Internal Sort F-62

M1 UCSD SORT Internal Sort F-63

Given the array $X_1, X_2, X_3 \dots X_N$, FORTRAN arranges the elements in ascending order and constructs an array, $K_1, K_2, K_3 \dots K_N$, of subscripts of X. If the ascending order of X elements is $X_2, X_7, X_3, \dots$ then the K values are 2,7,3... The K array can be used to order another array, e.g., Y, in sequence $Y, Y_7, Y_3 \dots$ by letting $O_1 \leftarrow Y_{K_1}$ for $I = 1$ to $I = N$ and then letting $Y_I \leftarrow Q_I$ for $I = 1$ to $I = N$ where Q is an auxiliary array. FORTRAN. Space required: 170 locations. Timing: approximately .862 (no) 1.2 milliseconds for randomly ordered numbers, time is shorter if list is partially ordered. Accuracy: exact. Equipment configuration: CDC 1604 with FORTRAN.

M4 CODA ARIAR2 Convert AR1 to AR2
Convert AR1 mag. tape to AR2 mag. tape. 278 locations.

M4 CODA BCDBIN BCD to Binary Conversion
Converts an 8 char. decimal number to its binary fixed point equivalent. Space required: 10 locations. Timing: 411.6 microseconds per 8 character word.

M4 CODA BINBCD Binary to BCD Conversion
Converts a positive or negative binary integer to BCD decimal. Space required: 29 loc. Timing: 78.0+118 N microsec. N is the number of BCD characters converted.

M4 CODA BINHOL Row Binary to Hollerith Conversion
Converts a 24 word row binary image to a 10 word Hollerith image. Before the conversion the row binary image is checked for illegal Hollerith punches. Space required: 135 locations. Equipment configuration: standard CO-OP computer.

M4 CODA BIRDCONV Binary Deck Conversion
Reads a 36-bit/word col. binary deck, unpacks into 48 bits/word array, converts and outputs the data by printed listing and/or punched cards. Space req.: 23600 locations including arrays. Accuracy: all significant bits are retained. Timing: about 150 cards per minute. Configuration: minimum CO-OP with FORTRAN-63 library routines.

M4 CODA BITREV Reverse the Order of the Bits in a Word
Reverses the order of the bits in the A-reg. Space req.: 6 loc. Timing: 565 microsec.

M4 CODA CBIRBI Column Binary to Row Binary Conversion
13 locations, 23 milliseconds.

M4 CODA CYPTPT Copy Paper Tape
Copy binary or octal paper tape. 73 locations.

M4 CODA MAGTPT Convert Symbolic Magnetic Tape to Paper Tape
Convert 80 or 120 character BCD mag. tape to flex tape. 243 locations.

M4 CODS CMPAA Compare Two Arrays CODAP-1
Compares two arrays in storage for equality, greater than, or less than. Configuration: minimum 1604.

M4 CODS CMPAL Compare an Array to a List CODAP-1
Compares the first N items of an array to the N items in the calling seq. list for equality, greater than, or less than. Configuration: minimum 1604.

M4 CODS CMPKA Compare an Array with a Variable CODAP-1
Compares a variable K to the N elements of an array starting at A. Config.: min. 1604

M4 CODS CMPKL Compare a Constant to a List CODAP-1
Compares single variable K with a list of items C. If the comparison finds at least 1 item in the list equal to K, it sets a flag on return, it sets the flag to a different value if no items on the list are equal to the variable K. Configuration: minimum 1604.

M4 CODS CMPLL Compare Two Lists of Items CODAP-1
Compares 2 lists of items for equality, greater than or less than. Config: minimum 1604.

M4 CODS INSERT Insert a Character into a Word
Moves the eighth char. position of the variable I to the L char. of the variable R
L is a char. position from 1 to 8, starting with char. 1 in the high order position
I and B can be fixed or floating point. Configuration: minimum 1604.

M4 CODS IXTAC Extract a Character
Extracts the L char. of the variable B and puts it into the low order of register A, the remainder of register A is clear. Characters are numbered 1 thru 8, from left to right, written as FORTRAN function subroutine. Configuration: minimum 1604.

- M4 CODS KARRAY Move a Variable to an Array CODAP-1
 Moves a variable K to N consecutive locations of an array starting at location A. No format conversion is made in the move. K and A may be fixed or floating point and may disagree in mode. Configuration: minimum 1604.
- M4 CODS KLIST Move a Variable to a List of Words CODAP-1
 Moves a variable K to a list of N words. No format conversion is made in the move. Configuration: minimum 1604.
- M4 CODS MOVE Move N Words from a List to an Array CODAP-1
 Moves a list of N words to an array starting at location A. No format conversion is made in the move. Configuration: minimum 1604.
- M4 CODS REMOVE Move Array to a List CODAP-1
 Moves N words, starting at location A to the list of variable specified. No format conversions are made in the move. Configuration: minimum 1604.
- M4 CODS TRNSFR Move N Words from One Array to Another CODAP-1
 Moves N words from an array starting at location A to an array starting at location B. No format conversion is made in the move. A and B may be fixed or floating point arrays and do not have to agree in mode. Configuration: minimum 1604.
- M4 EGG PLOTPACK (No abstract available)
- M4 LMSD BCDOCT BCD to Octal Conversion
 Convert an 8 char. BCD number to its octal equivalent. 17 locations. 823 microseconds per 8 character word.
- M4 LMSD DECOCT BCD to Binary Conversion
 Converts a BCD number to binary form. For decimal numbers, the conversion can be either fixed or floating, depending on the form of the original BCD number. Uses routine FLOAT.
- M4 LMSD FIX Floating Point to Fixed Point Conversion
 Convert a floating point number to fixed point. 17 locations.
- M4 LMSD FLOAT Fixed to Floating Binary Conversion
 Converts a fixed point binary number to a floating-point number. The number is entered into the accumulator and its binary scaling into index register 1. Output is left in the accumulator.
- M4 LMSD FLOATBIN Float Fixed Point Number
 Floats a fixed point number. Space required: 12 locations. Timing: 133.8 microseconds (average).
- M4 LMSD GCIR Generalized Card Interpretation
 A generalized card interpretation routine for conversion of card images in core. 240 locations.
- M4 LMSD OCTBCD Binary to BCD Conversion
 Converts a binary integer to the decimal BCD equivalent. Input is a binary positive integer in the accumulator. Output is the resultant BCD equivalent, right-adjusted with leading blanks in the accumulator.
- M4 LMSD UNPACK Floating Number to Fraction and Exponent
 Unpacks a floating point number into its fractional and exponential parts.

M4 NBSB HOLERITH BCI to Card Image, Variable Length Words
Transform an arbitrary number of arbitrary length BCI words to card image. 53 locations.

M4 NBSB IOVERP Decode Overpunches
Allows the reading of overpunched signs by FORTRAN

M4 UTEX AXES Axes Tape Generator for the 160 to 165 Plotter F-60
Converts numerical data and writes this information on a magnetic tape in a form to be used by the CDC 160 to plot points by the CDC 165 plotter. Requires 1095 locations. Accuracy: within .01 inch. Configuration: minimum 1604, two tape drives.

M4 UTEX PLOT 1604 Point Plot Tape Generator for 160 to 165 Plotter F-60
Converts numerical data and writes this information of a magnetic tape in a form to be used by the CDC 160 to plot points by the CDC 165 plotter. Requires 453 locations. Accuracy: within .01 inch. Configuration: minimum 1604, two tape drives.

M4 WADD DTCORR WADD Data Corrector
Correct fixed point transducer outputs, representing the magnitudes of a physical quantity, and convert to floating point values. 853 locations.

M4 WADD LISTSC List BCD Tape on S-C 4020 and S-C 1000
List a BCD magnetic tape file of 80 or 120 character records on the S-C 4020 with optional display on the S-C 1000. 301 locations.

M4 WADD OITP One Inch Tape Processor
Produce an edited one-half inch magnetic tape from a raw one inch magnetic tape. 3903 locations.

M4 WADD TAPRR WADD Table Preparation
Prepare a binary magnetic tape of the transducer characteristics tables required in processing structural test data. 772 locations plus space to hold largest file.

M5 NSAR SLIP (No abstract available)

M5 UTEX IPL-V
This is the programming language described in the Information Processing Language-V Manual, second edition, by Allen Newell, Fred M. Tonge, Edward A. Feigenbaum, Bert F. Green, Jr. and George H. Mealy. The system is available only on magnetic tape.

N1 CODA TRACMT3 Magnetic Tape Trace
Execute any program in the trace mode. Tracing can be every instruction. Every instruction in the directory, every jump, every jump in the directory or not address, designed for use under program control, 666 locations plus the directories. Timing about 150 times slower than normal routine execution.

N1 CODA TRACPT Trace (Paper Tape Output)

List on paper tape jump paths or register contents after execution of instructions in a selected range in core. 213 locations.

N1 UCSD TRACE TRACE F-62

A subroutine which traces a variable number of instructions in the program which calls it. Options include full or logical trace, amount and format of output. The contents of any cell may be included in the output. Requires 464 locations plus 18 labeled common. Configuration: minimum 1604 computer.

N1 UCSD TRACER (No abstract available)

N1 WADD INSCH Typewriter Inspect and Change

Inspect and optionally change the contents of storage. Type copy of operations performed. Includes J5 CODA TTEXT. 106 locations.

N1 WADD TRACMT Magnetic Tape Trace

Traces a program with listable mag tape monitoring the program. 296 locations.

N2 ANL ANLN250 TROUBLE

Snapshot dump called in FORTRAN source language. COMPASS coded. Space required: (206)₁₀ locations. Machine: standard CO-OP CDC 3600.

N2 CODA BTD Binary Tape Dump

Dump selected riles and/or records from binary tape. Output on tape is 120 char. BCD reocrds. 343 locations + temporary storage.

N2 CODA DMP Octal-Decimal Core Dump

Dump selected range in core on mag tape or on-line printer. Console scoop optional. Output in octal or floating decimal. 529 locations.

N2 CODA DUMPA Anelex Printer Dump

Dump selected 1604 memory ranges in octal format on the Anelex printer. No console scoop. 1000 lines per minute. 151 locations.

N2 LMSD CORE Memory Dump

A fast octal format dump, either program or console called. 462 locations, one minute to dump a 32K memory.

N2 LMSD DUMPC Binary Card Format Dump

Dump selected core locations as binary card images on mag tape, check sum. 136 locations.

N2 LMSD DUMPL Listable Dump

Dump selected core locations with the option of console settings, cells 00000 through 00006 and fault conditions on mag tape or on-line printer. 853 locations.

N2 LMSD DUMPR Restorable Dump

Dump selected core locations with identifiers that can restore core to its original state. 55 locations.

N2 NSAR DISASMBL DISASMBL

Extracts all information from a relocatable or absolute binary deck and then reconstructs the CODAP-1 source language.

N2 UCSD DUMP DUMP F-60

FORTTRAN. Dump provides a convenient means in FORTRAN programs for writing the contents of blocks of memory on the systems output tape as (1) 16 digit octal integers (2) floating point decimal numbers, (3) FORTRAN decimal integers, or, (4) instruction. If a block of eight or more locations contain the same number, a message to that effect is written. 245 locations.

N2 WADD INTDR Manual Interrupt and Restore

Interrupt a program, dump all of the core and arithmetic fault indicators. Routine can restore conditions at interrupt and stops at interrupt point. 9 seconds. 136 locations.

O1 NBSB PERIRROG FORTRAN Periprogram System

Enables transfer of information between a 1610 and magnetic tape simultaneously with the running of a stack of FORTRAN programs. Space required: about 2500 locations. Equipment configuration: standard CO-OP 1604, 1607 and 088.

O2 NBSB 650S 650 Simulator

Simulate object programs for a 650 with 2000 word drum, index registers, and floating point. 8357 locations.

P CODA EXFAULT EXFAULT

Provides an automatic interrupt when an exponent overflow, integer overflow, or divide fault occurs, and it calls a (user-supplied) routine named over to take any corrective action desired. It is useful mainly for FORTRAN programmers who do not wish to insert many programmed tests for faults in their programs. Space required: 57 (decimal) locations. Configuration: a standard 1604 or 1604-A using the CO-OP monitor and FORTRAN-63.

Q UCSD ITIME Current Time Routine

Makes available to the programmer the current value of the clock for timing purposes. Space required: 5 locations. Timing: 40 microseconds, approximately. Accuracy: gives correct time to 1/60 of a second.

Q UCSD TIMER FORTRAN Program Timer

Analyses map-listing for execution time of object program, sums average time for each machine language instruction, prints total time to go from one numbered FORTRAN statement to the next. 280 locations. Timing: up to 100 statements 1 to 2 minutes. Configuration: minimum CO-OP 1604 computer.

Q1 CODA CLRMEM Clear Selected Memory Range

Clear a selected range in memory. 10 locations.

Q3 UCSD FILE File (FORTRAN Tape File Search)

Provides a convenient means in FORTRAN programs to skip or backspace over one or more files on any tape unit (other than the system input and output tapes 5 and 6). FORTRAN symbolic machine language. Space required: 35 locations. Equipment configuration: CDC 1604 and two CDC 1607's.

Q4 NPGS GRAFPLOT 1604 Graph Plotting Subroutine F-63

Writes data on a mag tape for off-line plotting on the Control Data 165 plotter. The tape format is compatible with the 160-A Graph Plot program (SWAP ident. AE5.02) which is used to drive the 165 plotter. Space requirements: 1120 decimal locations. Configuration: CO-OP monitor with at least one output tape available.

Q9 CODA COMPRESS (No abstract available)

Q9 CODA SORTTIME

The Sort Timing Program is a FORTRAN-63 program which computes average run times for sorting random data; it will produce sorting times for the Control Data 3100, 3200, 3600, and 1604 computers using 601, 603, 604, 606, 607 or 1607 tape units. The computed times will not be exact for the following reasons: The 1604 and 3000 series sort programs use the tournament replacement technique for internal sorting. This method produces variable string lengths that contain an average of two times the number of logical records held in core during the internal sort. The sort produces longer strings when the input to the sort is partially in sequence. The sorting process compares the sort keys from major to minor. The first unequal pair terminates the comparison and any remaining keys are not compared. This program will run on the 1604 or the 3600. A complete description is contained in "Sort Timing Program," Control Data Publication Number 60083700.

Q9 UNC IDEFINE

The creation of a define tape requires the preparation of a directory for each program to be installed on the tape. The IDEFINE program accomplishes this by analyzing a relocatable binary deck and punching the corresponding directory cards. The program also punches various BCD cards to be used elsewhere in the define tape input deck. Since no two routines may have identical names, the IDEFINE program punches file cards containing the routine name, main program name, originator, and run date for reference purposes. FORTRAN-63.

UO CODA GCD Greatest Common Divisor F-60

Given two integers, A and B, find that integer D such that D divides both A and B, and further, that no other integer which divides A and B is greater than D. FORTRAN. Space required: unknown (about 7-8 statements). Accuracy: complete accuracy for any two fixed point numbers. Both arguments must be positive.

UO CODA LCM The Least Common Multiple F-60

Given 2 positive integers, MM and NN, find an integer ID such that ID is a multiple of both MM and NN and further, that ID is less than any other common multiple of MM and NN. FORTRAN. Space required: unknown (about 3 statements). Uses UO CODA GCD. Accuracy: accurate for all positive MM, NN.

UO CODA PHI Eulers Phi Function F-60

Given a positive integer, N, the Phi, or totient function expresses the number of integers of the set 1,2,... N-1,N, which are relatively prime to N. Two integers are said to be relatively prime when their greatest common divisor is 1. That is, $(M,N)=1$. Space required: unknown (about 15 statements). Accuracy: accurate for all fixed point argument.

UO CODA SIGTAU Number and Sum of Divisors of N F-60

Given a positive integer N, find the number of divisors of N and the sum of these divisors. FORTRAN. Space required: unknown (about 20 statements). Timing: variable. Accuracy: accurate for all fixed point positive argument.

Y1 CODS CECS Civil Engineering Computation System F-62

FORTRAN 62. Performs many civil engineering computations resulting from survey work such as:

- point-to-point distance in a plane
- the angle between two lines in a plane
- the area of polygonal figures in a plane
- the subdivision of a line into segments
- the formation of a line parallel to a given line

Any verb can be added to CECS easily by the user, even though the new verb has no relation to the rest of the system. Runs under CO-OP monitor.

Y1 CPAD TRAVERSE Traverse Closure F-62

Data preparation instructions for bearing traverse closures using the 1604 package CECS modified 2-6-63, see the CO-OP writeup for further details on the CECS package.

Y2 CODA SIZZLE (No abstract available)

Y2 CODA AIM-6 AIM-6 F-62 or F-63

A one-dimensional multi-group diffusion theory code similar to AIM-5 except that a library of microscopic cross section data is utilized. The difference equations are those of the FOG code. In addition to the searches available in AIM-5, a concentration search on one or two elements is permitted. An extensive edit of output data is available. Original code by Atomics International.

Y2 CODA EQUIPOIS Equipoise 3A F-63

An expanded version of equipoise 3. The two additions are a section of the input routine, which produces a picture of the arrangement of materials within the reactor, and a section of the output routine, which calculates first-order perturbation theory estimates of neutron lifetime and of the reactivity resulting from a unit increase in each of the group constants in each region of the reactor. The latter output will be provided when the adjoint flux option is used - the only additional input data required are the average neutron speeds for the two groups. Equipoise 3 solves two-group, two-dimensional, neutron diffusion equations in cylindrical or slab geometry.

maximum number of groups -- 2
maximum number of mesh points - 2100
maximum number of compositions - 50
maximum number of regions - 100

This code fills the need for a rapid two-dimensional calculation suitable for survey calculations. Magnetic tapes are used only for input, output, and overlays. The logarithmic derivative boundary condition is allowed, and adjoint fluxes and associated flux-adjoint flux region integrals may be calculated automatically if desired.

Y2 CODA FAIM (No abstract available)

Y2 CODA FOG FOG F-63

Collection of control programs utilizing a basic set of subroutines to perform various reactor calculations based upon the solution of the one-dimensional neutron diffusion equation. Written in FORTRAN for a computer with a 32K memory and by changing dimensional statements may be run on computers with smaller memories. Handles from one to four energy groups, up to 239 space points and up to 40 regions.

Y2 CODA PERT PERT F-63

Designed for use with the AIM-5, AIM-6 and FOG codes. Punched card output from these codes is used as input to pert, using cross section data, fluxes and adjoint fluxes, the relative change in KEFF may be calculated. Cross sections may be heightened with the fluxes or with fluxes and adjoint fluxes. The neutron lifetime for the delay groups may also be calculated.

Y2 CODA 20GRAND Twenty Grand F-63

Six-group, two-dimensional, neutron diffusion equations in cylindrical or slab geometry. Neutron transfer from any group to any group is permitted. The logarithmic derivative boundary condition is allowed, and the adjoint flux option is available. Original code by Oak Ridge National Laboratory.

Y2 CODA WHIRLWAY Whirlaway F-63

Two-group, three-dimensional, neutron diffusion equations in XYZ geometry, uses the same simple iterative procedure that is used in the two-dimensional code EQUIPOISE. It will compute adjoint fluxes and flux-adjoint flux regional integrals automatically if desired. Original code by Oak Ridge National Laboratory.

Y2 UOFM 20GRAND Twenty Grand F-60

Six-group, two-dimensional, neutron diffusion equations in cylindrical or slab geometry. Neutron transfer from any group to any group is permitted. The logarithmic derivative boundary condition is allowed, and the adjoint flux option is available. Original code by Oak Ridge National Laboratory.

Y2 ANL ARGUS (No abstract available)

Y2 CODA CLOUD Cloud F-63

Calculates the external gamma-ray dose rate and total integrated dose resulting from the continuous release of radioactive materials to atmosphere, meteorological parameters such as wind velocity, lateral and vertical diffusion parameters, stability parameters and the presence of physical boundaries such as a group surface and a temperature inversion layer, and considered, decay of the source material is described by the use of a simple parent-daughter decay scheme or by a Way-Wigner type relationship.

Y2 CODA FUGUE (No abstract available)

Y2 ORNL NUCY (No abstract available)

Y2 CODA GRACE1 Grace 1 F-63

Is a multigroup, multiregion, gamma-ray attenuation code primarily designed for computing gamma-ray heating and gamma-ray dose rates in multiregion finite or semi-infinite slab shields. The buildup factor is represented analytically by a double exponential expression of the suggested by Taylor. The contribution to the total flux distribution at any particular location in the shield from a given source region is computed using a single material buildup factor. If desired, however, a different buildup factor may be specified for each source region considered. As many as 30 regions, 10 mesh points per region, 20 gamma-ray energy groups, 10 shield materials, and 5 material buildup factors may be included in a single calculation. In any region, either a uniform or an exponential source distribution may be specified.

Y2 CODA GRACE2 Grace 2 F-63

Is a multigroup, multiregion, gamma-ray attenuation code, computing the total dose rate or heat generation rate from either a spherical or a cylindrical source. The source may be located in either the central region of the system or in a concentric shell region surrounding it. The source distribution may be uniform, exponential or have a polynomial variation in radial direction, and, in the case of cylindrical geometry, may also have a polynomial variation in the axial direction. A least squares fit is used to obtain the polynomial coefficients. The buildup factor is represented analytically in a double exponential form. The shield regions outside the source volume may be either semi-infinite slabs or concentric shells, as many as 22 regions, 10 mesh points per region, 20 gamma-ray energy group, 20 shield materials, and 20 material buildup factors may be included in a single calculation.

Y2 CODA AIREK2 Airek II Generalized Reactor Kinetics Code F-62 or F-63

Designed to solve the reactor kinetics equations with respect to time. The mathematical method used is that developed by F. R. Cohen. Original code by Atomics International.

Y2 ORNL MURGATRO Murgatroyd F-62 or F-63

Is a revised and extended version of the IBM 704 program PET-I, which solves (by a fifth-order Runge-Kutta procedure) the coupled first-order differential equations for power, delayed neutron concentration and temperature in one-region reactor as a function of time, given an input reactivity variation represented by a series of linear ramps. The basic extensions were those which were necessary to include the effects of the separate heat capacities and temperature coefficients of the fuel salt and graphite in the msre. and of heat transfer between the fuel and graphite. In addition, the input and output sections of the previous program were modified to facilitate the use of the program in extensive parameter studies, and a calculation of the pressure rise in the core was included.

Y2 CODA ARES-1 Resonance Integral Code F-63

Calculates effective resonance integrals and multigroup cross sections for lumps and mixtures using resonance parameters. It combines the resolved, unresolved and L/V parts of the calculation which were previously in separate codes. The multigroup cross sections are printed in a form for use in multigroup reactor calculations. Original code by Atomics International.

Y2 CODA AX-1 (No abstract available)

Y2 CODA FORM Form F-63

Is a Fourier transform slowing-down code. Two tape units are used in addition to those required for input and output. A library tape containing 54 group microscopic cross-sections, resonance parameters, inelastic scattering matrices, and source spectra is necessary for the operation of the code. This library tape is available, the present code will generate a 54 group flux spectrum and provide constants to be used as input data to a few group diffusion code.

Y2 CODA GAM-1 Gam-1 F-62 or F-63

Computes the slowing-down spectrum in either the P1 or the B1 approximation using 68 groups of neutrons with a constant group width DU equals 0.25. The code calculates multigroup constants for up to 32 fast groups. Original code by General Dynamics.

Y2 CODA HAFEVER Hafever F-63

Calculation of the energy exchange inelastic scattering cross section (integrated over angle) according to the Hauser-Feshbach theory as modified by D. Goldman. This modification includes the effect of spin-orbit coupling on the transmission coefficients. Original code by Atomic Power Development Associates.

Y2 CODA TEMPEST Tempest II F-63

A neutron thermalization code based upon the Wigner-Wilgins approximation for light moderators and the Wilkins approximation for heavy moderators. A Maxwellian distribution may also be used. The model used may be selected as a function of energy. The second-order differential equations are integrated directly rather than transformed to the Riccati equation, provides microscopic and macroscopic cross-section averages over the thermal neutron spectrum. Original code by Atomics International.

Y2 CODA TUZ Tuz F-63

Calculates resonance integrals from resonance parameters for a wide variety of temperatures, compositions, and geometries. The resonance integral calculation is in two parts. The resolved resonances are treated by ZUT and the unresolved resonances by TUZ.

Y2 CODA ZUT Zut F-63

Calculates resonance integrals from resonance parameters for a wide variety of temperatures, compositions, and geometries. The resonance integral calculation is in two parts. The resolved resonances are treated by ZUT and the unresolved resonances by TUZ.

Y2 UOFM GAM-1 Gam-1 F-60

Computes the slowing-down spectrum in either the P1 or the B1 approximation using 68 groups of neutrons with a constant group width DU equals 0.25. The code calculates multigroup constants for up to 32 fast groups. Original code by General Dynamics.

Y2 CODA FORTSNG FORTRAN SNG Code F-62 or F-63

A one-dimensional transport code. In addition to the regular flux calculations in plane, spherical, and cylindrical geometry, various criticality searches are permitted. The code was originally written by Los Alamos and modified by Argonne and Atomics International.

Y2 CODA S4CYCELL S4 Cylindrical Geometry Cell Code F-63

Solves the one-dimensional monoenergetic Boltzmann equation in cylindrical geometry, using the S4 approximation, in addition to the flux distribution. Cell-averaged parameters are computed. An input guess to the flux may be used or a diffusion calculation may be performed to provide an initial guess. In addition, when running multiple cases, the converged flux from the previous case may be used.

Y2 CODA SAIL (No abstract available)

Y2 CODA THERMOS (No abstract available)

Y2 UNC DTF (No abstract available)

Z CODA SAMPLE Sample

Intended for use as a guide to the CODAP output of the 1604 FORTRAN-63 compiler. This non-executable set of subprograms contains (many) examples of each type of FORTRAN-63 statement and the resulting CODAP statements.

Z NBSB ACCT 1604 Acceptance Test

To test the 1604 computer and components after initial installation at NBS. The system test includes 1604, comsole, 1-1607 and 1618 with 088 reader, 407 printer and 523 punch. One single pass run requires about one hour, 16.949 locations.

Z1 UCSD DOCUMENT Documentation of FORTRAN Source Language Programs F-62

Gives documentation of a program in terms of the FORTRAN statements rather than the compiled machine language. A program of any size may be documented, and machine language subroutines (FAP, or CODAP) will be by-passed. Space required: 24576. Timing: approximately 225 FORTRAN source language cards/min. An average timing was computed using four programs all exceeding 15 subroutines in size, two of the four programs contained machine language subroutines and comment cards. Configuration: standard CO-OP computer.

Z UCSD IDENTIFY Identify F-60

Z UCSD IDENTIFY Identify F-62

FORTRAN-60 or 62. Produces a new FORTRAN deck filling columns 73-80 with alpha-numeric ident code and serial number. 142 locations, 500 cards per minute. Configuration: minimum CO-OP 1604, 088 and 1612.

Z1 CODA CDAPCOMP (No abstract available)

Z1 CODA COMPCHEK 1604-3604 Compatibility Check Program

Incompatible or questionable cards are listed. 340 locations. Configuration: minimum CO-OP 1604, 088 and 1612.

Z1 CODA COMPCOMP (No abstract available)

Z1 NBSB SHIFTR Boolean Shift Function

Shifts Boolean (binary) information right or left a given number of bits.

Z1 NBSB TRADER Trade Names

Changes the name of a variable from fixed to floating or floating to fixed for more flexible use of Boolean expressions. The value itself is not changed.

Appendix I

CLASSIFICATION CODES

- A. Programmed Arithmetic: Any of subclasses could contain multiple precision
 - 1. Real: Multiple precision fixed and floating point arithmetic
 - 2. Complex: Complex arithmetic programs and any routines directly connected with them.
 - 3. Decimal: BCD
- B. Elementary Functions
 - 1. Trigonometric: Includes inverse trigonometric functions
 - 2. Hyperbolic
 - 3. Exponential and Logarithmic
 - 4. Roots and Powers: Refers to roots of quantities, not polynomials.
- C. Polynomials and Special Functions
 - 1. Evaluation of Polynomials
 - 2. Roots of Polynomials
 - 3. Evaluation of Special Functions
 - 4. Simultaneous Non-linear Algebraic Equations
 - 5. Simultaneous Transcendental Equations
- D. Operations on Functions and Solutions of Differential Equations
 - 1. Numerical Integration
 - 2. Numerical Solutions of Ordinary Differential Equations
 - 3. Numerical Solutions of Partial Differential Equations
 - 4. Numerical Differentiation
 - 5. Extreme Values of Functions
- E. Interpolation and Approximations
 - 1. Table Look-up and Interpolation
 - 2. Curve Fitting
 - 3. Smoothing
- F. Operations on Matrices, Vectors, and Simultaneous Linear Equations
 - 1. Matrix Operations
 - 2. Eigenvalues and Eigenvectors
 - 3. Determinants
 - 4. Simultaneous Linear Equations
- G. Statistical Analysis and Probability
 - 1. Data Reduction: Is interpreted as the calculation of the more common statistical parameters such as mean, median, standard deviation, etc.
 - 2. Correlation and Regression Analysis: Includes curve fitting which is explicitly for statistical purposes.
 - 3. Sequential Analysis
 - 4. Analysis of Variance
 - 5. Random Number Generators
 - 6. Monte Carlo Problems
 - 7. Time Series
 - 8. Multivariate Analysis
 - 9. Miscellaneous

H. Operations Research and Linear Programming

I. Input

- 1. Binary: Presently contains binary tape and card loaders
- 2. Octal: Card loaders only.
- 3. Decimal: Card loaders only.
- 4. BCD: Any tape input program which reads in the BCD mode.
- 9. Composite

J. Output

- 1. Binary: Includes binary tape or card preparation or on-line binary printing.
- 3. Octal: Refers to on-line octal card punching and on-line octal printing but the latter only when entry is by TSX linkage and the printing represents the final result of a program (not debugging).
- 3. Decimal: Contains on-line decimal printing or card punching.
- 4. BCD: All non-binary tape preparation.
- 5. Analog: CRT
- 9. Composite

K. Internal Information Transfer:

Denotes only core-to-core, drum-to-drum, and core-to-drum word movements.

- 1. Read Write Drum
- 2. Relocation: Is for core-to-core or drum-to-drum relocation only, not input with relocation.
- 3. Tape Handlers

L. Executive Routines

- 1. Assembly
- 2. Compiling
- 3. Automatic Operator Programs: Refers to the monitoring routines used by installations which operate in the peripheral mode.

M. Information Processing

- 1. Sorting
- 2. Report Preparation
- 3. Checking of Experimental Recording
- 4. Conversion
- 5. List Processing

N. Debugging Routines

- 1. Tracing, Trapping
- 2. Dumps: Includes all output primarily intended for debugging purposes such as print-out (on or off-line) of drums, tapes, cores, and console.
- 3. Search: Searching (of tape, core, or drum) for debugging purposes is differentiated from table-lookup.
- 4. Breakpoint Print

- O. Simulation Programs: Contain routines for the simulation of other machines on the 704, as well as for off-line equipment simulators.
- P. Diagnostic Programs: Are defined as those which check for malfunctions of the computer and/or its components.
- Q. Service Programs: Are routines of a utilitarian nature which perform a service for the programmer such as executing the equivalent of pushing a button on the computer or accumulating a check sum.
 - 1. Clear, Reset Programs
 - 2. Check, Sum Programs
 - 3. Restore, Rewind, Tape Mark, Load Button Programs
 - 4. Plotter Routines
- R. Geometry
 - 1. Pattern Recognition
- S. Machine Design
- T. Automata Studies
- U. Number Theory
- Y. Special Applications
 - 1. Civil Engineering
 - 2. Nuclear Reactor Codes
 - 3. Physics
 - 4. Chemistry
 - 5. Bio.-Med.
 - 6. High Energy Physics
 - 7. Metallurgy
- Z. All Others Contains all routines for which no primary class has yet been selected. Routines which seem to be included by a primary class but which are not adequately described by a sub-class are assigned the applicable primary classification with a sub-class designation of zero.

Appendix II

COLLATING SEQUENCE

CHAR.	EXT. BCD	CHAR.	EXT. BCD	CHAR.	EXT. BCD	CHAR.	EXT. BCD
blank	60	[	17	4	04	K	42
.	33	⌢	35	5	05	L	43
,	73	≡	36	6	06	M	44
(	74	^	37	7	07	N	45
)	34	†	55	8	10	Ø	46
=	13	‡	56	9	11	P	47
\$	53	>	57	A	21	Q	50
*	54	<	72	B	22	R	51
/	61	≥	75	C	23	S	62
-	14	⌣	76	D	24	T	63
-	40	;	77	E	25	U	64
✓	52	:	00	F	26	V	65
+	20	0	12	G	27	W	66
]	32	1	01	H	30	X	67
≤	15	2	02	I	31	Y	70
%	16	3	03	J	41	Z	71

Appendix III

EXCLUSION LIST

Single Characters

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9
 . , \$ * = () + - /

Two Character Words

TO AT BY AN OF IS ON IN OR BE AS W/ WL

Three Character Words

THE FOR AND ITS NOT HIS USE WHO HAS W/O ANL AMD NO. WLS

Four Character Words

THEN THIS FROM FORM AREA THAN USED WITH OVER WHAT WHOM WILL CODE WLSB

Five Character Words

THERE CORP. FORMS AREAS UNDER OTHER POINT

Six Character Words

AGENCY DURING REPORT CHANGE INFORM PLACED

Seven Character Words

AGAINST BETWEEN ARGONNE PROGRAM

Eight Character Words

AGENCIES CONSIDER FUNCTION ARGUMENT

If a word longer than eight characters matches the first eight characters of a word in the eight-character list it is excluded.