

The IBM logo consists of the letters "IBM" in a bold, sans-serif font, centered within a dark gray square.

Systems Reference Library

**Catalog of Programs for IBM 1620
and 1710 Data Processing Systems -
(January 1971)**

This Catalog contains a complete listing of all programs for the IBM 1620 and 1710 Data Processing Systems available from the Program Information Department, 40 Saw Mill River Road, Hawthorne, New York 10532.

Instructions for ordering programs are contained in the section of the Introduction entitled, "Completion of the IBM Program Order Form".

TABLE OF CONTENTS

	Page
Introduction	
Programs Available from PID.....	III
Type I and II Programs.....	III
Type III and IV Programs.....	III
Type III Programs With Service A Classification.....	III
IBM Catalogs of Programs.....	III
PID Order Processing Turn-Around Times.....	IV
Completion of the IBM Program Order Form.....	IV
IBM World Trade Users.....	VIII
Keyword-In-Context Index.....	VIII
Program Classification Codes.....	VIII
Using The Catalog.....	IX
New Programs.....	IX
Deleted Programs.....	X
Program Order Example (Figure 1).....	XI
List of New Type III and IV Programs.....	XII
List of Deleted Type I, II, III and IV Programs.....	XII
Keyword-In-Context (KWIC) Index.....	XV
Abstracts	
IBM Programs	
IBM 1620 Data Processing System.....	001
Contributed Programs	
IBM 1620 Data Processing System.....	013

Eleventh Edition (December 1970)

Copies of this and other IBM publications can be obtained through IBM branch offices. Address
 Comments concerning the contents of this publication to IBM, Program Information Department,
 40 Saw Mill River Road, Hawthorne, N.Y. 10532

© Copyright International Business Machines Corporation 1970

INTRODUCTION

The only authorized IBM agency in the United States for the distribution of programs to IBM users is the DP Program Information Department, 40 Saw Mill River Road, Hawthorne, New York 10532.

PROGRAMS AVAILABLE FROM PID

IBM makes available a wide variety of programs for IBM systems. This catalog contains a list of available programs categorized as Type I, II, III, and IV programs.

TYPE I AND II PROGRAMS

Type I and II programs are programs which have been subjected to formal testing. All Type I and II programs have been assigned a Service Classification. For information concerning Service Classifications, contact your IBM Branch Office. Most Type I and all Type II programs were available for delivery from the Program Information Department prior to June 23, 1969.

TYPE III AND IV PROGRAMS

Type III programs have been submitted by one or more IBM employees. They are programs of general interest submitted for unrestricted distribution. They have met a basic set of programming and documentation standards but are not program tested in any formal fashion by the IBM Corporation. The user is expected to make the final evaluation as to the usefulness in his own environment. These programs were available for delivery from the Program Information Department prior to June 23, 1969.

IBM MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AS TO THE DOCUMENTATION, FUNCTION OR PERFORMANCE OF THESE PROGRAMS.

Systems Engineering Service (charge basis) is available from your IBM Branch Office to assist you with the installation, modification or any technical assistance required for use of this program.

Type IV programs are those contributed for unrestricted distribution by one or more authors of which at least one is an employee of an IBM customer. They are made available by IBM essentially in the author's original form, but conform to published Type IV standards. IBM exercises no control over the technical content of the documentation but merely assures that the quality of reproduction is satisfactory. Type IV programs have not

been tested by IBM. The user is expected to make the final evaluation as to their usefulness in his own environment.

IBM MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AS TO THE DOCUMENTATION, FUNCTION OR PERFORMANCE OF THESE PROGRAMS.

TYPE III PROGRAMS WITH SERVICE A CLASSIFICATION

Type III programs which were given Service A Classification, perform functions which may be fundamental to the operation and maintenance of the user's system. These programs have not been subjected to formal test by IBM.

Until reclassified, IBM will provide for these Type III programs with the following: (a) Central Programming Service including design error correction and automatic distribution of corrections; (b) Field Engineering Programming Service including design error verification, Authorized Programming Analysis Report (APAR) documentation and submission, and application of Program Temporary Fixes or development of an emergency by-pass when required.

IBM does not guarantee service results or represent or warrant that all errors will be corrected. The user is expected to make the final evaluation as to the usefulness of these programs in his own environment.

THE FOREGOING IS IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IBM CATALOGS OF PROGRAMS

Abstracts and ordering instructions for all programs available from PID are found in the IBM Catalogs of Programs and their Supplements, published periodically by PID. These Catalogs are available from the Mechanicsburg Distribution Center as follows:

	CATALOG	SUPPLEMENT
SYSTEM	FORM NUMBER	FORM NUMBER
1240/1401/1420 1440/1450/1460	GC20-1601	GN20-0013
700 Series, 1410, 7000 Series	GC20-1602	GN20-0014

1620/1710	GC20-1603	GN20-0015
System/360 Models 25 and above.	GC20-1619	GN20-0030
1130/1800	GC20-1630	GN20-0031
Model 20	GC20-1691	GN20-1852

PID ORDER PROCESSING TURN-AROUND TIMES

The normal elapsed time which can be anticipated from the time the program order is shipped to PID till the time the order is received may be calculated from the following table:

ACTION	TIME IN DAYS
Order sent to PID	Average - 4 calendar days in transit
Order processed at PID	Maximum - 8 working days at PID
Order sent from PID	Maximum - 4 calendar days in transit

Thus, a three-week cycle should be planned for when ordering programs from PID.

PID SHIPPING METHOD'S

PID uses three methods to ship program packages, depending on destination, weight and urgency. This information may be worthwhile to users who send magnetic volumes to PID.

1. United Parcel Service (air and land) is used whenever possible.
2. U.S. Mail is used for destinations beyond United Parcel territories. Fourth Class Special Delivery is the level of service chosen because it provides service comparable to First Class (4 days maximum to any location in the continental United States) at a much lower rate. Special Handling Service it should be noted, is not the same as Special Delivery Service, and is not as fast. PID insures Fourth Class Special Delivery shipments to provide a means for tracing shipments. A signature at the destination is a requirement for insured packages.
3. Air Freight service is used for expedited shipments. To metropolitan centers, overnight delivery can usually be expected. Two day delivery to locations more than 50 miles from a major airport is normal.

COMPLETION OF THE IBM PROGRAM ORDER FORM INTRODUCTION

The IBM Program Order Form (120-1957) is to be employed for all orders submitted to PID for Type I, II, III, IV and Prior Use programs and for communications with PID relative to the establishment, modification and deletion of PID user profiles. This is the ONLY form to be used for these purposes.

The IBM Program Order Form is a 3-copy form. Copy 3 is retained by the user. Copies 1 and 2 should be forwarded to the IBM Branch Office. After completing Section 5 (see below), the Branch should forward Copy 1 to PID and retain Copy 2 for reference purposes.

THE IBM PROGRAM ORDER FORM CONTAINS 5 SECTIONS:

- Section 1, Program Package Identification, is used to describe the program material required.
- Section 2, Customer and Order Identification, MUST ALWAYS BE COMPLETED.
- Section 3, User Volume Information, is completed when the order requires the submission of user volumes.
- Section 4, User Registration, is completed to register a new PID user, or to modify or delete a user registration.
- Section 5, For IBM Use, MUST ALWAYS BE COMPLETED by an IBM representative.

Instructions for the completion of each section are given below. Refer to the sample form (Figure1) presented at the end of this discussion.

SECTION 1 PROGRAM PACKAGE IDENTIFICATION

This section is used to describe the program packages being ordered. The instructions which follow, apply to ordering all programs described in this catalog.

A program is packaged and distributed under one program number (e.g., 7090-PR-130, 1410-PR-155, 1620-01.6.145, 1440-UT-041, etc.) and is fully specified by entries in Columns 1-24 ON ONE LINE of Section 1. A total of 25 ordering lines have been provided on the order form. If more than 25 lines are required, the order may be continued on a second form and then a third, etc.

COLUMN I BASIC OR OPTIONAL MATERIAL

The requester specifies, in Column 1, whether the basic or optional program package is required. If both the basic

and the optional program packages are required, they must be described separately, on separate lines of the form. The contents of these program packages are described in the abstracts in this manual.

ENTER B or O

COLUMN 2 MACHINE READABLE

The requester specifies, in Column 2, whether or not he wishes the machine readable portion of the program package.

ENTER Y or N

COLUMN 3 DOCUMENTATION

The requester specifies, in Column 3, whether or not he wishes the documentation portion of the program package. PID will send one copy of the basic documentation associated with each Type I and II program ordered, if the documentation is requested. Requests for ONLY the documentation for Type I and II programs, when the machine readable material is not ordered, should be sent to the Mechanicsburg Distribution Center by the IBM Branch Office (use Publication Requisition #MO2-0618-4). Also, requests for multiple copies of documentation for Type I and II programs should be requested through the IBM Branch Office.

PID will honor "documentation only" requests for Type III and IV programs and also requests for multiple copies for Type III and IV program documentation, up to 3 copies. If more than 3 copies are required, the user may reproduce copies locally (provided this material is not copyrighted).

ENTER 0 or 1 for Type I and II Programs

ENTER 0, 1, 2 or 3 for Type III and IV Programs

COLUMNS 4-13 PROGRAM NUMBER

The exact Program Number, as specified in the ordering information portion of the Catalog of Programs abstract should be entered in this field.

ENTER the Program Number (e.g., 7040SI141) in columns 4-12 or columns 4-13, as the length requires. Omit all special characters such as decimal points or hyphens.

COLUMNS 15-20 PROGRAM NUMBER EXTENSION

The Program Number Extension is used in conjunction with the Program Number to completely and uniquely identify orderable Types I, II, III, IV and Prior Use Programs. Program number extensions pertinent to a given program number are described in

the ordering information portion of the Catalog of Programs abstract for that program. Whenever a program number requires a program number extension, IT MUST BE ENTERED in Columns 15-20.

ENTER as specified in the Catalog of Programs abstract (left justify).

COLUMN 14 ACTION CODE (TYPE I AND II BASIC PROGRAM PACKAGES ONLY)

Column 14 provides the user with the means to maintain his PID profiles for Type I and II programs in order to make most effective use of the Program Update Service. There are 2 specific actions requiring an entry in Column 14. COLUMN 14 SHOULD BE LEFT BLANK IN ALL OTHER CASES. These two actions are:

1. ORDER AN ANNOUNCED MAINTENANCE PACKAGE

Users of record receive announcements of the availability of orderable maintenance packages for programs automatically from PID.

Users wishing to order an announced orderable maintenance package may do so as follows:

ENTER M in Column 14

The program number and any applicable program number extension which is identified in the announcement material must be entered in Columns 4-13 and 15-20 respectively. The remainder of Columns 1-24 must also be completed as applicable.

2. DELETE A TYPE I OR II PROGRAM FROM THE USER PROFILE

Through the Program Update Service, PID makes extensive distributions of machine readable material and documentation to all users of record of all Type I and II basic programs. It is essential that the PID profiles be kept up to date to facilitate the distribution of this material to active users as well as to avoid the distribution of this material to installations no longer using previously ordered Type I and II programs.

A Type I or II program previously ordered, which is no longer being used, may be deleted from the PID profile as follows:

ENTER D in Column 14

The program number and any applicable program number extension must be entered in Columns 4-13 and Columns 15-20 respectively. No other entries in columns 1-24 are required.

COLUMNS 21-22 DISTRIBUTION MEDIUM CODE

(See Table Below)

The media on which each Type I, II, III, IV and Prior Use program is available from PID and the codes to be used, in Columns 21-22, to specify the desired media are identified in the Catalog of Programs abstract for each program.

ENTER the selected medium code.

MEDIUM CODE TABLE

TYPE	DESCRIPTION	CODE
DTR*	Medium defined by PID user profile	00
PT	8 channel paper tape.	05
CARDS	80 column punched cards.	15
7/556	Magnetic tape recorded at 7 track, 556 cpi.	22
7/800	Magnetic tape recorded at 7 track, 800 cpi.	24
7DC/800	Magnetic tape recorded at 7 track, 800 bpi. Data convert feature required.	26
9/800	Magnetic tape recorded at 9 track, 800 bpi.	28
9/1600	Magnetic tape recorded at 9 track, 1600 bpi.	29
1316	1316 Disk Pack.	52
2316	2316 Disk Cartridge	57
2315	2315 Disk Cartridge.	58
2316	2316 Disk Cartridge.	57

NOTE 1: DTR* Card programs will be distributed on DTR's (Distribution Tape Reels) to card users with magnetic tape capability as indicated on the PID user profile (See Section 4). These programs will be distributed in card form to users with no magnetic tape capability. Whenever possible, multiple card programs ordered together will be stacked on one or more DTR's. A retriever will be placed at the beginning of each DTR, enabling the user to selectively punch out the programs stacked on the DTR. Card programs which will be volume shared as described above are identified by DTR* in the ordering information portion of the Catalog of Programs abstracts. The user may establish or modify the profile entry describing his magnetic tape capability through the use of Section 4 of the Program Order Form.

NOTE 2: Types I, II, III, IV and Prior Use program orders require the user to specify a medium code. However, in the absence of a medium code, a default option is exercised by PID under the following circumstances.

. All distribution media for the program package in question

(Basic or Optional) must be magnetic tape.

- . User volume requirements for the program package in question (Basic or Optional) must be the same for all tape types.
- . The default medium must be one of the recording densities available.

The default options are:

- . For programs available on 7/556 cpi and 7/800 cpi, 7/800 cpi will be supplied.
- . For programs available on 7DC/800 cpi, 9/800 bpi, or 9/1600 bpi, 9/800 bpi will be supplied.

COLUMNS 23-24 USER VOLUMES REQUIRED

When the programs ordered require the submission of user volumes (2400' magnetic tape reels and/or disk devices) the number of user volumes for each program, as specified in the Catalog of Programs abstract, is entered in Columns 23-24 and Section 3 of the order form is to be completed.

ENTER the number of user volumes required for the medium type selected. The number should be entered as two digits (01, 02, etc.)

SECTION 2 CUSTOMER AND ORDER IDENTIFICATION

CUSTOMER NUMBER

Enter the 7-digit Customer Number in the space provided ON EVERY IBM PROGRAM ORDER FORM SUBMITTED TO PID. Do not use dashes. Do not use the shaded area unless previously advised to do so. The Customer Number MUST BE ENTERED CORRECTLY because the user profile maintenance and the address to which the ordered program material will be shipped by PID will be determined from this number for all registered PID users (See Section 4). Once registered with PID, users are not required to enter their name and address on the order form.

ORDER NUMBER

This number is pre-printed on each form.

PAGE - OF -

If only one form is needed to specify the program order, enter "1 of 1". When more than one form is needed, number the forms "1 of n" "2 of n"... "n of n". Enter the CUSTOMER NUMBER ON EVERY FORM, and staple the forms together when sending to PID.

SECTION 3 USER VOLUME INFORMATION

The total number of user volumes (2400' magnetic tape reels, disk packs or cartridges) required to fill the program order, as identified program by program in Columns 23-24 of Section 1, should be accounted for in this section. These volumes may either be forwarded to PID or ordered from the appropriate IBM location. Complete Section 3 by entering the number of 2400' magnetic tape reels forwarded or ordered, the serial numbers of disk devices forwarded, or the plant order number, quantity and scheduled shipping dates of the disk devices ordered from San Jose.

Copy 1 of the IBM Program Order Form should accompany user volumes forwarded to PID. User volumes forwarded to PID should be externally labelled as follows:

2400' MAGNETIC TAPE REELS	DISK PACKS/ CARTRIDGES
1. Customer Number	1. Customer Number
2. *Order Number (Preprinted)	2. *Order Number (Preprinted)
	3. Disk serial number

It is suggested that tape reels be of the aluminum hub variety and the tape secured by a tape end retainer

Disk packs should be shipped in the standard disk pack containers (Part #7350520). Disk cartridges should be shipped in the standard cartridge container (Part #7350600).

* If multiple Program Order forms are required to complete the program order, enter the preprinted Order Number from the FIRST FORM on all user volume labels.

In lieu of forwarding tape reels to PID, reels may be purchased in conjunction with ordering programs. To purchase magnetic tape reels, Part #7035113 (10 1/2" diameter 2400' reel, 3200 FCI, total surface tested, clear front, blue back, solid flanges), contact the IBM representative who can order them directly from PID by sending a completed copy of the Magnetic Tape Order Form #170-1138 to PID together with Copy 1 of the Program Order Form. Part #7035113 is the only part number PID carries. If different tape reels are desired the IBM representative must send orders for them with Copy 1 of the Program Order Form to the Boulder Tape Center. The Tape Center will forward the reels and the Program Order Form to PID. This procedure will of course extend total turnabout time and delay receipt of the program.

Disk packs and disk cartridges may be ordered from San Jose in conjunction with ordering programs. Contact the IBM representative for assistance. Copy 1 of the Program Order Form should be sent

directly to PID. Upon receipt of the volumes, PID will fill the order in the normal manner.

SECTION 4 USER REGISTRATION

Section 4 is completed to register a new PID user and to modify or delete previous registrations. Each user must be registered with PID prior to, or simultaneously with, his first program order. Once the user is registered Section 4 NEED NOT BE COMPLETED AGAIN until the registration data requires modification or deletion.

ACTION CODE

- R: REGISTER a new PID user. All blocks of Section 4 must be completed.
- M: MODIFY a previous registration by changing any or all blocks in Section 4. Each block modified must be completely respecified. Thus, a permanent change in the "Attention To" line of the user's name and address requires re-specification of the entire "Ship To" Information block of Section 4. The other blocks are left blank.
- D: DELETE a previous registration. This action causes the deletion of the entire user profile (identified by the 7-digit Customer Number entered in Section 2) from the PID files. No other information is necessary.
- S: SPECIAL "Ship To" this order only. This action causes a "Ship To" Information substitution for this order only. The "Ship To" Information block must be completely specified. All other blocks are left blank. The permanent user registration data is not affected.

DP BRANCH OFFICE NUMBER/IBM LOCATION

Enter the IBM DP Branch Office number for the IBM customer or DP Branch Office user. Enter the IBM division, location and department codes for IBM users.

MAGNETIC TAPE CAPABILITY

As stated in Section 1 (Columns 21-22) Card programs will be volume shared for distribution on Distribution Tape Reels (DTR's) to Card users with magnetic tape capability. These DTR's will have a retriever placed at the front to enable the user to punch the programs out selectively. Enter here the preferred tape recording mode (trackage and density) for these volume shared DTR's. Check "None of These" if not a Card user.

"SHIP TO" INFORMATION

Enter the complete shipping address. Do not use only a Post Office Box number since PID uses carriers other than the U. S. Mail. The ZIP CODE must be provided. In the "Attention To" line, if at all possible, enter a position title or department name/number, rather than the name of an individual.

SECTION 5 FOR IBM USE

IBM CONTACT

Enter the last name and telephone number of the IBM representative familiar with the order. If the representative can be reached on the IBM network, enter NET and the correct seven-digit number. PID will call this person should clarification of any of the information on the Order Form be required.

IBM MANAGEMENT SIGNATURE

Each order should be signed by a member of Branch management or, in the case of internal IBM users, by the department manager. The order form should be dated (MM DD YY) and the Branch Office/Department number entered.

IBM WORLD TRADE USERS

World Trade users should order programs by contacting their IBM representative.

KEYWORD-IN-CONTEXT (KWIC) INDEX

The Keyword-in-Context Index lists all available programs by their search words and keywords. Search words are significant words that describe the program but do not appear in the title. Keywords are significant words which appear in the program title.

Each search word and each keyword is listed alphabetically in a column of the index. Their respective context words are printed to the right of the search word or keyword. There is an index entry for each search word and keyword. Certain words are not accepted as indexing words. They are considered to be too general to be useful for retrieval purposes and are therefore prevented from indexing. Hyphenated words are treated as one index word, with only the first word being significant. Figure 2 illustrates the operation.

Note that the # sign always precedes the first word of the title. An * sign precedes a search word. Each print line in the KWIC Index contains 43 positions. A search word group or title that is longer than 43 positions will show only the words that fall to the right of the search word or keyword being highlighted, up to the limits of one line. The remaining words become a separate entry on a different line. The + sign at the end of a line indicates there are more words in the search word

group or title than are shown. The complete title may be found in the title section of the program abstract.

PROGRAM CLASSIFICATION CODES

Classification codes represent areas of function of application to which programs apply. Included below is a complete listing of classification codes for all types of programs and for each system included in this Catalog.

PROGRAMMING SYSTEMS TYPE I

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

APPLICATION PROGRAMMING TYPE II

Distribution

/DP/ Publishing
/DR/ Retail
/DW/ Wholesale

Fabrication and Assembly

/CN/ Numerical Control Applications
/CX/ Other
/EE/ Electrical Engineering
/EO/ Optics
/EX/ Other
/ME/ Electrical Machinery

Process

/MP/ Petroleum and Industrial Chemicals
/MT/ Textiles and Paper

Service Industries

Finance

/FB/ Banking
/FI/ Brokerage and Investment

Information Retrieval

/CR/ Information Retrieval

Insurance

/IF/ Fire and Casualty
/IL/ Life

State and Local Government
 /UG/ Government, State and Local

Transportation
 /ST/ Transportation

Utilities
 /SU/ Utilities

Federal Region
 /GF/ Government, Federal

Scientific Industries

Aerospace
 /MA/ Aerospace

Education
 /US/ Secondary Schools

Medical
 /UH/ Hospital and Medical

Scientific Marketing
 /CA/ Statistical Applications
 /CO/ Operations Research
 /CP/ Critical Path Scheduling
 /CM/ Mathematical Applications
 /EC/ Civil Engineering
 /MF/ Fabrication and Primary Metals

Cross Industry

Communications
 /SC/ Communications

Simulators
 /CS/ Simulators

Systems Engineering
 /SE/ Systems Engineering Techniques

TYPE III AND TYPE IV PROGRAMS

IBM 1620 Data Processing Systems

Utility Programs 1.0
 1.1 Assembly and Optimizing
 1.2 Loading
 1.3 Punching
 1.4 Tracing
 1.5 Tape Handling
 1.6 Miscellaneous General Purpose

Interpretive Programs 2.0

Mathematical Functions 3.0

Differential & Integral Equations 4.0

Matrix Programs 5.0

Statistical Programs 6.0

Mathematical Routines 7.0

Physical Sciences 8.0
 9.1 Aeronautical
 9.2 Civil
 9.3 Chemical

9.4 Electrical
 9.5 Mechanical
 9.6 Petroleum
 9.7 Other

Management Science 10.0
 10.1 Linear Programming
 10.2 Simulation
 10.3 Other
 10.4 Numerical Control

Demonstration Program 11.0
 Control Systems 12.0
 Unclassified 13.0

USING THE CATALOG

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

System	File No.
7070	AT-082
1410	11.9.001

The number of the IBM system for which the program is written.

The IBM Library code for filing and ordering a program.

Now refer back to the illustration in the section entitled, "Keyword-in-Context Index". As you can see, there are two kinds of file numbers: The first consists of an alphabetical and numeric reference; the second is completely numeric in a Dewey Decimal sequence.

Type I and II program abstracts are located in the "IBM Programs" section of this Catalog; Type III and IV program abstracts are located in the "Contributed Programs" section.

The page number listed at the end of the KWIC entry line will direct you to the program abstract. Each abstract describes the relevant program in enough detail to help you determine if the program will meet your requirements.

LIST OF NEW PROGRAMS

This section consists of a list of new Programs added since the last edition of the Catalog or its Supplements. All new Type III and IV Programs which appear in this catalog were accepted prior to December 31, 1969.

PROGRAM CORRECTIONS AND REVISIONS

There are two kinds of revisions to programs listed in this Catalog:

1. Changes in the program abstract,
2. Functional changes in the program documentation and/or machine readable material.

Abstract changes for all Types of programs are noted in this Catalog and in the Supplement. The following codes appear at the extreme right-end of the title line for each abstract that is new or has been revised in this edition:

- *N - This symbol indicates a new program.
- *M - This symbol indicates that the text of the abstract has been modified.

Functional changes in program documentation and/or decks or tapes for Type III (IBM Contributed) and Type IV (Customer Contributed) programs are listed in a special table preceding the KWIC Index. This data is listed under four headings: machine area; order number; date the correction was effective; and material changed. If a user has received the program data prior to the date indicated and would like to receive the correction, he must reorder the program. See the section entitled, "Completion of the IBM Program Order Form". All corrections and revisions which appear in this catalog were accepted prior to December 31, 1969.

Information concerning functional changes in program documentation and/or machine readable material for Type I (Programming Systems) and Type II (Application Programs) can be obtained through your IBM Branch Office.

DELETED TYPE I, II, III, AND IV PROGRAMS

Deleted Types I, II, III and IV programs are announced in each Catalog or Supplement in the table entitled "List of Deleted Type I, II, III and IV Programs".

Catalogs will contain a list of all deleted programs, including those contained in all previous supplements, that have been deleted since the last published catalog.

LIST OF NEW TYPE III AND IV PROGRAMS

All programs which appear on this list were accepted prior to December 31, 1969.

PROGRAM NO. -----	PROGRAM TITLE -----	PAGE NO. -----
1620-01.6.160	LABELR - A REPORT GENERATOR	Ø3Ø
1620-02.0.066	A MODIFIED PDQ FORTRAN SYSTEM	Ø37

DELETED TYPE I, II, III, AND IV PROGRAMS

The following programs were deleted because of low usage:

PROGRAM NO. -----	PROGRAM TITLE -----
1610-01.1.002	ADDITIONAL INSTRUCTION MACRO SUBROUTINE
1620-01.1.030	NELIAC COMPILER
1620-01.1.034	DEFT DISK EXECUTION OF FORTRAN TRANSFER
1620-01.1.036	DDSR - DISK DATA STORAGE ROUTINE
1620-01.2.015	GOTAFIT - GOTRAN AND AFIT FORTRAN FOR MONITOR I SYSTEM
1620-01.2.018	1620/1311 FORTRAN II-D SUBROUTINE PRE-READ AND COLUMN TEST MONITOR 1 SUBSET 1
1620-01.3.008	FORTRAN COMPRESSOR AND 75 COLUMN DUMP
1620-01.3.012	GENERAL GANG-PUNCHING PROGRAM
1620-01.4.001	SELECTIVE TRACE
1620-01.4.027	FORTRAN PROGRAM STRAIGHTENER
1620-01.6.019	FORTRAN II DIAGNOSTICIAN
1620-01.6.043	LOGGING PROGRAM
1620-01.6.045	FORTRAN COMPRESSOR AND MULTI-PROGRAMMER
1620-01.6.053	SPS FLOATING POINT CONVERSION SUBROUTINES
1620-01.6.070	CARD SEARCHING PROGRAM, CS3
1620-01.6.090	CLEAR AND LOAD 20K
1620-01.6.098	GENERAL COMPRESSOR PROGRAM
1620-01.6.099	SELECTIVE CARD REPRODUCER
1620-01.6.119	REPRODUCER (OR RESCUE, I.E. REPRODUCE, EMIT, AND SEQUENCE ON CUE)
1620-01.6.121	TNF AND TNS SIMULATION SUBROUTINES
1620-01.6.122	FACT-FINDER - A GENERAL CLASSIFICATION PROGRAM
1620-01.6.137	DISK PACKER
1620-01.6.144	PART - PROCESSOR AND RESULT TESTER
1620-01.6.145	PICTURE OF DISK PACK
1620-01.6.157	TNS, TNF, AND MF MACRO SUBROUTINES
1620-02.0.011	INTERPRETIVE SYSTEM FOR PERFORMING OPERATIONS WITH COMPLEX NUMBERS
1620-02.0.017	UTO FORTRAN PROCESSOR AND SUBROUTINES
1620-02.0.035	CARLETON BINARY SIMULATOR
1620-02.0.036	BG - UTO FORTRAN
1620-02.0.038	CARLETON COLLEGE COMPILER
1620-02.0.044	SINGLE AND MULTIPLE LINEAR REGRESSION ANALYSIS PROGRAM /CARD/
1620-02.0.049	PDQ THIRD ALTERNATE SUBROUTINE
1620-02.0.053	JANET - DIGITAL ANALOG SIMULATION PROGRAM
1620-02.0.054	JANET - II - DIGITAL ANALOG SIMULATION PROGRAM
1620-02.0.055	PDQ FORTRAN COMPRESSOR
1620-02.0.056	FHPS-5 (1620 VERSION)
1620-02.0.059	C4D - AN OPERATING SYSTEM FOR PDQ FORTRAN
1620-02.0.061	PDQ FORTRAN DISK SYSTEM FOR 1620
1620-02.0.065	INSPEC - INVESTIGATE NUMERICALLY STUDENTS PROGRAM EXECUTE AND CONTROL
1620-03.0.001	VARIABLE FIELD SQUARE ROOT SUBROUTINE
1620-03.0.009	REAL ROOTS OF CUBIC POLYNOMIALS
1620-04.0.006	SOLUTION OF N SIMULTANEOUS FIRST - ORDER DIFFERENTIAL EQUATIONS
1620-05.0.008	SIMULTANEOUS EQUATIONS A LA KING
1620-05.0.028	MULTIPLICATION OF MATRICES WITH VARIABLE LENGTH MANTISSA
1620-06.0.003	SCRAP/SIXTEEN - TWENTY CARD REGRESSION ANALYSIS PROGRAM
1620-06.0.031	STEPWISE REGRESSION (MODIFICATION OF BIMDO 9)
1620-06.0.037	MATRIX INVERSION AND SOLUTION OF SIMULTANEOUS LINEAR

PROGRAM NO.	PROGRAM TITLE
	EQUATIONS
1620-06.0.043	CONTINUOUS FOREST INVENTORY STATISTICAL CHECK PROGRAM
1620-06.0.067	LINEAR REGRESSION (TWO VARIABLES) LEAST SQUARES FIT
1620-06.0.126	AUTOCORRELATION AND SPECIAL ANALYSIS FOR A 20K 1620
1620-06.0.128	COMPUTATION OF THE CUMULATIVE BINOMIAL POISSON NORMAL
	STUDENT T/CHI - SQUARE F PROBABILITIES
1620-06.0.143	80 - SERIES MULTIPLE LINEAR REGRESSION SYSTEM (CARD)
1620-06.0.145	CORRELATION MATRIX WITH OPTIONAL FACTOR ANALYSIS AND
	ROTATION OF FACTORS
1620-06.0.148	SINGLE AND MULTIPLE LINEAR REGRESSION ANALYSIS PROGRAM /CARD/
1620-06.0.157	FOUR TYPE POLYNOMIAL CURVE FITTING BY LEAST SQUARES
1620-06.0.164	INVERSE LAPLACE TRANSFORM
1620-06.0.166	AUTOCORRELATION - SPECIAL ANALYSIS
1620-06.0.184	MULTIPLE LINEAR REGRESSION
1620-06.0.201	TAXONOMY PROGRAM FOR CLASSIFYING ITEMS DESCRIBED BY
	QUALITATIVE PROPERTIES
1620-06.0.202	1 TO 4 WAY ANALYSIS OF VARIANCE WITH REPEATED MEASURES AND
	UNEQUAL SUBSET CELL FREQUENCY
1620-06.0.203	HUNT - HOFSTRA UNIVERSITY NONPARAMETRIC TESTS
1620-06.0.216	STATISTICAL PROJECT ORGANIZER FOR TEACHING
1620-06.0.225	GENERAL PURPOSE ANALYSIS OF VARIANCE SYSTEM
1620-06.0.250	TRANSFORMATION TO CHECK AND INCREASE LINEARITY IN DATA
1620-06.0.252	1620 GENERAL PROGRAM APBE - ANALYSIS OF PLACKET - BURMAN
	EXPERIMENT
1620-06.0.253	PORTA - A GRADING PROGRAM
1620-07.0.002	POLYNOMIAL CURVE FITTING
1620-07.0.015	FORTRAN SYSTEM RELOCATABLE SUBROUTINE FOR GENERATING
	(RANDOM NUMBERS)
1620-07.0.021	RANDOM NUMBER SUBROUTINE FOR IBM 1620 FORTRAN W/FORMAT
1620-07.0.024	FOURIER CURVE FITTING - 1 - PASS
1620-07.0.026	ERROR FUNCTION - 1620 FORTRAN SUBROUTINE
1620-07.0.027	POLYNOMIAL CURVE FITTING AND EVALUATION
1620-07.0.031	FOURIER CURVE FITTING - 2 PASS
1620-07.0.039	BIVARIATE CURVE FIT
1620-07.0.040	POLYNOMIAL ROOTFINDER BY BARSTOW'S METHOD
1620-07.0.057	RANDOM NUMBER SUBROUTINE FOR FORTRAN II - D UNDER MONITOR I
1620-07.0.058	CONIC EQUATIONS PROGRAM
1620-07.0.059	RANDOM NUMBER SUBROUTINE FOR FORTRAN 2
1620-07.0.074	X Y PLOT PROGRAM
1620-07.0.076	FORTRAN II - D SUBROUTINE FOR MATRIX INVERSION AND/OR
	RELATED OPERATIONS
1620-08.1.005	GENERAL RAY TRACE PROGRAM
1620-09.0.001	GRAPH 2 - A PRINTER PLOTTING SUBROUTINE ALGORITHM
1620-09.2.010	CURVE BRIDGE PROGRAM
1620-09.2.016	DTM DESIGN SYSTEM 20K
1620-09.2.019	DTM DESIGN SYSTEM 40K
1620-09.2.020	COMPUTER SOLUTIONS FOR SLOPE STABILITY ANALYSIS/PAPER TAPE
1620-09.2.022	COLUMN ANALYSIS UNDER AXIAL LOAD AND TWO WAY BENDING
1620-09.2.026	DTM LOCATION SYSTEM
1620-09.2.029	WATER HAMMER
1620-09.2.034	SUBDIVISION PROGRAM
1620-09.2.036	DEAD LOW BEAM DEFLECTIONS PRECISION
1620-09.2.039	PIPE FRICTION HEAD LOSS CALCULATIONS IN WATER SUPPLY
	ENGINEERING USING THE DARCY METHOD
1620-09.2.050	PRESTRESSED GIRDER ANALYSIS AND DESIGN PROGRAM FOR THE IBM
	1620 DATA PROCESSING SYSTEM
1620-09.2.051	TWIN BOX CULVERT DESIGN
1620-09.2.053	CONTINUOUS BEAM SERIES - PROGRAM I THRU IX AND XCIX /CARD/
1620-09.2.054	SUBDIVISION CUT AND FILL
1620-09.2.055	DESIGN EARTHWORK VOLUMES
1620-09.2.056	DETERMINATE AND INDETERMINATE PIN JOINTED TRUSS ANALYSIS
1620-09.2.079	WELDED STEEL COMPOSITE BEAM DESIGN
1620-09.2.082	SYNCHRONIZING TRAFFIC SIGNALS FOR MAXIMAL BANDWIDTH
1620-09.2.083	THE SELECTION OF A CYCLE LENGTH FOR FIXED TIME TRAFFIC
	SIGNALS
1620-09.2.084	GENERALIZED STACK - VIBRATION CALCULATIONS BASED ON RAYLEIGH
	- RITZ FORMULAE
1620-09.3.008	MULTICOMPONENT DISTILLATION TOWER DESIGN CALCULATIONS BY
	SHORT CUT METHODS
1620-09.3.012	THIELE - GEDES METHOD FOR MULTICOMPONENT DISTILLATION

PROGRAM NO.	PROGRAM TITLE
1620-09.3.017	CALIBRATION AND SIZING OF ORIFICE FLOWMETERS
1620-09.4.064	LOCUL - A ROOT LOCUS ALGORITHM
1620-09.4.065	BODE - A FREQUENCY RESPONSE ALGORITHM
1620-09.4.066	ANALOG
1620-09.5.004	H-104, TWO DIMENSIONAL, TRANSIENT OR STEADY HEAT CONDUCTION
1620-09.5.005	FAMILY OF COMPUTER PROGRAMS FOR DISK CAM COMPUTATIONS
1620-09.5.006	NATURAL FREQUENCIES AND RELATIVE DEFLECTIONS AND FORCES OF VIBRATING BEAM
1620-09.5.014	KINEMATIC ANALYSIS METHOD
1620-09.6.003	RATE OF FLOW CALCULATIONS FOR PETROLEUM LIQUIDS AND GASES IN REFINERY OPERATIONS
1620-09.7.001	DISTRIBUTION OF WATER FLOW A PIPE NETWORK
1620-09.7.008	WATER FLOW IN A PIPE NETWORK BY HARDY CROSS SOLUTION /CARD/
1620-09.7.014	STRESS/CARD/
1620-10.1.002	LINEAR PROGRAMMING CODE FOR THE IBM 1620 WITH CARD INPUT AND OUTPUT
1620-10.1.005	TRANSPORTATION PROGRAM FOR THE IBM 1620
1620-10.1.007	LINEAR PROGRAMMING I
1620-10.1.008	LINEAR PROGRAMMING
1620-10.1.011	ECONOMIC ORDER QUANTITIES FOR LINEAR DEMAND FUNCTIONS
1620-10.1.013	LINEAR PROGRAMMING MANAGEMENT DECISION EXERCISE
1620-10.3.003	LESS (LEAST-COST ESTIMATING AND SCHEDULING) SCHEDULING FORTRAN
1620-10.3.010	ECONOMIC ANALYSIS OF PLANS - OUTPUT 1 AND OUTPUT 2
1620-10.3.011	MISS LESS MANAGEMENT INFORMATION SCHEDULING
1620-10.3.019	PECOS - PROTECT EVALUATION AND COST OPTIMIZATION SYSTEM
1620-10.3.023	HEXUP
1620-10.3.025	TWO DIMENSIONAL TRIM PROBLEM
1620-10.3.026	DYNAMIC
1620-10.3.027	LINEAR DECISION RULE FOR PRODUCTION AND EMPLOYMENT SCHEDULING
1620-10.3.028	CRITICAL PATH AND MAN
1620-10.3.029	CRITICAL PATH AND MAN SCHEDULING (60K VERSION)
1620-10.3.031	PERT-LESS
1620-10.3.035	PORTFOLIO SELECTIONS - DIAGONAL MODEL/40K/ /CARD/
1620-10.3.036	KWIC - KEYWORD IN CONTEXT INDEXING INFORMATION RETRIEVAL
1620-10.3.040	WEEK - WEEKLY SCHEDULE USING MASTER SCHEDULE
1620-10.3.052	ANALYSIS OF FACTORS AFFECTING OPTIMUM PLANT SIZE
1620-11.0.005	BLACKJACK GAME
1620-11.0.017	RANDOM WALK DEMONSTRATION
1620-11.0.019	HIM AND HER
1620-11.0.021	QUEENS GAME (MODIFIED)
1620-11.0.022	PERPETUAL CALENDAR
1620-11.0.023	CARD SYSTEM DEMONSTRATION
1620-11.0.024	ACCOUNTING DEMONSTRATION PROGRAM - ADP
1620-11.0.025	GAME OF DICE
1620-11.0.028	INFORMATION RETRIEVAL SYSTEM DEMONSTRATION
1620-11.0.033	MUSICAL OUTPUT PROGRAM
1620-11.0.034	MUSICAL ASSEMBLY PROGRAM
1620-11.0.039	MUSIC INTERPRETER
1620-11.0.040	DEMONSTRATION PROGRAM TO PRINT OUT PRIME NUMBERS
1620-11.0.052	MONABUS - A BUSINESS SIMULATION EXERCISE
1620-11.0.055	NOPE/NIM ONE FILE EDUCATOR
1620-13.0.011	SCRAMBLE - COMPUTER PREPARATION OF MULTIPLE FORMS OF AN EXAMINATION
1620-13.0.012	EXAMINATION ASSEMBLY PROGRAM
1620-13.0.013	FORTAN TEACH
1620-13.0.019	PACTOLUS - A DIGITAL ANALOG SIMULATOR PROGRAM
1620-13.0.026	A COMPUTER PROGRAM TO POWER-MATCH TEAMS IN A DEBATE TOURNAMENT
1620-13.0.028	UNIVERSITY OF MISSISSIPPI TEST SCORING PROGRAM - UMTS
1620-13.0.031	UNIVERSITY OF MISSISSIPPI TEST SCORING PROGRAM
1620-13.0.036	CAST - COMPUTER ASSISTED TEST SCORING

KNIC (KEYWORD-IN-CONTEXT) INDEX

ABERRATIONS	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGE	CENTROID
ABERRATIONS.	#GENERAL RAY TRACE AND THIRD+	1620-EO-81X	093	BEAM LIVE LOAD DEFLECTIONS.	#CONTINUOUS	1620-09.2.067	094
ABS, DEF, PLOT, WRIT.	#RELOCATABLE	1620-07.0.853	079	BEAM METHOD.	#DEFLECTIONS IN HINGED SPANS BY+	1620-09.2.063	094
#ABSOLUTE ASSEMBLY SYSTEM	7094 PAP+	1620-02.0.030	032	BEAM OR EQUI-INCLINATION SETTING.	#INTENSITY+	1620-08.4.002	083
#ABSORPTION CORRECTION IN CRYSTAL STRUCTURE+		1620-08.4.014	085	BEAM SERIES - PROGRAMS I AND II.	#COMPOSITE	1620-09.2.057	093
ABSORPTION CORRECTION IN CRYSTAL STRUCTURE+		1620-08.4.016	085	BEAM SERIES - PROGRAMS I THRU IX AND XCIX.		1620-09.2.053	093
ABSORPTION CORRECTION IN CRYSTAL STRUCTURE+		1620-08.4.017	085	BEAM.	#NATURAL FREQUENCIES AND RELATIVE+	1620-09.5.006	107
ABSTRACT.	#ZIP - KEYWORD IN CONTEXT ANALYSIS+	1620-10.3.032	114	BEARING.	#RANGE AND	1620-07.0.067	080
ACCOUNTING CASE.	#WISAL PROCESSOR FOR	1620-02.0.058	036	BENDING.	#RECTANGULAR REINFORCED CONCRETE+	1620-09.2.037	090
ACCOUNTING DEMONSTRATION PROGRAM - ADP.		1620-11.0.024	120	BENEATH CLASS MAXIMA.	#FREQUENCIES SHOWN	1620-06.0.227	078
ACTUAL 24-HOUR LOAD CYCLE.	#TRANSFORMER+	1620-09.4.032	102	#BESSEL FUNCTION SUBROUTINES FOR FORTRAN WITH		1620-07.0.037	077
AD-APT NUMERICAL CONTROL PROCESSOR.		1620-CN-06X	091	BESSEL FUNCTIONS OF INTEGRAL ORDER.		1620-03.0.005	038
ADDITIONS AND DISK UTILITY PACKAGE.	#DISK+	1620-01.6.134	026	#BG-UTO FORTRAN.		1620-02.0.036	033
#ADIABATIC FLAME TEMPERATURE, NO DISSOCIATION.		1620-09.3.011	097	BI-AXIAL BENDING.	#RECTANGULAR REINFORCED+	1620-09.2.037	090
ADJUSTMENT OF AERIAL TRIANGULATION STRIP+		1620-09.2.049	092	#BINARIATE LINEAR CORRELATION.		1620-06.0.188	065
ADJUSTMENT OF PRECISE SURVEY OBSERVATIONS.		1620-09.2.046	091	BINARY SIMULATOR.	#CARLETON	1620-02.0.035	032
ADJUSTMENT PROGRAM.	#SEASONAL	1620-10.3.024	114	#BINOMIAL COEFFICIENTS.		1620-07.0.060	079
ADJUSTMENT.	#SEASONAL	1620-06.0.054	048	BINOMIAL DISTRIBUTION.	#ESTIMATION OF+	1620-06.0.117	055
ADMITTANCE PARAMETERS.	#SCATTERING-MATRIX+	1620-09.4.063	106	BINOMIAL DISTRIBUTION.	#POWER CURVES FOR THE+	1620-06.0.116	055
ADP.	#ACCOUNTING DEMONSTRATION PROGRAM -	1620-11.0.024	120	BINOMIAL DISTRIBUTIONS.	#FITTING POISSON	1620-06.0.245	073
#AERIAL TRIANGULATION STRIP FORMATION - 6431.		1620-09.2.048	092	BINOMIAL DISTRIBUTIONS.	#FITTING NEGATIVE	1620-06.0.248	073
AERIAL TRIANGULATION STRIP 6432 + 6433.		1620-09.2.049	092	BINOMIAL POISSON NORMAL STUDENT T/CHI-SQUARE+		1620-06.0.128	056
AFIT FORTRAN FOR MONITOR I SYSTEM.	#GOTAFIT+	1620-01.2.015	016	#BOASSAY ANALYSIS/PARLOW.		1620-06.0.131	057
#AFIT IMPROVED FORTRAN.		1620-01.1.010	013	#BLACKJACK GAME.		1620-11.0.095	118
#AFIT LOAD AND GO SYMBOLIC PROGRAMMING SYSTEM.		1620-01.1.032	015	BLOCK DESIGN - SIMPLE OR MULTIPLE USU 10.		1620-06.0.107	054
#AFIT SYMBOLIC PROGRAMMING SYSTEM.		1620-01.1.023	013	BLOCK DESIGN-USU 63.	#MULTIVARIATE ANALYSIS+	1620-06.0.139	058
#AFIT SYMBOLIC PROGRAMMING SYSTEM, MODIFIED+		1620-01.1.027	014	BLOCK DESIGN, INDIVIDUAL AND COMB. STATION+		1620-06.0.123	056
ALGEBRA.	#MAGIC II - MATRIX	1620-05.0.031	042	BLOCK DESIGN, NO SUB-SAMPLES.	#ANALYSIS OF+	1620-06.0.070	050
#ALGEBRAIC SOLUTION FO GENERAL REAL QUARTIC+		1620-07.0.049	078	BLOCK DIAGRAM.	#PLOT A	1620-01.6.131	025
#ALGOL.		1620-02.0.044	033	BLOCK LETTERING ON IBM CARDS.	#CARD PUNCH+	1620-11.0.041	122
ALGORITHM.	#LOCUL - A ROOT LOCUS	1620-09.4.064	106	BLOCKS USU 12.	#ANALYSIS OF VARIANCE +	1620-06.0.087	051
ALGORITHM.	#BODE - A FREQUENCY RESPONSE	1620-09.4.065	106	BLOOD TAPE-TURN LATHE WITH MARK CENTURY+		1620-10.4.013	118
ALIGNMENT AND OFFSETS (HALO).	#HORIZONTAL	1620-09.2.038	090	#BODE - A FREQUENCY RESPONSE ALGORITHM.		1620-09.4.065	106
ALIGNMENT AND STAKROUT.	#VERTICAL	1620-09.2.081	096	#BOILERMAKER DAIRY MANAGEMENT GAME.		1620-11.0.048	124
ALIGNMENT DATA FROM COORDINATES (TAPE).		1620-09.2.027	088	#BOILERMAKER FARM SUPPLY BUSINESS MANAGEMENT+		1620-11.0.049	124
ALIED DATA.	#CALCULATION OF CENTER OF+	1620-09.5.013	099	#BOILERMAKER SUPERMARKET MANAGEMENT GAME.		1620-11.0.047	124
ALPHABETIC INDEXER AND LISTER FOR+		1620-10.3.038	115	#BOONAN FUNCTION TRANSFORMATION.		1620-05.0.025	041
#ALPHABETIC PLOTTING PROGRAM FOR THE OUTPUT+		1620-08.4.007	084	#BOX-COIN COLLEGE DECISION-MAKING EXERCISE.		1620-10.0.055	111
ALPHABETIC FORMAT PLOT RELOCATABLE+		1620-13.0.010	126	BOX-CULVERT DESIGN.	#TWIN	1620-09.2.051	092
ALPHANUMERIC SEARCH AND INFORMATION+		1620-01.6.064	020	BURCH AND TRANSCIT - (FLONBT).	#TABLE+	1620-01.1.053	029
ALTERNATE SUBROUTINE.	#PDQ THIRD	1620-02.0.049	034	#BREAKDOWN AND TALLY PROGRAM (TALLY).		1620-06.0.231	070
AMORTIZATION PROGRAM.	#MORTGAGE	1620-11.0.018	119	BRIDGE ELEVATIONS.	#SKEWED	1620-09.2.009	086
AMPLIFIERS TRANSFER FUNCTIONS.	#CALCULATION+	1620-09.4.057	105	BRIDGE PROGRAM.	#CURVE	1620-09.2.010	086
ANALOG SIMULATION PROGRAM.	#JANET - DIGITAL	1620-02.0.053	035	BUCKLING ANALYSIS OF OUTSTANDING COMPRESSION+		1620-09.2.030	089
ANALOG SIMULATION PROGRAM.	#JANET-II -	1620-02.0.054	035	BUILDING IN MULTIPLE REGRESSION USU 15.	16.	1620-06.0.084	051
ANALOG.		1620-09.4.066	107	BUILDINGS.	#COOLING-LOAD DETERMINATION FOR	1620-09.7.012	099
ANALYSIS-PRINCIPAL COMPONENTS I AND II.		1620-06.0.169	062	BUILDINGS.	#HEATING-LOAD DETERMINATION FOR	1620-09.5.011	118
ANALYSIS/PARLOW.	#BOASSAY	1620-06.0.131	057	BURGMASER DRILL PRESS WITH HUGES NC-211+		1620-10.4.011	108
ANALYZER.	#SPS OBJECT DRCK	1620-01.6.060	020	BUSINESS MANAGEMENT GAME.	#BOILERMAKER FARM+	1620-11.0.049	124
ANCHOR PIPE STRESS ANALYSIS.	#MULTI	1620-09.4.030	101	BUSINESS SIMULATION EXERCISE/CARD/.	#MONABOX	1620-11.0.052	125
#ANL MNEMONICS DUMP.		1620-01.6.022	019	CABLE RATINGS.	#NORMAL AND EMERGENCY	1620-09.4.031	101
ANNOTATION SUBPROGRAM.	#CHAR	1620-13.0.014	127	CAL-COMP PLOTTER.	#FORTRAN FORMAT SUBROUTINE+	1620-01.6.068	021
ANOV.	#COMPLETELY GENERALIZED	1620-06.0.090	051	CAL-COMP PLOTTER.	#FORTRAN II SUBROUTINE FOR+	1620-13.0.065	020
#ANSIR - ALPHANUMERIC SEARCH AND INFORMATION+		1620-01.6.064	020	#CAL-COMP 565 PLOTTER SUBROUTINE PEN FOR+		1620-13.0.065	020
ANTENNA ARRAY.	#ELECTRICAL FIELD INTENSITY+	1620-09.4.061	106	CALCULATION AND APPLICATION.	#NETWORK+	1620-09.4.029	101
ANTOINE EQUATION.	#LEAST SQUARES FIT OF+	1620-09.3.016	098	CALCULATION IN X-RAY CRYSTALLOGRAPHY.		1620-08.4.004	084
APERATURE AND SPOT DIAGRAM PROGRAMS.		1620-EO-03X	004	CALCULATION IN X-RAY CRYSTALLOGRAPHY.	#INTER+	1620-08.4.008	084
#APPROXIMATE RECTANGULAR GAME SOLUTION.		1620-07.0.046	078	CALCULATION IN 2 PASSES.	#RADIAL THREE PHASE+	1620-09.4.020	100
APPROXIMATION PROGRAM.	#RATIONAL	1620-07.0.079	082	CALCULATION OF CENTER OF GRAVITY, POLAR+		1620-09.5.013	109
APPROXIMATION TO THE ERROR FUNCTION+		1620-07.0.077	081	CALCULATION OF CLEBSCH-GORDAN COEFFICIENTS.		1620-06.0.155	060
#ARCSINE SUBROUTINE (RELOCATABLE).		1620-07.0.051	078	CALCULATION OF EIGENVALUES AND EIGENVECTORS+		1620-05.0.016	041
#ARCTANGENT SUBROUTINE.		1620-07.0.006	074	CALCULATION OF MINERAL UNIT CELL CONTENTS.		1620-08.3.004	083
ARGUMENTS.	#FORTRAN WITH FORMAT GAMMA+	1620-07.0.048	078	CALCULATION OF MULTIPLE CORRELATION+		1620-06.0.193	065
ARITHMETIC MORE PROGRAMMING.	#LESS	1620-01.1.001	013	CALCULATION OF POLES AND ZEROS OF AMPLIFIERS		1620-09.4.057	105
ARITHMETIC SUBROUTINES.	#DOUBLE PRECISION+	1620-07.0.010	075	CALCULATION OF POLES (REAL AND COMPLEX) OF A		1620-07.0.032	076
ARRAY.	#ELECTRICAL FIELD INTENSITY+	1620-09.4.061	106	CALCULATION OF ROOTS (REAL AND COMPLEX) OF+		1620-07.0.029	076
ASSEMBLER BY RICE UNIVERSITY.	#1620 SPS	1620-01.1.028	014	CALCULATION OF THE CHARACTERISTIC POLYNOMIAL		1620-07.0.042	077
ASSEMBLER.	#N.C.E. HIGH SPEED SPS	1620-01.1.029	014	CALCULATION OF THE REAL ROOTS OF A REAL+		1620-07.0.017	075
ASSEMBLY PROGRAM.	#MUSICAL	1620-11.0.034	121	CALCULATION OF THE REAL ROOTS OF A REAL+		1620-07.0.033	076
ASSEMBLY PROGRAM.	#EXAMINATION	1620-13.0.012	127	CALCULATION OF THE REAL ROOTS OF A SYSTEM OF		1620-07.0.041	077
ASSEMBLY SYSTEM 7094 PAP+		1620-02.0.030	032	CALCULATION OF VAN LAAR CONSTANTS AND VAPOR+		1620-09.3.015	098
ASSIGNMENT TECHNIQUE PROGRAM.	#CRITICAL PATH+	1620-10.3.030	114	CALCULATION.	#ELECTRIC SHORT CIRCUIT CURRENT	1620-09.4.045	103
#ASSIST.		1620-01.4.025	018	CALCULATIONS BASED ON RAYLEIGH-RITZ+		1620-09.2.084	097
ASSISTED TEST SCORING.	#CAST - COMPUTER	1620-13.0.036	130	CALCULATIONS FOR RADIAL DISTRIBUTION LINES.		1620-09.4.056	105
ASSOCIATION.	#INDEX OF ORDER OF	1620-06.0.098	053	CALCULATIONS IN WATER SUPPLY ENGINEERING+		1620-09.2.039	097
ASSUMPTIONS OF HOMOGENEITY OF VARIANCE,+		1620-06.0.152	060	CALCULATIONS OF THE DEFINITE INTEGRAL OF A+		1620-07.0.043	077
#ASTM-TO-TBP AND TBP-TO-ASTM DISTILLATION+		1620-09.3.006	097	CALCULATIONS.	#BEAM CAMBER	1620-09.2.024	088
ASYMMETRIC MATRICES.	#CORRELATION PROGRAM+	1620-06.0.114	055	CALCULATIONS.	#SHORT CIRCUIT	1620-09.4.007	099
ASYMMETRIC MATRICES.	#MISSING DATA+	1620-06.0.121	056	CALCULATIONS.	#GENERALIZED SAG AND TENSION	1620-09.2.069	095
ATOMIC DISTANCE CALCULATION IN X-RAY+		1620-08.4.008	084	CALCULATIONS.	#RADIAL THREE PHASE LINE DROP	1620-09.4.018	100
ATOMIC SCATTERING FACTOR TABLES.		1620-08.4.003	084	CALCULATOR.	#EXPENSIVE DESK	1620-11.0.043	123
#AUTO CORRELATION-POWER SPECTRUM.		1620-06.0.147	059	CALENDAR - 1585 to 2599 A.D..	#GREGORIAN	1620-11.0.044	123
#AUTO FLOAT FORTRAN PROCESSING SYSTEM.		1620-01.6.076	021	CALENDAR.	#PERPETUAL	1620-11.0.022	120
AUTO MINIMIZATION OF ERROR.	#NADAM - MATRIX+	1620-05.0.015	040	CALENDAR.	#UNIVERSAL	1620-11.0.026	120
#AUTOCORRELATION-SPECIAL ANALYSIS.		1620-06.0.166	062	CALENDAR.	#DATE INTERPRETER AND PERPETUAL	1620-11.0.045	123
AUTOMATA.	#MINIMIZATION AND STATE+	1620-13.0.035	129	CALL SUBROUTINES FOR PLOTTING.	#FORTRAN	1620-01.6.123	025
AUTOMATIC DATA CORRECTION SYSTEM - WESTERN+		1620-01.6.117	024	CAM COMPUTATIONS.	#FAMILY OF COMPUTER+	1620-09.5.005	107
AUTOMATIC FLOATING POINT.	#FORTRAN II FOR	1620-PO-049	095	CAMBER CALCULATIONS.	#BEAM	1620-09.2.024	088
#AUTOSLOT II POST-PROCESSOR FOR CENTINATIC+		1620-10.4.010	118	CANONICAL CORRELATION COEFFICIENT AND+		1620-06.0.178	063
AUTOSLOT III NUMERICAL CONTROL PROCESSOR.		1620-CN-07X	091	CANONICAL CORRELATION PROGRAM.	#ONE PASS	1620-06.0.214	067
#AUTOSLOT POST - PROCESSOR FOR MILWAUKEE -+		1620-10.3.015	113	#CANONICAL CORRELATION.		1620-06.0.137	058
#AUTOSLOT PROGRAM.		1620-CN-05X	091	#CAPITAL INVESTMENTS.		1620-CS-01X	002
AXES FACTOR ANALYSIS USING HOTELLINGS+		1620-06.0.091	052	#CAPITAL INVESTMENTS.		1620-10.3.037	115
AXIS.	#SX-1.01 - TRAVERSE	1620-09.2.060	094	CAREFREE PROGRAM DUMPER.		1620-01.6.142	027
AZEOTROPE DATA.	#CALCULATION OF VAN LAAR+	1620-09.3.015	098	CARLETON BINARY SIMULATOR.		1620-02.0.035	032
#BACKWATER CURVE PROGRAM.		1620-09.2.028	088	CARLETON COLLEGE COMPILER.		1620-02.0.038	033
BALANCE.	#TURBINE CYCLE HEAT	1620-09.5.009	108	CARLETON SPS.		1620-02.0.039	033
BALANCED LATTICE - USU 52.	#ANALYSIS OF+	1620-06.0.105	054	CAROLINA COLLEGE.	#AUTOMATIC DATA CORRECTION+	1620-01.6.117	024
BALANCED LATTICE DESIGN.	#ANALYSIS OF+	1620-06.0.062	049	CASE.	#WISAL PROCESSOR FOR COMPUTER	1620-02.0.058	036
BALANCING.	#PRODUCTION LINE	1620-LM-018	006	#CAST - COMPUTER ASSISTED TEST SCORING.		1620-13.0.036	130
BAR GRAPH GENERATOR PROGRAM.	#CRITICAL+	1620-10.3.020	113	CATALOG FOR DIGITAL COMPUTERS - PROCOM.		1620-10.3.049	117
#BARTLETT TEST FOR HOMOGENEITY OF VARIANCE.		1620-06.0.210	066	CATEGORICAL SYLLOGISM.	#A DEMONSTRATION+	1620-13.0.008	126
#BASEBALL GAME PROGRAM.		1620-11.0.037	121	CAUER EXPANSIONS OF PASSIVE ONE-PORT+		1620-09.4.026	100
BASEBALL SIMULATION AND DEMONSTRATOR.	#EBC	1620-11.0.032	121	CELL CONTENTS.	#CALCULATION OF MINERAL UNIT	1620-08.3.004	083
#BATCH PROCESSING STEPWISE MULTIPLE LINEAR+		1620-06.0.251	074	CELL FREQUENCY.	#1 TO 4 WAY ANALYSIS OF+	1620-06.0.202	065
#EBC BASEBALL SIMULATION AND DEMONSTRATOR.		1620-11.0.032	121	CELL SIZE-NON-SORT-ANOV.	#TEN MODEL-EQUAL	1620-06.0.213	067
BEAM ANALYSIS AND STEEL BEAM DESIGN.		1620-09.2.017	087	CELL.	#NONPARAMETRIC TWO-WAY ANALYSIS OF+	1620-06.0.218	068
#BEAM CAMBER CALCULATIONS.		1620-09.2.024	088	CENTER OF GRAVITY, POLAR MOMENTS OF INERTIA+		1620-09.5.013	109
BEAM DEFLECTIONS.	#DEAD LOW	1620-09.2.036	090	CENTIGRADE RISE TRANSFORMERS BASED ON LOSS+		1620-09.4.060	105
BEAM DESIGN.	#WELDED STEEL COMPOSITE	1620-09.2.079	096	CENTROID METHOD.	#FACTOR ANALYSIS -	1620-06.0.103	053
BEAM DESIGN.	#CONTINUOUS BEAM ANALYSIS AND+	1620-09.2.017	087	CENTROID METHOD..	#FACTOR ANALYSIS BY THE	1620-06.0.053	048

KWIC (KEYWORD-IN-CONTEXT) INDEX

CENTURY	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGE
	CENTURY NUMERICAL CONTOURING WITH "E"+	1620-10.4.013	118	CONSOLE EVALUATING AND DEBUGGING. #SPACED --	1620-01.6.107	023
	CHAIN PROCESS. #MARKOV	1620-05.0.038	042	#CONSTANT PROGRAM. #B	1620-09.4.044	103
	#CHAR ANNOTATION SUBPROGRAM.	1620-13.0.014	127	CONSTANT RESPONSE FOR A QUADRATIC+	1620-06.0.049	047
	CHARACTERISTIC POLYNOMIAL OF A REAL SQUARE+	1620-07.0.042	077	CONSTANTS AND VAPOR LIQUID EQUILIBRIUM FROM+	1620-09.3.015	098
	#CHEBYCHEV ORTHONORMALIZATION OF POLYNOMIALS.	1620-07.0.047	078	CONSTANTS IN THE NEGATIVE BINOMIAL+	1620-06.0.117	055
	CHECK AND INCREASE LINEARITY IN DATA.	1620-06.0.250	074	CONTENTS. #CALCULATION OF MINERAL UNIT CELL	1620-08.3.004	083
	CHECK PROGRAM. #CONTINUOUS FOREST INVENTORY+	1620-06.0.043	047	CONTEXT ANALYSIS ON A MULTIPLE LINE+	1620-10.3.032	114
	CHECKER. #FORTRAN FORMAT	1620-01.1.017	013	CONTEXT. #KWIC - KEYWORD IN	1620-10.3.016	113
	CHEMICAL REACTIONS. #COMPUTATION OF+	1620-09.3.018	098	CONTEXT. #KWIC - KEYWORD IN	1620-10.3.041	116
	#CHI SQUARE.	1620-06.0.089	053	#CONTINUOUS BEAM ANALYSIS AND STEEL BEAM+	1620-09.2.017	087
	CHI SQUARE, WHEN EXPECTATIONS ARE SMALL.	1620-06.0.182	064	#CONTINUOUS BEAM LIVE LOAD DEFLECTIONS.	1620-09.2.067	094
	#CHI-SQUARE #2.	1620-06.0.055	048	#CONTINUOUS BEAM SERIES - PROGRAMS I THRU IX+	1620-09.2.053	093
	CHI-SQUARE ANALYSIS, COUNT TABLE OR RAW+	1620-06.0.079	050	#CONTINUOUS FOREST INVENTORY STATISTICAL+	1620-06.0.043	047
	CHI-SQUARE ANALYSIS, COUNT TABLE OR RAW+	1620-06.0.082	050	CONTOURING WITH "E" FORMAT. #POST PROCESSOR+	1620-10.0.013	118
	CHOICE ITEM ANALYSIS PROGRAM. #FIVE	1620-06.0.229	070	CONTOURS OF CONSTANT RESPONSE FOR A+	1620-06.0.049	047
	CHOICE SPLIT-HALF RELIABILITY PROGRAM WITH+	1620-06.0.234	071	CONTROL PROCESSOR. #1620/1311 AD-APT	1620-CN-06X	001
	CHORDS. #THE BUCKLING ANALYSIS OF+	1620-09.2.030	089	CONTROL PROCESSOR. #1620/1311 AUTOSPOT III+	1620-CN-07X	001
	CINEMATIC TURRET DRILL WITH STEPPING SWITCH+	1620-10.4.010	118	CONTROL. #AUTOSPOT II POST-PROCESSOR FOR+	1620-10.4.010	118
	CIRCUIT ANALYSIS BY MATRIX METHOD. #SHORT	1620-09.4.023	100	CONTROL. #INSPIC - INVESTIGATE NUMERICALLY+	1620-02.0.065	037
	CIRCUIT ANALYSIS OF RADIAL SYSTEMS. #SHORT	1620-09.4.027	100	CONTROL. #POST PROCESSOR CONCEPTS FOR THE+	1620-10.4.011	118
	CIRCUIT ANALYSIS PROGRAM. #ELECTRONIC	1620-EE-02E	003	CONTROLS SEQUENTIAL ADDITIONS AND DISK+	1620-01.6.134	026
	CIRCUIT ANALYSIS. #SHORT	1620-09.4.006	098	#CONVERSION OF KELVIN FUNCTIONS TO THEIR+	1620-03.0.008	038
	CIRCUIT CALCULATIONS. #SHORT	1620-09.4.007	099	CONVERSION OF SUBROUTINES. #SPS FLOATING POINT	1620-01.6.053	028
	CIRCUIT CURRENT CALCULATION. #ELECTRIC SHORT	1620-09.4.045	103	CONVERSIONS. #ASTM-TO-TBP AND TBP-TO-ASTM+	1620-09.0.006	097
	CIRCUIT STUDY PROGRAM. #THREE PHASE SHORT	1620-09.4.050	104	CONVERT A COMPLEX MATRIX. #PROGRAM TO	1620-05.0.032	042
	CIRCUITS. #SOLUTIONS FOR DETERMINATION OF+	1620-09.4.039	102	#COOLING-LOAD DETERMINATION FOR BUILDINGS.	1620-09.7.012	109
	#CIVIL ENGINEERING COORDINATE GEOMETRY COGO 1	1620-UG-01X	011	COORDINATE GEOMETRY COGO 1 - CARD. #CIVIL+	1620-UG-01X	011
	#CIVIL ENGINEERING COORDINATE GEOMETRY I -	1620-UG-05X	011	COORDINATE GEOMETRY I - DISK. #CIVIL+	1620-UG-05X	011
	CLASS MAXIMA. #FREQUENCIES SHOWN BENEATH	1620-06.0.227	070	COORDINATES (TAPE). #HORIZONTAL ALIGNMENT+	1620-09.2.027	088
	CLEANER. #DISK	1620-01.6.125	025	COPY PROGRAM. #1620/1311 DISK PACK	1620-01.6.104	023
	CLEAR AND LOAD 20K.	1620-01.6.090	022	CORE DUMP PROGRAMS. #FIVE-CARD PRINTER	1620-01.6.146	028
	CLEBSCH-GORDAN COEFFICIENTS. #CALCULATION OF	1620-06.0.155	060	CORES DUMP 002.	1620-01.6.020	018
	#COAL FILE VOLUME.	1620-09.2.011	086	CORRECTION IN CRYSTAL STRUCTURE ANALYSIS FOR+	1620-08.4.017	085
	CODE FOR THE IBM 1620. #WHY A+	1620-08.2.001	082	CORRECTION IN CRYSTAL STRUCTURE ANALYSIS.	1620-08.4.014	085
	COEFFICIENT AND REGRESSION WEIGHTS.	1620-06.0.178	063	CORRECTION IN CRYSTAL STRUCTURE ANALYSIS.	1620-08.4.016	085
	COEFFICIENT MATRIX WITH MISSING DATA POINTS.	1620-06.0.097	052	CORRECTION PROGRAM FOR NORMAL - BEAM OR+	1620-08.4.002	083
	COEFFICIENT MATRIX. #SIMPLE CORRELATION	1620-06.0.052	048	CORRECTION SYSTEM - WESTERN CAROLINA+	1620-01.6.117	024
	COEFFICIENT PROGRAM. #CORRELATION	1620-06.0.215	067	CORRELATED DATA. #BRIDGE ANALYSIS FOR HIGHLY	1620-06.0.077	050
	COEFFICIENT. #LINEAR CORRELATION	1620-06.0.038	046	CORRELATED POLYNOMIAL ADJUSTMENT OF AERIAL+	1620-09.2.049	092
	COEFFICIENT. #CALCULATION OF MULTIPLE+	1620-06.0.193	065	CORRELATION COEFFICIENT AND REGRESSION+	1620-06.0.178	063
	COEFFICIENT. #KENDALL'S TAU AND SPEARMAN'S+	1620-06.0.172	063	CORRELATION COEFFICIENT MATRIX WITH MISSING+	1620-06.0.097	052
	COEFFICIENTS PROGRAM; B. PLOT-BACK PROGRAM.	1620-06.0.056	048	CORRELATION COEFFICIENT MATRIX. #SIMPLE	1620-06.0.052	048
	COEFFICIENTS. #BINOMIAL	1620-07.0.060	079	#CORRELATION COEFFICIENT PROGRAM.	1620-06.0.215	067
	COEFFICIENTS. #CORRELATION	1620-06.0.021	044	CORRELATION COEFFICIENT. #LINEAR	1620-06.0.038	046
	COEFFICIENTS. #ORTHOGONAL POLYNOMIAL	1620-03.0.003	038	CORRELATION COEFFICIENT. #CALCULATION OF+	1620-06.0.193	065
	COEFFICIENTS. #CALCULATION OF CLEBSCH-GORDAN	1620-06.0.155	060	CORRELATION COEFFICIENT. #KENDALL'S TAU AND+	1620-06.0.172	063
	COFIT PROGRAM ADAPTED TO THE IBM 1620.	1620-06.0.142	058	CORRELATION COEFFICIENTS.	1620-06.0.021	044
	#COGO PLOT CC ADDITIONAL COGO SUBROUTINES.	1620-09.2.071	095	#CORRELATION MATRIX PROGRAM.	1620-06.0.162	061
	COGO 1 - CARD. #CIVIL ENGINEERING COORDINATE+	1620-UG-01X	011	#CORRELATION MATRIX WITH OPTIONAL FACTOR+	1620-06.0.145	059
	COLLECTION. #MULTIVARIATE DATA	1620-06.0.167	062	#CORRELATION MATRIX WITH OUTPUT IN MATRIX+	1620-06.0.104	053
	COLLEGE COMPILER. #CARLETON	1620-02.0.038	033	#CORRELATION PROGRAM FOR SYMMETRIC AND+	1620-06.0.114	055
	COLLEGE DECISION-MAKING EXERCISE. #BOSTON	1620-10.2.005	111	CORRELATION PROGRAM FOR SYMMETRIC AND+	1620-06.0.121	056
	COLLEGE. #AUTOMATIC DATA CORRECTION SYSTEM --	1620-01.6.117	024	CORRELATION PROGRAM. #VARIABLE FORMAT	1620-06.0.205	066
	COLUMN ANALYSIS - BI-AXIAL BENDING.	1620-09.2.037	090	CORRELATION WITH MISSING OBSERVATIONS.	1620-06.0.214	067
	COLUMN PUNCH COUNT. #CARD	1620-06.0.235	071	CORRELATION WITH MISSING OBSERVATIONS.	1620-06.0.115	044
	COLUMN. #FREQUENCY DISTRIBUTION GENERATOR+	1620-06.0.095	052	CORRELATION. #CANONICAL	1620-06.0.037	058
	COLUMN. #FREQUENCY DISTRIBUTION PROGRAM --	1620-06.0.171	063	CORRELATION. #BINARIATE LINEAR	1620-06.0.188	065
	COLUMN. #FREQUENCY DISTRIBUTIONS - SINGLE+	1620-06.0.016	044	CORRELATION-POWER SPECTRUM. #AUTO	1620-06.0.147	059
	COLUMNS. #MEAN, STANDARD DEVIATION, AND+	1620-06.0.136	058	CORRELATIONS - FIRST OR FIRST AND SECOND+	1620-06.0.064	049
	COMB. STATION SUMMARIES. #ANALYSIS OF+	1620-06.0.123	056	CORRELATIONS OF ALL PAIR WISE COMBINATIONS+	1620-06.0.217	068
	#COMBINATIONAL SWITCHING FUNCTION SUBROUTINE+	1620-09.4.062	106	CORRELATIONS. #PRODUCT MOMENT	1620-06.0.022	044
	COMBINATIONS OF TWO SETS OF VARIABLES.	1620-06.0.217	068	CORRELATIONS. #SUM OF SQUARES AND PRODUCTS,	1620-06.0.040	047
	COMPARE SUBROUTINE FOR SPS. #FLOATING	1620-07.0.050	073	COS, SIN AND EXP SUBROUTINES FORTRAN II.	1620-07.0.038	077
	COMPARISONS. #BEST K OF 2K-1	1620-06.0.223	069	COSINE FIT-IBM 704 COFIT PROGRAM ADAPTED TO+	1620-06.0.142	058
	COMPARISONS. #A PROGRAM FOR PAIR	1620-06.0.180	064	COST SYSTEM. #VEHICLE SIMULATION AND	1620-09.2.032	089
	COMPILER AND SUBROUTINES. #FORTRAN 90	1620-02.0.014	031	COST. #INVESTMENT	1620-10.3.021	114
	COMPILER SUBROUTINE. #FORMAT STATEMENT	1620-01.6.138	027	COST. #POWER PRODUCTION	1620-09.4.011	099
	COMPILER. #NELIAC	1620-01.1.030	014	COST. #PLANT GENERATION FOR GIVEN INCREMENTAL	1620-09.4.036	102
	COMPILER. #CARLETON COLLEGE	1620-02.0.038	033	COUNT PROGRAM. #DOUBLE COUNT PUNCH	1620-06.0.230	070
	#COMPLEX FORTRAN FOR THE 1620.	1620-06.0.008	043	COUNT TABLE OR RAW DATA. #THREE WAY+	1620-06.0.079	050
	COMPLEX LOAD CYCLES. #TRANSFORMER RATING FOR+	1620-09.4.028	191	COUNT TABLE OR RAW DATA, USU 22. #TWO WAY+	1620-06.0.082	050
	COMPLEX MATRIX. #PROGRAM TO CONVERT A	1620-05.0.032	042	COUNT. #CARD COLUMN PUNCH	1620-06.0.235	071
	COMPLEX NUMBERS. #INTERPRETIVE SYSTEM FOR+	1620-02.0.011	031	COUNTING USU-II. #DIGIT	1620-06.0.130	057
	COMPLEX ROOTS OF POLYNOMIAL. #REAL AND	1620-07.0.014	075	COUPLES POLYNOMIALS EQUATION. #CALCULATION+	1620-07.0.029	076
	COMPLEX VALUES. #SIMULTANEOUS EQUATION+	1620-09.4.015	100	COVARIANCE - SPLIT PLOT FACTORIAL. #ANALYSIS+	1620-06.0.024	044
	COMPONENTS I AND II. #FACTOR+	1620-06.0.169	062	COVARIANCE - TWO-FACTOR FACTORIAL. #ANALYSIS+	1620-06.0.024	044
	COMPOSITE BEAM DESIGN. #WELDED STEEL	1620-09.2.079	096	COVARIANCE - TWO-FACTOR FACTORIAL. #ANALYSIS+	1620-06.0.025	045
	#COMPOSITE BEAM SERIES - PROGRAMS I AND II.	1620-09.2.079	096	COVARIANCE ANALYSIS - COMPLETELY RANDOMIZED+	1620-06.0.000	050
	COMPOSITION AND DECOMPOSITION. #VECTOR	1620-07.0.065	080	COVARIANCE ANALYSIS - RANDOMIZED BLOCK+	1620-06.0.187	054
	COMPRESSION AND TEMPERATURE OF CHEMICAL+	1620-09.3.018	098	COVARIANCE. #ANALYSIS OF	1620-06.0.032	045
	COMPRESSION CHORDS. #THE BUCKLING ANALYSIS+	1620-09.2.030	089	COVARIANCE. #ANALYSIS OF VARIANCE AND	1620-06.0.109	054
	#COMPRESSION SPRING DESIGN, DYNAMIC LOAD.	1620-09.5.002	107	COVARIANCE. #FACTOREL ANALYSIS OF VARIANCE+	1620-06.0.224	069
	COMPRESSOR AND MULTI-PROGRAMMER. #FORTRAN	1620-01.6.045	019	COVARIANCE-UNEQUAL SUBCLASS FREQUENCIES.	1620-06.0.132	057
	COMPRESSOR PROGRAM. #GENERAL	1620-01.6.098	022	#CPNAT #CRITICAL PATH NODE AND DUMMY	1620-10.3.030	114
	COMPRESSOR. #PDQ FORTRAN	1620-02.0.055	035	#CRITICAL PATH NODE AND DUMMY ASSIGNMENT+	1620-10.3.030	114
	COMPRESSOR. #MULTIPURPOSE SPS CARD OUTPUT	1620-01.1.006	013	CRITICAL PATH SYSTEM NETWORK. #LOOP LOCATOR+	1620-10.3.047	117
	COMPUTATION FOR RIVERS AND STREAMS.	1620-06.0.160	061	CRITICAL PATH/SCHEDULE BAR GRAPH GENERATOR+	1620-10.3.020	113
	#COMPUTATION OF BESSEL FUNCTIONS OF INTEGRAL+	1620-03.0.005	038	CRITICAL VALUES, FOR P LEVELS OF+	1620-06.0.124	056
	#COMPUTATION OF EQUILIBRIUM COMPOSITION AND+	1620-09.3.018	098	#CROSS AND SIMPLE TABULATION PROGRAM C. A. S.	1620-06.0.146	059
	#COMPUTATION OF ROOT LCC I.	1620-09.4.038	102	CROSS REFERENCED SYMBOL TABLE FOR MONITOR I+	1620-01.1.033	015
	#COMPUTATION OF THE CANONICAL CORRELATION+	1620-06.0.178	063	CROSS SECTION. #MASS DIAGRAM MODEL WITH	1620-09.2.043	091
	#COMPUTATION OF THE CUMULATIVE BINOMIAL+	1620-06.0.128	056	CROSS SOLUTION. #WATER FLOW IN A PIPE+	1620-09.7.008	109
	COMPUTATION. #GEOMETRIC	1620-09.2.040	090	CROSS-OVER DESIGN. #ANALYSIS OF VARIANCE,	1620-06.0.113	054
	COMPUTATION. #GEOMETRIC	1620-09.2.041	091	CROUT FOR SOLUTION OF SIMULTANEOUS LINEAR+	1620-05.0.035	042
	COMPUTATION. #GEOMETRIC	1620-09.2.042	091	#CROUT REDUCTION.	1620-05.0.021	041
	COMPUTATION. #INVERSE GEODETIC POSITION	1620-09.2.021	088	CRYSTAL STRUCTURE ANALYSIS FOR+	1620-08.4.017	085
	COMPUTATIONS PROGRAM. #WATER WAY	1620-09.2.008	086	CRYSTAL STRUCTURE ANALYSIS. #ABSORPTION+	1620-08.4.014	085
	COMPUTATIONS PROGRAM. #RADIAL ENERGY+	1620-09-05X	004	CRYSTAL STRUCTURE ANALYSIS. #TWO-DIMENSIONAL+	1620-08.4.016	085
	COMPUTATIONS. #FAMILY OF COMPUTER PROGRAMS+	1620-09.5.005	107	CRYSTALLOGRAPHY. #GENERAL THREE DIMENSIONAL+	1620-08.4.006	084
	COMPUTED FROM SHORT-CIRCUIT ADMITTANCE+	1620-09.4.063	106	CRYSTALLOGRAPHY. #GENERAL TWO DIMENSIONAL+	1620-08.4.005	084
	COMPUTERS - PROCOM. #PROGRAM CATALOG FOR+	1620-10.3.049	117	CRYSTALLOGRAPHY. #INTER AND INTRA-MOLECULAR+	1620-08.4.008	084
	#COMPUTEST.	1620-02.0.052	035	CRYSTALLOGRAPHY. #STRUCTURE FACTOR+	1620-08.4.004	084
	CONCEPTS FOR THE BURGMASER DRILL PRESS WITH+	1620-10.4.011	118	CRYSTALS. #A PROGRAM TO INDEX	1620-08.3.005	083
	CONCORDANCES, GLOSSARIES, AND DICTIONARIES.	1620-10.3.038	115	CS3. #CARD SEARCHING PROGRAM,	1620-01.6.070	021
	CONCRETE COLUMN ANALYSIS - BI-AXIAL BENDING.	1620-09.2.037	090	CUBIC POLYNOMIALS. #REAL ROOTS OF	1620-03.0.009	038
	CONDUCTION. #H-104, TWO-DIMENSIONAL,	1620-09.5.004	107	CULVERT DESIGN. #TWIN BOX	1620-09.2.051	092
	CONDUCTOR SIZE (SPECIFIC CASE NEW ENGLAND+	1620-09.4.004	098	CUMULATIVE BINOMIAL POISSON NORMAL STUDENT+	1620-06.0.128	056
	#CONIC EQUATIONS PROGRAM.	1620-07.0.058	079	CUMULATIVE FREQUENCIES. #PERCENTILE SCORES+	1620-06.0.115	055
	CONJUGATE BEAM METHOD. #DEFLECTIONS IN+	1620-09.2.063	094	CURRENT CALCULATION. #ELECTRIC SHORT CIRCUIT	1620-09.4.045	103

KWIC (KEYWORD-IN-CONTEXT) INDEX

CURRENT	TITLE	PROGRAM NO.	PAGE	TITLE	ELECTRIC	PROGRAM NO.	PAGE
CURRENT CALCULATIONS FOR RADIAL DISTRIBUTION+		1620-89.4.056	185	DIFFERENCE PROGRAM. #AN SPS VARIATE		1620-86.0.187	065
CURRENTS IN ELECTRIC CIRCUITS. #SOLUTIONS+		1620-89.4.039	182	DIFFERENCE SUBROUTINE - DATDIF. #DATE		1620-01.6.111	024
#CURVE BRIDGE PROGRAM.		1620-89.2.018	086	DIFFERENCES. #MULTIPLE RANGE TEST OF MEAN		1620-86.0.936	046
#CURVE DATA PROGRAM.		1620-89.2.018	087	DIFFERENCES, NON LINEAR CURVE FIT. #LEAST+		1620-86.0.181	064
CURVE DATA. #SPS TRAVERSE AND		1620-89.2.062	094	DIFFERENTIAL EQUATION BY HILNE'S METHOD+		1620-84.0.004	039
CURVE DATA. #HORIZONTAL		1620-86.0.181	064	DIFFERENTIAL EQUATION. #SOLUTION FOR INITIAL+		1620-84.0.001	039
CURVE FITS HYPERBOLIC, EXPONENTIAL, POWER+		1620-87.0.019	076	DIFFERENTIAL EQUATION. #SOLUTION FOR INITIAL+		1620-84.0.002	039
#CURVE FITTING (UCRBL 0865).		1620-86.0.118	055	DIFFERENTIAL EQUATIONS. #SOLUTION OF N+		1620-84.0.006	039
CURVE FITTING - NEWTONS DIVIDED DIFFERENTIAL+		1620-87.0.023	076	DIFFERENTIAL FORMULA. #POLYNOMIAL CURVE+		1620-87.0.023	076
#CURVE FITTING - SIMULATED PLANT RECORD+		1620-89.4.009	099	#DIFFERENTIATION OF AN EMPIRICAL FUNCTION.		1620-87.0.034	076
CURVE FITTING BY LEAST SQUARES. #FOUR TYPE+		1620-86.0.157	060	DIFFUSION CODE FOR THE IBM 1620. #WHY A+		1620-88.2.001	082
CURVE FITTING PROGRAM. #NON-LINEAR+		1620-86.0.134	057	DIFFUSION SYSTEM FOR THE IBM 1620. #MAIDS --		1620-88.2.003	083
CURVE FITTING USING LENGENDRE POLYNOMIALS.		1620-87.0.007	074	#DIGIT COUNTING USU-IL.		1620-86.0.130	057
CURVE LAYOUT. #SPIRAL		1620-89.2.075	096	DIGITAL ANALOG SIMULATION PROGRAM. #JANET -		1620-82.0.053	035
CURVE PROGRAM. #BACKWATER		1620-89.2.028	088	DIGITAL ANALOG SIMULATION PROGRAM. #JANET-II		1620-82.0.054	035
CURVE PROGRAM. #OGIVE FREQUENCY		1620-86.0.127	056	DIGITAL COMPUTERS - PROCON. #PROGRAM CATALOG+		1620-10.3.049	117
CURVES FOR THE NEGATIVE BINOMIAL+		1620-86.0.116	055	#DIGITAL TOOL FOR PLANNING RADIAL+		1620-89.4.043	103
CURVES TO FIRST ORDER LAG WITH OR WITHOUT+		1620-87.0.075	081	DIM AND EQUIVALENCE TABLE TEST. #MONITOR		1620-01.6.108	023
CYCLE HEAT BALANCE. #TURBINE		1620-89.5.009	108	DIMENSIONAL FOURIER SYNTHESIS PROGRAM FOR+		1620-84.0.005	084
CYCLE LENGTH FOR FIXED TIME TRAFFIC SIGNALS.		1620-89.2.083	097	DIMENSIONAL FOURIER SYNTHESIS PROGRAM FOR+		1620-84.0.006	084
CYCLE. #OVERLOAD RATINGS OF 65 DEGREES+		1620-89.4.060	105	#DIP - DISK INSPECTION PROGRAM.		1620-01.6.141	027
CYCLE. #TRANSFORMER RATINGS BASED ON LOSS OF+		1620-89.4.032	102	#DIRECT GEODETIC PROBLEM.		1620-81.1.004	082
CYCLES. #TRANSFORMER RATING FOR NORMAL AND+		1620-89.4.028	101	DIRECT GEODETIC PROBLEM. #HELMERTS		1620-87.0.068	080
#C4D - AN OPERATING SYSTEM FOR EDQ FORTRAN.		1620-82.0.059	036	DISK AND PRINTER. #DISKWIC - A KWIC INDEXER+		1620-86.0.249	073
DAIRY MANAGEMENT GAME. #BOLLERMAKER		1620-11.0.048	124	DISK CAM COMPUTATIONS. #FAMILY OF COMPUTER+		1620-10.3.051	117
DARCY METHOD. #PIPE FRICTION HEAD LOSS+		1620-89.2.039	090	#DISK CLEANER.		1620-01.6.125	025
DATDIF. #DATE DIFFERENCE SUBROUTINE -		1620-86.0.101	053	DISK DATA STORAGE ROUTINE. #DDSR -		1620-01.1.036	016
#DATE ANALYSIS PROGRAM.		1620-81.6.111	024	DISK DUMP PATCH. #MONITOR I		1620-01.6.143	027
#DATE DIFFERENCE SUBROUTINE - DATDIF.		1620-11.0.045	123	#DISK DUMP.		1620-01.6.158	030
#DATE INTERPRETER AND PERPETUAL CALENDAR.		1620-10.3.014	113	DISK EXECUTION OF FORTRAN TRANSFER. #DEPT -		1620-01.1.034	015
DATING ROUTINE. #PERT		1620-81.6.149	029	DISK INSPECTION PROGRAM. #DIP -		1620-01.6.141	027
#DATMAN - DATA MANIPULATION.		1620-81.6.047	019	#DISK IOCS ROUTINES, CONTROLS SEQUENTIAL+		1620-01.6.134	026
#DBD (DAYS BETWEEN DATES) SUBROUTINE.		1620-81.1.036	016	DISK ORIENTED EQUATION SOLVER. #DOES -		1620-05.0.037	042
#DDSR - DISK DATA STORAGE ROUTINE.		1620-89.2.036	090	DISK PACK COPY PROGRAM. #1620/1311		1620-01.6.104	023
#DEAD LOW BEAM DEFLECTIONS.		1620-87.0.075	081	DISK PACK. #PICTURE OF		1620-01.6.158	029
DEAD TIME. #LEAST SQUARES FIT OF RESPONSE+		1620-13.0.026	128	#DISK PACKER FORMONITOR II.		1620-01.6.137	026
DEBATE TOURNAMENT. #A COMPUTER PROGRAM TC+		1620-81.6.107	023	#DISK PACKER.		1620-01.6.150	029
DEBUGGING. #SPACED - SELF-LOADING+		1620-83.0.012	039	DISK SUBROUTINES TO READ OR WRITE IN OTHER+		1620-82.0.061	036
DECIMAL POINT. #FIXED POINT DIVISION OR+		1620-10.2.010	112	DISK SYSTEM FOR 1620. #PDQ FORTRAN		1620-01.6.134	026
DECISION EXERCISE. #FARM OPERATION SIMULATOR+		1620-10.2.005	111	DISK UTILITY PACKAGE. #DISK IOCS ROUTINES,+		1620-10.3.051	117
DECISION-MAKING EXERCISE. #BOSTON COLLEGE		1620-13.0.034	129	DISK. #CIVIL ENGINEERING COORDINATE GEOMETRY+		1620-06.0.05X	011
DECKS ON 1443 PRINTER. #TABULATE NUMERIC DATA		1620-87.0.065	080	#DISKWIC - A KWIC INDEXER FOR DISK AND+		1620-10.3.051	117
DECOMPOSITION. #VECTOR COMPOSITION AND		1620-87.0.053	079	DISOCIATION. #ADIABATIC FLAME TEMPERATURE,		1620-89.3.011	097
DEF. PLOT, WRIT. #RELOCATABLE SUBROUTINES		1620-10.3.017	113	DISTANCE BETWEEN POPULATIONS. #SWEEP OUT+		1620-86.0.208	066
DEFINITE INCREMENTS OF TIME. #STUDENT+		1620-87.0.043	077	DISTANCE CALCULATION IN X-RAY+		1620-84.0.008	084
DEFINITE INTEGRAL OF A REAL FUNCTION USING+		1620-89.5.006	107	DISTILLATION CONVERSIONS. #ASTM-TO-TBP AND+		1620-89.3.006	097
DEFLECTIONS AND FORCES OF A VIBRATING BEAM.		1620-89.2.063	094	DISTILLATION. #THIELE-GEDES METHOD FOR+		1620-89.3.012	097
#DEFLECTIONS IN HINGED SPANS BY THE CONJUGATE		1620-89.2.036	090	DISTRIBUTION AND FOCUS SHFT COMPUTATIONS+		1620-80.05X	004
DEFLECTIONS. #DEAD LOW BEAM		1620-89.2.067	094	DISTRIBUTION FACTOR CALCULATION AND+		1620-89.4.029	101
DEFLECTIONS. #CONTINUOUS BEAM LIVE LOAD		1620-81.1.034	015	DISTRIBUTION GENERATOR PROGRAM - SINGLE AND+		1620-86.0.095	052
#DEPT - DISK EXECUTION OF FORTRAN TRANSFER.		1620-89.4.060	105	DISTRIBUTION LINES. #VOLTAGE PROFILE AND+		1620-86.0.117	055
DEGREES CENTIGRADE RISE TRANSFORMERS BASED+		1620-11.0.019	119	DISTRIBUTION PROGRAM - SINGLE AND DOUBLE+		1620-86.0.171	063
DEMAND FUNCTIONS. #ECONOMIC CRDEF QUANTITIES+		1620-11.0.029	120	DISTRIBUTION PROGRAM. #TEST SCORE FREQUENCY		1620-86.0.232	071
#DEMONSTRATION #HM AND HER		1620-11.0.024	120	DISTRIBUTION SYSTEMS. #DIGITAL TOOL FOR+		1620-89.4.043	103
DEMONSTRATION OF THE IBM 1620. #DEMOPAK - A+		1620-13.0.008	126	DISTRIBUTION. #EQUIPMENT AND PROJECT TIME		1620-01.6.114	024
DEMONSTRATION PROGRAM - ADP. #ACCOUNTING		1620-11.0.040	122	DISTRIBUTION. #ESTIMATION OF CONSTANTS IN+		1620-86.0.117	055
DEMONSTRATION PROGRAM IN LOGIC TO DETERMINE+		1620-11.0.030	120	DISTRIBUTION. #POWER CURVES FOR THE NEGATIVE+		1620-86.0.116	055
DEMONSTRATION PROGRAM TO PRINT OUT PRIME+		1620-11.0.012	119	DISTRIBUTIONS - SINGLE AND DOUBLE COLUMN.		1620-86.0.116	084
DEMONSTRATION PROGRAM TO PUNCH BLOCK+		1620-11.0.051	124	DISTRIBUTIONS WITH THE NEWMAN A FORMULA.		1620-86.0.247	073
DEMONSTRATION PROGRAM. #PERFECT NUMBER		1620-11.0.012	119	DISTRIBUTIONS WITH THE POISSON WITH ZEROES.		1620-86.0.246	073
DEMONSTRATION. #PERFECT NUMBER		1620-11.0.051	124	DISTRIBUTIONS. #FITTING POISSON BINOMIAL		1620-86.0.245	073
DEMONSTRATION. #MOUSE IN THE MAZE		1620-11.0.038	122	DISTRIBUTIONS. #FITTING NEGATIVE BINOMIAL		1620-86.0.248	073
DEMONSTRATION. #ELEMENTARY NUMBER THEORY		1620-11.0.050	124	DISTRIBUTIONS. AND CUMULATIVE FREQUENCIES.		1620-07.0.123	076
DEMONSTRATION. #PRIME NUMBER		1620-11.0.032	121	DISTRIBUTIONS. #POLYNOMIAL+		1620-83.0.012	039
DEMONSTRATOR. #EBC BASEBALL SIMULATION AND		1620-81.6.109	023	DIVIDED DIFFERENTIAL FORMULA. #POLYNOMIAL+		1620-83.0.012	039
DEMONSTRATOR. #EBC BASEBALL SIMULATION AND		1620-87.0.055	079	DIVISION OR MULTIPLICATION REGULATOR FOR+		1620-86.0.125	055
#DEMOPAK - A FUNCTIONAL DEMONSTRATION OF THE+		1620-86.0.211	067	#DRAWING SYSTEM.		1620-86.0.142	056
#DEPAU MACHINE LANGUAGE INTERPRETER.		1620-86.0.107	054	DRILL PRESS WITH HUGES NC-211 MACHINE TOOL+		1620-10.4.011	118
DERIVATIVES BY NEWTONS F.I.M.. #POLYNOMIAL+		1620-86.0.080	050	DRILL WITH STEPPING SWITCH CONTROL.		1620-10.4.010	118
#DESCRIPTIVE STATISTICS.		1620-89.2.050	092	DROP CALCULATION IN 2 PASSES. #RADIAL THREE+		1620-89.4.020	100
DESIGN - SIMPLE OR MULTIPLE USU 10.		1620-89.2.016	087	DROP CALCULATIONS. #RADIAL THREE PHASE LINE		1620-89.4.018	100
DESIGN - SIMPLE OR MULTIPLE USU 29.		1620-89.2.019	087	#DSAVE.		1620-87.0.078	082
DESIGN PROGRAM FOR THE IBM 1620 DATA+		1620-86.0.083	051	DTM DESIGN SYSTEM 20K.		1620-89.2.016	087
DESIGN SYSTEM 20K. #DTM		1620-89.4.041	103	DTM DESIGN SYSTEM 40K.		1620-89.2.019	087
DESIGN SYSTEM 40K. #DTM		1620-89.2.051	092	DTM LOCATION SYSTEM.		1620-89.2.026	088
DESIGN USU 51. #ANALYSIS OF VARIANCE --		1620-89.2.061	094	DUMMY ASSIGNMENT TECHNIQUE PROGRAM.		1620-10.3.030	114
DESIGN. #LOW-PASS FILTER		1620-89.2.015	087	DUMP PATCH. #MONITOR I DISK		1620-01.6.143	027
DESIGN. #TWIN BOX CULVERT		1620-89.2.061	094	DUMP PROGRAMS. #FIVE-CARD PRINTER CORE		1620-01.6.146	028
DESIGN. #TRANSMISSION POWER		1620-89.2.015	087	DUMP #02. #CORES		1620-01.6.020	018
DESIGN. #TRANSMISSION TOWER		1620-89.2.079	096	DUMP. #DISK		1620-01.6.158	030
DESIGN. #WELDED STEEL COMPOSITE BEAM		1620-86.0.113	054	DUMP. #ANL MNEMONICS		1620-01.6.022	019
DESIGN. #ANALYSIS OF VARIANCE, CROSS-VEAM		1620-86.0.161	061	DUMPER. #CAREFREE PROGRAM		1620-01.6.142	027
DESIGN. #ANALYSIS OF VARIANCE		1620-86.0.062	049	#DUNCANS MULTIPLE RANGE TEST, USING HARTERS+		1620-86.0.124	056
DESIGN. #ANALYSIS OF VARIANCE - BALANCED+		1620-89.2.069	094	DYNAMIC LOAD. #COMPRESSION SPRING DESIGN,		1620-89.5.002	107
DESIGN. #ANALYSIS OF VARIANCE, SELT-PLOT+		1620-89.2.017	087	DYNAMIC TRACE PROGRAM FOR THE IBM COMPUTER.		1620-01.4.008	017
DESIGN. #CONTINUOUS BEAM ANALYSIS AND STEEL+		1620-89.5.002	107	#EARTHWORK PLOT.		1620-89.2.074	095
DESIGN, DYNAMIC LOAD. #COMPRESSION SPRING		1620-86.0.123	056	#ECONOMIC ANALYSIS OF PLANS - OUTPUT 1 AND+		1620-10.3.010	113
DESIGN, INDIVIDUAL AND COMB. STATION+		1620-86.0.070	050	ECONOMIC CONDUCTOR SIZE+		1620-89.4.004	098
DESIGN, NO SUB-SAMPLES. #ANALYSIS OF+		1620-86.0.139	058	#ECONOMIC ORDER QUANTITIES FOR LINEAR DEMAND+		1620-10.1.011	110
DESIGN-USU 63. #MULTIVARIATE ANALYSIS OF+		1620-86.0.138	058	ECONOMIZATION OF POLYNOMIALS. #CHEBYCHEV		1620-07.0.047	078
DESIGN-USU62. #MULTIVARIATE ANALYSIS OF+		1620-11.0.043	123	#EDIT SUBROUTINE.		1620-01.6.095	022
DESCALCULATOR. #EVALUATION OF A		1620-85.0.019	041	EDIT SUBROUTINE. #GENERAL		1620-01.6.128	025
DETERMINANT. #EVALUATION OF A		1620-89.2.058	093	#EDITOR.		1620-13.0.027	128
#DETERMINATE TRUSS ANALYSIS.		1620-86.0.239	072	EDUCATIONAL COMPUTER FOR INSTRUCTION IN+		1620-13.0.015	127
DEVIATION AND INTERCORRELATION PROGRAM.		1620-86.0.051	047	EDUCATIONAL COMPUTER FOR INSTRUCTION IN+		1620-13.0.016	127
DEVIATION AND VARIANCE. #MEAN STANDARD		1620-86.0.206	066	EDUCATIONAL COMPUTER FOR INSTRUCTION IN+		1620-13.0.017	128
DEVIATION PROGRAM. #VARIABLE FORMAT T TEST+		1620-86.0.243	072	EDUCATIONAL COMPUTER FOR INSTRUCTION IN+		1620-13.0.018	128
DEVIATION SORT PROGRAM WITH FLEXIBLE INPUT.		1620-86.0.212	067	EDUCATOR. #NOPE/NIM ONE FILE		1620-11.0.055	125
DEVIATION. #KARBER METHOD OF ANALYSIS+		1620-86.0.136	058	#EDWARDS PERSONAL PREFERENCE TEST SCORING BY+		1620-86.0.141	058
DEVIATION, AND VARIANCE BY ROWS AND COLUMNS.		1620-86.0.177	063	EFFICIENCY PROGRAM. #STEAM AND WATER+		1620-89.7.007	109
DEVIATION, SUM 3F SQUARES, N. #MEAN AND+		1620-10.3.035	115	EIGENVALUES AND EIGENVECTORS OF ZV EQUALS+		1620-85.0.016	041
DIAGONAL MODEL (40K). #PORTFOLIO SELECTIONS -		1620-85.0.015	040	EIGENVECTORS OF ZV EQUALS LAV. #CALCULATION+		1620-85.0.016	041
DIAGONALIZATION, AUTO MINIMIZATION OF ERROR.		1620-89.2.043	091	ELECTRIC CIRCUITS. #SOLUTIONS FOR+		1620-89.4.039	102
DIAGRAM MODEL WITH CROSS SECTION. #MASS		1620-89.4.049	104	#ELECTRIC LOAD FLOW SINGLE LINE DIAGRAM+		1620-89.4.049	104
DIAGRAM OF DATA FREQUENCIES. #SCATTER		1620-80-03X	004	ELECTRIC LOAD FLOW.		1620-89.4.053	105
DIAGRAM OUTPUT. #ELECTRIC LOAD FLOW SINGLE+		1620-01.6.131	025	#ELECTRIC POWER FLOW I. #SCALAR		1620-89.4.037	102
DIAGRAM PROGRAMS. #VIGNETTED APERTURE AND+		1620-11.0.025	120	#ELECTRIC POWER FLOW III.		1620-89.4.048	104
DIAGRAM. #PLOT A BLOCK		1620-86.0.144	059	#ELECTRIC SHORT CIRCUIT CURRENT CALCULATION.		1620-89.4.045	103
DICE. #GAME OF		1620-10.3.038	115	#ELECTRIC TROUBLE ANALYSIS.		1620-89.4.059	105
#DICHOTOMIZE DATA.							
DICIONARIES. #ALPHABETIC INDEXER AND LISTER+							

KWIC (KEYWORD-IN-CONTEXT) INDEX

ELECTRICAL		FORTRAN	
TITLE	PROGRAM NO. PAGE	TITLE	PROGRAM NO. PAGE
#ELECTRICAL FIELD INTENSITY PATTERNS-DRIVEN+	1620-09.4.061 106	FACTORIAL. #ANALYSIS OF VARIANCE --	1620-06.0.029 045
#ELECTRICAL NETWORK REDUCTION.	1620-09.4.058 105	FACTORS AFFECTING OPTIMUM PLANT SIZE.	1620-10.3.052 118
#ELECTRONIC CIRCUIT ANALYSIS PROGRAM.	1620-EE-02X 003	FACTORS. #TRANSMISSION LOSSES AND PENALTY	1620-09.4.008 099
#ELEMENTARY GERMAN-TO-ENGLISH TRANSLATION.	1620-11.0.054 125	FACTORS. #CORRELATION MATRIX WITH OPTIONAL+	1620-06.0.145 059
#ELEMENTARY GERMAN-TO-ENGLISH TRANSLATION.	1620-11.0.053 125	*FAMILY OF COMPUTER PROGRAMS FOR DISK CAM+	1620-09.5.005 197
#ELEMENTARY NUMBER THEORY DEMONSTRATION.	1620-11.0.038 122	FAP (FOR THE IBM 1620 DIGITAL COMPUTER).	1620-02.0.030 032
#ELEMENTS OF A POLYHEDRON (CRYSTAL).	1620-08.4.015 085	FARM MANAGEMENT DECISION EXERCISE. #FARM+	1620-10.2.010 112
ELEVATIONS.	1620-09.2.070 095	FARM SUPPLY BUSINESS MANAGEMENT GAME.	1620-11.0.049 124
ELEVATIONS. #ROADWAY	1620-09.2.009 086	FAULT CURRENT CALCULATIONS FOR RADIAL+	1620-09.4.056 102
EMERGENCY CABLE RATINGS. #NORMAL AND	1620-09.4.031 101	FEM-GROUP DIFFUSION CODE FOR THE IBM 1620.	1620-08.2.001 082
EMERGENCY OPERATION WITH COMPLEX LOAD+	1620-09.4.028 101	FIELD INTENSITY PATTERNS-DRIVEN ANTENNA+	1620-09.4.061 106
EMERGENCY OPERATION. #TRANSFORMER RATING FOR+	1620-09.4.012 099	FIELD NOTE REDUCTION. #1620 MODEL 4	1620-09.2.052 093
EMITTING. #CARD REPRODUCER AND LISTER WITH+	1620-01.3.016 077	FIELD SQUARE ROOT SUBROUTINE. #VARIABLE	1620-03.0.001 037
EMPIRICAL FUNCTION. #DIFFERENTIATION OF AN	1620-07.0.034 076	FILE EDUCATOR. #NOPE/WIM ONE	1620-11.0.055 125
END ALL MUSIC PROGRAMS. #VIRTUOSO - THE+	1620-11.0.046 123	FILE NO. 1620-PO-037. #BESSEL FUNCTION+	1620-07.0.037 077
END-POINT DETERMINATION. #BRED-NUECH 50+	1620-06.0.150 060	FILTER DESIGN. #LOW-PASS	1620-09.4.041 103
ENERGY DISTRIBUTION AND FOCUS SHIP+	1620-00-05X 004	#FINANCIAL EVALUATION PROGRAM.	1620-CS-16X 002
ENGINEERING COORDINATE GEOMETRY COGO 1 --	1620-UG-01X 011	FINDER. #MOLECULAR PEAK	1620-08.4.013 085
ENGINEERING COORDINATE GEOMETRY 1 - DISK.	1620-UG-05X 011	#FINITE FOURIER ANALYSIS; A. COEFFICIENTS+	1620-06.0.056 048
ENGINEERING USING THE DARCY METHOD. #PIPE+	1620-09.2.039 090	FINITE SERIES OR SAMPLE DATA. #BASIC+	1620-06.0.158 061
EQUAL N. #ANALYSIS OF VARIANCE. MEANS, AND+	1620-06.0.140 058	FINITE-ORDER DIFFERENTIAL EQUATIONS.	1620-04.0.006 039
EQUALS LAV. #CALCULATION OF EIGENVALUES AND+	1620-05.0.016 041	#FISHERS EXACT METHOD.	1620-06.0.063 049
EQUATION BY MINE'S METHOD USING RUNGE+	1620-04.0.004 039	#FISHERS EXACT PROBABILITY FOR A 2X2 TABLE.	1620-06.0.050 047
EQUATION IN ONE VARIABLE. #CALCULATION OF+	1620-07.0.033 076	FIT OF RESPONSE CURVES TO FIRST ORDER LAG+	1620-07.0.075 081
EQUATION SOLUTION AND MATRIX INVERSION WITH+	1620-09.4.015 100	FIT OF VAPOR PRESSURE DATA BY THE ANTOINE+	1620-09.3.016 098
EQUATION SOLUTION. #SIMULTANEOUS	1620-05.0.002 040	FIT. #LEAST SQUARE DIFFERENCES, NON LINEAR+	1620-06.0.181 064
EQUATION SOLVER. #DOES - DISK ORIENTED	1620-05.0.037 042	FIT-IBM 704 COFIT PROGRAM ADAPTED TO THE IBM+	1620-06.0.142 058
EQUATION. #ROOTS OF POLYNOMIAL	1620-07.0.036 077	FITS HYPERBOLIC, EXPONENTIAL, POWER+	1620-07.0.019 076
EQUATION. #CALCULATION OF ROOTS+	1620-07.0.029 076	FITTER. #SIXTEEN-TWENTY UNIVERSAL FUNCTION	1620-CA-02X 001
EQUATION. #CALCULATION OF ROOTS+	1620-07.0.032 076	FITTING (UCRBL 0065). #CURVE	1620-06.0.118 055
EQUATION. #CALCULATION OF THE REAL ROOTS OF+	1620-07.0.017 075	FITTING - NEWTONS DIVIDED DIFFERENTIAL+	1620-07.0.023 076
EQUATION. #LEAST SQUARES FIT OF VAPOR+	1620-09.3.016 098	FITTING - SIMULATED PLANT RECORD METHOD+	1620-09.4.009 099
EQUATION. #SOLUTION FOR INITIAL VALUE+	1620-04.0.001 039	FITTING BY LEAST SQUARES. #FOUR TYPE+	1620-06.0.157 060
EQUATION. #SOLUTION FOR INITIAL VALUE+	1620-04.0.002 039	#FITTING DISTRIBUTIONS WITH THE NEYMAN A+	1620-06.0.247 073
EQUATIONS IN N REAL VARIABLES. #SOLUTION OF+	1620-05.0.024 041	#FITTING DISTRIBUTIONS WITH THE POISSON WITH+	1620-06.0.246 073
EQUATIONS PROGRAM. #CONIC	1620-07.0.058 079	#FITTING NEGATIVE BINOMIAL DISTRIBUTIONS.	1620-06.0.248 073
EQUATIONS SOLUTION. #MOSES - MAXIMUM ONE+	1620-05.0.040 043	#FITTING POISSON BINOMIAL DISTRIBUTIONS.	1620-06.0.245 073
EQUATIONS. #SOLUTION OF SIMULTANEOUS LINEAR	1620-05.0.007 040	FITTING PROGRAM. #NON-LINEAR LEAST-SQUARES+	1620-06.0.134 057
EQUATIONS. #CALCULATION OF THE REAL ROOTS OF+	1620-07.0.041 077	FITTING USING LENGRENDE POLYNOMIALS.	1620-07.0.007 074
EQUATIONS. #MATRIX INVERSION AND SOLUTION OF+	1620-05.0.039 043	#FIXED-CARD PRINTER CORE DUMP PROGRAMS.	1620-01.6.146 028
EQUATIONS. #MATRIX INVERSION AND SOLUTION OF+	1620-06.0.037 046	#FIXED POINT DIVISION OR MULTIPLICATION+	1620-03.0.012 039
EQUATIONS. #SOLUTION OF HOMOGENEOUS AND+	1620-05.0.020 041	FIXED POINT.. #SINE/COSINE SUBROUTINE -	1620-07.0.018 075
EQUATIONS. #SOLUTION OF N SIMULTANEOUS+	1620-04.0.006 039	FIXED TIME TRAFFIC SIGNALS. #THE SELECTION+	1620-09.2.003 097
EQUATIONS. #SUBROUTINE CROUT FOR SOLUTION OF+	1620-05.0.035 042	FLAME TEMPERATURE, NO DISSOCIATION.	1620-09.3.011 097
EQUI-INCLINATION SETTING. #INTENSITY+	1620-08.4.002 083	FLANGED TAPERED HUB. #S-109 STRESS ANALYSIS+	1620-09.7.005 109
EQUILIBRIUM COMPOSITION AND TEMPERATURE OF+	1620-09.3.018 098	#FLEXIBLE CARD READ ROUTINE.	1620-01.2.008 016
EQUILIBRIUM FROM AZEOTROPE DATA.	1620-09.3.015 098	FLEXIBLE INPUT. #MISSING DATA MEAN AND+	1620-06.0.024 072
#EQUIPMENT AND PROJECT TIME DISTRIBUTION.	1620-01.6.114 024	FLOAT FORTRAN PROCESSING SYSTEM. #AUTO	1620-01.6.076 021
EQUIVALENCE TABLE CARD OUTPUT. #MONITOR	1620-01.3.013 017	#FLOATING COMPARE SUBROUTINE FOR SPS.	1620-07.0.050 078
EQUIVALENCE TABLE TEST. #MONITOR DIM AND	1620-01.6.108 023	FLOATING POINT ARITHMETIC SUBROUTINES.	1620-07.0.010 075
#EQUIVALENT PIPE LENGTHS.	1620-09.3.014 098	FLOATING POINT CONVERSION SUBROUTINES. #SPS	1620-01.6.053 020
#ERROR FUNCTION SUBROUTINE FOR PDQ FORTRAN+	1620-07.0.063 080	FLOATING POINT FORMAT SUBROUTINES FOR SPS+	1620-01.6.136 026
ERROR FUNCTION SUBROUTINE. #A VARIABLE+	1620-07.0.077 081	FLOATING POINT. #FORTRAN II FOR AUTOMATIC	1620-PO-049 005
ERROR. #NACAM - MATRIX DIAGONALIZATION, AUTO+	1620-05.0.015 040	#FLOATING-POINT SORTING SUBROUTINE FOR+	1620-01.6.133 026
ESTIMATES OF MEAN AND STANDARD DEVIATION.	1620-06.0.212 067	FLOW I. #ELECTRIC POWER	1620-09.4.037 102
#ESTIMATION OF CONSTANTS IN THE NEGATIVE+	1620-06.0.117 055	FLOW III. #ELECTRIC POWER	1620-09.4.048 104
EVALUATING AND DEBUGGING. #SPACED --	1620-01.6.107 023	FLOW IN A PIPE NETWORK BY HARDY CROSS+	1620-09.7.008 109
EVALUATION AND REVIEW TECHNIQUE. #PERT --	1620-10.3.006 112	FLOW IN PIPE NETWORKS. #HYDRAULIC ANALYSIS OF	1620-09.2.006 099
#EVALUATION OF A DETERMINANT.	1620-05.0.019 041	FLOW RATES IN GAS AND WATER NETWORKS.	1620-09.2.078 096
#EVALUATION OF POWER TRANSFORMER LOSSES.	1620-09.4.051 104	FLOW SINGLE LINE DIAGRAM OUTPUT. #ELECTRIC+	1620-09.4.049 104
EVALUATION PROGRAM. #FINANCIAL	1620-CS-16X 002	FLOW. #SCALAR ELECTRIC LOAD	1620-09.4.053 105
EXACT MEAN AND VARIANCE OF CHI SQUARE, WHEN+	1620-06.0.182 064	FOCUS SHIFT COMPUTATIONS PROGRAM. #RADIAL+	1620-20-05X 004
EXACT METHOD. #FISHERS	1620-06.0.063 049	#FOR-D-PRINTER.	1620-02.0.062 037
EXACT PROBABILITY FOR A 2X2 TABLE. #FISHERS	1620-06.0.050 047	#FOR-TO-GO (2 PASS FORGO).	1620-02.0.009 031
#EXAMINATION ASSEMBLY PROGRAM.	1620-13.0.012 127	#FOR-TO-GO-P PRINTER.	1620-02.0.063 037
EXAMINATION SCHEDULING SYSTEM 20K. #FINAL	1620-10.3.044 116	FORCES OF A VIBRATING BEAN. #NATURAL+	1620-09.5.006 197
EXAMINATION SCHEDULING SYSTEM 40K. #FINAL	1620-10.3.045 116	#FORCOM II-D - SUBROUTINES FOR FORTRAN II-D.	1620-01.6.105 023
EXAMINATION SCHEDULING SYSTEM 60K. #FINAL	1620-10.3.046 117	FORCOM SUBROUTINES FOR FORTRAN WITH FORMAT.	1620-01.6.096 022
EXAMINATION. #SCRAMBLE - COMPUTER+	1620-13.0.011 126	#FORCOM SUBROUTINES FOR FORTRAN II.	1620-01.6.074 021
EXECUTE AND CONTROL. #INSPEC - INVESTIGATE+	1620-02.0.065 037	#FORCOM SUBROUTINES FOR FORTRAN W/FORMAT.	1620-01.6.051 020
EXECUTION OF FORTRAN TRANSFER. #DEPT - DISK	1620-01.1.034 015	FORCOM SUBROUTINES FOR STATISTICAL CHECK PROGRAM.	1620-06.0.043 047
#EXECUTIVE GAME. #THE	1620-11.0.036 121	FORCO - LOAD AND GO FORTRAN.	1620-02.0.008 031
#EXECUTIVE GAME. #THE	1620-11.0.036 118	#FORCO P PRINTER.	1620-02.0.064 037
EXERCISE. #BOSTON COLLEGE DECISION-MAKING	1620-10.2.005 111	FORGO-D.	1620-02.0.043 033
EXERCISE. #FARM OPERATION SIMULATOR AND FARM+	1620-10.2.010 112	FORM. #CORRELATION MATRIX WITH OUTPUT IN+	1620-06.0.104 053
EXERCISE/CARD/. #MONABUS - A BUSINESS+	1620-11.0.052 125	FORMAT (CARD). #1620/1443 FORTRAN WITH	1620-PO-037 005
EXP SUBROUTINES FORTRAN II. #RELOCATABLE+	1620-07.0.038 077	FORMAT - CARD. #FORTRAN WITH	1620-PO-004 004
EXPANSIONS OF PASSIVE ONE-PORT NETWORKS.	1620-09.4.026 100	FORMAT - 1627 PLOTTER SUBROUTINE. #1620/1443+	1620-LM-040 006
EXPERIMENTATIONS ARE SMALL. #THE EXACT MEAN AND+	1620-06.0.182 064	FORMAT CHECKER. #FORTRAN	1620-01.1.017 013
#EXPENSIVE DESK CALCULATOR.	1620-11.0.043 123	FORMAT CORRELATION PROGRAM. #VARIABLE	1620-06.0.205 066
EXPERIMENTS. #ANALYSIS OF 2 - LEVEL FACTORIAL	1620-06.0.044 047	FORMAT GAMMA FUNCTION SUBROUTINE-POSITIVE+	1620-07.0.048 078
EXPLICIT DECIMAL POINT. #FIXED POINT+	1620-03.0.012 039	FORMAT PLOT RELOCATABLE SUBROUTINE.	1620-13.0.010 126
EXPLODER AND STUDENT SCHEDULING HANDBOOK.	1620-10.3.050 117	#FORMAT STATEMENT COMPILER SUBROUTINE.	1620-01.6.138 027
EXPONENTIAL NUMBER GENERATOR SUBPROGRAM.	1620-06.0.111 054	FORMAT STATEMENT PRESELECTOR. #FORTRAN II	1620-01.6.086 022
#EXPONENTIAL SMOOTHING (FORECASTING).	1620-10.2.008 111	FORMAT SUBROUTINE FOR PLOTTING WITH A+	1620-01.6.068 021
#EXPONENTIAL SMOOTHING PROGRAM.	1620-10.2.007 111	FORMAT SUBROUTINES FOR SPS II-D.	1620-01.6.136 026
EXPONENTIAL, POWER FUNCTIONS.. #THREE-IN-ONE+	1620-07.0.019 076	FORMAT T TEST MEAN AND STANDARD DEVIATION+	1620-06.0.206 066
#EXTENDED MONITOR SYSTEM (EMS).	1620-01.6.135 026	FORMAT. #KWIC INDEX WITH	1620-10.3.033 114
#EXTREME-POINT SOLUTIONS FOR RECTANGULAR+	1620-07.0.045 077	FORMAT. #PLOT SUBROUTINE FOR FORTRAN WITH	1620-01.6.056 020
F. I. M.. #POLYNOMIAL GENERATION AND+	1620-07.0.055 079	FORMAT. #MODIFIED CDS FORCOM SUBROUTINE FOR+	1620-01.6.096 022
#FACTOR ANALYSIS - CENTROID METHOD.	1620-06.0.103 053	FORMAT. #POST PROCESSOR FOR LE BLOND+	1620-10.4.013 118
FACTOR ANALYSIS AND ROTATION OF FACTORS.	1620-06.0.145 059	FORMAT. FILE NO. 1620-PO-037. #BESSEL+	1620-07.0.037 077
#FACTOR ANALYSIS BY THE CENTROID METHOD..	1620-06.0.053 048	FORMAT. 1627 PLOTTER SUBROUTINE, PROGRAM+	1620-LM-039 006
FACTOR ANALYSIS USING HOTELLINGS ITERATIVE+	1620-06.0.091 052	FORMATION - 6431. #AERIAL TRIANGULATION STRIP	1620-09.2.048 092
#FACTOR ANALYSIS-PRINCIPAL COMPONENTS I AND+	1620-06.0.169 062	FORMO/FORTRAN OF ROLLA MISSOURI. #6-64	1620-02.0.046 034
FACTOR CALCULATION AND APPLICATION. #NETWORK+	1620-09.4.029 101	FORMONITOR II. #DISK PACKER	1620-01.6.150 029
FACTOR CALCULATION IN X-RAY CRYSTALLOGRAPHY.	1620-08.4.004 084	FORMS OF AN EXAMINATION. #SCRAMBLE --	1620-13.0.011 126
FACTOR FACTORIAL ANALYSIS OF VARIANCE. #THREE	1620-06.0.207 066	FORMS. #CONVERSION OF KELVIN FUNCTIONS TO+	1620-03.0.008 038
FACTOR TABLES. #INTERPOLATION OF ATOMIC+	1620-08.4.003 084	FORMULA II. #MOLECULAR	1620-08.4.012 085
#FACTORIAL ANALYSIS OF VARIANCE AND+	1620-06.0.224 069	FORMULA. #FITTING DISTRIBUTIONS WITH THE+	1620-06.0.247 073
#FACTORIAL ANALYSIS OF VARIANCE.	1620-06.0.041 047	FORMULA. #POLYNOMIAL CURVE FITTING - NEWTONS+	1620-07.0.023 076
FACTORIAL ANALYSIS OF VARIANCE. #THREE FACTOR	1620-06.0.207 066	FORMULAE. #GENERALIZED STACK - VIBRATION+	1620-09.2.084 097
FACTORIAL DESIGN. #ANALYSIS OF VARIANCE,+	1620-06.0.069 049	#FORTE.	1620-02.0.060 036
FACTORIAL EXPERIMENTS. #ANALYSIS OF 2 - LEVEL	1620-06.0.044 047	FORTRAN (AN INTERPRETIVE PROGRAM). #BDQ	1620-02.0.031 032
FACTORIAL. #ANALYSIS OF COVARIANCE - SPLIT+	1620-06.0.023 044	FORTRAN (CARD). #ERROR FUNCTION SUBROUTINE+	1620-07.0.063 080
FACTORIAL. #ANALYSIS OF COVARIANCE --	1620-06.0.024 044	FORTRAN (FORMAT). #CAL-COMP 565 PLOTTER+	1620-13.0.005 126
FACTORIAL. #ANALYSIS OF COVARIANCE --	1620-06.0.025 045	#FORTRAN CALL SUBROUTINES FOR PLOTTING.	1620-01.6.123 025
FACTORIAL. #ANALYSIS OF VARIANCE -	1620-06.0.026 045	#FORTRAN COMPRESSOR AND MULTI-PROGRAMMER.	1620-01.6.045 019
FACTORIAL. #ANALYSIS OF VARIANCE -	1620-06.0.027 045	FORTRAN COMPRESSOR.	1620-02.0.055 035
FACTORIAL. #ANALYSIS OF VARIANCE - TWO-FACTOR	1620-06.0.028 045	FORTRAN DISK SYSTEM FOR 1620. #BDQ	1620-02.0.061 036

KWIC (KEYWORD-IN-CONTEXT) INDEX

FORTRAN	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGE
FORTRAN	FOR MONITOR I SYSTEM. #GOTAFIT -+	1620-01.2.015	016	#GAMMA FUNCTION SUBROUTINE FOR PDQ FORTRAN.	1620-07.0.062	088
FORTRAN	FOR MONITOR I, VERSION 2. #MODIFIED	1620-01.4.026	018	GAMMA FUNCTION SUBROUTINE-POSITIVE+	1620-07.0.048	070
FORTRAN	FOR MONITOR I, VERSION 2, 60K.	1620-01.4.028	018	GANG-PUNCHING OR EMITTING. #CARD REPRODUCER+	1620-01.3.016	017
FORTRAN	FOR THE 1620. #COMPLEX	1620-06.0.008	043	GANG-PUNCHING PROGRAM. #GENERAL	1620-01.3.012	016
FORTRAN	FOR 20K. #NCE LOAD AND GO	1620-02.0.029	032	GAS AND WATER NETWORKS. #PRESSURE AND FLOW+	1620-09.2.078	096
FORTRAN	FOR 20K. #N.C.E. LOAD AND GO	1620-02.0.057	036	#GAS NETWORK ANALYSIS PROGRAM FOR LOW, MEDIUM	1620-09.5.010	108
#FORTRAN	FORMAT CHECKER.	1620-01.1.017	013	GAS NETWORK ANALYSIS PROGRAM. #FLOW AND+	1620-09.3.013	097
#FORTRAN	FORMAT SUBROUTINE FOR PICTTING WITH+	1620-01.6.068	021	#GAUSS JORDAN WITH PARTIAL PIVOTAL.	1620-05.0.026	042
#FORTRAN	II (CARD).	1620-FO-019	004	GEAR SELECTION. #HELICAL	1620-09.5.001	107
#FORTRAN	II FOR AUTOMATIC FLOATING POINT.	1620-FO-049	005	GENERALIZED ANOV. #COMPLETELY	1620-06.0.050	051
#FORTRAN	II FORMAT STATEMENT PRESELECTION.	1620-01.6.086	022	#GENERALIZED SAG AND TENSION CALCULATIONS.	1620-09.2.069	095
#FORTRAN	II SUBROUTINE FOR PLOTTING WITH A+	1620-01.6.065	020	#GENERALIZED STACK - VIBRATION CALCULATIONS+	1620-09.2.084	097
FORTRAN	II. #FORCOM SUBROUTINES FOR	1620-01.6.074	021	GENERATE RANDOM NUMBERS FOR THE MONITOR I+	1620-07.0.071	081
FORTRAN	II. #RANDOM NUMBER SUBROUTINE FOR	1620-07.0.064	020	GENERATING (RANDOM NUMBERS). #FORTRAN SYSTEM+	1620-07.0.015	075
FORTRAN	II. #RELOCATABLE COS, SIN AND EXP+	1620-07.0.038	077	GENERATION AND INTERPOLATION WITH+	1620-07.0.055	079
#FORTRAN	II-D DISK SUBROUTINES TO READ OR+	1620-01.6.151	029	GENERATION FOR GIVEN INCREMENTAL COST. #PLANT	1620-09.4.036	102
#FORTRAN	II-D SUBROUTINE FOR MATRIX INVERSION	1620-07.0.076	081	#GENERATION PLANNING.	1620-09.4.033	102
FORTRAN	II-D. #GETREC SUBROUTINE	1620-01.6.112	024	GENERATION. #TWELVE - TONE MATRIX	1620-05.0.030	042
FORTRAN	II-D. #FORCOM II-D - SUBROUTINES FOR	1620-01.6.105	023	GENERATOR PROGRAM - SINGLE AND DOUBLE+	1620-06.0.095	052
FORTRAN	II-D. #FLOATING-POINT SORTING+	1620-01.6.133	026	GENERATOR PROGRAM. #CRITICAL PATH/SCHEDULE+	1620-10.3.020	113
FORTRAN	II-D. #FREAD - FREE-STYLE CARD+	1620-01.2.019	016	GENERATOR SUBPROGRAM. #RANDOM EXPONENTIAL+	1620-06.0.111	054
FORTRAN	II-D. #RELOCATABLE PLOT SUBROUTINE	1620-01.2.017	016	GENERATOR. #LABELR - A REPORT	1620-01.6.160	030
#FORTRAN	II-D, 1627 PLOTTER SUBROUTINES,+	1620-LM-042	007	#GEODESIC POINTS.	1620-07.0.069	081
#FORTRAN	II, 1627 PLOTTER SUBROUTINES PROGRAM	1620-LM-041	006	GEODESIC POSITION COMPUTATION. #INVERSE	1620-09.2.021	088
#FORTRAN	PRE-COMPILER (CARD).	1620-FO-006	004	GEODESIC PROBLEM FOR SHORT LINES. #REVERSE	1620-08.1.003	082
FORTRAN	PROCESSING SYSTEM. #AUTO FLCAT	1620-01.6.076	021	GEODESIC PROBLEM. #DIRECT	1620-08.1.004	082
FORTRAN	PROCESSOR AND SUBROUTINES. #UTO	1620-02.0.017	031	GEODESIC PROBLEM. #HELMERTS DIRECT	1620-07.0.068	080
FORTRAN	PROCESSOR. #SUPER-GC	1620-02.0.045	034	GEODIMETER FIELD NOTE REDUCTION. #1620 MODEL	1620-09.2.052	093
#FORTRAN	PROGRAM STRAIGHTENER.	1620-01.4.027	018	#GEOMETRIC COMPUTATION.	1620-09.2.040	090
#FORTRAN	SYSTEM RELOCATABLE SUBROUTINE FOR+	1620-07.0.015	075	#GEOMETRIC COMPUTATION.	1620-09.2.041	091
FORTRAN	SYSTEM. #A MODIFIED PDG	1620-02.0.066	037	#GEOMETRIC COMPUTATION.	1620-09.2.042	091
FORTRAN	SYSTEM. #WITRAN - A LOAD AND GO	1620-02.0.047	034	GEOMETRY COGO 1 - CARD. #CIVIL ENGINEERING+	1620-UG-01X	011
#FORTRAN	TEACH.	1620-13.0.013	127	GEOMETRY I - DISK. #CIVIL ENGINEERING+	1620-UG-05X	011
FORTRAN	TRANSFER. #DEFT - DISK EXECUTION OF	1620-01.1.034	015	GERMAN-TO-ENGLISH TRANSLATION. #ELEMENTARY	1620-11.0.054	125
FORTRAN	W/FORMAT. #FORCOM SUBROUTINES FOR	1620-01.6.051	020	GERMAN-TO-ENGLISH TRANSLATION. #ELEMENTARY	1620-01.6.155	030
FORTRAN	WITH FORMAT (CARD). #1620/1443	1620-FO-037	005	#GETAG SYSTEM.	1620-01.6.112	024
#FORTRAN	WITH FORMAT - CARD.	1620-FO-004	004	#GETREC SUBROUTINE FORTRAN II-D.	1620-09.2.050	092
FORTRAN	WITH FORMAT - 1627 PLOTTER+	1620-LM-040	006	GIRDER ANALYSIS AND DESIGN PROGRAM FOR THE+	1620-09.2.050	092
#FORTRAN	WITH FORMAT GAMMA FUNCTION+	1620-07.0.048	078	GIRDERS. #ANALYSIS OF HELICOIDAL	1620-09.5.007	108
FORTRAN	WITH FORMAT. #PLOT SUBROUTINE FOR	1620-01.6.056	020	GLOSSARIES, AND DICTIONARIES. #ALPHABETIC+	1620-10.3.038	115
FORTRAN	WITH FORMAT. #MODIFIED CDS FORCOM+	1620-01.6.096	022	#GOTAFIT - GOTRAN AND AFIT FORTRAN FOR+	1620-01.2.015	016
FORTRAN	WITH FORMAT, FILE NO. 1620-FO-037.	1620-07.0.037	077	#GOTRAN (CARD).	1620-PR-011	007
#FORTRAN	WITH FORMAT, 1627 PLOTTER+	1620-LM-039	006	GOTRAN AND AFIT FORTRAN FOR MONITOR I+	1620-01.2.015	016
#FORTRAN	90 COMPILER AND SUBROUTINES.	1620-02.0.014	033	#GRADE NORMALIZING AND PLOTTING.	1620-01.6.139	027
FORTRAN.	#BG-UTC	1620-02.0.036	031	GRADING PROGRAM. #PORTA - A	1620-06.0.253	074
FORTRAN.	#AFIT IMPROVED	1620-01.1.010	013	GRAPH GENERATOR PROGRAM. #CRITICAL+	1620-10.3.020	113
FORTRAN.	#FORGO - LOAD AND GO	1620-02.0.008	031	#GRAPH 2 - A PRINTER PLOTTING SUBROUTINE+	1620-09.0.001	086
FORTRAN.	#PLOT SUBROUTINE FOR	1620-01.6.055	020	#GRAPHING.	1620-03.0.011	078
FORTRAN.	#MANN-WHITNEY U TEST WRITTEN IN	1620-06.0.058	048	#GRAVITY LOAD ANALYSIS PROGRAM.	1620-09.2.072	095
FORTRAN.	#C4D - AN OPERATING SYSTEM FOR PDQ	1620-02.0.059	036	GRAVITY, POLAR MOMENTS OF INERTIA AND ALLIED+	1620-09.5.013	109
FORTRAN.	#GAMMA FUNCTION SUBROUTINE FOR PDQ	1620-07.0.062	080	#GREGORIAN CALENDAR - 1585 TO 2599 A.D..	1620-11.0.044	123
FORWARD	INTERPOLATION. #NEWTONS	1620-06.0.100	053	GROUP DISCRIMINANT ANALYSIS. #SEVERAL	1620-06.0.249	073
FOUR-FACTOR	FACTORTIAL. #ANALYSIS OF VARIANCE	1620-06.0.026	045	#GUESS.	1620-11.0.056	125
FOUR-FACTOR	FACTORTIAL. #ANALYSIS OF VARIANCE	1620-06.0.027	045	#H-104, TWO-DIMENSIONAL, TRANSIENT OR STEADY+	1620-09.5.004	107
#FOURIER	ANALYSIS - TWO OR THREE PASS SYSTEM.	1620-07.0.056	079	#HAMBUR. #WATER	1620-09.2.029	089
FOURIER	ANALYSIS; A. COEFFICIENTS PROGRAM;+	1620-06.0.056	048	HANDBOOK. #LUNCH STUDY EXPLODER AND STUDENT+	1620-10.3.050	117
FOURIER	SYNTHESIS PROGRAM FOR X-RAY+	1620-08.4.005	084	HARDY CROSS SOLUTION. #WATER FLOW IN A PIPE+	1620-09.7.008	109
FOURIER	SYNTHESIS PROGRAM FOR X-RAY+	1620-08.4.006	084	HARTERS CRITICAL VALUES, FOR P LEVELS OF+	1620-06.0.124	056
FOURIER	SYNTHESIS PROGRAM. #ALPHABETIC+	1620-08.4.007	084	HASH TOTAL. #CARD	1620-01.6.155	030
FRAME	ANALYSIS. #INDETERMINATE	1620-09.2.033	089	HEAD LOSS CALCULATIONS IN WATER SUPPLY+	1620-09.2.039	090
FRAME	ANALYSIS. #NON-PRISMATIC NCN+	1620-09.2.059	094	HEAD BALANCE. #TURBINE CYCLE	1620-09.5.009	108
#FRAME	SUBROUTINE.	1620-01.6.154	029	HEAT CONDUCTION. #H-104, TWO-DIMENSIONAL,+	1620-09.5.004	107
#FREAD	- FREE-STYLE CARD READING FOR 1620+	1620-01.2.019	016	#HEATING-LOAD DETERMINATION FOR BUILDINGS.	1620-09.5.011	108
FREED-STYLE	CARD READING FOR 1620 MONITOR II+	1620-01.2.019	016	HELICAL GEAR SELECTION. #COMPLETELY	1620-09.5.007	107
FREQUENCIES	AND RELATIVE DEFLECTIONS AND+	1620-09.5.006	107	HELICOIDAL GIRDERS. #ANALYSIS OF	1620-09.5.007	108
FREQUENCIES	SHOWN BENEATH CLASS MAXIMA.	1620-06.0.227	070	HELMERTS DIRECT GEODETIC PROBLEM. #HIM AND	1620-07.0.068	080
FREQUENCIES.	#SCATTER DIAGRAM OF DATA	1620-06.0.228	070	HER. #HIM AND	1620-11.0.019	119
FREQUENCIES.	#ANALYSIS OF VARIANCE AND+	1620-06.0.132	057	HFM AND HER.	1620-09.2.063	094
FREQUENCIES.	#PERCENTILE SCORES FREQUENCY+	1620-06.0.115	055	HINGED SPANS BY THE CONJUGATE BEAM METHOD.	1620-06.0.203	066
FREQUENCIES-UCRBL63.	#ANALYSIS OF VARIANCE -+	1620-06.0.110	054	HOFSTRA UNIVERSITY NONPARAMETRIC TESTS.	1620-06.0.283	066
FREQUENCY	CURVE PROGRAM. #OGIVE	1620-06.0.127	056	HOMOGENEITY OF VARIANCE TEST AND T TEST USU+	1620-06.0.081	050
#FREQUENCY	DISTRIBUTION GENERATOR PROGRAM -+	1620-06.0.095	052	HOMOGENEITY OF VARIANCE. #BARTLETTS TEST FOR	1620-06.0.152	060
#FREQUENCY	DISTRIBUTION PROGRAM - SINGLE AND+	1620-06.0.171	063	HOMOGENEITY OF VARIANCE, NONLINEAR DATA+	1620-06.0.152	060
#FREQUENCY	DISTRIBUTION PROGRAM. #TEST SCORE	1620-06.0.232	071	HOMOGENEOUS AND NON-HOMOGENEOUS SIMULTANEOUS+	1620-05.0.020	041
#FREQUENCY	DISTRIBUTIONS - SINGLE AND DOUBLE+	1620-06.0.016	044	#HORIZONTAL ALIGNMENT AND OFFSETS (HALO).	1620-09.2.038	090
#FREQUENCY	DISTRIBUTIONS, AND CUMULATIVE+	1620-06.0.115	055	#HORIZONTAL ALIGNMENT DATA FROM COORDINATES+	1620-09.2.027	088
#FREQUENCY	RESPONSE ALGORITHM. #BODE - A	1620-09.4.065	106	#HORIZONTAL CURVE DATA.	1620-09.2.062	094
#FREQUENCY.	#1 TO 4 WAY ANALYSIS OF VARIANCE+	1620-06.0.202	065	HOTELLINGS ITERATIVE PROCEDURE. #PRINCIPAL+	1620-06.0.091	052
FRICITION	HEAD LOSS CALCULATIONS IN WATER+	1620-09.2.039	090	#HOTELLINGS T-SQUARE.	1620-06.0.112	054
FUNCTION	(FORTRAN II). #SORT-LIBRARY	1620-01.6.069	021	HUB. #S-109 STRESS ANALYSIS OF A FLANGED+	1620-09.7.005	109
FUNCTION	FITTER. #SIXTEEN-TWENTY UNIVERSAL	1620-CA-02X	001	HUGES NC-211 MACHINE TOOL CONTROL. #POST+	1620-10.4.011	118
FUNCTION	SUBROUTINE FOR PDQ FORTRAN (CARD).	1620-07.0.063	080	#HUNT - HOFSTRA UNIVERSITY NONPARAMETRIC+	1620-06.0.203	066
FUNCTION	SUBROUTINE FOR PDQ FORTRAN. #GAMMA	1620-09.4.062	106	#HYDRAULIC ANALYSIS OF FLOW IN PIPE NETWORKS.	1620-09.7.006	109
FUNCTION	SUBROUTINE SET. #COMBINATIONAL+	1620-07.0.077	081	HYPERBOLIC, EXPONENTIAL, POWER FUNCTIONS..	1620-06.0.106	056
FUNCTION	SUBROUTINE. #A VARIABLE PRECISION+	1620-07.0.048	078	#HYPERGEOMETRIC STATISTICS - HYPERG.	1620-06.0.106	054
FUNCTION	SUBROUTINE-POSITIVE ARGUMENTS.	1620-07.0.037	077	HYPERG. #HYPERGEOMETRIC STATISTICS -	1620-06.0.106	054
FUNCTION	SUBROUTINES FOR FORTRAN WITH+	1620-05.0.025	041	IDENTIFICATION OF AUTOMATA. #MINIMIZATION+	1620-13.0.035	129
FUNCTION	TRANSFORMATION. #BOOLEAN	1620-07.0.043	077	II. #MOLECULAR FORMULA	1620-08.4.012	085
FUNCTION	USING SIMPSONS RULE. #NUMERICAL+	1620-07.0.034	076	II. #DISK PACKER FOR MONITOR	1620-01.6.150	029
FUNCTION.	#DIFFERENTIATION OF AN EMPIRICAL	1620-11.0.029	120	II. #FORCOM SUBROUTINES FOR FORTRAN	1620-01.6.074	021
FUNCTIONAL	DEMONSTRATION OF THE IBM 1620.	1620-07.0.071	081	II. #COMPOSITE BEAM SERIES - PROGRAMS I AND	1620-09.2.057	093
FUNCTIONAL	SUBROUTINE TO GENERATE RANDOM+	1620-03.0.007	038	II. #FACTOR ANALYSIS-PRINCIPAL COMPONENTS I+	1620-06.0.169	062
FUNCTIONS	OF FIRST ORDER. #KELVIN	1620-03.0.005	038	II. #RANDOM NUMBER SUBROUTINE FOR 1620	1620-07.0.064	080
FUNCTIONS	OF INTEGRAL ORDER. #COMPUTATION OF+	1620-03.0.008	038	II. #RELOCATABLE COS, SIN AND EXP+	1620-07.0.038	077
FUNCTIONS.	#CALCULATION OF POLES AND ZEROS+	1620-09.4.057	105	II, 1627 PLOTTER SUBROUTINES PROGRAM+	1620-LM-041	006
FUNCTIONS.	#ECONOMIC ORDER QUANTITIES FOR+	1620-10.1.011	110	INCREMENTAL COST. #PLANT GENERATION FOR GIVEN	1620-09.4.036	102
FUNCTIONS..	#THREE-IN-ONE CURVE FITS+	1620-07.0.019	076	INCREMENTS OF TIME. #STUDENT SCHEDULING+	1620-10.3.017	113
GAME (MODIFIED).	#QUEENS	1620-11.0.021	119	INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT+	1620-06.0.079	050
GAME	OF DICE.	1620-11.0.025	120	INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT+	1620-06.0.082	050
GAME	PROGRAM. #BASEBALL	1620-11.0.037	122	#INDETERMINATE FRAME ANALYSIS.	1620-09.2.033	089
GAME	SOLUTION. #APPROXIMATE RECTANGULAR	1620-07.0.046	078	INDEX CRYSTALS. #A PROGRAM TO	1620-08.3.005	083
GAME.	#BLACKJACK	1620-11.0.005	118	#INDEX OF ORDER OF ASSOCIATION.	1620-06.0.098	053
GAME.	#EXECUTIVE	1620-11.0.036	121	INDEX WITH FORMAT. #KWIC	1620-10.3.033	114
GAME.	#THE EXECUTIVE	1620-11.0.004	118	INDEXER AND LISTER FOR CONCORDANCES,+	1620-10.3.038	115
GAME.	#PRODUCTION MANPOWER	1620-10.2.009	111	INDEXER FOR DISK AND PRINTER. #DISKWIC - A+	1620-10.3.051	117
GAME.	#BOILERMAKER DAIRY MANAGEMENT	1620-11.0.048	124	INDEXER. #SPS LABEL REFERENCE	1620-01.1.014	013
GAME.	#BOILERMAKER SUPERMARKET MANAGEMENT	1620-11.0.047	124	INDIVIDUAL AND COMB. STATION SUMMARIES.	1620-06.0.123	056
GAME.	#BOILERMAKER FARM SUPPLY BUSINESS+	1620-11.0.049	124	INERTIA AND ALLIED DATA. #CALCULATION OF+	1620-09.5.013	109
GAMES.	#EXTREME-POINT SOLUTIONS FOR+	1620-07.0.045	077	INFORMATION RETRIEVAL. #LPI	1620-13.0.032	129

INFORMATION

KWIC (KEYWORD-IN-CONTEXT) INDEX

MATRIX

TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGE
INFORMATION RETRIEVAL. #ANSIR - ALPHANUMERIC+	1620-01.6.064	020	LINEAR EQUATIONS. #CALCULATION OF THE REAL+	1620-07.0.041	077
INITIAL VALUE PROBLEM INVOLVING ONE FIRST+	1620-04.0.001	039	LINEAR EQUATIONS. #MATRIX INVERSION AND+	1620-05.0.039	043
INITIAL VALUE PROBLEM INVOLVING ONE FIRST+	1620-04.0.002	039	LINEAR EQUATIONS. #MATRIX INVERSION AND+	1620-06.0.037	046
INPUT DIFFUSION SYSTEM FOR THE IBM 1620.	1620-08.2.003	083	LINEAR EQUATIONS. #SOLUTION OF HOMOGENEOUS+	1620-05.0.020	041
INPUT. #MISSING DATA MEAN AND STANDARD+	1620-06.0.243	072	LINEAR EQUATIONS. #SUBROUTINE CROUT FOR+	1620-05.0.035	042
#INPUT-OUTPUT SUBROUTINES FOR USE IN SYMBOLIC	1620-01.6.028	019	LINEAR IN K VARIABLES LINEAR EQUATIONS.	1620-07.0.041	077
#INSPEC - INVESTIGATE NUMERICALLY STUDENTS+	1620-02.0.065	037	LINEAR PROGRAM MATRIX PREPARATION. #MXV+	1620-10.1.004	110
INSPECTION PROGRAM. #DIP - DISK	1620-01.6.141	027	#LINEAR PROGRAMMING I.	1620-10.1.007	110
INTEGRAL OF A REAL FUNCTION USING SIMPSONS+	1620-07.0.043	077	#LINEAR PROGRAMMING SYSTEM. #1620/1311	1620-CO-04X	002
INTEGRAL ORDER. #COMPUTATION OF BESSEL+	1620-03.0.005	038	#LINEAR PROGRAMMING.	1620-10.1.008	110
#INTENSITY CORRECTION PROGRAM FOR NORMAL -+	1620-08.4.002	093	#LINEAR PROGRAMMING.	1620-10.1.013	111
INTENSITY PATTERNS-DRIVEN ANTENNA ARRAY.	1620-09.4.061	106	LINEAR PROGRAMMING. #OUTPUT ANALYSIS FOR	1620-10.1.012	111
#INTER AND INTRA-MOLECULAR ATOMIC DISTANCE+	1620-08.4.008	084	LINEAR REGRESSION ANALYSIS PROGRAM. #SINGLE+	1620-06.0.148	060
INTERCORRELATION PROGRAM. #40X40 MEAN+	1620-06.0.239	072	LINEAR REGRESSION PROGRAM OF B. L. WILDER+	1620-06.0.011	043
INTERCORRELATION. #T-TEST PROGRAM FOR 19X19+	1620-06.0.242	072	LINEAR REGRESSION SYSTEM. #80-SERIES MULTIPLE	1620-06.0.143	059
INTERPOLATION - 1620. #LAGRANGE	1620-07.0.030	076	LINEAR REGRESSION. #STEPWISE MULTIPLE	1620-06.0.006	043
#INTERPOLATION OF ATOMIC SCATTERING FACTOR+	1620-08.4.003	084	LINEAR REGRESSION. #MATCH PROCESSING+	1620-06.0.251	074
INTERPOLATION WITH DERIVATIVES BY NEWTONS+	1620-07.0.055	079	LINEARITY IN DATA. #TRANSFORMATIONS TO CHECK+	1620-06.0.250	074
INTERPOLATION. #NEWTONS FORWARD	1620-06.0.100	053	LINES. #REVERSE GEODETIC PROBLEM FOR SHORT	1620-08.1.003	082
INTERPRETER AND PERPETUAL CALENDAR. #DATE	1620-11.0.045	123	LINES. #VOLTAGE PROFILE AND FAULT CURRENT+	1620-09.4.056	185
INTERPRETER. #MUSIC	1620-11.0.039	122	LIQUID EQUILIBRIUM FROM AZEOTROPE DATA.	1620-09.3.015	098
INTERPRETER. #DEPAUW MACHINE LANGUAGE	1620-01.6.109	023	LIST PROCESSING LANGUAGE. #SNOBOL 3 A	1620-01.4.024	018
INTERPRETIVE PROGRAM FOR STATISTICS. #TIPS -+	1620-06.0.183	063	LISTER FOR CONCORDANCES, GLOSSARIES, AND+	1620-10.3.038	115
INTERPRETIVE PROGRAMMING SYSTEM. #TABTRAN	1620-02.0.051	035	LISTER WITH GANG-PUNCHING OR EMITTING. #CARD+	1620-01.3.016	017
#INTERPRETIVE SYSTEM FOR PERFORMING+	1620-02.0.011	031	LISTER.	1620-01.6.147	028
INTERRUPT. #PROGRAM	1620-01.6.029	019	LISTING. #AFIT SYMBOLIC PROGRAMMING SYSTEM,+	1620-01.1.027	014
INTRA-MOLECULAR ATOMIC DISTANCE CALCULATION+	1620-08.4.008	084	LIVE LOAD DEFLECTIONS. #CONTINUOUS BEAM	1620-09.2.067	094
#INVENT.	1620-01.6.156	030	LOAD ANALYSIS PROGRAM. #GRAVITY	1620-09.2.072	095
INVENTORY MANAGEMENT SIMULATOR - 1620+	1620-CS-00X	002	LOAD AND GO FORTRAN FOR 20K. #NCE	1620-02.0.029	032
INVENTORY STATISTICAL CHECK PROGRAM.	1620-06.0.043	047	LOAD AND GO FORTRAN FOR 20K. #N.C.E.	1620-02.0.057	036
#INVERSE GEODETIC POSITION COMPUTATION.	1620-09.2.021	088	LOAD AND GO FORTRAN SYSTEM. #WITRAN - A	1620-02.0.047	034
#INVERSE LAPLACE TRANSFORM.	1620-06.0.164	062	LOAD AND GO FORTRAN. #FORGO -	1620-02.0.008	031
INVERSION AND SOLUTION OF LINEAR EQUATIONS.	1620-05.0.039	063	LOAD AND GO SYMBOLIC PROGRAMMING SYSTEM.	1620-01.1.032	015
INVERSION AND SOLUTION OF SIMULTANEOUS+	1620-06.0.037	046	LOAD CYCLE. #OVERLOAD RATINGS OF 65 DEGREES+	1620-09.4.060	182
INVERSION AND/OR RELATED OPERATIONS.	1620-07.0.076	081	LOAD CYCLE. #TRANSFORMER RATINGS BASED ON+	1620-09.4.032	182
INVERSION PACKAGE. #VARIABLE PRECISION+	1620-06.0.120	055	LOAD CYCLES. #TRANSFORMER RATING FOR NORMAL+	1620-09.4.028	181
INVERSION SUBROUTINE. #MATRIX	1620-05.0.013	050	LOAD DEFLECTIONS. #CONTINUOUS BEAM LIVE	1620-09.2.067	094
INVERSION WITH COMPLEX VALUES. #SIMULTANEOUS+	1620-09.4.015	107	LOAD FLOW SINGLE LINE DIAGRAM OUTPUT.	1620-09.4.049	184
INVESTIGATE NUMERICALLY STUDENTS PROGRAM+	1620-02.0.065	037	LOAD FLOW. #SCALAR ELECTRIC	1620-09.4.053	185
#INVESTMENT COST.	1620-10.3.021	114	LOAD 20K. #CLEAR AND	1620-01.6.090	022
INVESTMENT. #CAPITAL	1620-CS-01X	002	LOAD. #COMPRESSION SPRING DESIGN, DYNAMIC	1620-09.5.002	107
INVESTMENTS. #CAPITAL	1620-10.3.037	115	LOC I. #COMPUTATION OF ROOF	1620-09.4.038	182
IOCS ROUTINES, CONTROLS SEQUENTIAL ADDITIONS+	1620-01.6.134	026	LOCATION SYSTEM. #DTH	1620-09.2.026	058
#ITEM ANALYSIS AND SCORING.	1620-06.0.135	057	LOCATOR FOR CRITICAL PATH SYSTEM NETWORK.	1620-10.3.047	117
#ITEM ANALYSIS FOR 1230 OPTICAL MARK SCORING+	1620-06.0.220	068	#LOCUS - A ROOT LOCUS ALGORITHM.	1620-09.4.064	186
#ITEM ANALYSIS OF PORTA-PUNCH TEST CARDS.	1620-06.0.179	063	LOCUS ALGORITHM. #LOCUS - A ROOT	1620-09.4.064	186
#ITEM ANALYSIS PROGRAM.	1620-06.0.185	064	LOCUS PLOTTING. #ROOT	1620-01.6.046	013
#ITEM ANALYSIS PROGRAM. #FIVE CHOICE	1620-06.0.229	070	#LOGGING PROGRAM.	1620-01.6.043	019
ITERATIVE PROCEDURE. #PRINCIPAL AXES FACTOR+	1620-06.0.091	052	LOGIC STATEMENTS. #TRUTH TABLES FOR SYMBOLIC	1620-01.6.152	029
#JANET DIGITAL ANALOG SIMULATION PROGRAM.	1620-02.0.053	035	LOGIC TO DETERMINE THE VALIDITY OF A+	1620-13.0.008	126
#JANET-II DIGITAL ANALOG SIMULATION PROGRAM.	1620-02.0.054	035	#LOGIC.	1620-01.1.035	015
JORDAN WITH PARTIAL PIVOTAL. #GAUSS	1620-05.0.026	042	LOOK-UP PROGRAM. #TABLE	1620-06.0.237	071
#KARBER METHOD OF ANALYSIS NONPARAMETRIC+	1620-06.0.212	067	LOOKUP. NO BRANCH AND TRANSMIT - (TLUNBT).	1620-01.6.153	029
KATE. #SPEK/SPEEDY	1620-08.2.004	083	LOOP CURRENTS IN ELECTRIC CIRCUITS.	1620-09.4.039	182
#KELVIN FUNCTIONS OF FIRST ORDER.	1620-03.0.007	038	#LOOP LOCATOR FOR CRITICAL PATH SYSTEM+	1620-10.3.047	117
KELVIN FUNCTIONS TO THEIR POLAR FORMS.	1620-03.0.008	038	LOSS CALCULATIONS IN WATER SUPPLY+	1620-09.2.039	090
#KENDALL'S TAU AND SPEARMAN'S RHO CORRELATION	1620-06.0.172	063	LOSS OF LIFE AND ACTUAL 24-HOUR LOAD CYCLE.	1620-09.4.032	182
KEYWORD IN CONTEXT ANALYSIS ON A MULTIPLE+	1620-10.3.032	114	LOSS OF LIFE AND 24-HOUR LOAD CYCLE.	1620-09.4.060	185
KEYWORD IN CONTEXT. #KWIC -	1620-10.3.016	113	LOSSES AND PENALTY FACTORS. #TRANSMISSION	1620-09.4.008	099
KEYWORD IN CONTEXT. #KWIC -	1620-10.3.041	116	LOSSES. #EVALUATION OF POWER TRANSFORMER	1620-09.4.051	184
KUTTA. #NUMERICAL SOLUTION OF A FIRST ORDER+	1620-04.0.004	039	#LOW-PASS FILTER DESIGN.	1620-09.4.041	183
#KWIC - KEYWORD IN CONTEXT.	1620-10.3.016	113	#LPI INFORMATION RETRIEVAL.	1620-13.0.032	129
#KWIC - KEYWORD IN CONTEXT.	1620-10.3.041	116	#LUNCH STUDY EXPLODER AND STUDENT SCHEDULING+	1620-10.3.050	117
#KWIC INDEX WITH FORMAT.	1620-10.3.033	114	MACHINE LANGUAGE INTERPRETER. #DEPAUW	1620-01.6.109	023
KWIC INDEX FOR DISK AND PRINTER. #DISKWIC+	1620-10.3.051	117	MACHINE TOOL CONTROL. #POST PROCESSOR+	1620-10.4.011	118
LAAR CONSTANTS AND VAPOR LIQUID EQUILIBRIUM+	1620-09.3.015	098	MACHINES. #TRANSIENT STABILITY FOR TEN	1620-09.4.013	099
LABEL REFERENCE INDEXER. #SPS	1620-01.1.014	013	#MACRO PROCESSOR FOR 1620-1443 MONITOR I+	1620-02.0.050	034
#LABELR - A REPORT GENERATOR.	1620-01.6.160	030	MACRO SUBROUTINE. #ADDITIONAL INSTRUCTION	1620-01.1.002	013
LAG WITH OR WITHOUT DEAD TIME. #LEAST+	1620-07.0.075	081	MACRO SUBROUTINES. #TNS, TNF AND MF	1620-01.6.157	030
#LAGRANGE INTERPOLATION - 1620.	1620-07.0.030	076	#MACROINSTRUCTION FLOATING POINT FORMAT+	1620-01.6.136	026
#LAMP #LESS ARITHMETIC MORE PROGRAMMING	1620-01.1.001	013	MACROSCOPIC INPUT DIFFUSION SYSTEM FOR THE+	1620-08.2.003	083
#LAPHA TRANS.	1620-06.0.236	071	#MADAM - MATRIX DIAGONALIZATION, AUTO+	1620-05.0.015	040
LAPLACE TRANSFORM. #INVERSE	1620-06.0.164	062	#MAGIC II - MATRIX ALGEBRA.	1620-05.0.031	042
LATHE WITH MARK CENTURY NUMERICAL CONTOURING+	1620-10.4.013	118	#MAIDS - A MACROSCOPIC INPUT DIFFUSION SYSTEM	1620-08.2.003	083
LATIN SQUARES USU 31. #ANALYSIS OF+	1620-06.0.086	051	#MAIDS-II.	1620-08.2.010	083
LATTICE - USU 52. #ANALYSIS OF VARIANCE -+	1620-06.0.105	054	MANAGEMENT DECISION EXERCISE. #FARM+	1620-10.2.010	112
LATTICE DESIGN USU 51. #ANALYSIS OF VARIANCE+	1620-06.0.083	051	MANAGEMENT GAME. #BOILERMAKER DAIRY	1620-11.0.048	124
LATTICE DESIGN. #ANALYSIS OF VARIANCE -+	1620-06.0.062	049	MANAGEMENT GAME. #BOILERMAKER SUPERMARKET	1620-11.0.047	124
LAV. #CALCULATION OF EIGENVALUES AND+	1620-05.0.016	041	MANAGEMENT GAME. #BOILERMAKER FARM SUPPLY+	1620-11.0.049	124
LAYOUT. #SPIRAL CURVE	1620-09.2.075	096	MANAGEMENT SIMULATOR - 1620 VERSION FOR+	1620-CS-04X	002
LEARNING PROGRAM. #TIC TAC TOE - A	1620-11.0.013	119	MANIPULATION. #DATMAN - DATA	1620-01.6.149	029
#LEAST SQUARE DIFFERENCES, NON LINEAR CURVE+	1620-06.0.181	064	#MANN-WHITNEY TEST.	1620-06.0.019	044
#LEAST SQUARES ADJUSTMENT OF PRECISE SURVEY+	1620-09.2.046	091	#MANN-WHITNEY U TEST WRITTEN IN FORTRAN.	1620-06.0.058	048
#LEAST SQUARES COSINE FIT-IBM 704 COFIT+	1620-06.0.142	058	MANPOWER GAME. #PRODUCTION	1620-10.2.009	111
#LEAST SQUARES FIT OF RESPONSE CURVES TO+	1620-07.0.075	081	MARK CENTURY NUMERICAL CONTOURING WITH "E"+	1620-10.4.013	118
#LEAST SQUARES FIT OF VAPOR PRESSURE DATA BY+	1620-09.3.016	098	MARK SCORING READER OUTPUT. #ITEM ANALYSIS+	1620-06.0.220	068
#LEAST SQUARES PROGRAM. #TWO-IN-ONE	1620-06.0.154	060	#MARKOV CHAIN PROCESS.	1620-05.0.038	042
LEAST SQUARES. #FOUR TYPE POLYNOMIAL CURVE+	1620-06.0.157	060	#MASS DIAGRAM MODEL WITH CROSS SECTION.	1620-09.2.043	091
LEAST-SQUARES CURVE FITTING PROGRAM.	1620-06.0.134	057	MASTER SCHEDULE. #WEEKLY SCHEDULING USING	1620-10.3.043	116
LENGENDRE POLYNOMIALS. #POLYNOMIAL CURVE+	1620-07.0.007	074	MASTER SCHEDULE. #WEEK - WEEKLY SCHEDULE	1620-10.3.040	115
LENGTH FOR FIXED TIME TRAFFIC SIGNALS. #THE+	1620-09.2.083	097	MATIC 11 TUBE - TYPE. #AUTOSPLIT POST -+	1620-10.3.015	113
LENGTHS. #EQUIVALENT PIPE	1620-09.3.014	098	MATRIX METHOD. #SHORT CIRCUIT ANALYSIS BY	1620-09.4.023	100
#LESS ARITHMETIC MORE PROGRAMMING.	1620-01.1.001	013	MATRICES. #CORRELATION PROGRAM FOR SYMMETRIC+	1620-06.0.114	055
LETTERING ON IEM CARDS. #CARD PUNCH+	1620-11.0.041	122	MATRICES. #MISSING DATA CORRELATION PROGRAM+	1620-06.0.121	056
LEVEL FACTORIAL EXPERIMENTS. #ANALYSIS OF 2 -	1620-06.0.044	047	MATRIX ALGEBRA. #MAGIC II -	1620-05.0.031	042
LEVELS OF .10, .01, .005. #DUNCANS MULTIPLE+	1620-06.0.124	056	MATRIX AND DISTANCE BETWEEN POPULATIONS.	1620-06.0.208	066
LIFE AND ACTUAL 24-HOUR LOAD CYCLE.	1620-09.4.032	182	MATRIX DIAGONALIZATION, AUTO MINIMIZATION OF+	1620-05.0.015	040
LIFE AND 24-HOUR LOAD CYCLE. #OVERLOAD+	1620-09.4.060	185	MATRIX FORM. #CORRELATION MATRIX WITH OUTPUT+	1620-05.0.104	053
LINE ABSTRACT. #ZIP - KEYWORD IN CONTEXT+	1620-10.3.032	114	MATRIX GENERATION. #TWELVE TONE	1620-05.0.030	042
LINE BALANCING. #PRODUCTION	1620-10.010	006	#MATRIX INVERSION AND SOLUTION OF LINEAR+	1620-05.0.039	043
LINE DIAGRAM OUTPUT. #ELECTRIC LOAD FLOW+	1620-09.4.049	104	MATRIX INVERSION AND SOLUTION OF+	1620-06.0.037	046
LINE DROP CALCULATION IN 2 PASSES. #RADIAL+	1620-09.4.020	100	MATRIX INVERSION AND/OR RELATED OPERATIONS.	1620-07.0.076	081
LINE DROP CALCULATIONS. #RADIAL THREE PHASE	1620-09.4.018	100	MATRIX INVERSION PACKAGE. #VARIABLE+	1620-06.0.120	055
LINE PLOTTING SUBROUTINE. #STRAIGHT	1620-01.6.140	027	MATRIX INVERSION SUBROUTINE.	1620-05.0.013	040
#LINEAR CORRELATION COEFFICIENT.	1620-06.0.038	046	MATRIX INVERSION WITH COMPLEX VALUES.	1620-09.4.015	100
LINEAR CORRELATION. #BINARIATE	1620-06.0.189	065	MATRIX PREPARATION. #MXV PROGRAM FOR LINEAR+	1620-10.1.004	110
LINEAR CURVE FIT. #LEAST SQUARE DIFFERENCES,+	1620-06.0.181	064	MATRIX PROGRAM. #CORRELATION	1620-06.0.162	061
LINEAR DEMAND FUNCTIONS. #ECONOMIC ORDER+	1620-10.1.011	110	MATRIX ROTATION. #VARIMAX	1620-06.0.094	052
LINEAR EQUATIONS IN N REAL VARIABLES.	1620-05.0.024	041	MATRIX WITH MISSING DATA POINTS. #SIMPLE+	1620-06.0.097	052
LINEAR EQUATIONS. #SOLUTION OF SIMULTANEOUS	1620-05.0.007	040	MATRIX WITH OPTIONAL FACTOR ANALYSIS AND+	1620-06.0.145	059

KWIC (KEYWORD-IN-CONTEXT) INDEX

MATRIX	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGES
MATRIX WITH OUTPUT IN MATRIX FORM.		1620-06.0.104	953	NETWORKS. #HYDRAULIC ANALYSIS OF FLOW IN PIPE	1620-09.7.086	189
MATRIX. #PROGRAM TO CONVERT A COMPLEX		1620-05.0.032	842	NETWORKS. #PRESSURE AND FLOW RATES IN GAS+	1620-09.2.078	096
MATRIX. #SIMPLE CORRELATION COEFFICIENT		1620-06.0.052	848	NETWORKS DIVIDED DIFFERENTIAL FORMULA.	1620-07.0.023	076
MATRIX. #CALCULATION OF THE CHARACTERISTIC+		1620-07.0.042	877	NETWORKS P.I.M. #POLYNOMIAL GENERATION AND+	1620-07.0.055	079
MATRIX-MATRIX MULTIPLICATION SUBROUTINE.		1620-05.0.018	840	NETWORKS FORWARD INTERPOLATION.	1620-06.0.180	053
MAXIMA. #FREQUENCIES SHOWN BENEATH CLASS		1620-06.0.227	870	NEYMAN A FORMULA. #FITTING DISTRIBUTIONS+	1620-06.0.247	073
#MAXIMUM CORRELATION WITH MISSING+		1620-06.0.175	863	#NIM.	1620-11.0.042	123
MAXIMUM ONE PASS SIMULTANEOUS EQUATIONS+		1620-05.0.040	843	NODE AND DUMMY ASSIGNMENT TECHNIQUE PROGRAM.	1620-10.3.030	114
MAZE DEMONSTRATION. #MOUSE IN THE		1620-11.0.051	124	NON LINEAR CURVE FIT. #LEAST SQUARE+	1620-06.0.181	064
MEAN AND STANDARD DEVIATION PROGRAM.		1620-06.0.206	866	NON SYMMETRICAL RIGID FRAME ANALYSIS.	1620-09.2.059	094
MEAN AND STANDARD DEVIATION SORT PROGRAM+		1620-06.0.243	872	NON- LINEAR IN K VARIABLES LINEAR EQUATIONS.	1620-09.2.041	077
MEAN AND STANDARD DEVIATION. #KARBER METHOD+		1620-06.0.212	867	NON-HOMOGENEOUS SIMULTANEOUS LINEAR+	1620-05.0.020	041
#MEAN AND STANDARD DEVIATION, SUM 3F SQUARES,		1620-06.0.177	863	NON-LINEAR EQUATION IN ONE VARIABLE.	1620-07.0.033	076
MEAN AND VARIANCE OF CHI SQUARE, WHEN+		1620-06.0.182	864	#NON-LINEAR LEAST-SQUARES CURVE FITTING+	1620-06.0.134	057
MEAN DIFFERENCES. #MULTIPLE RANGE TEST OF		1620-06.0.036	846	#NON-LINEAR PATCH FOR MULTIPLE LINEAR+	1620-06.0.011	043
MEAN STANDARD DEVIATION AND INTERCORRELATION+		1620-06.0.239	872	#NON-PRISMATIC NON SYMMETRICAL RIGID FRAME+	1620-09.2.059	094
#MEAN STANDARD DEVIATION AND VARIANCE.		1620-06.0.051	847	NONLINEAR DATA TRANSFORMATIONS. #MEETING+	1620-06.0.125	060
MEAN, SD AND INTERCORRELATION. #T-TEST+		1620-06.0.242	872	NONPARAMETRIC ESTIMATES OF MEAN AND STANDARD+	1620-06.0.212	067
#MEAN, STANDARD DEVIATION, AND VARIANCE BY+		1620-06.0.136	858	NONPARAMETRIC TESTS. #HUNT - HOFSTRA+	1620-06.0.203	066
MEASURES AND UNEQUAL SUBSET CELL FREQUENCY.		1620-06.0.202	865	#NONPARAMETRIC TWO-WAY ANALYSIS OF VARIANCE+	1620-06.0.218	068
MEDIUM AND HIGH PRESSURE SYSTEM. #GAS+		1620-09.5.010	108	#NOPE/NIM ONE FILE EDUCATOR.	1620-11.0.055	125
MEDIUM PRESSURE GAS NETWORK ANALYSIS+		1620-09.3.013	897	NORMAL - BEAM OR EQUI-INCLINATION SETTING.	1620-08.4.002	083
#MEETING ASSUMPTIONS OF HOMOGENEITY OF+		1620-06.0.152	860	#NORMAL AND EMERGENCY CABLE RATINGS.	1620-09.4.031	101
MEMORY PRINT - SAMP. #SEARCH AND		1620-01.6.100	823	NORMAL AND EMERGENCY OPERATION WITH COMPLEX+	1620-09.4.028	101
METHOD.. #FACTOR ANALYSIS BY THE CENTROID		1620-06.0.033	848	NORMAL AND EMERGENCY OPERATION. #TRANSFORMER+	1620-09.4.012	099
MILNE'S METHOD USING RUNGE KUTTA. #NUMERICAL+		1620-04.0.004	839	NORMAL STUDENT T/CHI-SQUARE F PROBABILITIES.	1620-06.0.128	056
MILWAUKEE - MATIC 11 TUBE - TYPE. #AUTOSPOT+		1620-10.3.015	113	NORMALITY WITH PROVISION FOR STANDARDIZATION+	1620-06.0.194	065
#MIN 3.		1620-05.0.041	843	#NORMALITY.	1620-06.0.034	046
MINERAL UNIT CELL CONTENTS. #CALCULATION OF		1620-08.3.004	883	NORMALIZING AND PLOTTING. #GRADE	1620-01.6.139	027
#MINIMIZATION AND STATE IDENTIFICATION OF+		1620-13.0.035	129	#NORTHEASTERN UNIVERSITY TEST SCORING PROGRAM.	1620-13.0.003	126
MINIMIZATION OF ERROR. #HADAM - MATRIX+		1620-05.0.015	840	NOTE REDUCTION. #1620 MODEL 4 GEODEMETER	1620-09.2.052	093
MISSING DATA AND 40X40 MEAN, SD AND+		1620-06.0.242	872	NUMBER DEMONSTRATION PROGRAM. #PERFECT	1620-11.0.030	120
#MISSING DATA CORRELATION PROGRAM FOR+		1620-06.0.121	856	NUMBER DEMONSTRATOR. #PRIME	1620-11.0.050	124
#MISSING DATA MEAN AND STANDARD DEVIATION+		1620-06.0.243	872	NUMBER GENERATOR SUBPROGRAM. #RANDOM+	1620-06.0.111	054
MISSING DATA POINTS. #SIMPLE CORRELATION+		1620-06.0.097	852	NUMBER SUBROUTINE FOR 1620 FORTRAN II.	1620-07.0.066	080
MISSING DATA. #19X19		1620-06.0.240	872	NUMBER THEORY DEMONSTRATION. #ELEMENTARY	1620-11.0.038	122
MISSING OBSERVATIONS. #MAXIMUM CORRELATION+		1620-06.0.175	863	NUMBERS FOR THE MONITOR I SYSTEM. #RANDF - A+	1620-07.0.071	081
MISSISSIPPI TEST SCORING PROGRAM - UMTS.		1620-13.0.028	128	NUMBERS. #DEMONSTRATION PROGRAM TO PRINT OUT+	1620-11.0.040	122
MISSISSIPPI TEST SCORING PROGRAM.		1620-13.0.031	129	NUMBERS. #INTERFERITIVE SYSTEM FOR PERFORMING+	1620-02.0.011	031
MISSOURI. #6-64 FORMO/PCPTRAN OF ROLLA		1620-02.0.046	834	NUMBERS. #NESTED ANALYSIS OF VARIANCE FOR+	1620-06.0.065	049
MNEMONICS DUMP. #ANL		1620-01.6.022	819	NUMERIC DATA DECKS ON 1443 PRINTER. #TABULATE	1620-13.0.034	129
MODEL-EQUAL CELL SIZE-NON-SORT-ANOV. #TEN		1620-06.0.213	867	#NUMERICAL CALCULATIONS OF THE DEFINITE+	1620-07.0.043	077
#MODIFIED CDS FORCOM SUBROUTINE FOR FORTRAN+		1620-01.6.096	822	NUMERICAL CONTOURING WITH "E" FORMAT. #POST+	1620-10.4.013	118
MODIFIED FOR 80-80 LISTING. #AFIT SYMBOLIC+		1620-01.1.027	814	NUMERICAL CONTROL PROCESSOR. #1620/1311	1620-CN-07X	081
#MODIFIED FORTRAN FOR MONITOR I, VERSION 2.		1620-01.4.026	818	NUMERICAL CONTROL PROCESSOR. #1620/1311+	1620-CN-07X	081
#MODIFIED FORTRAN FOR MONITOR I, VERSION 2,+		1620-01.4.028	818	#NUMERICAL SOLUTION OF A FIRST ORDER+	1620-04.0.004	039
#MODIFIED PDG FORTRAN SYSTEM. #A		1620-02.0.066	837	NUMERICALLY STUDENTS PROGRAM EXECUTE AND+	1620-02.0.065	037
#MODULAR INVENTORY MANAGEMENT SIMULATOR --		1620-CS-04X	002	OBJECT DECK ANALYZER. #SPS	1620-01.6.060	026
#MOLECULAR FORMULA II.		1620-08.4.012	885	OBJECTIVE BORSCHACH TEST/SORT. #SCORING,+	1620-06.0.165	062
#MOLECULAR PEAK FINDER.		1620-08.4.013	885	OBSERVATIONS PER CELL. #NONPARAMETRIC+	1620-06.0.218	061
MOMENT CORRELATIONS. #PRODUCT		1620-06.0.022	844	OBSERVATIONS. #LEAST SQUARES ADJUSTMENT OF+	1620-09.2.046	051
MOMENTS OF INERTIA AND ALLIED DATA.		1620-09.5.013	109	OBSERVATIONS. #MAXIMUM CORRELATION WITH+	1620-06.0.175	063
#MONABUS - A BUSINESS SIMULATION+		1620-11.0.052	125	OFFSETS (HALO). #HORIZONTAL ALIGNMENT AND	1620-09.2.038	090
#MONITOR DIM AND EQUIVALENCE TABLE TEST.		1620-01.6.100	823	#RELOCATION	1620-06.0.127	056
#MONITOR EQUIVALENCE TABLE CARD OUTPUT.		1620-01.3.013	817	#SIVE FREQUENCY CURVE PROGRAM.	1620-08.2.001	082
#MONITOR I DISK DUMP PARCH.		1620-01.6.143	827	ONE-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR+	1620-09.4.026	100
#MONITOR I SPS II-D PSEUDO PROCESS PHASE.		1620-01.1.033	815	ONE-PORT NETWORKS. #CAUER EXPANSIONS OF+	1620-06.0.233	071
#MONITOR I SYSTEM. #GOTAFIT - GOTRAN AND AFIT+		1620-01.2.015	816	ONE/TWO/THREE WAY ANALYSIS OF VARIANCE.	1620-09.2.032	089
#MONITOR I SYSTEM. #RANDF - A FUNCTIONAL+		1620-07.0.071	881	OPERATING COST SYSTEM. #VEHICLE SIMULATION	1620-02.0.059	036
#MONITOR I VERSION 2. #HACRO PROCESSOR FOR+		1620-02.0.050	834	OPERATING SYSTEM FOR PDQ FORTRAN. #C4D - AN	1620-02.0.011	031
#MONITOR I, VERSION 2. #MODIFIED FORTRAN FOR		1620-01.4.026	818	OPERATIONS WITH COMPLEX NUMBERS.	1620-07.0.076	081
#MONITOR I, VERSION 2, 60K. #MODIFIED FORTRAN FOR		1620-01.4.028	818	OPERATIONS. #FORTRAN II-D SUBROUTINE FOR+	1620-06.0.220	068
#MONITOR II (CARD). #1620/1311		1620-PR-029	008	OPTICAL MARK SCORING READER OUTPUT. #ITEM+	1620-10.3.052	118
#MONITOR II (CARD). #1620/1443		1620-PR-045	009	OPTIMUM PLANT SIZE. #ANALYSIS OF FACTORS+	1620-06.0.234	071
#MONITOR II (FORTRAN II-D) 1627 PLOTTER+		1620-LM-050	007	OPTION. #FIVE CHOICE SPLIT-HALF RELIABILITY+	1620-06.0.244	073
#MONITOR II (TAPE). #1620/1311		1620-PR-030	008	OPTIONAL FACTOR ANALYSIS AND ROTATION OF+	1620-20-01X	003
#MONITOR II FORTRAN II-D. #PREAD - PREE-STYLE+		1620-01.2.019	816	ORDER ABBREVIATIONS. #GENERAL RAY TRACE AND+	1620-04.0.004	039
#MONITOR SYSTEM (IMS). #EXTENDED		1620-01.6.135	826	ORDER DIFFERENTIAL EQUATION BY MILNE'S+	1620-04.0.001	039
#MONITOR 1 (CARD). #1620/1443		1620-PR-033	009	ORDER DIFFERENTIAL EQUATION. #SOLUTION FOR+	1620-04.0.002	039
#MORTGAGE AMORTIZATION PROGRAM.		1620-11.0.018	119	ORDER LAG WITH OR WITHOUT DEAD TIME. #LEAST+	1620-07.0.075	081
#MOSES - MAXIMUM ONE PASS SIMULTANEOUS+		1620-05.0.040	843	ORDER OF ASSOCIATION. #INDEX OF	1620-06.0.098	053
#HOUSE IN THE MAZE DEMONSTRATION.		1620-11.0.051	124	ORDER QUANTITIES FOR LINEAR DEMAND+	1620-03.0.007	038
#MULTI ANCHOR PIPE STRESS ANALYSIS.		1620-09.4.030	101	ORDER. #RELWIN FUNCTIONS OF FIRST	1620-03.0.005	038
#MULTI-ANCHOR PIPE STRESS ANALYSIS.		1620-09.4.040	102	ORDER. #COMPUTATION OF BESSEL FUNCTIONS OF+	1620-06.0.064	049
MULTI-PROGRAMMER. #FORTRAN COMPRESSOR AND		1620-01.6.045	819	ORDER. #PARTIAL CORRELATIONS - FIRST OR+	1620-06.0.216	067
MULTICOMPONENT DISTILLATION. #THIELE-GEDES+		1620-09.3.012	897	ORGANIZER FOR TEACHING. #STATISTICAL PROJECT	1620-05.0.037	042
MULTIPLICATION REGULATOR FOR DATA WITHOUT+		1620-03.0.012	839	ORIENTED EQUATION SOLVER. #DOES - DISK	1620-03.0.003	038
MULTIPLICATION SUBROUTINE. #MATRIX-MATRIX		1620-05.0.100	840	#ORTHOGONAL POLYNOMIAL COEFFICIENTS.	1620-10.1.012	111
#MULTIPOINT FLCTER.		1620-01.6.148	828	OUTPUT ANALYSIS FOR LINEAR PROGRAMMING.	1620-01.1.006	013
#MULTIPURPOSE SPS CARD OUTPUT COMPRESSOR.		1620-01.1.006	813	OUTPUT COMPRESSOR. #MULTIPURPOSE SPS CARD	1620-13.0.027	128
#MULTIVARIATE ANALYSIS OF VARIANCE COMPLETELY		1620-06.0.138	858	OUTPUT EDITOR. #STUFF	1620-06.0.104	053
#MULTIVARIATE ANALYSIS OF VARIANCE RANDCMIZED		1620-06.0.139	858	OUTPUT IN MATRIX FORM. #CORRELATION MATRIX+	1620-08.4.007	084
#MULTIVARIATE DATA COLLECTION.		1620-06.0.167	862	OUTPUT PROGRAM. #MUSICAL	1620-11.0.033	121
#MUSIC INTERPRETER.		1620-11.0.039	122	OUTPUT SUBROUTINE. #UNIVERSAL	1620-12.3.001	126
#MUSIC PROGRAM TO END ALL MUSIC PROGRAMS.		1620-11.0.046	123	OUTPUT 1 AND OUTPUT 2. #ECONOMIC ANALYSIS OF+	1620-01.3.013	017
#MUSIC PROGRAM.		1620-11.0.031	121	OUTPUT. #MONITOR EQUIVALENCE TABLE CARD	1620-09.4.049	104
#MUSIC PROGRAMS. #VIRTUOSO - THE MUSIC+		1620-11.0.046	123	OUTPUT. #ELECTRIC LOAD FLOW SINGLE LINE+	1620-06.0.220	068
#MUSICAL ASSEMBLY PROGRAM.		1620-11.0.034	121	OUTPUT. #ITEM ANALYSIS FOR 1230 OPTICAL MARK+	1620-09.2.030	089
#MUSICAL OUTPUT PROGRAM.		1620-11.0.033	121	OUTSTANDING COMPRESSION CHORDS. #THE+	1620-09.4.060	105
MULTIPLE LINEAR REGRESSION ANALYSIS PROGRAM.		1620-06.0.148	860	#OVERLOAD RATINGS OF 65 DEGREES CENTIGRADE+	1620-01.6.140	023
#MXV PROGRAM FOR LINEAR PROGRAM MATRIX+		1620-10.1.004	110	PACK COPY PROGRAM. #1620/1311 DISK	1620-01.6.145	028
#N.C.E. HIGH SPEED SPS ASSEMBLER.		1620-01.1.029	814	PACKER. #PICTURE OF DISK	1620-01.6.150	029
#N.C.E. LOAD AND GO FORTRAN FOR 20K.		1620-02.0.057	836	PACKER FOR MONITOR II. #DISK	1620-01.6.137	026
#NATURAL FREQUENCIES AND RELATIVE DEFLECTIONS		1620-09.5.006	107	PACKER. #DISK	1620-06.0.180	064
NC-211 MACHINE TOOL CONTROL. #POST PROCESSOR+		1620-10.4.011	118	PAIR COMPARISONS. #A PROGRAM FOR	1620-06.0.217	068
#NCE LOAD AND GO FORTRAN FOR 20K.		1620-02.0.029	832	PAIR WISE COMBINATIONS OF TWO SETS OF+	1620-08.4.017	085
NEGATIVE BINOMIAL DISTRIBUTION. #ESTIMATION+		1620-06.0.117	855	PARALLELOGRAMS. #TWO-DIMENSIONAL ABSORPTION+	1620-09.4.063	106
NEGATIVE BINOMIAL DISTRIBUTION. #POWER+		1620-06.0.116	855	PARAMETERS COMPUTED FROM SHORT-CIRCUIT+	1620-01.6.144	028
NEGATIVE BINOMIAL DISTRIBUTIONS. #FITTING		1620-06.0.248	873	#PART - PROCESSOR AND RESULT TESTER.	1620-06.0.064	049
#NELIAC COMPILER.		1620-01.1.030	814	#PARTIAL CORRELATIONS - FIRST OR FIRST AND+	1620-05.0.026	042
#NESTED ANALYSIS OF VARIANCE FOR UNEQUAL+		1620-06.0.065	849	PARTIALLY BALANCED LATTICE. #GAUSS JORDAN WITH	1620-06.0.105	054
NETWORK ANALYSIS PROGRAM FOR LOW, MEDIUM AND+		1620-09.5.010	108	PASS ANALYSIS OF VARIANCE. #ONE	1620-06.0.060	048
NETWORK ANALYSIS PROGRAM. #LOW AND MEDIUM+		1620-09.3.013	897	PASS CANONICAL CORRELATION PROGRAM. #ONE	1620-06.0.214	067
NETWORK BY HARTY CROSS SOLUTION. #WATER FLOW+		1620-09.7.008	109	PASS SIMULTANEOUS EQUATIONS SOLUTION. #MOSES+	1620-05.0.040	043
#NETWORK REDUCTION PLUS DISTRIBUTION FACTOR+		1620-09.4.029	101	PASS SYSTEM. #FOURIER ANALYSIS - TWO OR THREE	1620-07.0.056	079
#NETWORK REDUCTION PROGRAM.		1620-09.4.016	100	PASSES. #RADIAL THREE PHASE LINE DROP+	1620-09.4.020	100
NETWORK REDUCTION. #ELECTRICAL		1620-09.4.050	105			
NETWORK. #ILOC LOCATOR FOR CRITICAL PATH+		1620-10.3.047	117			
NETWORKS. #CAUER EXPANSIONS OF PASSIVE+		1620-09.4.026	100			

KWIC (KEYWORD-IN-CONTEXT) INDEX

PASSIVE	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	RADIAL PAGE	
PASSIVE ONE-PORT NETWORKS.	#CAUER EXPANSIONS+	1620-09.4.026	108	POLYNOMIAL.	#REAL AND COMPLEX ROOTS OF	1620-07.0.014	075
PATCH FOR MULTIPLE LINEAR REGRESSION PROGRAM+	#MONITOR I DISK DUMP	1620-06.0.011	043	POLYNOMIAL.	#ALGEBRAIC SOLUTION FO GENERAL+	1620-07.0.049	078
PATCH.	#MONITOR I DISK DUMP	1620-01.6.143	027	POLYNOMIALS.	#CALCULATION OF ROOTS+	1620-07.0.029	076
PATH NODE AND DUMMY ASSIGNMENT TECHNIQUE+		1620-10.3.030	114	POLYNOMIALS.	#REAL ROOTS OF CUBIC	1620-03.0.009	038
PATH SYSTEM NETWORK.	#LOOP LOCATOR FOR+	1620-10.3.047	117	POLYNOMIALS.	#CHEEYCHEV ECONOMICIZATION OF	1620-07.0.047	078
PATH/SCHEDULE BAR GRAPH GENERATOR PROGRAM.		1620-10.3.020	113	POLYNOMIALS.	#POLYNOMIAL CURVE FITTING USING+	1620-07.0.007	074
PATTERNS-DRIVEN ANTENNA ARRAY.	#ELECTRICAL+	1620-09.4.061	106	POLYNOMIALS.	#PROGRAM TO DETERMINE AND+	1620-06.0.073	081
PDQ FORTRAN SYSTEM.	#A MODIFIED	1620-02.0.066	037	POPULATIONS.	#SWEEP OUT METHOD FOR+	1620-06.0.208	066
#PDQ FORTRAN (AN INTERPRETIVE PROGRAM).		1620-02.0.031	032	#PORTA	#A GRADING PROGRAM.	1620-06.0.253	074
PDQ FORTRAN (CARD).	#ERROR FUNCTION+	1620-07.0.063	080	PORTA-PUNCH TEST CARDS.	#SCORIT-SCORING AND+	1620-06.0.179	063
#PDQ FORTRAN COMPRESSOR.		1620-02.0.055	035	#PORTFOLIO SELECTIONS - DIAGONAL MODEL (40K).		1620-10.3.035	115
#PDQ FORTRAN DISK SYSTEM FOR 1620.		1620-02.0.061	036	POSITION COMPUTATION.	#INVERSE GEODETIC	1620-09.2.021	088
PDQ FORTRAN.	#C4D - AN OPERATING SYSTEM FOR	1620-02.0.259	036	POST - PROCESSOR FOR MILWAUKEE - MATIC 11+		1620-10.3.015	113
PDQ FORTRAN.	#GAMMA FUNCTION SUBROUTINE FOR	1620-07.0.062	080	#POST PROCESSOR CONCEPTS FOR THE BURGMASHER+		1620-10.4.011	118
#PDQ THIRD ALTERNATE SUBROUTINE.		1620-02.0.049	034	#POST PROCESSOR FOR LE BLOND TAPE-TURN LATHE+		1620-10.4.013	118
PEAK FINDER.	#MOLECULAR	1620-08.4.013	085	POST-PROCESSOR FOR CINTINATIC TURRET DRILL+		1620-10.4.010	118
PEN FOR FORTRAN (FORMAT).	#CAL-COMP 565+	1620-13.0.005	126	#POWER CURVES FOR THE NEGATIVE BINOMIAL+		1620-06.0.116	055
PENALTY FACTORS.	#TRANSMISSION LOSSES AND	1620-09.4.008	099	POWER DESIGN.	#TRANSMISSION	1620-09.2.061	094
PERCENT END-POINT DETERMINATION.		1620-06.0.150	060	POWER FLOW I.	#ELECTRIC	1620-09.4.037	102
#PERCENTILE SCORES FREQUENCY DISTRIBUTIONS,+		1620-06.0.115	055	POWER FLOW III.	#ELECTRIC	1620-09.4.048	104
#PERFECT NUMBER DEMONSTRATION PROGRAM.		1620-11.0.030	120	POWER FUNCTIONS..	#THREE-IN-ONE CURVE FITS+	1620-07.0.019	076
PERFORMING OPERATIONS WITH COMPLEX NUMBERS.		1620-02.0.011	031	#POWER PRODUCTION COST.		1620-09.4.011	099
#PERPETUAL CALENDAR.		1620-11.0.022	120	POWER TRANSFORMER LOSSES.	#EVALUATION OF	1620-09.4.051	104
PERPETUAL CALENDAR.	#DATE INTERPRETER AND	1620-11.0.045	123	POWER-MATCH TEAMS IN A DEBATE TOURNAMENT.	#A+	1620-13.0.026	128
PERSONAL PREFERENCE TEST SCORING BY THE IBM+		1620-06.0.141	058	PRE-COMPIER (CARD).	#FORTRAN	1620-FO-006	004
#PERT - PROGRAM EVALUATION AND REVIEW+		1620-10.3.006	112	PRECISE SURVEY OBSERVATIONS.	#LEAST SQUARES+	1620-09.2.046	091
#PERT DATING ROUTINE.		1620-10.3.014	113	PRECISION FLOATING PCINT ARITHMETIC+		1620-07.0.010	075
#PERT.		1620-10.3.009	112	PRECISION MATRIX INVERSION PACKAGE.		1620-06.0.120	055
#PERT-LESS.		1620-10.3.031	114	PRECISION SERIES APPROXIMATION TO THE ERROR+		1620-07.0.077	081
PHASE LINE DROP CALCULATION IN 2 PASSES.		1620-09.4.020	100	PREPERANCE TEST SCORING BY THE IBM 1620.		1620-06.0.141	058
PHASE LINE DROP CALCULATIONS.	#RADIAL THREE	1620-09.4.018	100	PREPARATION OF MULTIPLE FORMS OF AN+		1620-13.0.011	126
PHASE SHORT CIRCUIT STUDY PROGRAM.	#THREE	1620-09.4.050	104	PREPARATION.	#MXX PROGRAM FOR LINEAR PROGRAM+	1620-10.1.004	110
PHASE.	#PUNCH CROSS REFERENCED SYMBOL TABLE+	1620-01.1.033	015	PRESELECTOR.	#FORTRAN II FORMAT STATEMENT	1620-01.6.006	022
#PICTURE OF DISK PACK.		1620-01.6.145	028	PRESS WITH HUGES NC-211 MACHINE TOOL+		1620-10.4.011	118
PILE VOLUME.	#COAL	1620-09.2.011	086	#PRESSURE AND FLOW RATES IN GAS AND WATER+		1620-09.2.078	096
#PIPE FRICTION HEAD LOSS CALCULATIONS IN+		1620-09.2.039	090	PRESSURE DATA BY THE ANTOINE EQUATION.		1620-09.3.016	098
PIPE LENGTHS.	#EQUIVALENT	1620-09.3.014	098	PRESSURE GAS NETWORK ANALYSIS PROGRAM.	#LOW+	1620-09.3.043	097
PIPE NETWORK BY HARDY CROSS SOLUTION.	#WATER+	1620-09.7.008	109	PRESSURE SYSTEM.	#GAS NETWORK ANALYSIS+	1620-09.5.010	100
PIPE NETWORKS.	#HYDRAULIC ANALYSIS OF PLWC IN	1620-09.7.006	109	#PRESTRESSED GIRDER ANALYSIS AND DESIGN+		1620-09.2.050	092
PIPE STRESS ANALYSIS.	#MULTI ANCHOR	1620-09.4.030	101	#PRIME NUMBER DEMONSTRATOR.		1620-11.0.050	124
PIPE STRESS ANALYSIS.	#MULTI-ANCHOR	1620-09.4.040	102	#PRINCIPAL AXES FACTOR ANALYSIS USING+		1620-06.0.091	052
PIPE STRESS.	#GENERAL	1620-09.5.012	108	PRINT - SAME.	#SEARCH AND MEMORY	1620-11.0.040	023
PIVOTAL.	#GAUSS JORDAN WITH PARTIAL	1620-09.4.043	103	PRINT OUT PRIME NUMBERS.	#DEMONSTRATION+	1620-11.0.040	122
PLANNING RADIAL DISTRIBUTION SYSTEMS.		1620-09.4.033	102	PRINTER CORE DUMP PROGRAMS.	#FIVE-CARD	1620-01.6.146	028
PLANNING.	#GENERATION	1620-10.3.018	113	PRINTER PLOTTING SUBROUTINE PROGRAM.	#GRAPH+	1620-09.0.081	086
PLANS - OUTPUT 1 AND OUTPUT 2.	#ECONOMIC+	1620-10.3.010	113	PRINTER.	#FORGO F	1620-02.0.064	037
#PLANT GENERATION FOR GIVEN INCREMENTAL CCST.		1620-09.4.036	102	PRINTER.	#FOR-TO-CO-F	1620-02.0.063	037
PLANT RECORD METHOD (REVISED VERSION).		1620-09.4.009	099	PRINTER.	#80 BE FOR 1443	1620-06.0.222	069
PLANT SIZE.	#ANALYSIS OF FACTORS AFFECTING+	1620-10.3.052	118	PRINTER.	#80 DE FOR 1443	1620-06.0.221	068
#PLOT A BLOCK DIAGRAM.		1620-01.6.131	025	PRINTER.	#DISKWIC - A KWIC INDEXER FOR DISK+	1620-10.3.051	117
PLOT ANALYSIS OF VARIANCE.	#SPLIT	1620-06.0.061	049	PRINTER.	#TABULATE NUMERIC DATA DECKS ON 1443	1620-13.0.034	129
PLOT CC ADDITIONAL COGO SUBROUTINES.	#COGC	1620-09.2.077	096	PROBABILITIES.	#COMPUTATION OF THE+	1620-06.0.128	056
PLOT CONTOURS OF CONSTANT RESPONSE FOR A+		1620-06.0.049	047	PROBABILITY FOR A 2X2 TABLE.	#FISHERS EXACT	1620-06.0.023	047
PLOT FACTORIAL.	#ANALYSIS OF COVARIANCE --	1620-06.0.023	044	#PROBIT ANALYSIS.		1620-06.0.085	051
PLOT RELOCATABLE SUBROUTINE.	#VARIABLE+	1620-13.0.010	126	#PROBIT ANALYSIS.		1620-06.0.093	052
PLOT SUBROUTINE FOR FORTRAN II-D.		1620-01.2.017	016	PROBLEM FOR SHORT LINES.	#REVERSE GEODETIC	1620-08.1.003	082
#PLOT SUBROUTINE FOR FORTRAN WITH FORMAT.		1620-01.6.056	020	PROBLEM INVOLVING ONE FIRST ORDER+		1620-04.0.001	039
#PLOT SUBROUTINE FOR FORTRAN.		1620-01.6.055	020	PROBLEM INVOLVING ONE FIRST ORDER+		1620-04.0.002	039
PLOT.	#EARTHWORK	1620-09.2.074	095	PROBLEM.	#TRANSPORTATION	1620-LM-017	005
PLOT, WRIT.	#RELOCATABLE SUBROUTINES ABS,	1620-07.0.053	079	PROBLEM.	#DIRECT GEODETIC	1620-08.1.004	082
PLOT-BACK PROGRAM.	#FINITE FOURIER ANALYSIS;+	1620-06.0.056	048	PROBLEM.	#HELMERTS DIRECT GEODETIC	1620-07.0.068	080
#PLOTTER (110x110).		1620-13.0.033	129	PROCESS PHASE.	#PUNCH CROSS REFERENCED+	1620-01.1.033	015
PLOTTER SUBROUTINE PEN FOR FORTRAN (FORMAT).		1620-13.0.005	126	PROCESS.	#MARKOV CHAIN	1620-05.0.038	042
PLOTTER SUBROUTINE.	#1620/1443 FORTRAN WITH+	1620-LM-040	006	PROCESSING LANGUAGE.	#SNOBOL 3 A LIST	1620-01.4.024	018
PLOTTER SUBROUTINE, PROGRAM (CARD).	#FORTRAN+	1620-LM-039	006	PROCESSING STEPWISE MULTIPLE LINEAR+		1620-06.0.251	074
PLOTTER SUBROUTINES (CARD).	#MCHITR II+	1620-LM-050	007	PROCESSING SYSTEM - AN EDUCATIONAL COMPUTER+		1620-13.0.015	127
PLOTTER SUBROUTINES PROGRAM (CARDS).		1620-LM-041	006	PROCESSING SYSTEM - AN EDUCATIONAL COMPUTER+		1620-13.0.017	127
PLOTTER SUBROUTINES, PROGRAM (CARD).		1620-LM-042	007	PROCESSING SYSTEM.	#AUTO FLOAT FORTRAN	1620-13.0.017	128
PLOTTER.	#MULTIPOINT	1620-01.6.148	028	PROCESSOR AND RESULT TESTER.	#PART -	1620-01.6.144	028
PLOTTER.	#FORTRAN FORMAT SUBROUTINE FOR+	1620-01.6.068	021	PROCESSOR AND SUBROUTINES.	#UTO PORTAN	1620-02.0.017	031
PLOTTER.	#FORTRAN II SUBROUTINE FOR PLOTTING+	1620-01.6.065	020	PROCESSOR CONCEPTS FOR THE BURGMASHER DRILL+		1620-10.4.011	118
PLOTTING PROGRAM FOR THE OUTPUT OF FOURIER+		1620-08.4.007	084	PROCESSOR FOR COMPUTER ACCOUNTING CASE.		1620-02.0.058	036
PLOTTING PROGRAM.	#DATA	1620-01.6.130	025	PROCESSOR FOR LE BLOND TAPE-TURN LATHE WITH+		1620-10.4.013	118
PLOTTING SUBROUTINE PROGRAM.	#GRAPH 2 - A+	1620-09.0.001	086	PROCESSOR FOR MILWAUKEE - MATIC 11 TUBE --		1620-10.3.015	113
PLOTTING SUBROUTINE.	#STRAIGHT LINE	1620-01.6.140	027	PROCESSOR FOR 1620-1443 MONITOR I VERSION 2		1620-02.0.050	034
PLOTTING WITH A CAL-COMP PLOTTER.	#FORTRAN+	1620-01.6.065	020	PROCESSOR SYSTEM - AN EDUCATIONAL COMPUTER+		1620-13.0.018	128
PLOTTING WITH A CAL-COMP PLOTTER.	#FORTRAN+	1620-01.6.068	021	PROCESSOR.	#SUPER-GO FORTRAN	1620-02.0.045	034
PLOTTING.	#ROOT LOCUS	1620-09.4.046	103	PROCESSOR.	#1620/1311 AD-APT NUMERICAL	1620-CN-06X	001
PLOTTING.	#GRADE NORMALIZING AND	1620-01.6.139	027	PROCESSOR.	#1620/1311 AUTOSPOT III NUMERICAL+	1620-CN-07X	001
PLOTTING.	#FORTRAN CALL SUBROUTINES FOR	1620-01.6.123	025	PROCON.	#PROGRAM CATALOG FOR DIGITAL+	1620-10.3.049	117
PLUG DECK TO COGO I.	#SPIRAL	1620-09.2.071	095	#PRODUCT MOMENT CORRELATIONS.		1620-06.0.022	044
PLUS DISTRIBUTION FACTOR CALCULATION AND+		1620-09.4.029	101	PRODUCTION COST.	#POWER	1620-09.4.011	099
POINT ARITHMETIC SUBROUTINES.	#DOUBLE+	1620-07.0.010	075	#PRODUCTION LINE BALANCING.		1620-LM-018	006
POINT CONVERSION SUBROUTINES.	#SPS FLOATING	1620-01.6.053	020	#PRODUCTION LINE MANPOWER GAME.		1620-10.2.009	111
POINT DIVISION OR MULTIPLICATION REGULATOR+		1620-03.0.012	039	PROFILES AND FAULT CURRENT CALCULATIONS FOR+		1620-09.4.056	105
POINT FORMAT SUBROUTINES FOR SPS II-D.		1620-01.6.136	026	PROFILE SAN2-K.	#WATER SURFACE	1620-09.2.023	088
POINT.	#FORTRAN II FOR AUTOMATIC FLOATING	1620-FO-049	005	PROGRAMMERS AID FOR CONSOLE EVALUATING AND+		1620-01.6.107	023
POINT.	#FIXED POINT DIVISION OR+	1620-03.0.012	039	PROJECT ORGANIZER FOR TEACHING.	#STATISTICAL	1620-06.0.216	067
POINT..	#SINE/COSINE SUBROUTINE - FIXED	1620-07.0.018	075	PROJECT TIME DISTRIBUTION.	#EQUIPMENT AND	1620-01.6.114	024
POINTS.		1620-07.0.069	081	PROPERTIES AND EFFICIENCY PROGRAM.	#STREAM+	1620-09.7.007	109
POINTS.	#SIMPLE CORRELATION COEFFICIENT+	1620-06.0.097	052	PROBET FOR STANDARDIZATION OF VARIABLES.		1620-06.0.194	065
POISSON BINOMIAL DISTRIBUTIONS.	#FITTING	1620-06.0.205	073	PSUDO PROCESS PHASE.	#PUNCH CROSS+	1620-01.1.033	015
POISSON NORMAL STUDENT T/CHI-SQUARE F+		1620-06.0.128	056	PUNCH BLOCK LETTERING ON IBM CARDS.	#CARD+	1620-11.0.041	122
POISSON WITH ZEROS.	#FITTING DISTRIBUTIONS+	1620-06.0.246	073	PUNCH COUNT PROGRAM.	#DOUBLE COUNT	1620-06.0.230	070
POLAR FORMS.	#CONVERSION OF KELVIN FUNCTIONS+	1620-03.0.008	038	PUNCH COUNT.	#CARD COLUMN	1620-06.0.235	071
POLAR MOMENTS OF INERTIA AND ALLIED DATA.		1620-09.4.013	105	#PUNCH CROSS REFERENCED SYMBOL TABLE FOR+		1620-01.1.033	015
POLES AND ZEROS OF AMPLIFIERS TRANSFER+		1620-09.4.057	109	PUNCH DEMONSTRATION PROGRAM TO PUNCH BLOCK+		1620-11.0.041	122
POLYHEDRON (CRYSTAL).	#ELEMENTS OF A	1620-08.4.015	085	QUADRATIC REGRESSION.	#PROGRAM TO PLOT+	1620-06.0.049	047
POLYNOMIAL ADJUSTMENT OF AERIAL+		1620-09.2.049	092	QUANTITIES FOR LINEAR DEMAND FUNCTIONS.		1620-10.1.011	110
POLYNOMIAL COEFFICIENTS.	#ORTHOGONAL	1620-03.0.003	038	QUANTITIES PROGRAM.	#VOLUMEFTRIC	1620-09.2.031	089
#POLYNOMIAL CURVE FITTING - NEWTONS DIVIDED+		1620-07.0.023	076	QUANTIC POLYNOMIAL.	#ALGEBRAIC SOLUTION FOR+	1620-07.0.049	078
POLYNOMIAL CURVE FITTING BY LEAST SQUARES.		1620-06.0.157	060	QUEENS GAME (MODIFIED).		1620-11.0.021	119
#POLYNOMIAL CURVE FITTING USING LENGENDRE+		1620-07.0.007	074	RADIAL DISTRIBUTION LINES.	#VOLTAGE PROFILE+	1620-09.4.056	105
POLYNOMIAL EQUATION.	#ROOTS OF	1620-07.0.036	077	RADIAL DISTRIBUTION SYSTEMS.	#DIGITAL TOOL+	1620-09.4.043	103
POLYNOMIAL EQUATION.	#CALCULATION OF ROOTS+	1620-07.0.032	076	RADIAL ENERGY DISTRIBUTION AND FOCUS SHIP+		1620-EO-05X	004
POLYNOMIAL EQUATION.	#CALCULATION OF THE+	1620-07.0.017	075	RADIAL SYSTEMS.	#SHORT CIRCUIT ANALYSIS OF	1620-09.4.027	100
#POLYNOMIAL GENERATION AND INTERPOLATION WITH		1620-07.0.055	079				
POLYNOMIAL OF A REAL SQUARE MATRIX.		1620-07.0.042	077				
#POLYNOMIAL REGRESSION PROGRAM.		1620-07.0.012	075				
#POLYNOMIAL ROOT SOLVER.		1620-07.0.013	075				

KNIC (KEYWORD-IN-CONTEXT) INDEX

RADIAL	TITLE	PROGRAM NO.	PAGE	TITLE	SIMULTANEOUS	PROGRAM NO.	PAGE
*RADIAL THREE PHASE LINE DROP CALCULATION IN+		1620-09.4.020	100	ROOT LOC I.	*COMPUTATION OF	1620-09.4.038	102
*RADIAL THREE PHASE LINE DROP CALCULATIONS.		1620-09.4.018	100	ROOT LOCUS ALGORITHM.	#LOCUL - A	1620-09.4.064	106
*RANDF - A FUNCTIONAL SUBROUTINE TO GENERATE+		1620-07.0.071	081	*ROOT LOCUS PLOTTING.		1620-09.4.046	103
*RANDOM EXPONENTIAL NUMBER GENERATOR+		1620-06.0.111	054	ROOT SOLVER.	#POLYNOMIAL	1620-07.0.013	075
*RANDOM NUMBER SUBROUTINE FOR 1620 FORTRAN II.		1620-07.0.064	080	ROOT SUBROUTINE.	#SQUARE	1620-07.0.005	074
RANDOM NUMBERS FOR THE MONITOR I SYSTEM.		1620-07.0.071	081	ROOT SUBROUTINE.	*VARIABLE FIELD SQUARE	1620-03.0.001	037
RANDOMIZED BLOCK DESIGN - SIMPLE OR MULTIPLE+		1620-06.0.107	054	ROOTS (REAL AND COMPLEX) OF A REAL+		1620-07.0.032	076
RANDOMIZED BLOCK DESIGN-USU 63.		1620-06.0.139	058	ROOTS (REAL AND COMPLEX) CF COUPLES+		1620-07.0.029	076
RANDOMIZED BLOCKS USU 12. #ANALYSIS OF+		1620-06.0.087	051	ROOTS FROM POLYNOMIALS. #PROGRAM TO+		1620-07.0.073	081
RANDOMIZED COMPLETE BLOCK DESIGN, INDIVIDUAL+		1620-06.0.123	056	ROOTS OF A REAL NON-LINEAR EQUATION IN ONE+		1620-07.0.033	076
RANDOMIZED COMPLETE BLOCK DESIGN, NO+		1620-06.0.070	050	ROOTS OF A REAL POLYNOMIAL EQUATION.		1620-07.0.017	075
RANDOMIZED DESIGN - SIMPLE OR MULTIPLE USU+		1620-06.0.080	050	ROOTS OF A SYSTEM OF K REAL NON- LINEAR IN K+		1620-07.0.041	077
RANDOMIZED DESIGN-USU62. #MULTIVARIATE+		1620-06.0.138	058	ROOTS OF CUBIC POLYNOMIALS.	#REAL	1620-03.0.009	038
*RANGE AND BEARING.		1620-07.0.067	080	*ROOTS OF POLYNOMIAL EQUATION.		1620-07.0.036	077
RANGE TEST OF MEAN DIFFERENCES. #MULTIPLE		1620-06.0.036	046	ROOTS OF POLYNOMIAL.	#REAL AND COMPLEX	1620-07.0.014	075
RANGE TEST, USING HARTERS CRITICAL VALUES,+		1620-06.0.124	056	ROORSCHACH TEST/SORT. #SCORING, STANDARDIZED+		1620-06.0.165	062
RANK OF A MATRIX AND DISTANCE BETWEEN+		1620-06.0.208	066	ROTATION OF FACTORS. #CORRELATION MATRIX+		1620-06.0.145	059
RATES IN GAS AND WATER NETWORKS. #PRESSURE+		1620-09.2.078	096	ROTATION.	*VARINAX MATRIX	1620-06.0.094	052
RATING FOR NORMAL AND EMERGENCY OPERATION.		1620-09.4.012	099	*ROUNDING SUBROUTINE.		1620-06.0.075	050
RATING FOR NORMAL AND EMERGENCY OPERATION+		1620-09.4.028	101	ROWS AND COLUMNS. #MEAN, STANDARD DEVIATION,+		1620-06.0.136	058
RATINGS BASED ON LOSS OF LIFE AND ACTUAL+		1620-09.4.032	102	RULE. #NUMERICAL CALCULATIONS OF THE+		1620-07.0.043	077
RATINGS FOR THE STRUCTURED, OBJECTIVE+		1620-06.0.165	062	RUNGE KUTTA. #NUMERICAL SOLUTION OF A FIRST+		1620-04.0.004	039
RATINGS OF 65 DEGREES CENTIGRADE RISE+		1620-09.4.060	105	RUNK.	#SUBROUTINE	1620-04.0.005	039
RATINGS. #NORMAL AND EMERGENCY CABLE		1620-09.4.031	101	*S-109 STRESS ANALYSIS OF A FLANGED TAPERED+		1620-09.7.005	109
*RATTICAL APPROXIMATION PROGRAM.		1620-07.0.079	082	*SADSIM.		1620-10.2.013	112
RAW DATA. #THREE WAY INDEPENDENCE CHI-SQUARE+		1620-06.0.079	050	SAG AND TENSION CALCULATIONS. #GENERALIZED		1620-09.2.069	095
RAW DATA, USU 22. #TWO WAY INDEPENDENCE+		1620-06.0.082	050	SAMP. #SEARCH AND MEMORY PRINT -		1620-01.6.100	023
RAY TRACE AND THIRD ORDER ABERRATIONS.		1620-00-01X	003	SAMPLE DATA. #BASIC STATISTICS/FUNDAMENTAL+		1620-06.0.158	061
RAY TRACE PROGRAM. #GENERAL		1620-08.1.005	082	SANZ-X. #WATER SURFACE PROFILE		1620-09.2.023	088
RAYLEIGH-RITZ FORMULAE. #GENERALIZED STACK ->		1620-09.2.084	097	*SCALAR ELECTRIC LOAD FLOW.		1620-09.4.053	105
*REACTION TIME PROGRAM.		1620-11.0.020	119	*SCALAR SHORT-CIRCUIT.		1620-09.4.052	104
REACTIONS. #COMPUTATION OF EQUILIBRIUM+		1620-09.3.018	098	*SCATTER DIAGRAM OF DATA FREQUENCIES.		1620-06.0.228	070
READ CR WRITE IN OTHER THAN THE WORK AREA.		1620-01.6.151	029	SCATTERING FACTOR TABLES. #INTERPOLATION OF+		1620-08.4.003	084
READ ROUTINE. #FLEXIBLE CARD		1620-01.2.008	016	*SCATTERING-MATRIX PARAMETERS COMPUTED FROM+		1620-09.0.063	106
READER OUTPUT. #ITEM ANALYSIS FOR 1230+		1620-06.0.220	068	SCHEDULE USING MASTER SCHEDULE. #WEEK -		1620-10.3.040	115
READING FOR 1620 MONITOR II FORTRAN II-D.		1620-01.2.019	017	SCHEDULE. #WEEKLY SCHEDULING USING MASTER		1620-10.3.044	116
*REAL AND COMPLEX ROOTS OF POLYNOMIAL.		1620-07.0.014	077	SCHEDULE. #WEEK - WEEKLY SCHEDULE USING		1620-10.3.040	115
REAL FUNCTION USING SIMPSON'S RULE.		1620-07.0.043	075	SCHEDULING HANDBOOK. #LUNCH STUDY EXPLODER+		1620-10.3.050	117
REAL LINEAR EQUATIONS IN N REAL VARIABLES.		1620-05.0.024	041	SCHEDULING SUPPLEMENTARY PROGRAM. #STUDENT		1620-10.3.039	115
REAL NON - LINEAR IN K VARIABLES LINEAR+		1620-07.0.041	077	SCHEDULING SYSTEM 20K. #FINAL EXAMINATION		1620-10.3.044	116
REAL NON-LINEAR EQUATION IN ONE VARIABLE.		1620-07.0.033	076	SCHEDULING SYSTEM 40K. #FINAL EXAMINATION		1620-10.3.045	116
REAL POLYNOMIAL EQUATION. #CALCULATION OF+		1620-07.0.017	075	SCHEDULING SYSTEM 60K. #FINAL EXAMINATION		1620-10.3.046	117
REAL POLYNOMIAL EQUATION. #CALCULATION OF+		1620-07.0.032	076	SCHEDULING TECHNIQUE USING DEFINED+		1620-10.3.041	113
REAL QUARTIC POLYNOMIAL. #ALGEBRAIC SOLUTION+		1620-07.0.049	078	SCHEDULING USING MASTER SCHEDULE. #WEEKLY		1620-06.0.232	071
REAL ROOTS OF A REAL NON-LINEAR EQUATION IN+		1620-07.0.033	076	SCORE FREQUENCY DISTRIBUTION PROGRAM. #TEST		1620-06.0.186	065
REAL ROOTS OF A REAL POLYNOMIAL EQUATION.		1620-07.0.017	075	*SCORE PROGRAM.	#Z	1620-06.0.115	055
REAL ROOTS OF A SYSTEM OF K REAL NON- LINEAR+		1620-03.0.009	038	SCORES AND RATINGS FOR THE STRUCTURED,+		1620-06.0.165	062
*REAL SQUARE MATRIX. #CALCULATION OF THE+		1620-07.0.042	077	SCORING BY THE IBM 1620. #EDWARDS PERSONAL+		1620-06.0.141	058
REAL VARIABLES. #SOLUTION OF N REAL LINEAR+		1620-05.0.024	041	SCORING PROGRAM - UMMS. #UNIVERSITY OF+		1620-13.0.028	128
RECORD METHOD (REVISED VERSION). #CURVE+		1620-09.4.009	099	SCORING PROGRAM. #NORTHEASTERN UNIVERSITY		1620-13.0.003	126
RECTANGULAR GAME SOLUTION. #APPROXIMATE		1620-07.0.046	078	SCORING PROGRAM. #UNIVERSITY OF MISSISSIPPI+		1620-13.0.031	129
RECTANGULAR GAMES. #EXTREME-POINT SOLUTIONS+		1620-07.0.045	077	SCORING READER OUTPUT. #ITEM ANALYSIS FOR+		1620-06.0.220	068
RECTANGULAR LATTICE DESIGN USU 51. #ANALYSIS+		1620-06.0.083	051	SCORING.	#ITEM ANALYSIS AND	1620-06.0.135	057
*RECTANGULAR REINFORCED CONCRETE COLUMN+		1620-09.2.037	090	SCORING. #CAST - COMPUTER ASSISTED TEST		1620-13.0.036	130
REDUCTION PLUS DISTRIBUTION FACTOR+		1620-09.4.029	101	*SCORING, STANDARDIZED SCORES, AND RATINGS+		1620-06.0.165	062
REDUCTION PROGRAM. #NETWORK		1620-09.4.016	100	SCORING-SCORING AND ITEM ANALYSIS OF+		1620-06.0.179	063
REDUCTION. #CROUT		1620-05.0.021	041	*SCRAMBLE - COMPUTER PREPARATION OF MULTIPLE+		1620-13.0.011	126
REDUCTION. #ELECTRICAL NETWORK		1620-09.4.058	105	SDS FOR SUBGROUPS WITH UNEQUAL OR EQUAL N.		1620-06.0.140	058
REDUCTION. #1620 MODEL 4 GEODIMETER FIELD		1620-09.2.052	093	SEARCH AND INFORMATION RETRIEVAL. #ANSIR ->		1620-01.6.064	020
*REED-MUENCH 50 PERCENT END-POINT+		1620-06.0.150	060	*SEARCH AND MEMORY PRINT - SAMP.		1620-01.6.100	023
REFERENCE INDEXER. #SPS LABEL		1620-01.1.014	013	SEARCHING PROGRAM, CS3. #CARD		1620-01.6.070	021
REFERENCED SYMBOL TABLE FOR MONITOR I SPS+		1620-01.1.033	015	*SEASONAL ADJUSTMENT PROGRAM.		1620-10.3.024	114
REGRESSION (I, II AND III). #MULTIPLE		1620-06.0.168	062	*SEASONAL ADJUSTMENT.		1620-06.0.054	048
REGRESSION (MODIFICATION OF BMD09).		1620-06.0.031	045	SECOND ORDER. #PARTIAL CORRELATIONS - FIRST+		1620-06.0.064	049
REGRESSION ANALYSIS PROGRAM. #SINGLE AND+		1620-06.0.148	060	SECTION. #MASS DIAGRAM MODEL WITH CROSS		1620-09.2.243	091
REGRESSION ANALYSIS PROGRAM. #STRAP -		1620-06.0.066	049	SEDIMENT-LOAD COMPUTATION FOR RIVERS AND+		1620-06.0.160	061
REGRESSION ANALYSIS PROGRAM. #STRAP ->		1620-06.0.122	055	SELECTION OF A CYCLE LENGTH FOR FIXED TIME+		1620-09.2.083	097
REGRESSION AND VARIABLE PRECISION MATRIX+		1620-06.0.120	055	*SELECTION OF ECONOMIC CONDUCTOR SIZE+		1620-09.4.004	098
REGRESSION PROGRAM OF B. L. WILDER 8/8/61.		1620-06.0.011	043	SELECTION.	#HELICAL GEAR	1620-09.5.001	107
REGRESSION PROGRAM. #POLYNOMIAL		1620-07.0.012	075	SELECTIONS - DIAGONAL MODEL (40K). #PORTFOLIO		1620-10.3.035	115
REGRESSION SYSTEM. #80-SERIES MULTIPLE LINEAR		1620-06.0.143	059	*SELECTIVE CARD REPRODUCER.		1620-01.6.099	022
REGRESSION USU 15, 16. #MODEL BUILDING IN+		1620-06.0.084	051	*SELECTIVE TRACE.		1620-01.4.001	017
REGRESSION WEIGHTS. #COMPUTATION OF THE+		1620-06.0.178	063	SELF-LOADING PROGRAMMERS AID FOR CONSOLE+		1620-01.6.107	023
REGRESSION. #TESTING		1620-06.0.159	061	SEQUENCE ON CUE). #REPRODUCER+		1620-01.6.119	024
REGRESSION. #STEPWISE MULTIPLE LINEAR		1620-06.0.006	043	SEQUENTIAL ADDITIONS AND DISK UTILITY+		1620-01.6.134	026
REGRESSION. #BATCH PROCESSING STEPWISE+		1620-06.0.251	074	SERIES - PROGRAMS I AND II. #COMPOSITE BEAM		1620-09.2.057	093
REGRESSION. #PROGRAM TO PLOT CONTOURS OF+		1620-06.0.049	047	SERIES - PROGRAMS I THRU IX AND XCIX.		1620-09.2.053	093
REGULATOR FOR DATA WITHOUT EXPLICIT DECIMAL+		1620-03.0.012	039	SERIES APPROXIMATION TO THE ERROR FUNCTION+		1620-07.0.077	081
REINFORCED CONCRETE COLUMN ANALYSIS ->		1620-09.2.037	090	SERIES OR SAMPLE DATA. #BASIC+		1620-06.0.158	061
RELIABILITY PROGRAM WITH UNPACKING OPTION.		1620-06.0.234	071	SET. #COMBINATIONAL SWITCHING FUNCTION+		1620-09.4.062	106
*RELOCATABLE COS, SIN AND EXP SUBROUTINES+		1620-07.0.038	077	SETS OF VARIABLES. #CORRELATIONS OF ALL PAIR+		1620-06.0.217	068
*RELOCATABLE PLOT SUBROUTINE FOR FORTRAN II-D.		1620-01.2.017	016	SETTING. #INTENSITY CORRECTION PROGRAM FOR+		1620-08.4.002	083
RELOCATABLE SUBROUTINE FOR GENERATING+		1620-07.0.015	075	SHIFT COMPUTATIONS PROGRAM. #RADIAL ENERGY+		1620-00-05X	004
RELOCATABLE SUBROUTINE. #VARIABLE ALPHAMERIC+		1620-13.0.010	126	SHORT-CIRCUIT ADMITTANCE PARAMETERS.	#SCALAR	1620-09.4.063	106
*RELOCATABLE SUBROUTINES ABS, DEF, PLOT, WRIT.		1620-07.0.053	079	SHORT-CIRCUIT.		1620-09.4.052	104
*RELOCATION OFFSETS.		1620-09.2.012	086	SHOWN BENEATH CLASS MAXIMA. #FREQUENCIES		1620-06.0.227	070
REMOVE MULTIPLE ROOTS FROM POLYNOMIALS.		1620-07.0.073	081	SIGNALS FOR AXIAL AND WITH. #SYNCHRONIZING+		1620-09.2.082	096
REPEATED MEASURES AND UNEQUAL SUBSET CELL+		1620-06.0.282	065	SIGNALS. #THE SELECTION OF A CYCLE LENGTH+		1620-09.2.083	097
REPEATED RANDOMIZED BLOCKS USU 12. #ANALYSIS+		1620-06.0.087	051	SIMPSON'S RULE. #NUMERICAL CALCULATIONS OF+		1620-07.0.043	077
REPORT GENERATOR. #LABEL - A		1620-01.6.160	030	SIMULATED PLANT RECORD METHOD+		1620-09.4.009	099
REPRODUCER AND LISTER WITH GANG-PUNCHING OR+		1620-01.3.016	017	SIMULATION AND DEMONSTRATOR. #EBC BASEBALL		1620-11.0.032	121
REPRODUCER. #SELECTIVE CARD		1620-01.6.099	022	SIMULATION AND OPERATING COST SYSTEM.		1620-09.2.032	089
*REPRODUCER+		1620-01.6.119	024	SIMULATION EXERCISE/CARD+. #MONABUS - A+		1620-11.0.052	123
RESPONSE ALGORITHM. #BODE - A FREQUENCY		1620-09.4.065	106	*SIMULATION OF THE IBM 7040/7044 ON THE IBM+		1620-02.0.037	033
RESPONSE CURVES TO FIRST ORDER LAG WITH OR+		1620-07.0.075	081	SIMULATION PROGRAM. #JANET - DIGITAL ANALOG		1620-02.0.053	035
RESPONSE FOR A QUADRATIC REGRESSION.		1620-06.0.049	047	SIMULATION PROGRAM. #JANET-II - DIGITAL		1620-02.0.054	035
RESULT TESTER. #PART - PROCESSOR AND		1620-01.6.140	028	SIMULATION SUBROUTINES. #TMS, TWF, AND MF		1620-01.6.159	030
RETRIEVAL. #ANSIR - ALPHA NUMERIC SEARCH AND+		1620-13.0.032	129	SIMULATOR - 1620 VERSION FOR 1001-1620.		1620-CS-04X	002
RETRIEVAL. #ANSIR - ALPHA NUMERIC SEARCH AND+		1620-01.6.064	028	SIMULATOR AND FARM MANAGEMENT DECISION+		1620-10.2.010	112
*REVERSE GEODETIC PROBLEM FOR SHORT LINES.		1620-08.1.003	082	SIMULATOR.	#CARLETON BINARY	1620-02.0.035	032
REVIEW TECHNIQUE. #PERT - PROGRAM EVALUATION+		1620-10.3.008	112	SIMULATOR.	#GENERAL SYSTEMS	1620-10.2.012	112
RHO CORRELATION COEFFICIENT. #KENDALL'S TAU+		1620-06.0.172	063	*SIMULTANEOUS EQUATION SOLUTION AND MATRIX+		1620-09.4.015	100
RICE UNIVERSITY. #1620 SPS ASSEMBLER BY		1620-01.1.028	014	*SIMULTANEOUS EQUATION SOLUTION.		1620-05.0.002	040
*RIDGE ANALYSIS FOR HIGHLY CORRELATED DATA.		1620-06.0.077	050	SIMULTANEOUS EQUATIONS SOLUTION. #MOSIS ->		1620-05.0.040	043
RIGID FRAME ANALYSIS. #NON-PRISMATIC NON+		1620-09.2.059	094	SIMULTANEOUS FIRST-ORDER DIFFERENTIAL+		1620-04.0.006	039
RISE TRANSFORMERS BASED ON LOSS OF LIFE AND+		1620-09.4.060	105	SIMULTANEOUS LINEAR EQUATIONS. #SOLUTION OF		1620-05.0.007	040
RIVERS AND STREAMS. #SUSPENDED SEDIMENT-LOAD+		1620-06.0.160	061	SIMULTANEOUS LINEAR EQUATIONS. #MATRIX+		1620-06.0.037	046
*ROADWAY ELEVATIONS.		1620-09.2.070	095	SIMULTANEOUS LINEAR EQUATIONS. #SOLUTION OF+		1620-05.0.020	041
ROLLA MISSOURI. #6-64 FORMO/FORTRAN OF		1620-02.0.046	034	SIMULTANEOUS LINEAR EQUATIONS. #SUBROUTINE+		1620-05.0.035	042

KWIC (KEYWORD-IN-CONTEXT) INDEX

SIN	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	TEST	PAGE
SIN AND EXP SUBROUTINES	FORTAN II.	1620-07.0.038	077	STRESS.	#GENERAL PIPE	1620-09.5.012	188
#SINE/COSINE SUBROUTINE - FIXED POINT..		1620-07.0.018	075	STRIP FORMATION - 6431. #AERIAL TRIANGULATION		1620-09.2.048	092
#SIXTEEN-TWENTY UNIVERSAL FUNCTION FITTER.		1620-CA-02X	091	STRIP 6432 + 6433. #UNCORRELATED AND+		1620-09.2.049	092
SIZE (SPECIFIC CASE NEW ENGLAND SYSTEM+)		1620-09.4.004	098	STRUCTURE ANALYSIS FOR PARALLELOGRAMS.		1620-08.4.017	085
SIZE. #ANALYSIS OF FACTORS AFFECTING OPTIMUM+		1620-10.3.052	118	STRUCTURE ANALYSIS. #ABSORPTION CORRECTION+		1620-08.4.014	085
SIZE-NON-SORT-ANOV. #TEN MODEL-EQUAL CELL		1620-06.0.213	067	STRUCTURE ANALYSIS. #TWO-DIMENSIONAL+		1620-08.4.016	085
#SKEWED BRIDGE ELEVATIONS.		1620-09.2.009	086	STRUCTURE FACTOR CALCULATION IN X-RAY+		1620-08.4.004	084
SLOPE STABILITY ANALYSIS. #COMPUTER+		1620-09.2.028	087	STRUCTURED, OBJECTIVE BORSCHACH TEST/SORT.		1620-06.0.165	062
SMOOTHING (FORECASTING). #EXPONENTIAL		1620-10.2.008	111	STRUCTURES. #GENERAL VIRTUAL WORK ANALYSIS OF		1620-09.2.014	086
SMOOTHING PROGRAM. #EXPONENTIAL		1620-10.2.007	111	STUDENT SCHEDULING HANDBOOK. #LUNCH STUDY+		1620-10.3.050	117
#SNOBOL 3 A LIST PROCESSING LANGUAGE.		1620-01.4.024	018	STUDENT SCHEDULING SUPPLEMENTARY PROGRAM.		1620-10.3.039	115
SOLUTIONS FOR DETERMINATION OF LOOP CURRENTS		1620-09.4.039	102	STUDENT SCHEDULING TECHNIQUE USING DEFINED+		1620-10.3.017	113
SOLUTIONS FOR RECTANGULAR GAMES.		1620-07.0.045	077	STUDENT T TEST.		1620-06.0.096	052
SOLUTIONS FOR SLOPE STABILITY ANALYSIS.		1620-09.2.028	087	STUDENT T/CHI-SQUARE F PROBABILITIES.		1620-06.0.128	056
SOLVER. #POLYNOMIAL ROOT		1620-07.0.013	075	STUDENTS PROGRAM EXECUTE AND CONTROL.		1620-02.0.065	037
SOLVER. #DOES - DISK ORIENTED EQUATION		1620-05.0.037	042	STUDY EXPLODER AND STUDENT SCHEDULING+		1620-10.3.050	117
SORT PROGRAM WITH FLEXIBLE INPUT. #MISSING+		1620-06.0.243	072	STUDY PROGRAM. #THREE PHASE SHORT CIRCUIT		1620-09.4.050	184
#SORT-LIBRARY FUNCTION (FORTRAN II).		1620-01.6.069	021	STUFF OUTPUT EDITOR.		1620-13.0.027	128
SORT-MERGE (CARD). #1620/1311		1620-SM-047	009	SUB-SAMPLES. #ANALYSIS OF VARIANCE,+		1620-06.0.070	057
SORTING SUBROUTINE FOR FORTRAN II-D.		1620-01.6.133	026	SUBCLASS FREQUENCIES. #ANALYSIS OF VARIANCE+		1620-06.0.132	057
#SPACED - SELF-LOADING PROGRAMMERS AID FOR+		1620-01.6.107	023	SUBCLASS FREQUENCIES-UCRBL63. #ANALYSIS OF+		1620-06.0.110	054
SPANS BY THE CONJUGATE BEAM METHOD.		1620-09.2.063	093	SUBCLASS NUMBERS. #NESTED ANALYSIS OF+		1620-06.0.065	049
SPEARMAN'S RHO CORRELATION COEFFICIENT.		1620-06.0.172	063	#SUBDIVISION PROGRAM.		1620-09.2.034	094
SPECTRUM. #AUTO CORRELATION-POWER		1620-06.0.147	059	SUBGROUPS WITH UNEQUAL OR EQUAL N. #ANALYSIS+		1620-06.0.140	058
SPEED SPS ASSEMBLER. #N.C.E. HIGH		1620-01.1.029	014	SUBPROGRAM. #CHAR ANNOTATION		1620-13.0.014	127
#SPEK/SPEEDY RATE.		1620-08.2.004	083	SUBPROGRAM. #RANDOM EXPONENTIAL NUMBER+		1620-06.0.111	054
#SPIRAL CURVE LAYOUT.		1620-09.2.075	096	SUBROUTINE-POSITIVE ARGUMENTS. #FORTRAN WITH+		1620-07.0.048	078
#SPIRAL PLUG DECK TO COGO I.		1620-09.2.071	095	SUBROUTINES (CARD). #MONITOR II+		1620-LM-050	097
#SPLIT PLOT ANALYSIS OF VARIANCE.		1620-06.0.061	049	SUBROUTINES ABS, DEF, PLOT, WRIT.		1620-07.0.053	079
SPLIT PLOT FACTORIAL. #ANALYSIS OF+		1620-06.0.023	044	SUBROUTINES FOR FORTRAN II.	#FORCOM	1620-01.6.074	021
SPLIT-HALF RELIABILITY PROGRAM WITH+		1620-06.0.234	071	SUBROUTINES FOR FORTRAN II-D. #FORCOM II-D-		1620-01.6.105	023
SPLIT-PLCT FACTORIAL DESIGN. #ANALYSIS OF+		1620-06.0.069	049	SUBROUTINES FOR FORTRAN W/FORMAT. #FORCOM		1620-01.6.051	020
SPLIT-SPLIT-PLCT DESIGN. #ANALYSIS OF		1620-06.0.161	061	SUBROUTINES FOR FORTRAN WITH FORMAT, FILE+		1620-07.0.037	077
SPOT DIAGRAM PROGRAMS. #WIGNETTED APERTURE+		1620-EO-03X	004	SUBROUTINES FOR PLOTTING. #FORTRAN CALL		1620-01.6.123	025
SPRING DESIGN, DYNAMIC LOAD. #COMPRESSION		1620-09.5.002	107	SUBROUTINES FOR SPS II-D. #MACROINSTRUCTION+		1620-01.6.136	026
SPS (CARD). #1620/1710		1620-SP-020	010	SUBROUTINES FOR USE IN SYMBOLIC PROGRAMMING+		1620-01.6.028	019
SPS ASSEMBLER BY RICE UNIVERSITY. #1620		1620-01.1.028	014	SUBROUTINES FORTRAN II. #RELOCATABLE COS,+		1620-07.0.038	077
SPS ASSEMBLER. #N.C.E. HIGH SPEED		1620-01.1.029	014	SUBROUTINES PROGRAM (CARDS). #FORTRAN II,+		1620-LM-041	096
SPS CARD OUTPUT COMPRESSOR. #MULTIPURPOSE		1620-01.1.006	013	SUBROUTINES TO READ OR WRITE IN OTHER THAN,+		1620-01.6.151	029
#SPS FLOATING POINT CONVERSION SUBROUTINES.		1620-01.6.053	020	SUBROUTINES. #TNS, TNF AND MF MACRO		1620-01.6.157	030
SPS II-D PSEUDO PROCESS PHASE. #PUNCH CROSS+		1620-01.1.033	015	SUBROUTINES. #FORTRAN 90 COMPILER AND		1620-02.0.014	031
SPS II-D. #MACROINSTRUCTION FLOATING POINT+		1620-01.6.136	026	SUBROUTINES. #UTO FORTRAN PROCESSOR AND		1620-02.0.017	031
#SPS III (CARD).		1620-SP-027	010	SUBROUTINES. #TNS, TNF, AND MF SIMULATION		1620-01.6.159	030
SPS III (CARD). #1620/1443		1620-SP-035	011	SUBROUTINES. #COGC ELCT CC ADDITIONAL COGO		1620-09.2.077	094
#SPS III (TAPE).		1620-SP-028	010	SUBROUTINES. #SPS FLOATING POINT CONVERSION		1620-01.6.053	020
#SPS LABEL REFERENCE INDEXER.		1620-01.1.014	013	SUBROUTINES. #DOUBLE PRECISION FLOATING+		1620-07.0.010	075
#SPS OBJECT DECK ANALYZER.		1620-01.6.060	020	SUBROUTINES, PROGRAM (CARD). #FORTRAN II-D,+		1620-LM-042	097
#SPS TRAVERSE AND CURVE DATA PROGRAM.		1620-09.2.018	087	SUBSET CELL FREQUENCY. #1 TO 4 WAY ANALYSIS+		1620-06.0.202	065
#SPS UNPACKING.		1620-06.0.238	072	SUM OF SQUARES AND PRODUCTS, CORRELATIONS.		1620-06.0.040	047
#SPS VARIATE DIFFERENCE PROGRAM. #AN		1620-06.0.187	065	SUM 3F SQUARES, N. #MEAN AND STANDARD+		1620-06.0.177	063
SPS. #CARLETON		1620-02.0.039	033	SUMMARIES. #ANALYSIS OF VARIANCE RANDOMIZED+		1620-06.0.123	056
SPS. #FLOATING COMPARE SUBROUTINE FOR		1620-07.0.050	078	#SUPER LISTER.		1620-01.6.147	028
SQUARE DIFFERENCES, NON LINEAR CURVE FIT.		1620-06.0.181	064	#SUPER-GO FORTRAN PROCESSOR.		1620-02.0.045	034
SQUARE MATRIX. #CALCULATION OF THE+		1620-07.0.042	077	SUPERMARKET MANAGEMENT GAME. #BOILERMAKER		1620-11.0.047	124
#SQUARE ROOT SUBROUTINE.		1620-07.0.005	074	SUPPLEMENTARY PROGRAM. #STUDENT SCHEDULING		1620-10.3.039	115
SQUARE ROOT SUBROUTINE. #VARIABLE FIELD		1620-03.0.001	037	SUPPLY BUSINESS MANAGEMENT GAME.		1620-11.0.049	124
SQUARE. #CHI		1620-06.0.099	053	SUPPLY ENGINEERING USING THE DARCY METHOD.		1620-09.2.039	090
SQUARE, WHEN EXPECTATIONS ARE SMALL. #THE+		1620-06.0.182	064	SURFACE PROFILE SAN2-X. #WATER		1620-09.2.023	088
SQUARES ADJUSTMENT OF PRECISE SURVEY+		1620-09.2.046	091	#SUSPENDED SEDIMENT-LOAD COMPUTATION FOR+		1620-06.0.160	061
SQUARES AND PRODUCTS, CORRELATIONS. #SUM OF		1620-06.0.040	047	#SWEEP OUT METHOD FOR DETERMINING RANK OF A+		1620-06.0.208	066
SQUARES COSINE FIT-ITEM 704 COPIT PROGRAM+		1620-06.0.142	058	SWITCH CONTROL. #AUTOSPOT II POST-PROCESSOR+		1620-10.4.010	118
SQUARES FIT OF RESPONSE CURVES TO FIRST+		1620-07.0.075	081	SWITCHING FUNCTION SUBROUTINE SET.		1620-09.4.062	196
SQUARES FIT OF VAPOR PRESSURE DATA BY THE+		1620-09.3.016	098	#SX-1.01 - TRAVERSE AXIS.		1620-09.2.060	094
SQUARES PROGRAM. #TWO-IN-ONE LEAST		1620-06.0.154	060	SYLLOGISM. #A DEMONSTRATION PROGRAM IN LOGIC+		1620-13.0.008	126
SQUARES USU 31. #ANALYSIS OF+		1620-06.0.086	051	SYMBOL TABLE FOR MONITOR I SPS II-D PSEUDO+		1620-01.1.033	015
SQUARES. #FOUR TYPE POLYNOMIAL CURVE FITTING+		1620-06.0.157	060	SYMBOLIC LOGIC STATEMENTS. #TRUTH TABLES FOR		1620-01.6.152	029
SQUARES, N. #MEAN AND STANDARD DEVIATION,+		1620-06.0.177	063	SYMBOLIC PROGRAMMING FOR THE CARD 1620.		1620-01.6.028	019
STABILITY ANALYSIS. #COMPUTER SOLUTIONS FOR+		1620-09.2.020	087	SYMBOLIC PROGRAMMING SYSTEM (CARD 1/0).		1620-SP-009	010
STABILITY FOR TEN MACHINES. #TRANSIENT		1620-09.4.013	099	SYMBOLIC PROGRAMMING SYSTEM. #AFIT		1620-01.1.023	013
STACK - VIBRATION CALCULATIONS BASED ON+		1620-09.2.084	097	SYMBOLIC PROGRAMMING SYSTEM. #AFIT LOAD AND		1620-01.1.032	015
STAKEOUT. #VERTICAL ALIGNMENT AND		1620-09.2.081	096	SYMBOLIC PROGRAMMING SYSTEM. #TYGO --		1620-01.1.031	015
STANDARD DEVIATION AND INTERCORRELATION+		1620-06.0.239	072	SYMBOLIC PROGRAMMING SYSTEM, MODIFIED FOR+		1620-01.1.027	014
STANDARD DEVIATION AND VARIANCE. #MEAN		1620-06.0.051	047	SYMETRICAL RIGID FRAME ANALYSIS.		1620-09.2.059	094
STANDARD DEVIATION PROGRAM. #VARIABLE FORMAT+		1620-06.0.206	066	SYMETRIC AND ASYMETRIC MATRICES.		1620-06.0.114	055
STANDARD DEVIATION SORT PROGRAM WITH+		1620-06.0.243	072	SYMETRIC AND ASYMETRIC MATRICES. #MISSING+		1620-06.0.121	056
STANDARD DEVIATION. #KARBER METHOD OF+		1620-06.0.212	067	#SYNCHRONIZING TRAFFIC SIGNALS FOR ANIMAL+		1620-09.2.082	096
STANDARD DEVIATION, AND VARIANCE BY ROWS AND+		1620-06.0.136	058	SYNTHESIS PROGRAM FOR X-RAY CRYSTALLOGRAPHY.		1620-08.4.005	084
STANDARD DEVIATION, SUM 3F SQUARES, N. #MEAN+		1620-06.0.177	063	SYNTHESIS PROGRAM FOR X-RAY CRYSTALLOGRAPHY.		1620-08.4.006	084
STANDARDIZATION OF VARIABLES. #TEST FOR+		1620-06.0.194	063	SYNTHESIS PROGRAM. #ALPHABETIC PLOTTING+		1620-08.0.007	084
STANDARDIZED SCORES, AND RATINGS FOR THE+		1620-06.0.165	062	T-SQUARE. #CORELLINGS		1620-06.0.112	054
STATE IDENTIFICATION OF AUTOMATA.		1620-13.0.035	129	T-TEST OPTION. #SIMPLE ANALYSIS OF VARIANCE+		1620-06.0.244	073
STATEMENT COMPILER SUBROUTINE. #FCRNAT		1620-01.6.138	027	#T-TEST PROGRAM FOR 19X19 MISSING DATA AND+		1620-06.0.242	072
STATEMENT PRESELECTION. #FORTRAN II FORMAT		1620-01.6.086	022	T/CHI-SQUARE F PROBABILITIES. #COMPUTATION+		1620-06.0.128	056
STATEMENTS. #TRUTH TABLES FOR SYMBOLIC LOGIC		1620-01.6.152	029	TABLE CARD OUTPUT. #MONITOR EQUIVALENCE		1620-01.3.013	017
STATION SUMMARIES. #ANALYSIS OF VARIANCE+		1620-06.0.123	056	TABLE FOR MONITOR I SPS II-D PSEUDO PROCESS+		1620-01.1.033	015
STATISTICAL CHECK PROGRAM. #CONTINUOUS+		1620-06.0.043	047	TABLE LOOK-UP PROGRAM.		1620-06.0.237	071
#STATISTICAL PROJECT ORGANIZER FOR TEACHING.		1620-06.0.216	067	TABLE LOOKUP, NO BRANCH AND TRANSMIT --		1620-01.6.153	029
STATISTICS - HYPRG. #HYPERGEOMETRIC		1620-06.0.106	054	TABLE OR RAW DATA. #THREE WAY INDEPENDENCE+		1620-06.0.079	050
#STATISTICS I.		1620-06.0.039	046	TABLE OR RAW DATA, USU 22. #TWO WAY+		1620-06.0.082	050
STATISTICS.		1620-06.0.211	067	TABLE TEST. #MONITOR DIM AND EQUIVALENCE		1620-01.6.108	023
STATISTICS. #DESCRIPTIVE		1620-06.0.183	064	TABLE. #FISHERS EXACT PROBABILITY FOR A 2X2		1620-06.0.050	047
STATISTICS. #TIPS - TENNESSEE INTERPRETIVE+		1620-06.0.158	061	TABLES FOR SYMBOLIC LOGIC STATEMENTS. #TRUTH		1620-01.6.152	029
STATISTICS/FUNDAMENTAL ANALYSIS OF FINITE+		1620-09.5.004	107	TABLES. #INTERPOLATION OF ATOMIC SCATTERING+		1620-08.4.003	084
STEADY HEAT CONDUCTION. #H-104,+		1620-09.7.007	109	#TABERN INTERPRETIVE PROGRAMMING SYSTEM.		1620-02.0.051	035
#STEAM AND WATER PROPERTIES AND EFFICIENCY+		1620-09.2.017	087	#TABULATED NUMERIC DATA DECKS ON 1443 PRINTER.		1620-13.0.034	129
STEEL BEAM DESIGN. #CONTINUOUS BEAM ANALYSIS+		1620-09.2.079	096	TABULATION PROGRAM C. A. S. T.. #CROSS AND+		1620-06.0.146	059
STEEL COMPOSITE BEAM DESIGN. #WELDED		1620-10.4.010	118	TAC TOE - A LEARNING PROGRAM. #TIC		1620-11.0.013	119
STEPPING SWITCH CONTROL. #AUTOSPOT II+		1620-06.0.006	043	TALLY PROGRAM (TALLY). #BREAKDOWN AND		1620-06.0.231	070
#STEPWISE MULTIPLE LINEAR REGRESSION.		1620-06.0.251	074	TAPE-TURN LATHE WITH MARK CENTURY NUMERICAL+		1620-10.4.013	118
STEPWISE MULTIPLE LINEAR REGRESSION. #BATCH+		1620-06.0.031	045	TAPERED HUB. #S-109 STRESS ANALYSIS OF A+		1620-09.7.005	109
STEPWISE REGRESSION (MODIFICATION OF BIND09).		1620-06.0.066	049	TAU AND SPEARMAN'S RHO CORRELATION.		1620-06.0.172	063
STEPWISE REGRESSION ANALYSIS PROGRAM. #STRAP		1620-01.1.036	016	TEP-TO-ASTM DISTILLATION CONVERSIONS.		1620-09.3.006	097
STORAGE ROUTINE. #DDSR - DISK DATA		1620-01.6.140	027	TEACH. #FORTRAN		1620-13.0.013	127
#STRAIGHT LINE PLOTTING SUBROUTINE.		1620-01.4.027	018	TEACHING. #STATISTICAL PROJECT ORGANIZER FOR		1620-06.0.216	067
STRAIGHTENER. #FORTRAN PROGRAM		1620-06.0.066	049	TEAMS IN A DEBATE TOURNAMENT. #A COMPUTER+		1620-13.0.026	128
#STRAP - STEPWISE REGRESSION ANALYSIS PROGRAM.		1620-06.0.160	061	TEMPERATURE OF CHEMICAL REACTIONS.		1620-09.3.018	098
STREAMS. #SUSPENDED SEDIMENT-LOAD+		1620-09.7.005	109	TEMPERATURE, NO DISSOCIATION. #ADIABATIC		1620-09.3.011	097
STRESS ANALYSIS OF A FLANGED TAPERED HUB.		1620-09.4.030	101	TENNESSEE INTERPRETIVE PROGRAM FOR+		1620-06.0.183	064
STRESS ANALYSIS. #MULTI ANCHOR PIPE		1620-09.4.040	102	TENSION CALCULATIONS. #GENERALIZED SAG AND		1620-09.2.069	095
STRESS ANALYSIS. #MULTI-ANCHOR PIPE		1620-09.7.014	110	TEST AND T TEST USU 32. #HOMOGENEITY OF+		1620-06.0.081	050

KWIC (KEYWORD-IN-CONTEXT) INDEX

TEST	TITLE	PROGRAM NO.	PAGE	TITLE	PROGRAM NO.	PAGE
TEST CARDS.	#SCORIT-SCORING AND ITEM+	1620-06.0.179	063	UNEQUAL SUBSET CELL FREQUENCY. #1 TO 4 WAY+	1620-06.0.202	065
TEST FOR HOMOGENEITY OF VARIANCE.	#BARTLETTS	1620-06.0.210	066	UNIT CELL CONTENTS. #CALCULATION OF MINERAL	1620-08.3.004	083
#TEST FOR NORMALITY WITH PROVISION FOR+		1620-06.0.194	065	#UNIVERSAL CALENDAR.	1620-11.0.026	120
TEST MEAN AND STANDARD DEVIATION PROGRAM.		1620-06.0.206	066	UNIVERSAL FUNCTION FITTER. #SIXTEEN-TWENTY	1620-CA-02X	001
TEST OF MEAN DIFFERENCES. #MULTIPLE RANGE		1620-06.0.036	066	#UNIVERSAL OUTPUT SUBROUTINE.	1620-12.3.001	126
#TEST SCORE FREQUENCY DISTRIBUTION PROGRAM.		1620-06.0.232	071	UNIVERSITY NONPARAMETRIC TESTS. #HUNT --	1620-06.0.203	066
TEST SCORING BY THE IBM 1620. #EDWARDS+		1620-06.0.141	058	#UNIVERSITY OF MISSISSIPPI TEST SCORING+	1620-13.0.028	128
TEST SCORING PROGRAM - UMTS. #UNIVERSITY OF+		1620-13.0.028	128	#UNIVERSITY OF MISSISSIPPI TEST SCORING+	1620-13.0.031	129
TEST SCORING PROGRAM. #NORTHEASTERN		1620-13.0.003	126	UNIVERSITY TEST SCORING PROGRAM.	1620-13.0.003	126
TEST SCORING PROGRAM. #UNIVERSITY OF+		1620-13.0.031	129	UNIVERSITY. #1620 SPS ASSEMBLER BY RICE	1620-01.1.028	014
TEST SCORING. #CAST - COMPUTER ASSISTED		1620-13.0.036	130	UNPACKING OPTION. #FIVE CHOICE SPLIT-HALF+	1620-06.0.234	071
TEST USU 32. #HOMOGENEITY OF VARIANCE TEST+		1620-06.0.081	050	UNPACKING. #SPS	1620-06.0.238	072
TEST WRITTEN IN FORTRAN. #MANN-WHITNEY U		1620-06.0.058	048	USU 10. #COVARIANCE ANALYSIS - RANDOMIZED+	1620-06.0.107	054
TEST.	#STUDENT T	1620-06.0.096	052	USU 12. #ANALYSIS OF VARIANCE - REPEATED+	1620-06.0.087	051
TEST.	#MANN-WHITNEY	1620-06.0.019	044	USU 15, 16. #MODEL BUILDING IN MULTIPLE+	1620-06.0.084	051
TEST.	#WILCOXON TWO-SAMPLE	1620-06.0.219	068	USU 22. #TWO WAY INDEPENDENCE CHI-SQUARE+	1620-06.0.082	050
TEST.	#MONITOR DIM AND EQUIVALENCE TABLE	1620-01.6.108	023	USU 29. #COVARIANCE ANALYSIS - COMPLETELY+	1620-06.0.080	050
TEST USING HARTERS CRITICAL VALUES, FOR P+		1620-06.0.124	056	USU 31. #ANALYSIS OF VARIANCE-REPEATED LATIN+	1620-06.0.086	051
TEST/SORT. #SCORING, STANDARDIZED SCORES,+		1620-06.0.165	062	USU 32. #HOMOGENEITY OF VARIANCE TEST AND T+	1620-06.0.081	050
TESTER. #PART - PROCESSOR AND RESULT		1620-01.6.104	028	USU 51. #ANALYSIS OF VARIANCE - RECTANGULAR+	1620-06.0.083	051
#TESTING REGRESSION.		1620-06.0.159	061	USU 52. #ANALYSIS OF VARIANCE - PARTIALLY+	1620-06.0.195	054
TESTS. #HUNT - HOFSTRA UNIVERSITY+		1620-06.0.203	066	USU-TI. #DIGIT COUNTING	1620-06.0.130	057
THEORY DEMONSTRATION. #ELEMENTARY NUMBER		1620-11.0.038	123	UTILITY PACKAGE. #DISK IOCS ROUTINES,+	1620-01.6.134	026
#THIRLE-GEDDES METHOD FOR MULTICOMPONENT+		1620-09.3.012	097	#UTO FORTRAN PROCESSOR AND SUBROUTINES,+	1620-02.0.017	031
THREE-FACTOR FACTORIAL. #ANALYSIS OF+		1620-06.0.029	045	VALIDITY OF A CATEGORICAL SYLLOGISM. #A+	1620-13.0.088	126
#THREE-IN-ONE CURVE FITS HYPERBOLIC,+		1620-07.0.019	076	VALUE PROBLEM INVOLVING ONE FIRST ORDER+	1620-04.0.081	039
#TIC TAC TOE - A LEARNING PROGRAM.		1620-11.0.013	119	VALUE PROBLEM INVOLVING ONE FIRST ORDER+	1620-04.0.082	039
#TIC-TAC-TOE DEMONSTRATION.		1620-11.0.012	119	VALUES. #SIMULTANEOUS EQUATION SOLUTION AND+	1620-09.4.015	108
TIME DISTRIBUTION. #EQUIPMENT AND PROJECT		1620-01.6.114	024	VALUES, FOR P LEVELS OF .10, .01, .005.	1620-06.0.124	056
TIME PROGRAM. #REACTION		1620-11.0.020	119	VAN LAAR CONSTANTS AND VAPOR LIQUID+	1620-09.3.015	098
TIME TRAFFIC SIGNALS. #THE SELECTION OF A+		1620-09.2.083	097	VAPOR LIQUID EQUILIBRIUM FROM AZEOTROPIC+	1620-09.3.015	098
TIME. #LEAST SQUARES FIT OF RESPONSE CURVES+		1620-07.0.075	081	VAPOR PRESSURE DATA BY THE ANTOINE EQUATION.	1620-09.3.016	098
TIME. #STUDENT SCHEDULING TECHNIQUE USING+		1620-10.3.017	113	#VARIABLE ALPHAMERIC FORMAT PLOT RELOCATABLE+	1620-13.0.100	126
#TIPS - TENNESSEE INTERPRETIVE PROGRAM FOR+		1620-06.0.183	064	#VARIABLE FIELD SQUARE ROOT SUBROUTINE.	1620-03.0.001	037
TNF AND MF MACRO SUBROUTINES. #TNS,		1620-01.6.157	030	#VARIABLE FORMAT CORRELATION PROGRAM.	1620-06.0.295	066
TNF, AND MF SIMULATION SUBROUTINES. #TNS,		1620-01.6.159	030	#VARIABLE FORMAT T TEST MEAN AND STANDARD+	1620-06.0.296	066
#TNS, TNF AND MF MACRO SUBROUTINES.		1620-01.6.159	030	VARIABLE PRECISION MATRIX INVERSION PACKAGE.	1620-06.0.120	055
#TNS, TNF, AND MF SIMULATION SUBROUTINES.		1620-11.0.013	119	VARIABLE PRECISION SERIES APPROXIMATION TO+	1620-07.0.077	081
TOE - A LEARNING PROGRAM. #TIC TAC		1620-05.0.030	042	VARIABLE. #CALCULATION OF THE REAL ROOTS OF+	1620-07.0.233	076
TOE MATRIX GENERATION. #TWELVE -		1620-10.4.011	118	VARIABLES LINEAR EQUATIONS. #CALCULATION OF+	1620-07.0.041	077
TCCL CONTROL. #POST PROCESSOR CONCEPTS FOR+		1620-09.4.043	103	VARIABLES. #CORRELATIONS OF ALL PAIR WISE+	1620-06.0.217	068
TOOL FOR PLANNING RADIAL DISTRIBUTION+		1620-13.0.026	128	VARIABLES. #SOLUTION OF M REAL LINEAR+	1620-05.0.024	041
TOURNAMENT. #A COMPUTER PROGRAM TO+		1620-09.2.015	087	VARIABLES. #TEST FOR NORMALITY WITH+	1620-06.0.194	065
TOWER DESIGN. #TRANSMISSION		1620-09.0-01X	003	VARIANCE (FACTORIAL DESIGN WITH NESTING+	1620-06.0.088	051
TRACE AND THIRD ORDER ABERRATIONS. #GENERAL+		1620-01.4.008	017	VARIANCE (ONE FACTOR). #ANALYSIS OF	1620-06.0.033	046
TRACE PROGRAM FOR THE IBM COMPUTER. #DYNAMIC		1620-08.1.005	082	VARIANCE (SPLIT PLOT FACTORIAL). #ANALYSIS OF	1620-06.0.030	045
TRACE PROGRAM. #GENERAL RAY		1620-01.4.017	017	VARIANCE - BALANCED LATTICE DESIGN.	1620-06.0.062	049
TRACE PROGRAM. #GENERAL 1620		1620-01.4.001	017	VARIANCE - FOUR-FACTOR FACTORIAL. #ANALYSIS	1620-06.0.026	045
TRACE.	#SELECTIVE	1620-09.2.082	096	VARIANCE - FOUR-FACTOR FACTORIAL. #ANALYSIS	1620-06.0.027	045
TRAFFIC SIGNALS FOR AXIMAL AND WITH.		1620-09.2.083	097	VARIANCE - PARTIALLY BALANCED LATTICE - USU+	1620-06.0.105	054
TRAFFIC SIGNALS. #THE SELECTION OF A CYCLE+		1620-06.0.236	071	VARIANCE - RECTANGULAR LATTICE DESIGN USU+	1620-06.0.083	051
TRANS. #LAEHA		1620-09.4.057	105	VARIANCE - REPEATED RANDOMIZED BLOCKS USU+	1620-06.0.087	051
TRANSFER FUNCTIONS. #CALCULATION OF POLES+		1620-01.1.034	015	VARIANCE - THREE-FACTOR FACTORIAL. #ANALYSIS+	1620-06.0.029	045
TRANSFER. #DEPT - DISK EXECUTION OF FORTRAN		1620-06.0.164	062	VARIANCE - TWO-FACTOR FACTORIAL. #ANALYSIS OF	1620-06.0.028	045
TRANSFORM. #INVERSE LAELACE		1620-05.0.025	041	VARIANCE - UNEQUAL SUBCLASS+	1620-06.0.110	054
TRANSFORMATION. #BOOLEAN FUNCTION		1620-06.0.122	056	VARIANCE AND COVARIANCE. #ANALYSIS OF	1620-06.0.109	054
TRANSFORMATIONAL REGRESSION ANALYSIS+		1620-06.0.250	074	VARIANCE AND COVARIANCE. #FACTORIAL ANALYSIS+	1620-06.0.224	069
#TRANSFORMATIONS TO CHECK AND INCREASE+		1620-06.0.152	060	VARIANCE AND COVARIANCE-UNEQUAL SUBCLASS+	1620-06.0.132	057
TRANSFORMATIONS. #MEETING ASSUMPTIONS OF+		1620-09.4.051	104	VARIANCE BY ROWS AND COLUMNS. #MEAN,+	1620-06.0.136	058
TRANSFORMER LOSSES. #EVALUATION OF POWER		1620-09.4.012	099	VARIANCE COMPLETELY RANDOMIZED DESIGN-USU62.	1620-06.0.138	058
#TRANSFORMER RATING FOR NORMAL AND EMERGENCY+		1620-09.4.028	101	VARIANCE FOR UNEQUAL SUBCLASS NUMBERS.	1620-06.0.065	049
#TRANSFORMER RATING FOR NORMAL AND EMERGENCY+		1620-09.4.032	102	VARIANCE OF CHI SQUARE, WHEN EXPECTATIONS+	1620-06.0.182	064
#TRANSFORMER RATINGS BASED ON LOSS OF LIFE+		1620-09.4.060	105	VARIANCE RANDOMIZED BLOCK DESIGN-USU 63.	1620-06.0.139	058
TRANSFORMERS BASED ON LOSS OF LIFE AND+		1620-09.5.004	107	VARIANCE RANDOMIZED COMPLETE BLOCK DESIGN,+	1620-06.0.123	056
TRANSIENT OR STEADY HEAT CONDUCTION. #H-104,+		1620-09.4.013	099	VARIANCE SPLIT-SPLIT-PLOT DESIGN. #ANALYSIS	1620-06.0.161	061
#TRANSIENT STABILITY FOR TEN MACHINES.		1620-11.0.054	125	VARIANCE SYSTEM. #GENERAL PURPOSE ANALYSIS OF	1620-06.0.225	069
TRANSLATION. #ELEMENTARY GERMAN-TO-ENGLISH		1620-11.0.053	125	VARIANCE TEST AND T TEST USU 32.	1620-06.0.081	050
TRANSLATION. #ELEMENTARY GERMAN-TO-ENGLISH		1620-09.4.008	099	VARIANCE WITH N OBSERVATIONS PER CELL.	1620-06.0.218	068
#TRANSMISSION LOSSES AND PENALTY FACTORS.		1620-09.2.061	094	VARIANCE WITH REPEATED MEASURES AND UNEQUAL+	1620-06.0.202	065
#TRANSMISSION POWER DESIGN.		1620-09.2.015	087	VARIANCE WITH T-TEST OPTION. #SIMPLE+	1620-06.0.244	073
#TRANSMISSION TOWER DESIGN.		1620-01.6.153	029	VARIANCE. #ANALYSIS OF	1620-06.0.102	053
TRANSMT - (TUNNY). #TABLE LOCKUP, NO+		1620-10.017	005	VARIANCE. #HOMOGENEITY OF	1620-06.0.035	046
#TRANSPORTATION PROGRAM.		1620-10.1.005	110	VARIANCE. #ONE PASS ANALYSIS OF	1620-06.0.060	048
#TRANSPORTATION PROGRAM FOR THE IBM 1620.		1620-06.0.122	056	VARIANCE. #FACTORIAL ANALYSIS OF	1620-06.0.041	047
#TRAP - TRANSFORMATIONAL REGRESSION ANALYSIS+		1620-09.2.045	091	VARIANCE. #SPLIT PLOT ANALYSIS OF	1620-06.0.051	047
TRAVESER ANALYSIS PROGRAM (1620 - 40K).		1620-09.2.073	095	VARIANCE. #MEAN STANDARD DEVIATION AND	1620-06.0.233	071
TRAVESER ANALYSIS PROGRAM.		1620-09.2.018	087	VARIANCE. #ONE TWO/THREE WAY ANALYSIS OF	1620-06.0.210	066
TRAVERSE AND CURVE DATA PROGRAM. #SPS		1620-09.2.060	094	VARIANCE. #BARTLETTS TEST FOR HOMOGENEITY OF	1620-06.0.207	066
TRAVERSE AXIS. #SX-1.01 -		1620-09.2.025	088	VARIANCE. #THREE FACTOR FACTORIAL ANALYSIS OF	1620-06.0.113	054
TRAVERSE PROGRAM. #GENERAL SURVEY		1620-09.2.048	092	VARIANCE, CROSS-OVER DESIGN. #ANALYSIS OF	1620-06.0.140	058
TRIANGULATION STRIP FORMATION - 6431. #AERIAL		1620-09.2.049	092	VARIANCE, MEANS, AND SDS FOR SUBGROUPS WITH+	1620-06.0.152	060
TRIANGULATION STRIP 6432 + 6433.		1620-09.2.047	092	VARIANCE, NONLINEAR DATA TRANSFORMATIONS.	1620-06.0.070	050
#TRIGNET - 6409, 6420, 6421, 6423, 6424, 6425.		1620-09.4.059	105	VARIANCE, RANDOMIZED COMPLETE BLOCK DESIGN,+	1620-06.0.069	049
TROUBLE ANALYSIS. #ELECTRIC		1620-09.2.058	093	VARIANCE, SPLIT-PLOT FACTORIAL DESIGN.	1620-06.0.086	051
TRUSS ANALYSIS. #DETERMINATE		1620-01.6.152	029	VARIANCE-REPEATED LATIN SQUARES USU 31.	1620-06.0.187	065
#TRUTH TABLES FOR SYMBOLIC LOGIC STATEMENTS.		1620-10.3.015	113	VARIATE DIFFERENCE PROGRAM. #AN SPS	1620-06.0.094	052
TUBE - TYPE. #AUTOSPOT POST - PROCESSOR FOR+		1620-09.5.009	108	#VARIANT MATRIX ROTATION.	1620-07.0.065	080
#TURBINE CYCLE HEAT BALANCE.		1620-10.4.010	118	#VECTOR COMPOSITION AND DECOMPOSITION.	1620-09.2.032	089
TURRET DRILL WITH STEPPING SWITCH CONTROL.		1620-05.0.030	042	#VERTICAL ALIGNMENT AND STAKEOUT.	1620-09.2.081	096
#TWIN BOX CULVERT DESIGN.		1620-09.2.051	092	VIBRATING BEAM. #NATURAL FREQUENCIES AND+	1620-09.5.006	107
#TWO-DIMENSIONAL ABSORPTION CORRECTION IN+		1620-08.4.016	085	VIBRATION CALCULATIONS BASED ON+	1620-09.2.084	097
#TWO-DIMENSIONAL ABSORPTION CORRECTION IN+		1620-08.4.017	085	#VIGNETTED APERTURE AND SPOT DIAGRAM+	1620-EO-03X	004
TWO-DIMENSIONAL, TRANSIENT OR STEADY HEAT+		1620-09.5.004	107	VIRTUAL WORK ANALYSIS OF STRUCTURES. #GENERAL	1620-09.2.014	086
TWO-FACTOR FACTORIAL. #ANALYSIS OF VARIANCE -		1620-06.0.028	045	#VIRTUOSO - THE MUSIC PROGRAM TO END ALL+	1620-11.0.046	123
TWO-FACTOR FACTORIAL. #ANALYSIS OF+		1620-06.0.024	044	VOLTAGE PROFILE AND FAULT CURRENT+	1620-09.4.056	105
TWO-FACTOR FACTORIAL. #ANALYSIS OF+		1620-06.0.025	045	VOLUME. #COAL FILE	1620-09.2.011	086
#TWO-IN-ONE LEAST SQUARES PROGRAM.		1620-06.0.154	060	VOLUMETRIC QUANTITIES PROGRAM.	1620-09.2.031	089
TWO-SAMPLE TEST. #WILCOXON		1620-06.0.219	068	W/FORMAT. #FORCOM SUBROUTINES FOR FORTRAN	1620-01.6.051	020
TWO-WAY ANALYSIS OF VARIANCE WITH N+		1620-06.0.218	068	#WATER FLOW IN A PIPE NETWORK BY HARDY CROSS+	1620-09.7.008	109
#TYGO - TYPE-AND-GO SYMBOLIC PROGRAMMING+		1620-01.1.031	015	#WATER HAMMER.	1620-09.2.029	089
TYPE POLYNOMIAL CURVE FITTING BY LEAST+		1620-06.0.157	060	WATER NETWORKS. #PRESSURE AND FLOW RATES IN+	1620-09.2.078	096
TYPE. #AUTOSPOT POST - PROCESSOR FOR+		1620-10.3.015	113	WATER PROPERTIES AND EFFICIENCY PROGRAM.	1620-09.7.007	109
TYPE-AND-GO SYMBOLIC PROGRAMMING SYSTEM.		1620-01.1.031	015	WATER SUPPLY ENGINEERING USING THE DARCY+	1620-09.2.039	090
UCRBL 54. #UCRBL 54-ANALYSIS OF VARIANCE+		1620-06.0.088	051	#WATER SURFACE PROFILE SAN2-X.	1620-09.2.023	088
UMTS. #UNIVERSITY OF MISSISSIPPI TEST+		1620-13.0.028	128	#WATER WAY COMPUTATIONS WITH REPEATED+	1620-09.2.008	086
#UNCORRELATED AND CORRELATED POLYNOMIAL+		1620-09.2.049	092	WAY ANALYSIS OF VARIANCE WITH REPEATED+	1620-06.0.202	065
UNEQUAL OR EQUAL N. #ANALYSIS OF VARIANCE,+		1620-06.0.140	058	WAY ANALYSIS OF VARIANCE. #ONE TWO/THREE	1620-06.0.233	071
UNEQUAL SUBCLASS FREQUENCIES-UCRBL63.		1620-06.0.110	054	WAY COMPUTATIONS PROGRAM. #WATER	1620-09.2.008	086
UNEQUAL SUBCLASS NUMBERS. #NESTED ANALYSIS+		1620-06.0.065	049	WAY INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT+	1620-06.0.079	050

KWIC (KEYWORD-IN-CONTEXT) INDEX

88-88

WAY	TITLE	PROGRAM NO.	PAGE
	WAY INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT+	1628-06.0.882	050
#WEEK	WEEKLY SCHEDULE USING MASTER SCHEDULE.	1628-10.3.840	115
	WEEKLY SCHEDULE USING MASTER SCHEDULE. #WEEK	1628-10.3.840	115
#WEEKLY	WEEKLY SCHEDULING USING MASTER SCHEDULE.	1628-10.3.843	116
#WEIBULL	ANALYSIS PACKAGE.	1628-06.0.878	050
#WEIGHTS	PROGRAM.	1628-06.0.241	072
	WEIGHTS. #COMPUTATION OF THE CANONICAL+	1628-06.0.178	063
#WELDED	STEEL COMPOSITE BEAM DESIGN.	1628-09.2.079	096
WESTERN	CAROLINA COLLEGE. #AUTOMATIC DATA+	1628-01.6.117	024
#WILCOXON	TWO-SAMPLE TEST.	1628-06.0.219	068
WILDER	8/8/61. #NON-LINEAR PATCH FOR+	1628-06.0.011	043
#WISAL	PROCESSOR FOR COMPUTER ACCOUNTING CASE.	1628-02.0.058	036
WISE	COMBINATIONS OF TWO SETS OF VARIABLES.	1628-06.0.217	068
#WITRAM	- A LOAD AND GO FORTRAN SYSTEM.	1628-02.0.047	034
WORK	ANALYSIS OF STRUCTURES. #GENERAL VIRTUAL	1628-09.2.014	086
WORK	AREA. #FORTRAN II-D DISK SUBROUTINES TO+	1628-01.6.151	029
WRITE.	#RELOCATABLE SUBROUTINES ABS, DEF,	1628-07.0.053	079
WRITE	IN OTHER THAN THE WORK AREA. #FORTRAN+	1628-01.6.151	029
WRITTEN	IN FORTRAN. #MANN-WHITNEY U TEST	1628-06.0.058	048
X-RAY	CRYSTALLOGRAPHY. #GENERAL THREE+	1628-08.4.006	084
X-RAY	CRYSTALLOGRAPHY. #GENERAL TWO+	1628-08.4.005	084
X-RAY	CRYSTALLOGRAPHY. #INTER AND+	1628-08.4.008	084
X-RAY	CRYSTALLOGRAPHY. #STRUCTURE FACTOR+	1628-08.4.004	084
KCIX.	#CONTINUOUS BEAM SERIES - PROGRAMS I+	1628-09.2.053	093
ZEROS.	#FITTING DISTRIBUTIONS WITH THE+	1628-06.0.246	073
ZEROS	OF AMPLIFIERS TRANSFER FUNCTIONS.	1628-09.4.057	105
#ZIP	- KEYWORD IN CONTEXT ANALYSIS ON A+	1628-10.3.032	114
10.	#COVARIANCE ANALYSIS - RANDOMIZED BLOCK+	1628-06.0.107	054
12.	#ANALYSIS OF VARIANCE - REPEATED+	1628-06.0.087	051
1230	OPTICAL MARK SCORING READER OUTPUT.	1628-06.0.220	068
1401-1620.	#MODULAR INVENTORY MANAGEMENT+	1628-CS-04X	002
#141	DATA PROCESSING SYSTEM - AN EDUCATIONAL+	1628-13.0.015	127
#141	DATA PROCESSING SYSTEM - AN EDUCATIONAL+	1628-13.0.016	127
#141	DATA PROCESSING SYSTEM - AN EDUCATIONAL+	1628-13.0.017	128
#141	DATA PROCESSOR SYSTEM - AN EDUCATIONAL+	1628-13.0.018	128
#1443	PRINTER. #80 BE FOR	1628-06.0.222	069
#1443	PRINTER. #80 DE FOR	1628-06.0.221	068
1443	PRINTER. #TABULATE NUMERIC DATA DECKS ON	1628-13.0.034	129
15,	16. #MCDL BUILDING IN MULTIPLE+	1628-06.0.084	051
1585	to 2599 A.D.. #GREGORIAN CALENDAR -	1628-11.0.044	123
16.	#MODEL BUILDING IN MULTIPLE REGRESSION+	1628-06.0.084	051
1620-PO-037.	#EESSEL FUNCTION SUBROUTINES+	1628-07.0.037	077
1620-1443	MONITOR I VERSION 2. #MACRO+	1628-02.0.050	034
#1620/1311	AD-APT NUMERICAL CONTROL PROCESSOR.	1628-CN-06X	001
#1620/1311	AUTOSPOT III NUMERICAL CONTROL+	1628-CN-07X	001
#1620/1311	DISK PACK COPY PROGRAM.	1628-01.6.104	023
#1620/1311	LINEAR PROGRAMMING SYSTEM.	1628-CO-04X	002
#1620/1311	MONITOR II (CARD).	1628-PR-029	008
#1620/1311	MONITOR II (TAPE).	1628-PR-030	008
#1620/1311	SORT-MERGE (CARD).	1628-SM-047	009
#1620/1443	FORTRAN WITH FORMAT (CARD).	1628-PO-037	005
#1620/1443	FORTRAN WITH FORMAT - 1627 PLOTTER	1628-LM-040	006
#1620/1443	MONITOR II (CARD).	1628-PR-045	009
#1620/1443	MONITOR I (CARD).	1628-PR-033	009
#1620/1443	SPS III (CARD).	1628-SP-035	011
#1620/1710	SPS (CARD).	1628-SP-020	010
1627	PLOTTER SUBROUTINE. #1620/1443 FORTRAN+	1628-LM-040	006
1627	PLOTTER SUBROUTINE, PROGRAM (CARD).	1628-LM-039	006
1627	PLOTTER SUBROUTINES (CARD). #MONITOR II+	1628-LM-050	007
1627	PLOTTER SUBROUTINES PROGRAM (CARDS).	1628-LM-041	006
1627	PLOTTER SUBROUTINES, PROGRAM (CARD).	1628-LM-042	007
19X19	MISSING DATA AND 40X40 MEAN, SD AND+	1628-06.0.242	072
#19X19	MISSING DATA.	1628-06.0.240	072
2K-1	COMPARISONS. #BEST K OF	1628-06.0.223	069
2X2	TABLE. #FISHERS EXACT PROBABILITY FOR A	1628-06.0.050	047
22.	#TWO WAY INDEPENDENCE CHI-SQUARE+	1628-06.0.082	050
24-HOUR	LOAD CYCLE. #OVERLOAD RATINGS OF 65+	1628-09.4.060	105
24-HOUR	LOAD CYCLE. #TRANSFORMER RATINGS+	1628-09.4.032	102
2599	A.D.. #GREGORIAN CALENDAR - 1585 to	1628-11.0.044	123
31.	#ANALYSIS OF VARIANCE-REPEATED LATIN+	1628-06.0.086	051
32.	#HOMOGENEITY OF VARIANCE TEST AND T TEST+	1628-06.0.081	050
40-40.	#CORRELATION	1628-06.0.015	044
#40X40	MEAN STANDARD DEVIATION AND+	1628-06.0.239	072
40X40	MEAN, SD AND INTERCORRELATION. #T-TEST+	1628-06.0.242	072
402.	#CORES DUMP	1628-01.6.020	018
51.	#ANALYSIS OF VARIANCE - RECTANGULAR+	1628-06.0.083	051
52.	#ANALYSIS OF VARIANCE - PARTIALLY+	1628-06.0.105	054
54.	#UCRBL 54-ANALYSIS OF VARIANCE+	1628-06.0.088	051
54-ANALYSIS	OF VARIANCE+	1628-06.0.088	051
565	PLOTTER SUBROUTINE PEN FOR FORTRAN+	1628-13.0.005	126
#6-64	FORMO/FORTRAN OF ROLLA MISSOURI.	1628-02.0.046	034
63.	#MULTIVARIATE ANALYSIS OF VARIANCE+	1628-06.0.139	058
6409,	6420, 6421, 6423, 6424, 6425. #TRIGNET -	1628-09.2.047	092
6431.	#AERIAL TRIANGULATION STRIP FORMATION -	1628-09.2.048	092
6432 +	6433. #UNCORRELATED AND CORRELATED+	1628-09.2.049	092
7040/7044	ON THE IBM 1620. #SIMULATION OF+	1628-02.0.037	033
7094	FAP (FOR THE IBM 1620 DIGITAL+	1628-02.0.030	032
8/8/61.	#NON-LINEAR PATCH FOR MULTIPLE+	1628-06.0.011	043
#80-SERIES	MULTIPLE LINEAR REGRESSION SYSTEM.	1628-06.0.143	059
80-80	LISTING. #AFIT SYMBOLIC PROGRAMMING+	1628-01.1.027	014

CONTINUED FROM PRIOR COLUMN

1620-CA-02X

SIXTEEN-TWENTY UNIVERSAL FUNCTION FITTER

*M

DESCRIPTION - The Sixteen-Twenty Universal Function Fitter Program is a complex linear and non-linear regression analysis or generalized function fitting routine for the 1620 (Model 1 or 2)-1311 combination. With this program, it is possible to fit a set of data points to any algebraic function whose coefficients of regression are linear.

FEATURES -

- Algebraic specification of model.
- Wide range of models.
- Output in the form of regression coefficients plus a complete set of statistical measures, including plotback.
- Adjustable mantissa in floating point fields.
- Simplified preparation of input data.
- Size of model expandable with memory.
- Program stored on disk file.

The entire program, stored on the 1311 Disk Storage Drive, is comprised of nine phases. Each phase is self-contained and, at its conclusion, locates the next phase, which is then read into core memory. The program is not constructed to allow for thousands or even hundreds of variables- on the contrary, its main intent is to extend the complexity of the function which it is required to fit.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system with...1622 Card Read Punch...1311 Disk Storage Drive...and if a 1620 is a Model 1, Indirect Addressing special feature. Optional-40K or 60K Storage...Automatic Floating Point...and if 1620 is a Model 1, Direct Divide special feature.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Program write-up...Listings.
MACHINE READABLE - Object code...Source code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620CA02X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-CN-05X

AUTOSPOT PROGRAM

DESCRIPTION - The Basic Autospot program is for point-to-point machining for drilling, tapping, reaming, and boring. The program includes - English language specifications for greater clarity and accuracy. Flexible instructions allowing for pattern definitions, translations, rotations, and inversions. Validity checks of the source statement to insure internal consistency.

MINIMUM SYSTEM REQUIREMENTS - A 1620 system with 20,000 positions of storage, Indirect Addressing, Automatic Divide, and card input/output.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620CN05X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-CN-06X

1620/1311 AD-APT NUMERICAL CONTROL PROCESSOR

*M

DESCRIPTION - AD-APT is a numerical control processor for contouring type machine tools. It uses English-like words to describe a wide operations. The output from AD-APT may be stored on the 1311 Disk Storage Drive for conversion by the customer post processing programs for most types of numerically controlled machine tools or plotted output. Range of two-dimensional and limited Three-dimensional machining.

MINIMUM SYSTEM REQUIREMENTS - Either a 20K 1620 Model 1 with these features - Additional Instructions (TNS, TNF, MF), Automatic Divide, Automatic Floating Point operations, Card Read Punch Adapter, Disk Storage Drive Adapter, and Indirect Addressing... or a 1620 Model 2 with these special features- Automatic Floating Point operations, Card Read Punch Adapter, Disk Storage Drive Adapter, and a 1625 Core

Storage Model 1 with 20K storage... and a 1622 Card Read Punch and one 1311 Disk Storage Drive Model 3. In addition, most post processor programs will require some method of producing 8 Channel Punched Tape output. Either the 1902 Model 23 or 1902 Model 24 Tape Punch (RPQ) may be used on-line for tape punching. These units are attached to the system through the 1999 Model 5 Punch Independent Attachment (RPQ) and feature No. 5520 or No. 5521 Tape Unit Adapter. Your customer may also want to take advantage of the 1627 Plotter for visual verification of his part programs. Contact your regional special equipment department for further information.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up, Reference Manuals, listings.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620CN06X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	CARDS	15	none

1620-CN-07X

1620/1311 AUTOSPOT III NUMERICAL CONTROL PROCESSOR

*M

DESCRIPTION - This program provides a fast, flexible, and efficient problem solving tool to aid numeric controlled machine tool users. AUTOSPOT III offers the low cost computer user a significant advancement in numerical control program processing. AUTOSPOT III assists the user in the preparation of tapes for numerically controlled machine tools. Input statements are English-like and conform to common machine-shop terminology. AUTOSPOT III is primarily a point-to-point language most useful in generating locations of holes to be drilled, tapped, reamed, etc. Routines are included for easily specifying a series of straight line or circular incremental points and for translating, rotating, inverting, or patterns of points. Milling capabilities allow straight Reversing patterns of points. Milling capabilities allow straight line and circular paths to be defined, with special routines for offset milling, face milling, and filletting.

FEATURES-

- AUTOSPOT III is written in SPS-II-D and operates under control of the 1620 Monitor I System.
- Special machine tool functions may be defined through reserved commands.
- Ability to go directly from source statements to final output in one pass.
- Ability to define points, lines and circles geometrically to facilitate point definition.
- Ability to define patterns of points, perform multiple transformations and manipulations on these patterns and collect groups of patterns into higher level patterns for further transformation and manipulation.
- The user has the facility to adapt AUTOSPOT III for use with plotting or drafting devices.
- Intersection and tangency points of various curves are calculated relieving the parts programmer of this task.
- Source language input may be from cards, typewriter, or paper tape.

For customers using AUTOSPOT II, the addition of the 1311 Disk storage Drive utilized by AUTOSPOT III provides many advantages-

- Removes restriction on number of points in a pattern.
- Removes restriction on number of pattern levels.
- Provides the ability to accept any point(s) in an incremental statement or previously defined pattern.

For the prospective user of computer programming for N/C tools, AUTOSPOT III offers new depth and power previously unattainable in a Point-To-Point language.

MINIMUM SYSTEM REQUIREMENTS - Either 20K 1620 Model 1 with Adapter, Disk Storage, Drive Adapter, and Indirect Addressing... 1622 Card Read Punch Model 1... 1311 Disk Storage Drives Model 3...

OR

20K 1620 Model 2 with Card Read Punch Adapter and Disk Storage Drive Adapter... 1625 Core Storage Model 1... 1622 Card Read Punch Model 2... 1311 Disk Storage Drive Model 3.

NOTE - Most N/C machine tool users will require tape punching facilities for preparing 8-channel tape.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE

DOCUMENTATION - Application Description, H20-0178...
Part Programmers Manual, H20-0200... Operators Manual,
H20-0201... Systems Manual.
MACHINE READABLE - Object code... Sample problem.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620CN07X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-CS-01X

CAPITAL INVESTMENT

DESCRIPTION - The program is designed to accept various input parameters and data, and from this, compute tables of depreciation and salvage values, earnings, and interest payments. From these tables, a stream of cash flow is generated and this, in turn, is used to compute a table of rates of return. The program used the augmented investors method of predicting the expected value of the rate of return. To do so, it employs the following concepts; Cash Flow, Time Value of Money, Probability Distribution of Economic Life. These three concepts enable the data processing system to take all the economic factors of a wide variety of capital investment proposals and relate them to a reliable standard of economic worth. Application of this program may be applied to future projects to prove the feasibility of including them in the capital investment budget. It may be used to select the particular machine, process, etc., before the contract is let or the production order is released.

MINIMUM SYSTEM REQUIREMENTS - 1620 computer with 40K memory and card input and output. The Automatic Divide feature is necessary if the FORTRAN II Processor is used. The program will also assemble, using FORTRAN with Format for card systems.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Program Write-up.
MACHINE READABLE - FORTRAN source decks... FORTRAN object decks with subroutines... Sample problem deck.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620CS01X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-CO-04X

1620/1311 LINEAR PROGRAMMING SYSTEM

DESCRIPTION - Linear programming adds a new dimension to the IBM 1620. The 1311 Disk Storage Drive, combined with this tailored and sophisticated Linear Programming Systems, means the scope of applications is large - production allocation, blending, distribution and shipping, production and planning, market research, material handling, and many more.

The IBM 1620/1311 LP System is composed of a number of programs which are stored on the disks. The programs are called by procedure control cards known as Agendum cards. The sequence of Agendum cards defines the solution procedure by forming the processing agenda for an application.

Linear Programming is a mathematical technique for optimum resource allocation. The resources (capital, raw materials, manpower, etc.) are allocated to specified activities (investments, products, jobs, etc.) to obtain a particular objective (maximum profit, minimum cost, etc.).

FEATURES - The minimum system configuration will handle 100 rows including primary and alternate objective functions, and 1,000 column including primary and alternate right-hand sides. Flexible, powerful procedure control statements tailor input, solution and output processing as required for an application. Input data originates from cards, and may be stored and maintained on disk for subsequent reprocessing due to price or requirement changes. Multiple problems may be defined from a single data source by selecting subsets of a master data file. Columns (variables and right-hand sides) and rows (constraints and objective functions) are referenced by name. Input data card format (SHARE) is compatible with other linear programming systems. Advanced mathematical methods increase accuracy and processing speeds - dual and primal revised simplex, bounded variable, user or automatic assignment and variation of inversion frequency and floating point length. Extensive output reports may be selected by the user. These include solution levels, reduced costs and marginal values, cost ranges, etc. Any output report may be subdivided into meaningful groups to simplify data analysis and distribution. The output unit is specified by the user. Check of solution accuracy.

PROGRAMMING SYSTEMS - Operates under the control of 1620 Monitor I (1620-PR-025).

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 System Model 1 or 2 with one 1311 Disk Storage Drive... 1622 Card Read Punch... Indirect Addressing, Automatic Divide, and Additional Instructions. Additional core storage increases problem capacity up to 400 rows by 3,000 columns for 60,000 digits of core (these larger problems may require one or more additional disk storage drives). The Automatic Floating Point operations are optional and will decrease processing time. The on-line printer may be utilized as an optional output device. Only one - and two-disk operation is supported by this release, (Version I, Mod 0). A two disk system has solved a 400 row problem.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Application Directory... Application Description... Reference Manual.
MACHINE READABLE - Object code... Sample problem.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - Manual with listings.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620CO04X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	CARDS	15	none

1620-CS-04X

MODULAR INVENTORY MANAGEMENT SIMULATOR - 1620 VERSION FOR 1401-1620

DESCRIPTION - A Modular Inventory Management Simulator to provide pre-testing of inventory control system.

PROGRAMMING SYSTEMS - Written in FORTRAN; designed for ease of understanding, ease of modification.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K, and no special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Program write-up... Listings.
MACHINE READABLE - Object code... Source code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620CS04X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-CS-16X

FINANCIAL EVALUATION PROGRAM

DESCRIPTION - The Financial Evaluation Program provides a computerized method for performing economic evaluations. The program, which is structured on the discounted cash flow method, provides a tool for the realistic evaluation of capital investment and associated investment expenses by considering tax impact, inventory carrying costs and turnover rates, manpower dollars, income, etc. Program flexibility is achieved by using control card input of the constants required in the evaluation.

FEATURES -

- Calculates total project costs.
- Provides the yearly cash flows, either differential (in relative project analysis) or absolute (when only one project is being analyzed), taking into account depreciation, state, federal and capital gains tax rates, and the time value of money.
- Analyzes the cash flow and arrives at a rate of savings that represents the interest rate necessary to obtain the same cash flow incomes.
- Calculates a payback period.

This program is primarily a cost minimization model, and

CONTINUED FROM PRIOR PAGE

as such provides a uniform financial treatment of all basic cost information related to the projects under consideration. It may also be used for profit maximization evaluations, as it recognizes and deals with primary, ancillary, and capital gains incomes. Project associated costs and incomes are generated by the analyst, and new input prepared for each new evaluation. Information infrequently modified (i.e., man year dollar rates, investment tax lives, turnover rates, and tax rates) is maintained as constant input. The program output is a listing of the constant information and the results of the particular evaluation.

PROGRAMMING SYSTEMS - Written in IBM 1620/1710 SPS (1620-SP-020).

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 equipped with Auto Divide, Additional Instruction, Indirect Addressing, and 1622 Card Read/Punch.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Application Directory... Reference Manual... Systems Manual.
 MACHINE READABLE - Source code... Object code... Sample problem.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620CS16X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-CX-04X

DRAFTING SYSTEM

*M

DESCRIPTION - The IBM Drafting Processor converts statements describing the drawing into commands that operate the IBM 1627 Plotter. The part can be described by a variety of two-dimensional geometric and arithmetic statements. Dimensions and notes may be placed on the drawing with the use of annotation statements. Logic, macros, program loops, and line class capabilities further enhance the set of statements to produce detail engineering drawings.

FEATURES -
 - The first IBM Application Program designed to produce engineering drawings as computer output.
 - Provides an immediate link with numeric control, an important step in an engineering data processing system.
 - User can customize his own system by storing his sub-drawing routines on the file.
 - Converts language statements to drawings in one monitored job.
 - Rapid Processing is achieved by using the 1311 file for storage of data programs.
 - The system has the versatility to produce master grids, standard drawings, proposal drawings, chassis layouts, printed circuits, and pattern developments.
 - The annotation capabilities include a set of special symbols that conform to military drafting standards to aid the implementation of geometric and positional tolerance practices.

Working from a layout drawing or an engineering sketch, the user prepares language statements that are input to the Drafting Processor. The Processor translates the language statements, performs the necessary computations, and controls the IBM 1627 Plotter to produce a detailed engineering drawing.

PROGRAMMING SYSTEMS - Monitor I(1620-PR-025), Version 1, Level 9.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system with paper tape adapter, disk storage drive adapter, card read punch adapter, plotter control... 1622 Card Read Punch...One 1311 Disk Storage Drive Model 3...1627 Plotter. If the

system is a Model 1, Additional Instructions, Automatic Divide, and Indirect Addressing are needed.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Program write-up...Application Directory...Application Description...Users Manual...Operators Manual...System Manual.
 MACHINE READABLE - Object code...Sample problem.

OPTIONAL PROGRAM PACKAGE
 DOCUMENTATION - None.
 MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620CX04X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

CONTINUED FROM PRIOR COLUMN

BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-EE-02X

ELECTRONIC CIRCUIT ANALYSIS PROGRAM

*M

DESCRIPTION - This programming system provides the electronics engineer with a powerful engineering tool to aid in the solution of an analysis and reliability problem prevalent in the electrical, electronics, and aerospace industries. It also provides sole justification for a 1620 in companies largely engaged in electronics design.

The program has the facility for AC, DC, or transient analysis of electronic circuits. The effect on circuit performance of tolerance variations and changes in component characteristics can be analyzed, allowing the engineer to obtain a final design of highly reliable circuits quickly and inexpensively. The engineer first develops a circuit equivalent to the one he wants to analyze in which he replaces active elements with equivalent models composed of passive elements. He then uses a specially designed input language, which greatly facilitates the use of the program by non-computer oriented engineers, to describe the equivalent circuit and its physical characteristics. The system then automatically generates the circuit equations, relieving the engineer of this chore. Selective control over the analysis and output is retained by the engineer through simple input statements. Console intervention routines provide additional control over the program and allow for experimental modification of the circuit parameters.

FEATURES -
 - Easy to use input language
 - Automatic generation of circuit equations.
 - Obtains designs of high reliability through ability to practically investigate many variations of the circuit design.
 - Allows experimental design at the console or automatic iterative solutions of final design.
 - Handles a circuit of up to 21 nodes and 60 branches.
 - Non-linear transient analysis through linear approximations.
 - Worst case analysis of DC circuits.

The input language is interpreted by a main line program which then calls in one of the three analysis programs as requested by the user through the input language. Input may be batched, thus performing a number of analyses that may or may not be related.

PROGRAMMING SYSTEMS - Written in FORTRAN II-D, resides on the 1311 Disk Storage Drive, and operates under the 1620 Monitor I System, (1620-PR-025).

MINIMUM SYSTEM REQUIREMENTS - A 40K 1620 System Model 1 or 2 with... one 1311 Disk Storage Drive... 1622 Card Read Punch... Automatic Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Program write-up...Application Directory...Application Description... Users Manual...Operators Manual.
 MACHINE READABLE - Object code...Monitor control program...sample problem program.

OPTIONAL PROGRAM PACKAGE
 DOCUMENTATION - Systems Manual.
 MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620EE02X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-EO-01X

GENERAL RAY TRACE AND THIRD ORDER ABERRATIONS

*M

DESCRIPTION - The lens design application is a simulation of the lens systems effects upon rays of light which enter such systems. A lens system is defined as an object surface, a succession of refracting and/or reflecting surfaces, and an image surface. The purpose of this application program is to assist the lens designer in designing lens systems, which meet the specifications, without laborious manual computations and extensive model building.

MINIMUM SYSTEM REQUIREMENTS - A 1620 system with a 20,000 core memory, Indirect Addressing and card input/output.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Listings.

CONTINUED FROM PRIOR PAGE

MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.

MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620E001X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-FO-03X *M
VIGNETTED APERTURE AND SPOT DIAGRAM PROGRAMS

DESCRIPTION - This program computes the vignettted aperture of a lens system. The program aids constructs a grid across the area and traces rays through the system from the grid. Thus the lens designer can focus his attention on the total usable path of light through the system. The program will handle - up to 999 spots traced per spot diagram, up to 29 surfaces, including up to 5 tenth order aspheric surfaces, or up to 31 surfaces if all conic sections. The vignettted aperture shape may be either specified by the designer or computed automatically.

MINIMUM SYSTEM REQUIREMENTS - A 1620 system with a 20,000 position core memory, Indirect Addressing, and either card or paper tape input/output, (Paper tape systems must be at least E suffix models).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Listings.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620E003X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-FO-05X *M
RADIAL ENERGY DISTRIBUTION AND FOCUS SHIFT COMPUTATIONS PROGRAM

DESCRIPTION - The program computes Radial Energy distribution from Spot Diagram input data. The program will handle up to 500 spots per energy distribution. The program has the ability to obtain chromatic energy distributions, specify obscurations, shift focus to arbitrary image position and surface shape.

MINIMUM SYSTEM REQUIREMENTS - A 1620 system with a 20,000 position core memory, Indirect Addressing, and either card or paper tape input/output. (Paper Tape systems must be at least E suffix models.)

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Listings.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620E005X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-FO-004 *M
FORTRAN WITH FORMAT - CARD

DESCRIPTION - The new version incorporates the set of subroutines previously available as 1620 F/F-AFP subroutines, No. 1620-LM-022 (card). It also provides a new set of subroutines designed specifically for 1620 systems equipped with the Automatic Floating Point operations, Additional Instructions, and Indirect Addressing features. The 1620 FORTRAN with Format system brings the advantages of the FORTRAN language to 1620 users. The language of FORTRAN closely resembles the language of mathematics. The similarity allows technical personnel

CONTINUED FROM PRIOR COLUMN

who are not trained as programmers to prepare their problems for the 1620. For scientific and engineering computations where problems are usually expressed mathematical formulae, FORTRAN is extremely useful. A source program written in the FORTRAN Language is processed by the 1620 FORTRAN with Format Compiler (processor) to produce a 1620 machine-language object program, which is then loaded and executed. Input/output facilities contain provision for including fixed or variable alphabetic information in the typed or punched results. The appropriate set of floating point arithmetic and functional subroutines may be compiled with the object program or loaded with the compiled program prior to execution. Functional subroutines are selectively included as necessary. The precisions of Fixed Point and Floating Point Arithmetic are 4 and 8 decimal digits, respectively. Four sets of fixed length floating point subroutines are available, designed for four different 1620 system features configurations.

MINIMUM SYSTEM REQUIREMENTS - For both compilation and execution, a 20K 1620 Model 1 or 2 with... 1622 Card Read/Punch or 1621 Paper Tape Reader and 1624 Tape Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Listings... Flowcharts.
MACHINE READABLE - Option 1 - Subroutines (with listings) for machines with the Automatic Divide feature; 1620 FORTRAN with Format Processor, and is specified by using Program Number Extension OPT1. Option 2 - Subroutines (with listings) for machines with the Automatic Floating Point Operations feature; 1620 FORTRAN with Format Processor, and is specified by using Program Number Extension OPT2. Option 3 - Subroutines (with listings) for machines with the Automatic Floating Point Operations, additional instructions, and indirect addressing; 1620 FORTRAN with Format Processor and is specified by using Program Number Extension OPT3. Option 4 - Subroutines (with listings) for machines without the Automatic Divide feature; 1620 FORTRAN with Format Processor, and is specified by using Program Number Extension OPT4.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620F0004

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
	OPT3	DTR*	00	none
	OPT4	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				01 01

1620-FO-006 *M
FORTRAN PRE-COMPILER (CARD)

DESCRIPTION - This program detects and permits correction of errors in a FORTRAN source program before the object program is compiled. The Pre-Compiler detects many of the more common programming errors in individual source statements, and indicates possible logical errors in the source program as a whole.

MINIMUM SYSTEM REQUIREMENTS - 20,000 positions, 1620 CPU, 1622 Card Reader/Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Listings.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620F0006

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-FO-019 *M
FORTRAN II (CARD)

DESCRIPTION - 1620 FORTRAN II is an extension of 1620 FORTRAN and 1620 FORTRAN with Format. It provides many additional features such as subroutine and function subprogram facility, provision for arithmetic statement

CONTINUED FROM PRIOR PAGE

functions, common and equivalence statements, and complete flexibility in format specifications. Continuation cards, variable length precision in calculations, extensive diagnostic checks, and multiple compilation facility enhance the usability of the system.

MINIMUM SYSTEM REQUIREMENTS - (1) For compilation - A 1620 with 40,000 digits of storage, card read/punch, Indirect Addressing, and Automatic Divide features. The processor can be modified for 60,000 digits of storage to allow an extension of the symbol and name tables. (2) For execution, a 1620 with 40,000 digits of storage, card read/punch, Indirect Addressing, and Automatic Divide features. The processor can be modified to compile object programs for execution on 1620's with 20,000 or 60,000 digits of storage.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Reference Manual.
MACHINE READABLE - Option 1 - Subroutines for systems without Automatic Floating Point and is specified by using Program Number Extension OPT1. Option 2 - Subroutines for systems with the Automatic Floating Point feature and is specified by using Program Number Extension OPT2.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings... Flowcharts.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620FO019

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
OPTIONAL	none	none		none

1620-FO-037 *M
1620/1443 FORTRAN WITH FORMAT (CARD)

DESCRIPTION - The IBM 1620/1443 FORTRAN with Format, No. 1620-FO-037 (card), is a modification of IBM 1620 with Format. It uses the IBM 1443 Printer as an integral component in the compilation of source programs, and incorporates printer versions of the subroutine sets. 1620-1443 Systems are thus provided with a convenient and relatively fast means of listing FORTRAN source programs and symbol tables, greater programming flexibility and faster throughput.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system, Model 1 or 2... 1622 Card Read/Punch... 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Listings... Flowcharts... Manual of 1620 FORTRAN with Format.
MACHINE READABLE - 1620-1443 FORTRAN with Format processor deck plus one of the following options:
Option 1 - Subroutines (with listings) for machines with the Automatic Divide feature and is specified by using Program Number Extension OPT1. Option 2 - Subroutines (with listings) for machines with the Automatic Floating Point feature and is specified by using Program Number Extension OPT2. Option 3 - Subroutines (with listings) for machines with the Automatic Floating Point, Additional Instructions, Indirect Addressing features and is specified by using Program Number Extension OPT3. Option 4 - Subroutines (with listings) for machines without the Automatic Divide feature and is specified by using Program Number Extension OPT4.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620FO037

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
	OPT3	DTR*	00	none
	OPT4	DTR*	00	none
OPTIONAL	none	none		none

1620-FO-049 *M
FORTRAN II FOR AUTOMATIC FLOATING POINT

DESCRIPTION - The IBM 1620 FORTRAN II for Automatic Floating Point, program 1620-FO-049, (card) generates In-Line

CONTINUED FROM PRIOR COLUMN

Floating-Point and Fixed-point instructions from arithmetic statements, resulting in improved object program speed. The language specifications are the same as those of 1620 FORTRAN II, Version 2, with the addition of two new statements for overflow and exponent check. They are-

if (exponent check) N1, N2
if (exponent check) N1, N2

A source program written in FORTRAN Language is processed by the 1620 FORTRAN II for Automatic Floating Point Compiler to produce a 1620 machine language object program deck, which may then be loaded and executed. A set of arithmetic and functional subroutines may be punched with the compiler program or loaded with the object program prior to execution. Functional subroutines are selectively included as necessary. The precision of fixed-point (I-type) data may vary from 4 to 10 decimal digits, the precision of floating-point (E-or F type) mantissas is fixed at 8 decimal digits.

Object execution...performance compilation object programs generated by the 1620 FORTRAN II for Automatic Floating-point may be executed in up to 50 percent less time than required by the 1620 FORTRAN II, Version 2, depending on the proportion of the program that involves arithmetic computations. The translation efficiency and compilation speed are essentially the same for both the 1620 FORTRAN II for Automatic Floating Point (1620-FO-049) and 1620 FORTRAN II, Version 2, (1620-FO-019) programs. The object programs for the 1620 FORTRAN II for Automatic Floating Point, however, begin at core storage location 10000, thus providing an additional 1000 positions of core storage over the 1620 FORTRAN II, Version 2.

PROGRAMMING SYSTEMS - Written in FORTRAN, machine language.

MINIMUM SYSTEM REQUIREMENTS - For compilation- a 40K 1620 Model 1 or 2 system with 1622 Card Read Punch, Indirect Addressing feature. For object program execution- the same, plus the Automatic Divide and Automatic Floating Point Operations features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, reference manual.
MACHINE READABLE - Processor, subroutine set, FORTRAN sample program.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Program listings, flowcharts.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620FO049

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-LM-017
TRANSPORTATION PROBLEM

DESCRIPTION - This program solves the transportation problem. That is, it minimizes the total cost of shipping from M warehouses to N retailers.

METHOD - A logical search technique applied to the stepping-stone methods. Restrictions problems: sizes are indicated by the formula 6,000 plus (M) (MODC) plus (M plus N) (MODS plus MODC plus 23) plus N (MODS plus 12) plus MODS equals cores where M equals number of warehouses max of 99. N equals number of retailers max of 900. MODS equals maximum number of digits used to specify units. MODS equals maximum number of digits used to specify cost. CORES equals number of positions of core memory. Typical sizes are 40 x 50 with both MODS and MODC equal to 5 digit fields, 40 x 80 with MODS and MODC, MODS and MODC reduced to 3 digit fields, or if 40K additional memory is available, a 48 x 300 problem may be solved using 3 digit fields. Results of a 40 x 50 problem calculation time for a 40 x 50 test problem varied from 3 min. using 3 digit cost and unit fields to 3 3/4 min. using 8 digit fields. The variation of core storage used was from about 15,000 to over 26,000. The total card input required approximately 2 1/2 additional min. while output added another 1/2 min., for a total running time of less than 7 minutes. Other 40 x 50 test problems have required as much as 8 minutes of calculation time, using 8 digit fields and occupying over 26,000 core locations.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Card or tape I/O. Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, listings.
MACHINE READABLE - Object code.

CONTINUED FROM PRIOR PAGE

CONTINUED FROM PRIOR COLUMN

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Object program code for paper tape system users.

EXTENSION	TYPE	CODE	REQUIREMENT
BASIC none	DTR*	00	none
OPTIONAL none	DTR*	00	none

ORDERING INFORMATION: PROGRAM NUMBER 1620LM017

PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
EXTENSION	TYPE	CODE	REQUIREMENT
BASIC none	CARDS	15	none
	PT	05	none
OPTIONAL none	none		none

1620-LM-018

PRODUCTION LINE BALANCING

DESCRIPTION - Given the times and precedence relationships for all of the basic jobs on an assembly line; given also the production rate desired, this program, using a fast Heuristic approximation technique, assigns these jobs to operators, minimizing the total number of operators on the line. The approximation technique used requires that the line be zoned and that each job be classified as either a must-do (must be done in one particular zone) or a can-do (can be done in two or more zones).

Restrictions - Up to 99 zones per line, from 27 to 98 jobs per zone depending on the complexity of the precedence relationships, up to 98 can-do jobs per line.

Timing - Very much dependent on the complexity of the problem being solved.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 with Paper Tape or Card I/O equipment.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, listings.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM018

PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
EXTENSION	TYPE	CODE	REQUIREMENT
BASIC none	CARDS	15	none
	PT	05	none
OPTIONAL none	none		none

1620-LM-039

FORTRAN WITH FORMAT, 1627 PLOTTER SUBROUTINE, PROGRAM (CARD)

DESCRIPTION - FORTRAN compilers supported with Plotting Facility are FORTRAN with Format, FORTRAN II, and FORTRAN II-D (Monitor I and 1443 Monitor I). Plotter output instructions can now be incorporated directly into your customers FORTRAN source programs.

Each program provides a relocatable plot subroutine (written for 1620-LM-039) for executing on-line point-to-point plotting. Calling from FORTRAN source program, write (...N) list for LM-039 control point-to-point plotting. call CHAR (list) followed immediately by a format statement controls annotation. A modification must be made to the FORTRAN with Format compiler which pre-empts 350 core storage locations (35 symbol table entries). No space is required in the other two compilers. Object time core requirements are for 1620-LM-039 - WRIT, 2830 point-to-point plotting speed is at least two inches per second (200 increments). Annotations speed will be variable depending on the size of characters, the characters themselves, and the distance between characters.

MINIMUM SYSTEM REQUIREMENTS - Compilation and execution requirements in each case are the same as those of the parent FORTRAN compiler, except that the IBM 1627 Plotter is required for execution.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, listings, flow-charts, 1620-1627 FORTRAN Plotter Subroutines Manual.
MACHINE READABLE - Modification deck, Plot subroutine.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM039

PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
----------------	--------------	--------	-------------

1620-LM-040

1620/1443 FORTRAN WITH FORMAT - 1627 PLOTTER SUBROUTINE

DESCRIPTION - The IBM 1620-1443 FORTRAN with Format, (1620-LM-040) allows the 1627 Plotter output instructions to be incorporated into source programs written for the IBM 1620/1443 FORTRAN with Format Compiler. The relocatable subroutine WRIT can be accessed by a new statement, write (99,N) list, which causes the 1627 Plotter to perform on-line point-to-point plotting from coordinates supplied in the list. The modification deck modifies the 1620/1443 FORTRAN with Format Processor to accept the new statement. The modification pre-empts 350 core storage locations (35 symbol table entries). The object time core requirement for the WRIT subroutine is 2830. Plotting speed is at least two inches per second (200 increments).

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system, Model 1 or 2, 1622 Card Read Punch or 1621 Paper Tape Unit, Model 2, 1443 Printer, IBM 1627 Plotter is required for object program execution.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, flowcharts, listings, FORTRAN plotter subroutines.
MACHINE READABLE - Modification deck
PLOT subroutine WRIT.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM040

PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
EXTENSION	TYPE	CODE	REQUIREMENT
BASIC none	DTR*	00	none
OPTIONAL none	DTR*	00	none

1620-LM-041

FORTRAN II, 1627 PLOTTER SUBROUTINES PROGRAM (CARDS)

DESCRIPTION - FORTRAN compilers supported with plotting facility are FORTRAN with Format, FORTRAN II, and FORTRAN II-D (Monitor I and 1443 Monitor I). Plotter output instructions can now be incorporated directly into your customers FORTRAN source programs.

Each program provides a relocatable PLOT subroutine (PLOT for 1620-LM-041) for executing on-line point-to-point plotting. 1620-LM-041 provides an additional annotation subroutine (CHAR) for plotting letters, numbers, and FORTRAN special characters. Call PLOT (list) for 1620-LM-041 control point-to-point plotting. Call CHAR (list) followed immediately by a format statement controls annotation.

A modification must be made to the FORTRAN with Format Compiler which pre-empts 350 core storage locations (35 symbol table entries). No space is required in the other two compilers. Object time core requirements are- 1620-LM-041 - PLOT, 2868 - CHAR, 4350. Point-to-point plotting speed is at least two inches per second (200 increments). Annotations speed will be variable depending on size of characters, the characters themselves, and the distance between characters.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEMS REQUIREMENTS - Compilation and execution requirements in each case are the same as those of the parent FORTRAN compiler, except that the IBM 1627 Plotter is required for execution.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, listings, flowcharts, 1620-1627 FORTRAN Plotter Subroutines Manual.
MACHINE READABLE -
Option 1- Plot subroutine code, PLOT requiring Automatic Floating Point feature, Annotation subroutine deck CHAR requiring Automatic Floating Point feature. Specified by using Program Number Extension OPT1

Option 2- Plot subroutine code PLOT, not requiring Automatic Floating Point feature. Annotation subroutine deck CHAR not requiring Automatic Floating Point feature.

CONTINUED FROM PRIOR PAGE

Specified by using Program Number Extension OPT2.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM041

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
OPTIONAL	none	CARDS	15	none

1620-LM-042 *M
FORTRAN II-D, 1627 PLOTTER SUBROUTINES, PROGRAM (CARD)

DESCRIPTION - FORTRAN compilers supported with Plotting Facility are FORTRAN with Format, FORTRAN II, and FORTRAN II-D (Monitor I and 1443 Monitor I). Plotter output instructions can now be incorporated directly into your customers FORTRAN source programs.

Each program provides a relocatable plot subroutine (PLOT for 1620-LM-942 for executing on-line point-to-point plotting. 1620-LM-041 and 1620-LM-042 provide an additional annotation subroutine (CHAR) for plotting letters, numbers, and FORTRAN special characters. Call PLOT (list) for 1620-LM-042 control point-to-point plotting. Call CHAR (list) followed immediately by a format statement controls annotation. A modification must be made to the FORTRAN with Format compiler which pre-empts 350 core storage locations (35 symbol table entries). No space is required in the other two compilers. Object time core requirements are- for 1620-LM-042 - PLOT, 2868... CHAR, 4305. Point-to-point plotting speed is at least two inches per second (200 increments). Annotations speed will be variable depending on size of characters, the characters themselves, and the distance between characters.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Compilation and execution requirements in each case are the same as those of the parent FORTRAN compiler, except that the IBM 1627 Plotter is required for execution.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up, listings, flowcharts, 1620-1627 FORTRAN Plotter Subroutine Manual.
MACHINE READABLE - Plot subroutines and Annotation subroutine.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM042

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-LM-050 *M
MONITOR II (FORTRAN II-D) 1627 PLOTTER SUBROUTINES (CARD)

DESCRIPTION - The IBM 1620 Monitor II, FORTRAN II-D, 1627 Plotter Subroutines, (1620-LM-050) has the combined plot and annotation capabilities to control the operation of the 1627 Plotter, on-line with the 1620 mdl 2. These subroutines operate with 1620-1311 Monitor II, Version 2, (1620-PR-029 card) and 1620-1443 Monitor II, (1620-PR-029 card) and 1620-1443 Monitor II, (1620-PR-045 card).

The plot subroutines (PLOT) allows the user to perform point-to-point on-line plotting from coordinates supplied by the arguments of a FORTRAN call statement. The call statement is written as CALL PLOT (LIST), where the items in the list provide the input for the plot subroutine. The annotation subroutine (CHAR) gives the user an easy method of annotating in conjunction with plotting. This subroutine utilizes the 1620 FORTRAN II-D program for plotting letters and numbers as well as all FORTRAN special characters for labeling. It can be accessed by a FORTRAN call statement followed immediately by a FORMAT statement containing the alphanumeric information and the FORMAT specifications with which the object time values of the variables are to be plotted.

The two FORTRAN statements required for accessing the CHAR subroutine must be used in the following order: CALL CHAR (N, SIZE, IHV, VAR SUB 1, VAR SUB 2, --- VAR SUB N) N format (S SUB 1, S SUB 2, --- S SUB N) where VAR SUB 1,

CONTINUED FROM PRIOR COLUMN

VAR SUB 2, --- VAR SUB N are variables to be plotted and S SUB 1, S SUB 2, S SUB N are the formats of these variables.

Source programs which call these plotter subroutines will compile at approximately the same speed as any comparable program with call statement.

MINIMUM SYSTEM REQUIREMENTS - FORTRAN II-D... PLOT, 2868 core positions... Annotation, 4308 core positions (Annotation for the 1620 Monitor I, FORTRAN II-D requires 4304 core positions). A 20K 1620 mdl 2 system with... 1522 Card Read Punch... 1626 Plotter Control and 1627 Plotter, mdl 1 or 2... 1311 disk Storage Drive, mdl 3... Automatic Floating Point feature, Index Registers... 1442 Printer (when using 1620-1443 Monitor II).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program Write-up, Program Listings, Flowcharts.
MACHINE READABLE - Point-to-point plot subroutines.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620LM050

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-PR-011 *M
GOTRAN (CARD)

DESCRIPTION - A relatively fast compiler for programs which will generally be executed only once. GOTRAN stores the compiled program in memory during computation. The object program is then executed in an interpretive mode. No object tape or deck is produced. After execution of an object program, computation of a new object program is possible without loading the processor. Restrictions/range: the language used in GOTRAN is a modified subset of FORTRAN, including the functional subroutines.

Arithmetic statements are restricted to one arithmetic operation per statement. Data is handled in the form of 10 digit floating point numbers or 3 digit fixed point numbers. Input-output is the same form as FORTRAN with the exception that cards are punched with one item per card. The maximum number of symbols that may be used in 490. The number statements allowed is inversely proportional to the number of symbols used. Approximately 211 statements can be compiled using 200 symbols. Storage requirements not given.

MINIMUM SYSTEM REQUIREMENTS - Basic 1620 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR011

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-PR-025 *M
MONITOR 1 (CARD)

DESCRIPTION - Among the outstanding features of the sophisticated monitor I are-

1. Reduces set up time.
2. Expedites processor loading.
3. Expands error checking and correction.
4. Provides versatile I/O macros.
5. Simplifies program segmentation.
6. Provides load and go techniques for SPS and FORTRAN.
7. Provides compile and go techniques for SPS and FORTRAN.
8. Intermixing of FORTRAN compilations, SPS assemblies and object programs in any order.

The IBM 1620 Monitor I System is composed of four distinct but interdependent programs.* Supervisor program, Disk Utility program, SPS II-D, and FORTRAN II-D. The new publication, IBM 1620 Monitor I System, C26-5739-1, provides complete specifications and operating instructions for Monitor I and its four component programs. The *MOVE control record function found in the Disk Utility program

CONTINUED FROM PRIOR PAGE

specification (IBM 1620 Monitor I System specifications, C226-5719-0, pg. 18) has been deleted from Monitor I System. This function can be accomplished by using the *DLOAD, and *DELET DUP control functions. The new publication covers this function in more detail.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 card system with... 1622 Card Read Punch... One 1311 Disk Storage Drive... Indirect Addressing feature. Automatic Divide is required for execution of FORTRAN II-D compiled programs which include floating point arithmetic or functional macro-instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - 1620 Monitor I System decks, sample problem.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings, flowcharts.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR025

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				02 02

1620-PR-029 *M
1620/1311 MONITOR II (CARD)

DESCRIPTION - 1620 Monitor II, Version 2, a disk-oriented system allows the user to execute several programs without operator intervention. Jobs to be performed are stacked and separated by control cards that identify the jobs. Jobs may be processed in any order: i.e., FORTRAN compiling jobs, SPS assembly jobs, and previously compiled or assembled user jobs. Input may be from cards, paper tape or typewriter. An optimizing phase has been included in the FORTRAN II-D Compiler eliminating redundant subscript address calculations with the use of index registers. The result is less generated object code due to fewer subscript calculations and hence faster execution of object programs. Additional object time speed is obtained by the in-line Floating Point instruction, and a new fixed-word length subroutine package. Compilation speed - with the exception of very small programs (less than 32 seconds of compilation), compilation time on Monitor II, Version 2, when compared to Monitor I on a 1620 Model 1 is reduced by a factor of up to approximately 4. The relationship can be expressed by the approximate formula: Y equals 0.26 x 8 + 25 (all times expressed in seconds) where X equals Monitor I on a Model 1 compile time and, Y equals Monitor II, Version 2 compile time.

NOTE - When comparing Monitor II, Version 2 with Monitor II, Version 1, use the formula Y equals 0.62 x 8 + 28.

Generally, compile times are in the range of from 60-80 cards per minute.

Object execution speed - It is difficult to discuss object program speed without discussing a particular program. If a program is input/output limited, it is obvious that no object program speed can be gained. If, however, there are extended periods of processing, the gains can be dramatic. The following can be stated relative to programs which are processor limited (extended periods of computation without frequent I/O operations) - The Monitor II, Version 2, execution time will be reduced by a factor of up to 7.5 when compared to Monitor I on a Model 1.

Example- A processor limited program which took 15 minutes to execute on Monitor I on a Model 1, now takes 2 minutes to execute on Monitor II, Version 2.

Note- In a similar situation Monitor II, Version 1 execution by Monitor II, Version 2.

Object program space- The gain in translation efficiency of Version 2 compared with Version 1 is dependent on the number and type of subscript expressions in a given program. In highly subscripted programs, where the subscripts are expressions, the number of generated instructions for Version 2 compiled programs has been cut in half. There is no reduction in a program which does not use any subscripting.

Faster execution... Faster compiling... Reduced object space... Executes up to 7 1/2 times faster, compiles up to 4 times faster, and reduces object space up to 50 per cent when compared to FORTRAN II-D under Monitor I.

These significant increases are accomplished by-

- Generating floating point instructions in line.

CONTINUED FROM PRIOR COLUMN

- Providing a fixed length subroutine package.
- Adding an additional phase which optimizes subscripting and index register usage.

Because of the increased speed and the flexibility of the Monitor System, the 1620, Model 2, running stacked FORTRAN jobs will out-perform many larger and more expensive systems. Monitor II, Version 2, is the result of our experience gained through the development of 1620 compiling systems and a thorough analysis of customer requirements.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system, Module 2, with... 1622 Card Read Punch or 1621 Paper Tape Unit, Model 2... 1311 Disk Storage Drive... Index Registers and Automatic Floating Point Operations features. (Below serial #20176, be sure operation codes BTA (10) and BTAM (20) are installed).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Sample problem and Monitor II program.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings, flowcharts.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR029

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				02 02

1620-PR-030 *M
1620/1311 MONITOR II (TAPE)

DESCRIPTION - 1620 Monitor II, Version 2, a disk-oriented system allows the user to execute several programs without operator intervention. Jobs to be performed are stacked and separated by control cards that identify the jobs. Jobs may be processed in any order-i.e., FORTRAN compiling jobs, SPS assembly jobs, and previously compiled or assembled user jobs. Input may be from cards, paper tape or typewriter. An optimizing phase has been included in the FORTRAN II-D Compiler eliminating redundant subscript address calculations with the use of index registers. The result is less generated object code due to fewer subscript calculations and hence faster execution of object programs. Additional object time speed is obtained by the in-line Floating Point Instruction, and a new fixed-word length subroutine package.

Compilation speed - With the exception of very small programs (less than 32 seconds of compilation), compilation time on Monitor II, Version 2, when compared to Monitor I on a 1620 Model 1 is reduced by a factor of up to approximately 4. The relationship can be expressed by the approximate formula-Y equals 0.26 x + 25 (all times expressed in seconds) where X equals Monitor I on a Model 1 compile time and, Y equals Monitor II, Version 2 compile time.

Note- When comparing Monitor II, Version 2 with Monitor II, Version 1, use the formula Y equals 0.62 x + 28. Generally, compile times are in the range of from 60-80 cards per minute.

Object execution speed - It is difficult to discuss object program speed without discussing a particular program. If a program is input/output limited, it is obvious that no object program speed can be gained. If, however, there are extended periods of processing, the gains can be dramatic. The following can be stated relative to programs which are processor limited (extended periods of computation without frequent O/O operations) - The Monitor II, Version 2, execution time will be reduced by a factor of up to 7.5 when compared to Monitor I on a Model 1.

Example- A processor limited program which took 15 minutes to execute on Monitor I on a Model 1, now takes 2 minutes to execute on Monitor II, Version 2. Note- In a similar situation Monitor II, Version 1 execution times are reduced by 35 per cent when compiled and executed by Monitor II, Version 2.

Object program space- The gain in translation efficiency of Version 2 compared with Version 1 is dependent on the number and type of subscript expressions in a given program. In highly subscripted programs, where the subscripts are expressions, the number of generated instructions for Version 2 compiled programs has been cut in half. There is no reduction in a program which does not use any subscripting.

Faster execution... Faster compiling... Reduced object space... Executes up to 7 1/2 times faster, compiles up to 4 times faster, and reduces object space up to 50 per cent when compared to FORTRAN II-D under Monitor I.

CONTINUED FROM PRIOR PAGE

CONTINUED FROM PRIOR COLUMN

cent when compared to FORTRAN II-D under Monitor I. These significant increases are accomplished by- generating Floating Point Instructions in line... providing a fixed length subroutine package... adding an additional phase which optimizes subscripting and index register usage. Because of the increased speed and the flexibility of the monitor system, the 1620, Model 2, running stacked FORTRAN jobs will out-perform many larger and more expensive systems. Monitor II, Version 2, is the result of our experience gained through the development of 1620 compiling systems and a thorough analysis of customer requirements.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system, Model 2, with... 1622 Card Read Punch or 1621 Paper Tape Unit, Model 2... 1311 Disk Storage Drive... Index Registers and Automatic Floating Point Operations features. (Below Serial #20176, be sure operation codes BTA (10) and BTAM (20) are installed).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up, Reference Manual.
MACHINE READABLE - Sample problem, Monitor II system.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings, flowcharts.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR030

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	MT	7/556 7/800	22 24
				02 02

1620-PR-0331620/1443 MONITOR I (CARD)

*M

DESCRIPTION - The 1620/1443 Monitor I, is a major modification of the IBM 1620 Monitor I system. The modified system uses the IBM 1443 Printer as an integral component for on-line listings during compilation or assembly of FORTRAN II-D or SPS II-D source programs and as an output device for lists or tables in the Disk Utility Program (DUP). In general, printer output now replaces typewriter output. Furthermore, listings which are presently obtained by listing punched card output from Monitor I off-line on an IBM 407, can now be obtained on-line on the 1443 Printer. All 144 print positions may be used by FORTRAN II-D programs. Use and output remains the same except that printer output and control cards replace FORTRAN II-D console switch settings.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system (Model 1 or 2)... 1622 Card Read Punch... One 1311 Disk Storage Drive... 1443 Printer... Indirect Addressing feature. The Automatic Divide feature is required for execution of FORTRAN II-D compiled programs, and for execution of SPS II-D compiled programs using Floating Point arithmetical or functional macro-instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up, Manual of 1620 Monitor I System.
MACHINE READABLE - 1620/1443 Monitor I program, SPS II-D sample problem, FORTRAN II-D sample problem plus one of the following options: Option 1- For machines with 120 print positions and is specified by using Program Number Extension OPT1. Option 2- For machines with 144 print positions and is specified by using Program Number Extension OPT2.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings, flowcharts.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR033

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				02 02

1620-PR-0451620/1443 MONITOR II (CARD)

*M

DESCRIPTION - The 1620/1443 Monitor II provides printing facilities for users. The use and operation of the program is essentially the same as for the 1620 Monitor II with the exceptions of printer output.

Added features-

- Easy-to-use SPS II-D macro-instructions control printer operation.
- FORTRAN print and format statements control printer operation including carriage control.
- Up to 120 characters can be printed on each line by FORTRAN object programs.
- Up to 144 characters can be printed on each line by SPS object programs.
- Object programs may be printed by either typewriter or output printer.
- List and tables are printed on the 1443 by use of the Disk Utility Program.
- On-line program listings are generated on the printer during compilation of assembly.

Core storage requirements for compilation and assembly- The disk storage requirements for the system are approximately one half of a disk storage cylinder more than that required by Monitor II. The FORTRAN II-D Compiler and SPS II-D Assembler each uses core storage positions 02402 to the limit of available core storage. Their core storage requirements have not been materially increased, due to the addition of the printer, for the following reasons- (1) The listing of the program being compiled or assembled is accomplished by substituting printer commands for typewriter commands. (2) Page overflow routines from disk storage overlay a portion of the compiler or assembler when in core storage.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 mdl 2 system with... 1622 Card Read Punch... one 1311 Disk Storage Drive... 1443 Printer... Index Registers feature. The Automatic Floating Point Operations feature is required for execution of FORTRAN object programs.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up and Reference Manual.
MACHINE READABLE - Program decks, sample problem for SPS and FORTRAN.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Listings, flowcharts.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620PR045

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				02 02

1620-SM-0471620/1311 SORT-MERGE (CARD)

*M

DESCRIPTION - The IBM 1620/1311 Sort/Merge 1620-SM-047 card program demonstrates the versatility of the 1620 in solving both scientific and commercial applications. Users have a complete operating program for maximum system utilization.

FEATURES - 1620-1311 Sort/Merge allows input of data and control records from cards or disk pack. Either one or two input data files can be sorted or two data files merged. Output is on a disk pack. Exit points to user routines permit the user to edit or select input records, output to other units besides the disk pack, and to return control to his program upon completion of the Sort/Merge Program. Records may be either fixed-length or variable-length, data may be either numeric or alphanumeric. Sort/Merge consists of 5 phases (0-4).

The first 4 phases of the program form a tag for each input record and sort these tags into either ascending or descending sequence. The tag contains the control fields and the location of the record on disk. The size of the location field is 8 core positions for variable-length records and 2 to 5 core positions for fixed-length records. The maximum number of fixed or variable length records that can be sorted or merged is 99,999. This number may be further reduced depending upon the disk storage space available for the tag file work area and the input and output data files. Phase 4 may be used to sort records into the sequence corresponding to the sorted tags. Maximum record length is 2500 core locations (2500 numerical or 1250 alphanumeric characters). Each record can contain up to 10 control fields and each field can have up to 100 core locations. The total tag size (control fields plus location field) must not exceed 900 core positions.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system mdl 1 or 2... 1311 Disk Storage Drive... 1622 Card Read/Punch... Indirect Addressing feature.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up... Reference Manual.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE

CONTINUED FROM PRIOR PAGE

DOCUMENTATION - Flowcharts... Program listings.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620SM047

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				01 01

1620-SP-009 *M
SYMBOLIC PROGRAMMING SYSTEM (CARD I/O)

DESCRIPTION - This program system assembles symbolic instructions into absolute machine language. The source program, consisting of the symbolic instructions, is read twice. Restrictions/range: The system can accommodate 312 labels.

PROGRAMMING SYSTEMS: Written in absolute machine language.

MINIMUM SYSTEM REQUIREMENTS - Basic 1620 with card I/O and can be modified for the 1623 Additional Storage Unit.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-Up... Listings.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620SP009

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-SP-020 *M
1620/1710 SPS (CARD)

DESCRIPTION - SPS is an extension of 1620 SPS. It provides many additional features in the assembly of source programs, and includes five sets of floating point subroutines for use on 1620 or 1710 systems of a variety of configurations. These are: (A) fixed length floating point numbers not using the Automatic Divide feature. (B) Fixed length floating point numbers using the Automatic Divide feature. (C) Variable length floating point numbers not using the Automatic Divide feature. (D) Variable length floating point numbers using the Automatic Divide feature. (E) Variable length floating point numbers using the Automatic Floating Point feature.

PROGRAMMING SYSTEMS - Written in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up and listings.
MACHINE READABLE - Option 1 - Basic 1620 and is specified by using Program Number Extension OPT1. Option 2 - Auto-Divide feature and is specified by using Program Number Extension OPT2. Option 3 - Auto-Floating Point feature and is specified by using Program Number Extension OPT3.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620SP020

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
		DTR*	00	none
		DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				01 01

1620-SP-027 *M
SPS III (CARD)

DESCRIPTION - The 1620 SPS III Processor is a major modification of 1620/1710 SPS in which provision has been made in the symbolic language for the indexing and binary features available with model 2 systems. All 1710 mnemonics and references to 1710 operations are deleted. The 1620 SPS III Processor assembles instructions, sets index register flags and, depending on the position of Console

CONTINUED FROM PRIOR COLUMN

Program Switch 1, produces the ADD table with each object deck (the multiply table is always produced). A Model 1 or Model 2 1620 can be used to assemble programs for either model. Object programs produced will utilize additional core storage to the extent such storage is available.

The subroutines available for 1620 SPS III are -

Floating Point Add	Floating Point Arctangent
Floating Point Subtract	Floating Point Exponential
Floating Point Multiply	Floating Point Logarithm
Floating Point Divide	Floating Point Right
Divide	Floating Point Left
Floating Point Square Root	Transmit Floating
Floating Point Sine	Branch and Transmit Floating
Floating Point Cosine	

Fixed length (8-digit) subroutines are provided which utilize the following two feature configurations- (a) No special features, and, (b) Automatic Divide feature. Variable length subroutines are provided for those two configurations and for a third configuration- (c) Automatic Divide and Automatic Floating Point Operations features. The floating point Mantissa can range from 2 to 45 digits in length in the variable length subroutines. The range of Floating Point numbers for the Floating Point subroutines is $\pm 1000...x10$ to the minus 99th power to $\pm 9999...9x10$ to the 99th power.

MINIMUM SYSTEM REQUIREMENTS - A 20K system, Model 1 or 2...1622 Card Read/Punch or 1621 Paper Tape Unit, Model 2...Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up and listings.
MACHINE READABLE - Option 1 - Fixed length subroutine and variable length subroutine set not using Auto-Divide feature and is specified by using Program Number Extension OPT1. Option 2 - Fixed length subroutine and variable length subroutine set using Auto-Divide feature and is specified by using Program Number Extension OPT2. Option 3 - Variable length subroutine set using Automatic Floating Point feature and is specified by using Program Number Extension OPT3.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620SP027

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
		DTR*	00	none
		DTR*	00	none
OPTIONAL	none	MT	7/556 7/800	22 24
				01 01

1620-SP-028
SPS III (TAPE)

DESCRIPTION - The 1620 SPS III Processor is a major modification of 1620/1710 SPS in which provision has been made in the symbolic language for the Indexing and Binary features available with Model 2 systems. All 1710 mnemonics and references to 1710 operations are deleted. The 1620 SPS III Processor assembles instructions, sets index register flags and, depending on the position of Console Program Switch 1, produces the ADD table with each object deck (the multiply table is always produced). A Model 1 or Model 2 1620 can be used to assemble programs for either model. Object programs produced will utilize additional core storage to the extent such storage is available.

The subroutines available for 1620 SPS II are -

Floating Point Add	Floating Point Arctangent
Floating Point Subtract	Floating Point Exponential
Floating Point Multiply	Floating Point Logarithm
Floating Point Divide	Floating Shift Right
Divide	Floating Shift Left
Floating Point Square Root	Transmit Floating
Floating Point Sine	Branch and Transmit Floating
Floating Point Cosine	

Fixed length (8-digit) subroutines are provided which utilize the following two feature configurations- (a) No special features, and, (b) Automatic Divide feature. Variable length subroutines are provided for those two configurations and for a third configuration- (c) Automatic Divide and Automatic Floating Point Operations features. The floating point Mantissa can range from 2 to 45 digits in length in the variable length subroutines. The range of floating

CONTINUED FROM PRIOR PAGE

CONTINUED FROM PRIOR COLUMN

point numbers for the floating point subroutines is $+ .1000 \times 10$ to the minus 99th power to $+ .9999 \dots 9 \times 10$ to the 99th power.

MT 7/800 24

01

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 system, Model 1 or 2...1622 Card Read/Punch or 1621 Paper Tape Unit, Model 2...Indirect Addressing.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Program write-up, listings and flowcharts.

MACHINE READABLE - Option 1 - SPS III program, Compressor program and sample problem. Fixed length subroutine set (with listings) not using the Automatic Divide feature. Variable length subroutine set (with listing) not using the Automatic Divide feature and is specified using Program Number Extension OPT1. Option 2 - SPS III program, Compressor program and sample problem. Fixed length subroutine set (with listings) using the Automatic Divide feature. Variable length subroutine set (with listing) using the Automatic Divide feature and is specified using Program Number Extension OPT2. Option 3 - SPS III program, Compressor program and sample problem. Variable length subroutine set (with listings) using the Automatic Floating Point feature and is specified by using Program Number Extension OPT3.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620SP028

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	PT	05	none
	OPT2	PT	05	none
	OPT3	PT	05	none
OPTIONAL	none	MT	7/556 7/800	01 01

1620-SP-035

1620/1443 SPS III (CARD)

DESCRIPTION - The IBM 1620 1443 SPS III Program, #1620-SP-035 (card), is a modification of 1620 SPS III. Its processor assembles programs for the IBM 1620 Models 1 and 2 systems (including provision for the Index Registers and Binary Capabilities features), and utilizes the 1443 Printer as an integral component in the processing of source programs written in SPS III language. A source program written in SPS III language is processed by the 1620 1443 SPS III program to produce a 1620 machine language object program deck or tape which can be loaded and executed. Program listings are produced on the 1443 Printer. Typewriter listings and off-line 407 listings are no longer necessary.

PROGRAMMING SYSTEMS - Written in SPS III Language.

MINIMUM SYSTEM REQUIREMENTS - For assembly and execution... a 20K 1620 system, Model 1 or 2... 1622 Card Read/Punch... 1443 Printer... Indirect Addressing feature.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Program write-up, flowcharts, Reference Manual and listings.

MACHINE READABLE - Option 1 - Subroutines (with listings) for machines without Automatic Divide feature and is specified by using Program Number Extension OPT1. Option 2 - Subroutines (with listings) for machines with Automatic Divide feature and is specified by using Program Number Extension OPT2. Option 3 - Subroutines (with listings) for machines with Floating Point features and is specified by using Program Number Extension OPT3.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620SP035

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	OPT1	DTR*	00	none
	OPT2	DTR*	00	none
	OPT3	DTR*	00	none
OPTIONAL	none	MT	7/556	01

1620-UG-01X

CIVIL ENGINEERING COORDINATE GEOMETRY COGO 1 - CARD

DESCRIPTION - COGO 1 is a problem oriented programming system designed for civil engineering geometry problems. The system is applicable to all phases of horizontal geometrical design such as right-of-way computations, subdivision layout, highway and ramp design, and structural bridge geometry. Using COGO 1, the engineer merely states his problem, in his own professional language, to the 1620. The computer then solves the problem without the need for any machine programming by the engineer. The concepts involved are applicable to a wide range of all engineering design problems.

FEATURES -

- A programming system that allows the civil engineer to state his problem to the 1620 in his own professional language.
- An effective sales tool, allowing the engineer to use the computer on his own problems with no machine programming training.
- The 1620 can recognize the civil engineer's vocabulary.
- No forms are involved for original data preparation. The engineer can use any piece of paper to state his problem -- even a surveying field book.
- There is no limit to the size of problem that can be solved, the system is open-ended.
- No programming -- in the usual sense of the word -- is ever necessary.
- The system is easily modified and expanded to fit the customers needs.
- The engineer uses his experience, judgement, and creative ability in close communication with the 1620.

The COGO System is divided into a main routine and eleven subroutine decks encompassing 43 civil engineering terms. The user writes the description of his problem and how to solve it with these civil engineering terms. Each line of data and descriptive information he has written is punched on cards or entered on the console typewriter. The user then selects the correct subroutine decks and includes them with his description deck. Therefore, the run is tailored to the specific problem at hand and since the terms can be reused, there is no limit to the extent of a run.

MINIMUM SYSTEM REQUIREMENTS - Any 20K 1620 (card).

BASIC PROGRAM PACKAGE

DOCUMENTATION - Reference Manual... Flowcharts... Listings.

MACHINE READABLE - Source program... Object program.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620UG01X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-UG-05X

CIVIL ENGINEERING COORDINATE GEOMETRY I - DISK

DESCRIPTION - COGO I - Disk is the new version of Civil Engineering Coordinate Geometry which includes the use of 1311 disk storage. The present card system (1620-UG-01X) will continue to be maintained.

This problem-oriented-programming system is designed for civil engineering geometry problems and is applicable to all phases of horizontal geometrical design. This includes highway design, right-of-way computation, subdivision layout, ramp and interchange design, surveying and layout, and structural geometry calculations.

FEATURES -

- The civil engineer states his problem to the 1620 in his own professional language.
- An effective sales tool, allowing the engineer to use the computer on his own problems with no programming training.
- The 1620 recognizes the civil engineer's vocabulary.
- No forms are involved for data preparation. The source document may be a design drawing or even a surveying fieldbook.
- No limit to the size of problem which may be solved; the system is open ended.
- The engineer uses his experience, creative ability, and engineering judgement in close communication with COGO I Disk.
- No programming - in the usual sense of the word, is ever necessary.

CONTINUED FROM PRIOR PAGE

- The system may be easily modified and expanded to fit the individual customer's needs.
- Eliminates the need for a programming staff in civil engineering geometry applications area.

USE - COGO I - Disk System is divided into a main routine and eleven subroutine decks encompassing 43 civil engineering terms. The user writes the description of his problem and how to solve it with these civil engineering terms. Each line of data and descriptive information he has written is punched on cards or entered through the console typewriter. The commands are analyzed, necessary subroutines are selected from the 1311, brought into core storage, executed, and control proceeds to the next command.

MINIMUM SYSTEM REQUIREMENTS - Any 20K 1620 card system with 1311 Disk Storage Drive. CEM number 231 must be installed.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Reference Manual... System Manual.

MACHINE READABLE - Object program... Source program... Sample problem.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620UG05X

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

CONTINUED FROM PRIOR COLUMN

1620-01.1.001

LESS ARITHMETIC MORE PROGRAMMING

AUTHOR: E. Matthys

DIRECT TECHNICAL INQUIRIES TO:
E. Matthys
IBM Corporation
424 South Monroe Avenue
Green Bay, Wisconsin

DESCRIPTION - LAMP is a revised version of SPS II for card I/O. It was designed specifically for commercial applications requiring more than the 312 symbols allowed by SPS II for assemblies on a 20K 1620. LAMP allows 670 symbols and will reduce assembly time by up to 35 per cent.

PROGRAMMING SYSTEMS - A version of SPS II.

MINIMUM SYSTEM REQUIREMENTS - 20K, 1620 and 1622.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011001

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
EASIC	none	CARDS	15	none
OPTIONAL	none	none		none

R. L. Pratt
Senior Computer Programmer
Data Corporation
7400 Old Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - Improvement of IBM's 1620 FORTRAN System. Major changes are: input may be unformatted, compiler and pre-compiler are built into the same program, several programs may be compiled without reloading the compiler each time, lister is included to provide SPS listing of compiled programs. Storage requirements - 20K.

MINIMUM SYSTEM REQUIREMENTS - Card 1620, memory 20K. No special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011010

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-01.1.014

SPS LABEL REFERENCE INDEXER

AUTHOR: R. L. Pratt

DIRECT TECHNICAL INQUIRIES TO:
R. L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - This program reads an SPS source deck, and provides an alphabetized list of all labels defined or referred to by the program, together with the page and line number of each card which contains a reference to the label. About 1300 source card maximum on 20K. Much more on larger memories. Card I/O and a memory of 20K; Indirect Addressing. Written to work with AFIT SPS source statements, but also accepts regular SPS statements.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.002

ADDITIONAL INSTRUCTION MACRO SUBROUTINE

*M

AUTHOR: Jon Petersen

DIRECT TECHNICAL INQUIRIES TO:
Jon Petersen
Computer Section
Washington State Highway Department
Transportation Building
Olympia, Washington

DESCRIPTION - These subroutines when added to the SPS processor package simulate the operations MOVE FLAG *MF - 71*, transfer numeric strip *TNS - 72*, and transfer numeric fill *TNF - 73* on an IBM 1620 which does not have these commands as a special feature but which does have the Indirect Addressing special feature. Storage used is 528 locations. Indirect Addressing is required.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011002

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.017

FORTRAN FORMAT CHECKER

AUTHOR: Carlos A. Font

DIRECT TECHNICAL INQUIRIES TO:
Ismael Rodrigues Astacio
Electronic Computer and Photogrammetry Division
Department of Public Works
Santorco, Puerto Rico

DESCRIPTION - To edit FORTRAN/FORMAT source programs for coding errors. Punch instructions substituted by NOPS and an error routine added. Restriction/range - The equivalent of 16 symbols (160 positions) from the symbol table are used for error storage purposes.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 (card). Automatic-Division. Error messages same as in regular FORTRAN/FORMAT except that they are followed by the printing of the source statement in error.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011017

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-01.1.006

MULTIPURPOSE SPS CARD OUTPUT COMPRESSOR

AUTHOR: Michael W. Bate

DIRECT TECHNICAL INQUIRIES TO:
Michael W. Bate
Wolf Research & Development Corporation
1st Aerospace Squadron
Box 90
ENT Air Force Base
Colorado Springs, Colorado

DESCRIPTION - Compresses output card decks from SPS assembly. Differs from standard compressor as follows: Can edit subroutines for inclusion in FORTRAN subroutine deck can eliminate half from program loading operation allows input decks to be stacked in card reader can return control to SPS Assembler. Uses locations 15000 to 18100 (approximately). Memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.010

AFIT IMPROVED FORTRAN

AUTHOR: R. L. Pratt

DIRECT TECHNICAL INQUIRIES TO:

1620-01.1.023

AFIT SYMBOLIC PROGRAMMING SYSTEM

AUTHOR: Richard L. Pratt

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR PAGE

Richard L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - This system is an improvement of the IBM 1620/1710 SPS System. Its chief advantage is its speed. It assembles three to four times faster than 1620/1710 SPS. It also includes additional features. In particular, it allows the assembly of relocatable programs. Storage used by program - 40K or up. Equipment required by program: Card system, TNS, TNF, MF, Auto Divide, and Indirect Addressing. Program can be used on lesser machine where requirements can be easily removed - Auto Divide and TNS, TNF, MF. Written in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011023

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.028
1620 SPS ASSEMBLER BY RICE UNIVERSITY

AUTHORS: W. Hobbs T. McBride
M. McCants M. Alexander

DIRECT TECHNICAL INQUIRIES TO:
M. McCants
Rice University
Houston, Texas

DESCRIPTION - This assembler processes source program cards at reader speed. It can punch out the symbol table at the end of pass 1 for offline listing. With the 40K-60K version source program card images are stored in available memory during pass 1 so that these cards need not be read for pass 2. About 1000 source cards will be stored in a 40K machine. The language accepted includes IBM 1620 SPS version II as a subset. The extended set of operation codes is designed for greater convenience and flexibility in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011028

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.024
EDIT

AUTHORS: H. J. Delhommer F. A. Cloutier

DIRECT TECHNICAL INQUIRIES TO:
H. J. Delhommer
P. O. Box 3664
Lafayette, Louisiana

DESCRIPTION - 1620 EDIT is designed to provide data editing abilities to the 1620 through programming. It is very similar to that available to 1400 system users with changes only to offer more choices. It will work on data in either the numerical or alphabetic format. The routine edits data using the address locations supplied by the programmer in actual or symbolic of the edit word, edit data, and edit output (location where result is to be put) and telling it to edit. Storage used by program - 2246. Equipment required by program - Card system, TNS, TNF, MF, and Indirect Addressing. Program can be used on lesser machine. Requirements that can be easily removed are TNS, TNF, MF Write and Insert subroutine. Programming type subroutine, SPS - 1620/1710. This routine is designed to be included with an SPS program at compile time. It will later be modified to be made a routine under monitor for those using 1311S. Running time varies with edit word and size of EW and data fields.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011024

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.029
N.C.E. HIGH SPEED SPS ASSEMBLER

AUTHORS: Kurt Germann George Rurill

DIRECT TECHNICAL INQUIRIES TO:
Kurt Germann
Newark College of Engineering
Computer Center
323 High Street
Newark, New Jersey

DESCRIPTION - This program is an attempt to provide users with an SPS assembler that has the language capabilities of APIT SPS and a symbol table size of the order of LAMP in a 20K machine. The assembler is about 2 to 3 times as fast as IBM 1602/1710 SPS exclusive of input-output. Uncompressed object decks are usually one half the size of corresponding IBM SPS decks and they can be listed on a 407 using an 80-80 board. The number of six character symbols that can be used in 20K varies from 350 to 462 depending on whether or not the built-in compressor is left in core. A symbol table listing can be punched out on cards in alphabetical order at the end of pass 1. If the source program in core during pass 1 and eliminate the need to manually reenter the source deck for pass 2. Variable and fixed mantissa length subroutine decks which include built-in FORTRAN type input-output subroutines are also provided.

MINIMUM SYSTEM REQUIREMENTS - Card system with Indirect Addressing and at least 20K (expands to 40K or 60K automatically.)

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620011029

	PROGRAM NUMBER	DISTRIBUTION MEDIUM	USER VOLUME
	EXTENSION	TYPE	CODE
			REQUIREMENT
BASIC	none	DTR*	00 none
OPTIONAL	none	DTR*	00 none

1620-01.1.027
AFIT SYMBOLIC PROGRAMMING SYSTEM, MODIFIED FOR 80-80 LISTING

AUTHOR: Richard L. Pratt

DIRECT TECHNICAL INQUIRIES TO:
Richard L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - This system is an improvement of the IBM 1620/1710 SPS System. Its chief advantage is its speed. It assembles three to four times faster than 1620/1710 SPS. It also includes additional features. In particular, it allows the assembly of relocatable programs. It differs from AFIT SPS (1.1.023) chiefly in the format of the listing output, which can be listed with an 80-80 board. The listing deck is only about one-half as large, and therefore takes only half as long to punch, and half as long to list. Specifications - 40K or more, card input-output, Automatic Divide, Indirect Addressing, TNS, TNF, and MF. Program automatically adapts itself to memory size. Could be reprogrammed fairly easily to remove requirements for Automatic Divide and TNS, TNF, and MF. Language - Program is written in its own language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011027

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.1.030
NELIAC COMPILER *M

AUTHOR: H. B. Stewart

DIRECT TECHNICAL INQUIRIES TO:
H. B. Stewart
Box 738
Rancho Santa Fe, California

DESCRIPTION - NELIAC is an Algorithmic Language growing out of ALGOL. This program rapidly compiles a subset of NELIAC which includes as extra features variable fixed-point precision, decision without comparison, and literal string definition. Execution of divide and floating point instructions limited to 1620s with corresponding hardware. Storage used - exactly 20,000 digits.

PROGRAMMING SYSTEMS - SPS which needs expanded symbol table.

MINIMUM SYSTEM REQUIREMENTS - Card 1620. Instructions provided for conversion to paper tape or typewriter input can easily be removed.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011030

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-01.1.031TYGO - TYPE-AND-GO SYMBOLIC PROGRAMMING SYSTEM

AUTHORS: Ronald C. Read P. J. Jutsum
P. Roussele

DIRECT TECHNICAL INQUIRIES TO:
Ronald C. Read
Computing Centre
Mathematics Department
University of the West Indies
Mona, Kingston 7, Jamaica

DESCRIPTION - This program is a processor which compiles an S.P.S. source program directly into storage, thus obviating the need for any tape handling other than one loading of the processor and the subroutines (if called). Thus an S.P.S. program can be typed in at the console, and will be assembled and ready to execute as soon as the typing has been completed. Provision is also made to accept a source program from tape, and to produce an object program tape. An object program tape can be produced at any time after compilation before and/or after debugging the program. Under switch control a listing can be produced simultaneously with compilation. In general this listing will (necessarily) be incomplete since symbols will have been used before being defined, operands that have not yet been defined are left blank. At the end of compilation a symbol table listing can be produced if required. The partial listing together with the symbol table listing will usually suffice for debugging purposes, but if a complete listing is required, this can be obtained by making a second pass of the source tape. Provision is also made for the statement by statement production of a source tape, incorporating the corrections to errors discovered by the processor (after the manner of the FORTRAN precompiler). The TYGO processor will compile any S.P.S. (SP-008) source statement subject to the restriction that operands must be of the form - Symbol plus or minus const. or simpler. If operands more complex than this occur in a program, they can still be handled, with a certain amount of operator intervention. The only other restriction is on the amount of storage space taken by a program (since the processor must remain in storage during compilation). A program of up to 8,000 digits (not counting subroutines) should compile comfortably. Shoehorn techniques have been built into the processor whereby larger programs (up to 10,000 digits) can be compiled. Provided the subroutines are not called, any number of programs can be processed, debugged and executed one after the other (unless a program destroys part of the processor). TYGO is therefore a handy adjunct in the teaching of the S.P.S. language, and in testing student programs. When no listing of the program is required, and the aim is merely to compile a source program and get it into storage, TYGO will take about one-third the time taken by the SP-008 processor to achieve this. Even when, in addition, a listing and an object tape are required, TYGO is still appreciably faster than the two-pass S.P.S. processor. TYGO is written for the basic 20K Tape 1620 - no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011031

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-01.1.032AFIT LOAD AND GO SYMBOLIC PROGRAMMING SYSTEM

AUTHOR: John C. Pierce

DIRECT TECHNICAL INQUIRIES TO:
Capt. John C. Pierce
1600E Arnold Drive
Rantoul, Illinois 61866

DESCRIPTION - This program is a modification of AFIT SPS and features load and go operation. It includes most of the additional features of AFIT SPS but is four to six times faster when used on suitably sized programs because it does not require the punching and loading of an object deck. It can also be used to test and debug large programs which can be segmented. Since the processor is retained in core at all times, the debugging process is accelerated greatly. Storage used by program - 20,465 core storage positions.

PROGRAMMING SYSTEMS - Written in SPS. Program can be used in conjunction with AFIT SPS, 1620-01.1.027. If it is necessary to obtain an object deck, so that a program may be rerun at a later time, then AFIT SPS must be used to produce the program. AFIT load and go SPS does not incorporate this feature.

CONTINUED FROM PRIOR COLUMN

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with 1622 Card Read-Punch, TNS, TNF, MF, Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011032

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-01.1.033PUNCH CROSS REFERENCED SYMBOL TABLE FOR MONITOR I SPS II-D PSEUDO PROCESS PHASE

AUTHOR: J. W. Kinney

DIRECT TECHNICAL INQUIRIES TO:
J. W. Kinney
Assistant EDP Manager
The Childrens Hospital of Akron
W. Buchtel at Bowers
Akron, Ohio 44308

DESCRIPTION - This program produces a label reference index similar to 1400 series Autocoder under 1620 Monitor I SPS II-D Control. It is superior to Richard Pratt's program (01.1.014) for users of the Monitor I System as it allows in process operation and no additional passes of the source program need be made. The reference deck is produced in the process of assembly, and still, the operator or programmer has the option of requesting the reference deck or not. The drawback of increased assembly time is more than offset by the elimination of a second assembly or program phase to produce a reference index. Storage used is virtually all of 20K in core. 117 disk file sectors for program storage and 400 disk file sectors for work area. Equipment required - 1620 Model I with card I/O, one 1311 Disk Drive, additional instructions TNF, TNS, MF, and Indirect Addressing. The requirement for TNF, TNS, MF can be easily removed. The Indirect Addressing requirement could be removed, but Monitor I requires it. Programmed in SPS and assembled on the Monitor I assembler version of SPS II-D. (1620-PR-025, PR-026). This is a process type program - in effect, a pseudo process phase of SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011033

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-01.1.034DEFT - DISK EXECUTION OF FORTRAN TRANSFER

AUTHORS: V. A. Lippo P. A. Hricik

DIRECT TECHNICAL INQUIRIES TO:
V. A. Lippo
West Penn Power Co.,
Cabin Hill
Greensburg, Pa.

DESCRIPTION - The DEFT System facilitates loading and retrieving information from the disk file when using FORTRAN. The DEFT System uses FORTRAN for all main program steps, and machine language for program and data transfers. The machine language instructions are read into a reserved area in the object program in core. The overlapped area contains only "go to" and "pause" instructions arranged and labeled so that the DEFT routine entries and exits have a FORTRAN label.

PROGRAMMING SYSTEMS - Written in machine language.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 card system, 1 disk file system with Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620011034

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-01.1.035LOGIC

AUTHOR: D. G. Olson

DIRECT TECHNICAL INQUIRIES TO:
D. G. Olson
Computer Center
North Dakota State University
Fargo, N.D.

CONTINUED FROM PRIOR PAGE

DESCRIPTION - Translates FORTRAN IV logical expressions to executable Kingston FORTRAN II source statements. The resulting deck can then be compiled and executed as a regular Kingston FORTRAN II source program. An "1" must be placed in column one of all statements using logical values or expressions. There is a maximum number of three logical and/or operators for a logical statement. A maximum of one continuation card may be used in a logical statement. Program requires a 40K card system with Auto Divide and Indirect Addressing. Written in Kingston FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#011#35

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.1.#36DDSR - DISK DATA STORAGE ROUTINE

*M

AUTHOR: E. D. Cutting

DIRECT TECHNICAL INQUIRIES TO:

C. H. Davidson
Director, University of Wisconsin
Engineering Computing Lab.
Madison, Wisc.

DESCRIPTION - DDSR is a program written in SPS II-D to facilitate permanent disk storage of users data from FORTRAN or SPS programs. The blocks of data are given a name and table entries that are completely compatible with the Monitor I System. The user need not know what sectors on the disk are available.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 162# Model I or II, Indirect Addressing, 20K memory, card I/O, 1 disk drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#011#36

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.2.#08FLEXIBLE CARD READ ROUTINE

AUTHOR: F. J. Sarno

DIRECT TECHNICAL INQUIRIES TO:

F. J. Sarno
Burns and Roe, Incorporated
16# West Broadway
New York, N. Y.

DESCRIPTION - For SPS programs with large quantities of input data to provide a ready means of reading in any amount of alphanumeric and numeric data desired and transferring control to any location desired. To provide complete flexibility in ordering input, an output format easy to check for errors and an easy means of recouping the storage are consumed by the read routine.

MINIMUM SYSTEM REQUIREMENTS - 162#; no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#012#08

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.2.#15GOTAFIT - GOTRAN AND AFIT FORTRAN FOR MONITOR I SYSTEM

*M

AUTHOR: J. C. Ewing

DIRECT TECHNICAL INQUIRIES TO:

J. C. Ewing
Dept. of Mathematics and Astronomy
University of Oklahoma
816 College Ave.
Norman, Oklahoma 73#69

DESCRIPTION - Loads the GOTRAN Compiler/Interpreter and the AFIT FORTRAN Processor, loader, and subroutines onto the 1311 Disk Pack, together with those routines necessary for calling these programs through the Monitor I Control System. Loading is done by the Monitor I Disk Utility Program. The need for loading GOTRAN and AFIT FORTRAN from cards is eliminated with a consequent saving of time. GOTRAN has been modified to return control to the monitor

CONTINUED FROM PRIOR COLUMN

system, permitting batch running of GOTRAN programs.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program is 20K, Sectors 195165-1#5199, 1#54#-1#5199; a 20K Card 162# with disk file Auto Divide is required. A requirement which can be easily removed is Auto-Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#012#15

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.2.#17RELOCATABLE PLOT SUBROUTINE FOR FORTRAN II-D

AUTHOR: L. R. Alley

DIRECT TECHNICAL INQUIRIES TO:

L. R. Alley
Center for Research and Data Processing
Central Missouri State College
Warrensburg, Missouri

Relocatable Plot Subroutine for FORTRAN II-D plots arguments of 19 independent N-dimensional arithmetic functions having a range between 1.# and 8#.#. Digits are automatically assigned to each arithmetic statement involving the subroutine call word and then punched into a card column corresponding to the nearest integral value of the argument. All possible argument values are handled by either causing a punch in a card when the argument is between 1.# and 8#.# or a descriptive error message to be typed. Subroutine applicable to virtually all scaled arithmetic statements and especially suited to harmonic functions. Equipment: Card, disk drive, Indirect Addressing, 162# Model 1, and 58# positions of core are used. Programmed in SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#012#17

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.2.#19FREAD - FREE-STYLE CARD READING FOR 162# MONITOR II FORTRAN II-D

AUTHOR: P. P. Emin

DIRECT TECHNICAL INQUIRIES TO:

P. P. Emin
University of New Brunswick
Computing Centre
Fredericton, New Brunswick, Canada

DESCRIPTION - FREAD is a system which comprises two methods of permitting free-style, or format-free read statements to be compiled and executed in a FORTRAN II-D program. The first method, which requires changes to the FORTRAN II-D processor, enables the statement "read, list..." to compile and execute correctly. The second method requires no changes to the processor but read statements must still reference a format statement and must be immediately preceded by "CALL FREAD" although the format may be a dummy of one used by other I/O since it is not scanned by FREAD. Method one requires the use of a library subroutine, while method two makes use of subprogram FREAD. Both methods permit program data cards to be punched free-style, identical to the method of FORGO. Storage use by program-library subroutine- 1446 cores, FREAD - 1644 cores.

PROGRAMMING SYSTEM - FORTRAN II-D, SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 162#, 20K memory, Index Registers, 1 disk pack.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162#012#19

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

162#-#1.3.#12GENERAL GANG-PUNCHING PROGRAM

*M

AUTHOR: Richard E. Hammer

DIRECT TECHNICAL INQUIRIES TO:

Richard E. Hammer
Case Institute of Technology
Cleveland, Ohio

DESCRIPTION - This program is designed to transfer rearranged information from a set of master cards to a set of detail cards. Restrictions/range: Up to 5# fields,

CONTINUED FROM PRIOR PAGE

each from one to fifteen characters in length, may be transferred from each master card. If each master card has exactly one detail card, the number of master cards is unlimited, and the program occupies 2,950 positions. If not 5000 master cards, each with as many as 999 details cards, are permitted, and the program occupies 19,897 positions.

MINIMUM SYSTEM REQUIREMENTS - Indirect Addressing. The program runs at card reader or card punch speed. Various error messages are typed when the data does not conform to the specifications.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620013012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.3.013MONITOR EQUIVALENCE TABLE CARD OUTPUT

AUTHOR: Bryan Betz

DIRECT TECHNICAL INQUIRIES TO:
Ray L. Shaffer
Norden Div.
United Aircraft Corp.
Norwalk, Conn.

DESCRIPTION - The Monitor Equivalence Table Card Output program enables one to output the equivalence table in an improved format over the monitor equivalence table dump. Output includes name, Dim No., sector location, No. of sectors, F, K, program length, next common, and disk pack name. Storage used by program- 1134 plus size of equivalence table.

PROGRAMMING SYSTEMS - SPS II-D, Mainline, complete. Library routines are not part of the output.

MINIMUM SYSTEM REQUIREMENTS - Card system, X disk file system, TNS, TNP, MF, Indirect Addressing. Program can be used on lesser machine. Requirements that can be easily removed are TNS, TNP, MF, IA.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620013013

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.3.016CARD REPRODUCER AND LISTER WITH GANG-PUNCHING OR EMITTING

AUTHOR: Howard Givner

DIRECT TECHNICAL INQUIRIES TO:
Howard Givner
Office of Testing and Research
Brooklyn College
Brooklyn, New York 11210

DESCRIPTION - This program will enable the user to use the 1620 to copy any columns of one set of cards into any columns of a new set of cards, or into any printer positions for a listing on a 1443, and will also, simultaneously from a master card, gang-punch information into the new cards or emit characters while listing. Data is restricted to valid 1620 card codes.

PROGRAMMING SYSTEM - Written in SPS Mainline complete.

MINIMUM SYSTEM REQUIREMENTS - Basic card 1620 system, no I. A. or special instructions needed. 1443 required only for listing option.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620013016

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.001SELECTIVE TRACE

AUTHOR: W. H. Jefferys

DIRECT TECHNICAL INQUIRIES TO:
W. H. Jefferys
Van Vleck Observatory
Wesleyan University
Middletown, Conn.

DESCRIPTION - This program provides a detailed listing

CONTINUED FROM PRIOR COLUMN

of the operations executed during the running of a program which is being debugged. Indirect addresses are completely traced. The mnemonics for the commands are printed. The programmer specifies, by two numbers input to the routine, which instructions he wants traced. Outside of the specified range the instructions are executed, but not printed. In this manner already debugged portions of the program and routines such as the floating point subroutines can be run through at high speed. Several options as to the mode of tracing are provided. 2366 locations.

MINIMUM SYSTEM REQUIREMENTS - The program will not trace TNP, TNS, MF or automatic floating point commands.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014001

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.008DYNAMIC TRACE PROGRAM FOR THE IBM COMPUTER

AUTHOR: E. G. Halline

DIRECT TECHNICAL INQUIRIES TO:
E. G. Halline
Bell Telephone Laboratories, Inc.
Whippany Road
Whippany, New Jersey

DESCRIPTION - Supply a step by step history of a 1620 program during execution. Selective trace output features are provided. Storage 2698 digits.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Indirect Addressing and card input/output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.017GENERAL 1620 TRACE PROGRAM

AUTHOR: Rene R. Leblanc

DIRECT TECHNICAL INQUIRIES TO:
Rene R. Leblanc
Automatic Electric Laboratories, Inc.
400 North Wolf Road
Northlake, Illinois 60164

DESCRIPTION - This program facilitates efficient debugging of 1620 programs by tracing each instruction (within specified trace control limits) and punching out (if instruction is also within specified output limits) instruction address and operation code, and when applicable, P or P and Q address(es), all intermediate indirect addresses, contents of P and/or Q addresses (up to 77 digits), and the product area (77 digits). The trace program is completely relocatable at load time. It allows the program being traced to run under its own control (and speed) for all instructions not in region of trace control. When the trace is in control, trace output is produced only if the instruction being traced is located within specified output limits. The trace control limits and output limits are typed in after loading the trace. All trace output shows exact memory flag and character configurations in easily interpreted format. The output format associated with each instruction is controlled by a matrix of control digits. By altering the control digits, the trace output may be changed to print more or less information for each instruction. It can also be arranged to produce output on branches only.

PROGRAMMING SYSTEM - SPS 1620/1710 plus special relocating loader written in machine language.

MINIMUM SYSTEM REQUIREMENTS - 1976 consecutive locations in storage. Card I/O system, Indirect Addressing, 20K storage. Easily modified to work with extra memory and/or special instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014017

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

*#

CONTINUED FROM PRIOR COLUMN

1620-01.4.024SNOBOL 3 A LIST PROCESSING LANGUAGE

AUTHOR: David L. Wilson

DIRECT TECHNICAL INQUIRIES TO:

David L. Wilson
University of Wisconsin
Milwaukee Computing Center
Downer & Kenwood
Milwaukee, Wisc.

DESCRIPTION - SNOBOL permits easy manipulation of strings of alphabetic data. It contains capabilities for pattern matching, creating new strings, and recursive subroutines. Most machine language functions, except for define, have been implemented. These functions are not available to the non-disk user. Storage used - 18K.

PROGRAMMING SYSTEMS - Written in SPS, II-D. A loader is included for systems without a disk drive. It replaces the non-disk get and put routines and loads a core image deck. It can be used with any SPS II-D program.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model 1, 20K, card system with Auto Divide, Indirect Addressing. If division in source is avoided then Auto-Divide is not required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620014024

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	CARDS	15	none

1620-01.4.025ASSIST

AUTHOR: Dr. F. Atkins

DIRECT TECHNICAL INQUIRIES TO:

Dr. F. Atkins
Eastern Illinois University
Department of Mathematics
Charleston, Ill.

DESCRIPTION - When called by a program in core, this program simulates execution of the program, printing, for each instruction, the location of the instruction, the mnemonic OP Code, the numeric OP code, the P address, the Q address, 41 digits from the location pointed to by the P address, and 41 digits from the location pointed to by the Q address (if applicable, i.e. if the addresses may be expected to reference a data field). Fields are printed with flags and record marks. After the instruction is executed (or simulated) the P field and Q field are again output. Thus students and programmers are given a clear picture of the transformations performed in core by the executed instructions. The program Assist is thus useful as both an educational and debugging device. The simulator is designed to recognize operation codes 11-49 (except 20, 30, 40, of course), 55, 71, 72, 73. Considerable revision would be required to add other instructions to this set.

PROGRAMMING SYSTEMS - Written in SPS II-D. The program is complete, but is ordinarily called by a program in core, similar to a subroutine.

MINIMUM SYSTEM REQUIREMENTS - 4,897 positions. A 1620 Model 1 with card I/O 1 disk file, TNS, TNE, MFX, Indirect Addressing and a 1443 Printer is required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014025

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.026MODIFIED FORTRAN FOR MONITOR I, VERSION 2

AUTHOR: David L. Wilson

DIRECT TECHNICAL INQUIRIES TO:

Prof. C.H. Davidson
Director, Engineering Computing Lab.
University of Wisconsin
Madison, Wisc. 53706

DESCRIPTION - Modified FORTRAN has free format, variable format, improved execution time diagnostics, improved trace output, and P scaling. All statement MAP option has been removed.

PROGRAMMING SYSTEMS - Written in SPS-D.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 Model I, card I/O, 1 disk drive, Automatic Divide, Indirect Addressing and a 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014026

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.027FORTRAN PROGRAM STRAIGHTENER

AUTHOR: David L. Wilson

DIRECT TECHNICAL INQUIRIES TO:

David L. Wilson
Engineering Computing Laboratory
University of Wisconsin
Madison, Wisc. 53706

DESCRIPTION - FORTRAN program duplicated with all statements starting in column 7, sequence numbers will appear in columns 77-80, and all statement numbers, will be in ascending sequence in increments of 10. Will not process if or computed go to statements which have continuation cards. Will accept both the FORTRAN II I/O statements and the FORTRAN IV generalized read/write statements.

PROGRAMMING SYSTEMS - Written in SNOBOL 3.

MINIMUM SYSTEM REQUIREMENTS - 40K 1620 Model I, card input-output, 1 disk drive, Automatic Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162004027

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.4.028MODIFIED FORTRAN FOR MONITOR I, VERSION 2, 60K

AUTHOR: David L. Wilson

DIRECT TECHNICAL INQUIRIES TO:

Prof. C. H. Davidson
Director, Engineering Computing Lab.
University of Wisconsin
Madison, Wisc. 53706

DESCRIPTION - Modified FORTRAN has free format, variable format, improved execution time diagnostics, improved trace output, and P scaling. All statement MAP option has been removed.

PROGRAMMING SYSTEMS - Written in SPS-D.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I, card input-output, 1 disk drive, Automatic Divide, Indirect Addressing, 1443 Printer, 60K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620014028

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.020COBES DUMP 402

AUTHOR: Tom Michel

DIRECT TECHNICAL INQUIRIES TO:

Tom Michel
Argonne National Laboratory
9400 South Cass Avenue
Argonne, Ill.

DESCRIPTION - Addressed core dump of any portion of memory above location 300 with provision to restore machine at end of dump. Console switch option controls 12-digit instruction type format or 10-digit numerical field format. Storage locations 0-299 and last 5 of core.

MINIMUM SYSTEM REQUIREMENTS - 20K, Indirect Addressing, and 1622 Card Read-Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016020

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.022ANL MNEMONICS DUMP

AUTHOR: Tom Michel

DIRECT TECHNICAL INQUIRIES TO:

Tom Michel
Argonne National Laboratory
University of Chicago
9700 South Cass Avenue
Argonne, Ill.

DESCRIPTION - Interpretive cores dump. If instruction, types address, mnemonic, OP code, P and Q fields. Senses most packed instructions. If not instruction, type 2, 5-digit fields. Dumps all characters. Optional zero skip.
MINIMUM SYSTEM REQUIREMENTS - Storage 1868 positions memory 20K, Indirect Addressing.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016022

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.028INPUT-OUTPUT SUBROUTINES FOR USE IN SYMBOLIC PROGRAMMING FOR THE CARD 1620

AUTHOR: Otto Dykstra, Jr.

DIRECT TECHNICAL INQUIRIES TO:

Otto Dykstra, Jr.
General Foods Research Center
555 South Broadway
Tarrytown, N.Y.

DESCRIPTION - To facilitate input of data and output of results. One subroutine converts 1 fixed point number to floating, another converts up to 99 fixed point numbers and stores them consecutively. The output subroutine prints at most 8 digits to the left of the decimal point and 6 or no digits to the right.

MINIMUM SYSTEM REQUIREMENTS - 498 digits storage for single fixed-float, 782 for multiple fixed-float, and 484 for float to fixed and print. Memory 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016028

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.029PROGRAM INTERRUPT

AUTHOR: L. T. Michel

DIRECT TECHNICAL INQUIRIES TO:

L. T. Michel
Argonne National Laboratory
Argonne, Illinois

DESCRIPTION - Provides for semi-automatic interruption and subsequent resumption of a program having no internal restart provision.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K, Indirect Addressing, and 1622 Card Read-Punch.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016029

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.031CARD HASH TOTAL

AUTHORS: W. G. Weideman J. H. Van Nuland

DIRECT TECHNICAL INQUIRIES TO:

Robert J. Robinson
Marquette University
1515 W. Wisconsin Avenue
Milwaukee 3, Wisconsin

DESCRIPTION - The purpose of card HASH total is to determine quickly and accurately whether a duplicate card deck is

CONTINUED FROM PRIOR COLUMN

an exact copy of its master. The total may be punched into a card suitable for use as input. Each card is read alphabetically and multiplied by a 2-digit card count. The result is split into 20-digit fields and the result subtracted from an accumulator.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016031

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.043LOGGING PROGRAM

AUTHOR: Karen L. Roof

DIRECT TECHNICAL INQUIRIES TO:

Karen L. Roof
Stevens Institute of Technology
Castle Point Station
Hoboken, New Jersey

DESCRIPTION - To generate monthly reports of time used on the computer for various purposes, such as test and production time, educational use, demonstration, machine error time and idle time.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Indirect Addressing, and card input/output.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016043

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.045FORTRAN COMPRESSOR AND MULTI-PROGRAMMER

AUTHOR: Donald S. Gardner

DIRECT TECHNICAL INQUIRIES TO:

Donald S. Gardner
General Foods Research Center
555 S. Broadway
Tarrytown, New York

DESCRIPTION - This program will compress any regular FORTRAN object deck into a near-minimum number of cards, with or without the non-relocatable subroutines. It further allows for serial or (block) programming to be done at the object level so that a large program can be written in logical parts, compiled separately, compressed, and then joined together into one program which will be executed, by parts, automatically. The restrictions placed on the programmer are at a minimum.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K (should work with larger systems with a few changes), card system, and no special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016045

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.047DBD (DAYS BETWEEN DATES) SUBROUTINE

AUTHORS: A. B. McEachran C. W. Sheppard

DIRECT TECHNICAL INQUIRIES TO:

A. B. McEachran
University of Tennessee
Department of Physiology
894 Union Avenue
Memphis, Tennessee

DESCRIPTION - Calculates the number of days between any two dates occurring after January 1, 1900.

MINIMUM SYSTEM REQUIREMENTS - Storage requirements are 537, Automatic Divide, and no other special features required. (Only slight modifications would be necessary to make this subroutine compatible with a machine without these features.)

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620016047

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.051

FORCOM SUBROUTINES FOR FORTRAN W/FORHAT

AUTHOR: Wendell L. Pope

DIRECT TECHNICAL INQUIRIES TO:
Wendell L. Pope
Computer Center
Utah State University
Logan, Utah

DESCRIPTION - These subroutines have the same function as those in Mr. Loudens original package, and are adapted from them, with two exceptions: the absolute value (ABS) subroutine has been added, and the PUT subroutine has been modified so that the user can detect when left most (most significant) digits of a number are dropped.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, card I/O, any core size, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016051

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
EASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-01.6.053

SPS FLOATING POINT CONVERSION SUBROUTINES

AUTHOR: Richard L. Pratt

DIRECT TECHNICAL INQUIREES TO:
Richard L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio

DESCRIPTION - A set of two subroutines to be called by macro-operations for use with 1620/1710 SPS. These convert floating point numbers from internal to external form, and vice versa. This is intended for use with I/O commands, but the I/O commands are not included in the subroutines.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016053

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.055

PLOT SUBROUTINE FOR FORTRAN

AUTHOR: John H. Reynolds

DIRECT TECHNICAL INQUIREES TO:
Kurt V. Schoeni
Sprague Electric Co.
Marshall Street
North Adams, Massachusetts

DESCRIPTION - This subroutine produces output on the on line typewriter rapidly and in graphical form. It plots up to six functions with an accuracy up to 0.7%.

PROGRAMMING SYSTEMS - Written in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016055

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
EASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-01.6.056

PLOT SUBROUTINE FOR FORTRAN WITH FORHAT

AUTHOR: John H. Reynolds

DIRECT TECHNICAL INQUIRIES TO:
Kurt V. Schoeni
Senior Mathematician
Sprague Electric Co.
Marshall Street
North Adams, Massachusetts

DESCRIPTION - This subroutine produces output on the on line typewriter rapidly and in graphical form. It plots up to six functions with an accuracy of up to 0.7%.

PROGRAMMING SYSTEMS - Written in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016056

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-01.6.060

SPS OBJECT DECK ANALYZER

AUTHOR: Louis A. Bezreh

DIRECT TECHNICAL INQUIREES TO:
Louis A. Bezreh
John Hancock Mutual Life Insurance Co.
200 Berkeley Street
Boston, Massachusetts

DESCRIPTION - An aid to debugging and/or changing any processed SPS program. Produces a list showing, in ascending order, the absolute locations referred to by instructions in the object deck. With each such location are shown, in ascending sequence, the absolute addresses and operation codes of all the instructions making reference to it. Also indicates whether Indirect Addressing is used.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Any size K. Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016060

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.064

ANSIR - ALPHANUMERIC SEARCH AND INFORMATION RETRIEVAL

AUTHOR: R. P. Gruss

DIRECT TECHNICAL INQUIREES TO:
J. L. C. Lof
Computer Center
University of Connecticut
Storrs, Connecticut

DESCRIPTION - ANSIR is a Utility program that will locate the card or cards on which desired information appears. The desired information (called search word) may be in the form of an alphabetic word, a group or groups of alphanumeric and special characters, or a machine instruction. Output ranges from typing the contents of every card that contains the search word to merely counting the number of times it appears in the deck.

PROGRAMMING SYSTEMS - Written entirely in machine language.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K and any 1620 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016064

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.065

FORTRAN II SUBROUTINE FOR PLOTTING WITH A CAL-COMP PLOTTER

AUTHOR: J. Fassino

CONTINUED FROM PRIOR PAGE

DIRECT TECHNICAL INQUIRIES TO:
J. Fassino
Todd Shipyards Corp.
P.O. Box 231
San Pedro, Calif.

DESCRIPTION - This is a subroutine to be incorporated in FORTRAN II library subroutine decks. This subroutine has been written expressly for plotting output from an IBM 1620 computer on a CAL-COMP X-Y digital plotter.

MINIMUM SYSTEM REQUIREMENTS - Automatic Divide, MF, TNF, TNS, card, CAL-COMP Plotter. Fixed point SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016065

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.068FORTRAN FORMAT SUBROUTINE FOR PLOTTING WITH A CAL-COMP PLOTTER

AUTHOR: J. Fassino

DIRECT TECHNICAL INQUIRIES TO:
J. Fassino
Todd Shipyards Corp.
P.O. Box 231
San Pedro, Calif.

DESCRIPTION - This is a subroutine to be incorporated in FORTRAN - format library subroutine decks. This subroutine has been written expressly for plotting output from an IBM-1620 computer on a CAL-COMP X-Y Digital Plotter.
MINIMUM SYSTEM REQUIREMENTS - 1622 with automatic divide, and the special instructions MF, TNF, TNS, card, CAL-COMP Plotter.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016068

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.069SORT-LIBRARY FUNCTION (FORTRAN II)

AUTHOR: H. E. Anderson

DIRECT TECHNICAL INQUIRIES TO:
H. E. Anderson
Sandia Corp.
Albuquerque, New Mexico

DESCRIPTION - Sorts N floating point or fixed point numbers in a dimensioned FORTRAN array.

PROGRAMMING SYSTEMS - Written in machine language.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with 40K memory, Automatic Divide, Indirect Addressing, and Floating Point hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016069

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.070CARD SEARCHING PROGRAM, CS3

*M

AUTHOR: R. C. Wilhoit

DIRECT TECHNICAL INQUIRIES TO:
R. C. Wilhoit
Texas A & M Univ.
Dept. of Chemistry
Chemical Thermodynamic Properties Center
College Station, Texas

DESCRIPTION - Searches a deck of cards for certain information previously specified by a deck of control cards. A variety of alternatives and combinations can be accommodated by the program. Cards which satisfy the search criterion can be either removed from the deck manually or duplicated by punching another card.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 20K, 1620 with card I/O, Indirect Addressing.

CONTINUED FROM PRIOR COLUMN

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016070

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.074FORCOM SUBROUTINES FOR FORTRAN II

AUTHOR: J. S. Webster

DIRECT TECHNICAL INQUIRIES TO:
M. J. Orloff
General Motors Institute
Flint 2, Michigan

DESCRIPTION - The FORCOM system is a group of 14 FORTRAN subroutines designed to satisfy three objectives -

- (1) To provide a general purpose interpreter for commercial data processing operations.
- (2) To provide a complete input/output editing package for technical applications, with complete format control of card reader, card punch and typewriter.
- (3) To provide alphameric symbol manipulation facilities at the FORTRAN level for logical applications which previously required machine language programming.

These subroutines have been adapted from Mr. R. K. Loudens original FORCOM package for FORTRAN I. Restrictions/range: a maximum of nine card images may be used. The subroutines are self-adjusting for any length of mantissa declared in the parent program. Standard subroutine deck is for 40K but can be readily modified for 20K or 60K.

PROGRAMMING SYSTEMS - Language used in write-up is SPS. The write-up contains notes on the use of FORCOM subroutines.

MINIMUM SYSTEM REQUIREMENTS - The number of digits occupied by the subroutines are as follows: RCDF, 188, PCFH 152, RTCF 116, TABF 116, SPCF 116, GETF 468, PUTF 704, ZONF 214, PASF 284, TYPF 284, UNLF 322, ENTF 116, CMPF 368, CDSF 210 6 (200 X N) (N equals number of card images reserved) equipment specifications minimum 1620 capable of using FORTRAN II with card input/output facilities. Library function to the FORTRAN II system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016074

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.076AUTO FLOAT FORTRAN PROCESSING SYSTEM

AUTHOR: A. J. Brittain

DIRECT TECHNICAL INQUIRIES TO:
A. J. Brittain
Sunstrand Aviation
2400 W. 70th Ave.
Denver 21, Colorado

DESCRIPTION - AUTO FLOAT FORTRAN is a 1620 FORTRAN processing system for Automatic Floating Point hardware. Many features inherent in a larger machine configuration processing system are included. Can be modified for any size storage.

- (1) In-line compilation of most Floating Point instructions. This feature accounts for most of the speed differential between AUTO FLOAT FORTRAN and IBM's Version.
- (2) Starting location of object program is 05500. This low starting point was accomplished primarily by rewriting all subroutines with Floating Point instructions, Indirect Addressing, etc.
- (3) Continuous running object programs.
- (4) Compiler automatically prepares a condensed object program with Clear Memory and Automatic Operation feature.
- (5) Batch compilation if desired.
- (6) Source statements and an improved symbol table dump are automatically punched into the select hopper during compilation along with their corresponding machine locations.
- (7) Compiler contains many error analysis routines for checking source statements.
- (8) Non-format or free input routine.

MINIMUM SYSTEM REQUIREMENTS - Automatic Divide, Indirect Addressing, Automatic Floating Point, additional instruction (MF, TNF, TNS), card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016076

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR PAGE

in columns 4-13 on the IBM Program Order Form.

1620-01.6.096MODIFIED CDS FORCOM SUBROUTINE FOR FORTRAN WITH FORMAT1620-01.6.086FORTRAN II FORMAT STATEMENT PRESELECTOR

AUTHOR: J. Petersen

DIRECT TECHNICAL INQUIRIES TO:

L. H. Morgan
Computer Engineer
Washington State Highway Dept.
Highways-Licenses Bldg.
Olympia, Washington

DESCRIPTION - The Format Statement Preselector is a library subroutine which, when added to the FORTRAN II processor, enables the programmer to write one or more FORTRAN statements that examine any column or columns of the card that is about to be read. The programmer then writes in FORTRAN, a logic network which selects the proper read statement.

PROGRAMMING SYSTEMS - FORTRAN II subroutine subprogram (S or F). The program is a library (IE, SPS) function to the FORTRAN system checked SPS subroutine X.

MINIMUM SYSTEM REQUIREMENTS - 302 positions, card system, Auto Divide, Indirect Addressing. Two subroutines are included, one for a compiler without Floating Point hardware and for a compiler with Floating Point hardware.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016086

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.090CLEAR AND LOAD 20K

*M

AUTHOR: Dr. K. Eisemann

DIRECT TECHNICAL INQUIRIES TO:

Dr. K. Eisemann
Computing Center
Catholic University
Washington 17, D.C.

DESCRIPTION - To clear memory without console manipulation. When placed ahead of any self-loading program and loaded, this program will first clear all of memory to zero and then do the equivalent of depressing the reader load button, i.e. it then reads-in the next card into locations 00-79 and branches to 00. Mathematical method-compounded doubling of cleared area.

MINIMUM SYSTEM REQUIREMENTS - 20K memory only. Will not work on a 40K or 60K machine.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016090

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.095EDIT SUBROUTINE

AUTHOR: T. L. Yates

DIRECT TECHNICAL INQUIRIES TO:

T. L. Yates
Director
Statistics Computing Lab.
Oregon State University
Corvallis, Oregon

DESCRIPTION - To provide data field editing similar to the IBM 1401. Input and output in alpha mode. Editing includes insertion of punctuation, zero suppression and sign control.

MINIMUM SYSTEM REQUIREMENTS - A. Storage used by program is 777. B. Equipment required by program - card system, Indirect Addressing, SPS subroutine.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016095

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.099SELECTIVE CARD REPRODUCER

*M

AUTHOR: J. C. Fassino

DIRECT TECHNICAL INQUIRIES TO:

J. C. Fassino
8031 20th Street
Westminster, California

DESCRIPTION - To selectively reproduce any or all card columns. A maximum of 13 unlimited fields may be relocated under header card control. Restrictions/range: no restrictions on field movement, however, there is a maximum of 13 fields that may be moved.

PROGRAMMING SYSTEMS - Written in 1620/1710 SPS. Fixed

AUTHOR: J. S. Webster

DIRECT TECHNICAL INQUIRIES TO:

J. S. Webster
Engineering E.D.P. Installation
State Electricity Commission of Victoria
22William Street
Melbourne, Australia

DESCRIPTION - This subroutine is intended to replace the CDS subroutine in the normal FORCOM Package of Prof. W. L. Pope, Utah State University, Logan, Utah, 1620 Program No. 1.6.051, to give the following advantages -

(A) The modified subroutine is permanently self-clearing, i.e. each repeated use of the statement dummy equals CDS(N) in a program, or branching back through such a statement, results in the clearing of card images nos. 1 through N. (In the operation of the normal CDS subroutine the contents of card image no. 1 are transmitted into each of the other card images).

(B) The modified subroutine completely clears the nominated card image area so that gaps between normal card images can be used for all FORCOM operations (except direct card input/output) by the extension of card image addressing to include columns 00 through 99. (In the operation of the normal CDS subroutine a flag is set at the beginning of each card image which prevents the safe use of the gaps between card images where continuity with card images is required). Apart from the economy of making use of the gaps, the consequent continuity of addressing results in a simplification of programming in some applications. The standard subroutine is for 20K, but can be readily modified for other sizes of storage.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - The subroutine occupies 180 + (200 X N) digits. (N equals number of card images). Equipment required by program: minimum 1620 with card input/output and Indirect Addressing. Programming type: library function to the FORTRAN/Format system.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016096

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.098GENERAL COMPRESSOR PROGRAM

*M

AUTHOR: B. A. M. Moon

DIRECT TECHNICAL INQUIRIES TO:

B. A. M. Moon
Mobil Computer Laboratory
University of Canterbury
Box 1471
Christchurch, New Zealand

DESCRIPTION - This program punches from storage a sequentially numbered self-loading deck of cards which when loaded will leave storage as it was immediately prior to its use. Groups of more than 75 consecutive unflagged zeros are not punched. The program is especially useful for compressing FORTRAN object decks but not limited to this use.

PROGRAMMING SYSTEMS - Written in SPS II.

MINIMUM SYSTEM REQUIREMENTS - Any card 1620 with the Indirect Addressing feature.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016098

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR PAGE

Point.

MINIMUM SYSTEM REQUIREMENTS - 1500 core locations. Card read punch, memory 20K X, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016099

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.100SEARCH AND MEMORY PRINT - SAMP

DESCRIPTION - This utility program can be used as an aid in debugging machine language programs, the instructions of which occur at intervals of 12 positions. The search writes out the locations and instructions of all conditional and unconditional branches to the address being sought. The memory print types out any portion of the memory in instruction or data format along with the location at the beginning of each line. Indirect Addressing in the p-part of a branching instruction is assumed to be of one level only.

PROGRAMMING SYSTEMS - SPS, mainline, complete. Language used in the write-up is SPS.

MINIMUM SYSTEM REQUIREMENTS - 2600 positions (37400-39999), card system, Indirect Addressing. Program can be used on lesser machine. Requirements can be easily removed. Source can be modified for 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016100

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.1041620/1311 DISK PACK COPY PROGRAM

AUTHORS: E. Betz S. Shimberg

DIRECT TECHNICAL INQUIRIES TO:
R. L. Shaffer
Norden Division
United Aircraft Corporation
Norwalk, Conn.

DESCRIPTION - The 1620/1311 Disk Pack Copy Program allows the operator to copy part or all of a disk pack to another disk pack. The original and copy packs may be on any drive of an 2 - 4 drive system. The copying IA (IA may be easily removed).

PROGRAMMING SYSTEMS - Written in SPS-II-D, complete mainline program.

MINIMUM SYSTEM REQUIREMENTS - 4641 positions, disk file, 2-4 packs, IA (IA may be easily removed).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016104

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.105FORCOM II-D - SUBROUTINES FOR FORTRAN II-D

AUTHORS: E. Betz S. Shimberg

DIRECT TECHNICAL INQUIRIES TO:
R. L. Shaffer
Norden Division
United Aircraft Corp.
Norwalk, Conn.

DESCRIPTION - This system consists of 17 call type subroutines for use with FORTRAN II-D for the IBM 1620/1311 system. FORCOM II-D was written to provide alphanumeric symbol manipulation and card image manipulation at the FORTRAN level for logical applications which previously required machine language programming. All FORCOM II-D subroutines are relocatable and are therefore loaded only when needed by a particular object program.

PROGRAMMING SYSTEMS - Written in SPS II-D, subroutine. Program may be used on a 20K system.

MINIMUM SYSTEM REQUIREMENTS - Variable -- 11098 maximum, card system, X disk file system, No. of packs 1-4, TNS, TNF, MF, Auto Divide, Indirect Addressing.

CONTINUED FROM PRIOR COLUMN

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016105

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.107SPACED - SELF-LOADING PROGRAMMERS AID FOR CONSOLE EVALUATING AND DEBUGGING

AUTHOR: R. S. Hostetler

DIRECT TECHNICAL INQUIRIES TO:
R. S. Hostetler
Radiological Health Lab.
1901 Chapman Ave.
Rockville, Md. 20852

DESCRIPTION - SPACED is a valuable aid to the programmer who is debugging or evaluating an SPS or machine language program from the console. Instead of entering machine language instructions through the typewriter, the programmer enters mnemonic commands with associated operands. These commands include a pause-return combination which allows the programmer to pause before the execution of any instruction in his program and then return to that instruction. Also included are a number of commands which allow typewriter input and output of data in easily readable formats. SPACED is variable in length at object (loading) time and is relocatable at object time.

PROGRAMMING SYSTEMS - Other programming language used is machine language.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program - variable from 673 to 1513 plus 00000 thru 00042. Equipment required by program - card system, TNS, TNF, MF, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016107

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.108MONITOR DIM AND EQUIVALENCE TABLE TEST

AUTHOR: R. R. White

DIRECT TECHNICAL INQUIRIES TO:
R. R. White
Los Angeles Dept. of Water & Power
P.O. Box 3669
Terminal Annex
Los Angeles, Calif. 90054

DESCRIPTION - This program punches cards to list all entries to the DIM Table in the 1620 Monitor System. Where a program also has a name entered in the Equivalence Table the name is listed with its associated DIM entry. The program is assembled to run independently of the monitor and was written to be able to determine if either the DIM Table or Equivalence Table has been inadvertently altered, but can be conveniently used to list DIM entries of all the programs on disk. (5) n/a. (6) DIM Table and Equivalence Table lengths must be as originally set up in monitor 1, e.g., 999 entries in the DIM Table and 80 sectors with 500 program names in the Equivalence Table.

PROGRAMMING SYSTEMS - SPS - 1620/1710, mainline, complete with I/S and TNF instructions.

MINIMUM SYSTEM REQUIREMENTS - This program is self-contained and generates its own data. Output is punched cards to be listed with a standard 80-80 board on a 407 or other listing device.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016108

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.109DEPAUW MACHINE LANGUAGE INTERPRETER

AUTHOR: R. B. Nelsen

DIRECT TECHNICAL INQUIRIES TO:
R. B. Nelsen
Computer Center
DePaul University
Greencastle, Indiana 46135

CONTINUED FROM PRIOR PAGE

DESCRIPTION - The program is designed to interpret a deck of machine language cards, each card containing six machine language order in card columns 1-72. The program separates the numeric operation code and the P and Q addresses, and also supplies the mnemonic operation code and the address of each order. The output is designed to resemble the coding sheet form X26-5591-0. The purpose of this program is to aid the programmer in debugging machine language routines and also provides a convenient method for listing student machine language programs.

PROGRAMMING SYSTEMS - Written in basic machine language.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 card system, 28K memory, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016109

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.114EQUIPMENT AND PROJECT TIME DISTRIBUTION

AUTHOR: J. B. Rotolo, Jr.

DIRECT TECHNICAL INQUIRIES TO:
J. B. Rotolo, Jr.
Computer Center
Hofstra University
Hempstead Turnpike
Hempstead, New York

DESCRIPTION - Evaluates for each of the computer center's machines the number of hours spent in operation, type of work performed (debugging, production, etc.) on a particular machine, and the various departments which have used the center's facilities. Enclosed can be found flow charts, sample source material, operating procedures, sample output reports and flow chart explanations. Limited to six types of work performed plus down time, and six machines. Time must be in 24-hour clock form. Program uses locations 00492-05089. Remaining storage is used for totals. Program is designed to test machine's storage capacity and to modify the number of projects accordingly.

PROGRAMMING SYSTEMS - Written in SPS fixed point.

MINIMUM SYSTEM REQUIREMENTS - Card system and Indirect Addressing. In the project report for each project number, 190 positions of storage are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016114

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.111DATE DIFFERENCE SUBROUTINE - DATDIF

AUTHORS: J. W. Gaskill K. M. Weiss

DIRECT TECHNICAL INQUIRIES TO:
J. W. Gaskill
Radiological Health Lab.
1901 Chapman Avenue
Rockville, Maryland

DESCRIPTION - This subprogram calculates the elapsed time between any two dates in the twentieth century. The elapsed time is calculated in minutes, hours, and days, and all three results are returned to the mainline program. A date consists of the year, month, and day, each as a 2-digit number, and the time of the day (military time) as a 4-digit number. For each date entered, the elapsed time in minutes is calculated from the first minute of the year 1901. The difference of these results if the elapsed time in minutes between the two dates. Dividing by 60 and then by 24 gives the elapsed time in hours and days. The differences calculated are exact, that is, an extra day (s) for leap year is accounted for when necessary.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 4158 core positions used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016111

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.117AUTOMATIC DATA CORRECTION SYSTEM - WESTERN CAROLINA COLLEGE

AUTHOR: M. D. Kennedy

DIRECT TECHNICAL INQUIRIES TO:
M. D. Kennedy
Computer Operations
Western Carolina College
Cullowhee, North Carolina

DESCRIPTION - The system consists of two programs -- Phase I and Phase II. Two data decks are punched from the same source document. These decks serve as input to Phase I which reports discrepancies (errors) in cards of the same sequential positions of the two decks. If desired, only specified columns may be compared for errors. Phase I output, on cards, is listed and provides the means for simple error analysis and the punching of a corrector card. Phase II is then used to automatically correct the errors. Advantages of the system are the following -- (1) It obviates the verifier, (2) Mispunched cards are never handled individually, (3) It is rarely necessary to repunch the correct letter, number, or symbol in correcting an error, and (4) It provides an index of keypunch accuracy. The programs automatically adapt to a memory of any size. The system is constructed so that it can be used by a person with only slight experience in using the 1620.

PROGRAMMING SYSTEMS - Written in SPS - 1620/1710.

MINIMUM SYSTEM REQUIREMENTS - Both phases, with data, use all of the memory of the machine, 1620 card system with TMF, TNS, and Indirect Addressing (minimal configuration).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016117

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.112GETREC SUBROUTINE FORTRAN II-D

AUTHOR: Frank Nicolazzo

DIRECT TECHNICAL INQUIRIES TO:
Frank Nicolazzo
Aluminum Company of America
1501 Alcoa Bldg.
Pittsburgh, Pennsylvania

DESCRIPTION - Gives FORTRAN programmer access to data anywhere on 1311's by sector. Permits movement of data to and from permanent storage area under FORTRAN prog. control vs. DUP control. (Ex. 1) CALL GETREC (3,15000,15999,1,219) would move 100 sec. from disk drive 3 to work cylinder on drive 1 in 65 sec. (Ex. 2) CALL GETREC (1,3000,3999,1,319) would move 100 sectors from disk drive 1 to another area on disk drive 1. One card must be changed to handle a specific word size. The subroutine as submitted is for F and K of 0806 2 card must be changed to change the name.

PROGRAMMING SYSTEMS - FORTRAN IID, subroutine. Language used is SPS IID.

MINIMUM SYSTEM REQUIREMENTS - 600 storage locations, standard Monitor I specification (card), card system, disk file system, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016112

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.119REPRODUCER (OR RESCUE, I.E. REPRODUCE, EMIT, AND SEQUENCE ON CUE)

AUTHOR: Marilyn S. Wilson

DIRECT TECHNICAL INQUIRIES TO:
Russell A. Altenberger
University of Maine
University Computing Center
Orono, Maine

DESCRIPTION - This program simulates the card reproducing, emitting, and sequencing functions of an IBM 519 Reproducer. Up to six functions may be performed at the same time, specified by control cards - (1) move fields (up to 48 fields, each of any length), (2) emit characters, (3) set to blank, (4) clear flags, (5) set flags, and (6) sequence (from a specified initial number and by a specified increment). The control card format is simple (simple enough to be punched from memory) and the number of control

CONTINUED FROM PRIOR PAGE

cards is low (1, 2, or 3 per function used), despite the versatility of the program.

PROGRAMMING SYSTEMS - Written in SPS - 1620/1710.

MINIMUM SYSTEM REQUIREMENTS - 20,000 minimum storage (program uses 00401-12809). Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016119

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.123FORTRAN CALL SUBROUTINES FOR PLOTTING

AUTHOR: J. E. Turney, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. E. Turney, Jr.
Mgt. Research Dept.
H. P. Hood & Sons, Inc.
Charlestown, Massachusetts

DESCRIPTION - To determine data range and prepare card images containing reference numbers, scale ranges, and scaled data points. Output may be listed on standard printer for graphic presentation of data.

MINIMUM SYSTEM REQUIREMENTS - Depends on use of local control. Minimum - 1326, Maximum - 3574. 1620 card system with 20K Automatic Divide - Indirect Addressing - and one 1311 Disk Drive is required. Uses FORTRAN II-D with Monitor I-System. User's system must contain functional subroutines VAPP1F and VAPP2F (Program No. 13.0.010).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016123

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.125DISK CLEANER

AUTHOR: Dennis Moser

DIRECT TECHNICAL INQUIRIES TO:

Professor C. H. Davidson
Director, Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - Disk Cleaner is a program written in IBM SPS II-D (Monitor I System) which is designed to keep a single 1311 Disk File free of DIM numbers which do not have entries in the Equivalence Table. Both the Equivalence and Sequential Tables are read from disk into core and DIM number comparisons are made. When a DIM number is found in the Sequential Table that doesn't exist in the Equivalence Table, two output cards are produced which, under monitor control, will delete this entry. It should be noted that DIM numbers 0001 through 0169, those used by the monitor system, are protected by the program. Under no circumstances will the output cards produced be capable of deleting these entries. Disk Cleaner is restricted to a 1620 with one 1311 Disk File. A 1620 Model I or II with 20K memory, card I/O, Indirect Addressing and 1 disk drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016125

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.128GENERAL EDIT SUBROUTINE

AUTHOR: L. D. Salus

DIRECT TECHNICAL INQUIRIES TO:

L. D. Salus
Electronic Data Processing, Inc.
60 Coral Center
Fort Lauderdale, Florida

DESCRIPTION - To provide the 1620 SPS programmer with an ease of editing similar to the hardware edit of the IBM 1401 systems. Incorporated is a new macro instruction with three operands which specifies the field to be edited, where the edited field is to be stored and the format of the editing desired.

CONTINUED FROM PRIOR COLUMN

PROGRAMMING SYSTEMS - 1620-SP-035. The general edit subroutine generates its own linkage and return address and therefore does not need the use of IBH's "PICK" subroutine.

MINIMUM SYSTEM REQUIREMENTS - Card; TNS, TNF, MF, Indirect Addressing, 1620 Model 1.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016128

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.130DATA PLOTTING PROGRAM

AUTHOR: D. L. Wright

DIRECT TECHNICAL INQUIRIES TO:

D. L. Wright
Computation Center
Georgetown University
Washington, D.C. 20007

DESCRIPTION - Program makes plots on an on-line CALCOMP Plotter of data supplied from cards as input. Up to twenty variables may be used as input, and any two variables may be plotted against each other. Up to ten different plots may be made on the same graph, and the scales of the two axes may be different for each set of variables plotted. Each plot may be labeled with one line of alphanumeric characters along the x-axis and one along the y-axis. The minimum and maximum scale values are also written on both axes if desired.

PROGRAMMING SYSTEMS - Programmed in FORTRAN II-D, and SPS II-D. Program is three parts - (1) Mainline SPS (2) Mainline FORTRAN (3) FORTRAN Subroutine in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 Model 1 card system with 1 disk file and TNS, TNF, MF; Auto Divide; Indirect Addressing; Floating Point hardware. Special instructions and AFP can be replaced by macros.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016130

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.131PLOT A BLOCK DIAGRAM

AUTHORS: T. M. Harts Susannah H. Young

DIRECT TECHNICAL INQUIRIES TO:

T. M. Hartz
USPHS, Div. of Radiological Health
1901 Chapman Ave.
Rockville, Md.

DESCRIPTION - This program utilizes a 1620 computer, card read/punch, CALCOMP Plotter to convert any SPS program into block diagram form for purposes of program documentation and permanent records. All SPS Op codes including those for plotter and disk operation (but not floating point) are provided for. The plotter will produce for each Op code its conventional symbol. Furthermore, each symbol is complete with Op code, P Operand, Q Operand, Flag Operand and/or label, if present, logically positioned. The plot is drawn horizontally and the plotter draws an 11 inch horizontal line every 8 1/2 inches as the paper unrolls. There are two lines of the block diagram on each 8 1/2 x 11 page. Error messages to describe instruction discrepancies are produced, but diagramming can continue if the operator so desires. The only limit placed on the number of instructions which can be drawn by the plotter is the available time.

PROGRAMMING SYSTEMS - Written in SPS - 1620/1710.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card system with 40K memory, CALCOMP On-Line Plotter, one disk file system, TNS, TNF, MF Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016131

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-01.6.133

FLOATING-POINT SORTING SUBROUTINE FOR FORTRAN II-D

AUTHOR: E. Satterthwaite
 DIRECT TECHNICAL INQUIRIES TO:
 E. Satterthwaite
 University of Delaware
 Computing Center
 Newark, Delaware 19711

DESCRIPTION - Subroutine for rapidly sorting elements of a FORTRAN Floating-Point array. Similar to 1620-01.6.069 but written as a subroutine for the Monitor-II/FORTRAN II-D System, uses index registers, and sorts Floating-Point only. Typical sorting time for 1000 elements is 30 seconds. Storage used- 488 core positions.

PROGRAMMING SYSTEM REQUIREMENTS - Programmed in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card system with disk file system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, and a 1620 Model II equipped for Monitor II.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016133

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.134

DISK IOCS ROUTINES, CONTROLS SEQUENTIAL ADDITIONS AND DISK UTILITY PACKAGE

AUTHOR: P. Delashmutt
 DIRECT TECHNICAL INQUIRIES TO:
 P. Delashmutt
 IBM Corporation
 3833 N. Fairfax Dr.
 Arlington, Va.

DESCRIPTION - This paper discusses disk input output routines and programs available for the 1620/1311/1443 system. Read, Write, Seek Check and Error routines are provided which allow for file processing without monitor. Get and Put routines handle blocking and deblocking of records during consecutive or control sequential processing and issue actual file reads or writes when all records in a block have been processed. If a control sequential file is specified, the routines check for chained records and process these records in sequence. Random processing is handled by Direct Addressing Read and Write routines. An Open routine checks the internal pack label. The user supplies the parameter cards required by the routines used in his program and inserts the linkage instructions in his program when he wants to Read or Write Disk or check a pack label ... the Control Sequential Additions program adds records to a control sequential file and creates the necessary linkage to, within and from the additions area. The user supplies the record assembly and end of file routines and includes ten parameter cards.... the disk utility package provides zero pack, label pack, file-to-printer, and alter sector programs.

MINIMUM SYSTEM REQUIREMENTS - A 20K machine with Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016134

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none	none	none

1620-01.6.135

EXTENDED MONITOR SYSTEM (EMS)

AUTHOR: H. Givner
 DIRECT TECHNICAL INQUIRIES TO:
 H. Givner
 Testing and Research
 Brooklyn College
 Brooklyn, N.Y. 11210

DESCRIPTION - The EMS is designed especially to allow users of PR-033, Version 1 to load checked-out machine language programs and object programs (that have been produced without the monitor) onto the monitor disk pack, so they may be called for execution in the same manner as programs assembled with SPS II-D or compiled with FORTRAN II-D.

The EMS may also be used to manually interrupt a job, and restart it at a later time.

PROGRAMMING SYSTEMS - Can easily be modified to operate with the latest versions of PR-025, PR-026, PR-033, or PR-034, and operate with paper tape systems.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card system, with Model 1 or 2, with at least 20000 core positions, a 1311 Model 3 Disk Drive, and the special feature, Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016135

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none	none	none

1620-01.6.136

MACROINSTRUCTION FLOATING POINT FORMAT SUBROUTINES FOR SPS II-D

AUTHOR: E. Satterthwaite
 DIRECT TECHNICAL INQUIRIES TO:
 E. Satterthwaite
 University of Delaware
 Computing Center
 Newark, Del. 19711

DESCRIPTION - A set of two subroutines providing the macroinstructions FMTE and FMTF. Each macro requires three operands, A, B, and C. Execution of FMTE results in conversion of a floating-point B field to the corresponding alphanumeric FORTRAN-like E-field with Address A. The C field contains format specifications. FMTF is similar but results in an alphanumeric F-field. Usual macro programming restrictions apply.

PROGRAMMING SYSTEMS - Programmed in SPS II-D, macro.

MINIMUM SYSTEM REQUIREMENTS - Storage required - 694 (FMTE) and 1058 (FMTF) core positions. Equipment required - Monitor I or Monitor II card system, TNS/TNF/MF, Indirect Addressing, Floating Point hardware (TFL only). TFL requirement can be removed by suitable restrictions on B Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016136

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.137

DISK PACKER

AUTHOR: D. Moser
 DIRECT TECHNICAL INQUIRIES TO:
 Prof. C. H. Davidson, Director
 Engineering Computing Laboratory
 University of Wisconsin
 Madison, Wisc. 53706

DESCRIPTION - Disk Packer is a program which is designed to pack users programs into the smallest possible area on the disk. Users programs are read from one area of disk and written in another to cause larger gaps to appear than would normally occur if the monitor area assignment process was used. The Monitor I System normally reserves cylinders 25 to 80 for users programs and it is these cylinders that are affected by Disk Packer. Both the Dim Table and the Sequential Program Table are updated by disk packer after the packing operation is complete. The packing allows more users programs to be stored on any one disk than was previously possible because there are no holes too small to be profitably used. Disk Packer is restricted to a 1620 with one 1311 Disk File. The program should be used only in these installations which use the Monitor I Version I system.

PROGRAMMING SYSTEMS - Written in SPS II-D, Monitor 1 Version 1.

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model I or II, 20K memory, card I/O, Indirect Addressing, and 1 disk drive.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016137

*M

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.138FORMAT STATEMENT COMPILER SUBROUTINE

AUTHORS: J. E. Shapiro J. Pearson
R. K. Neff

DIRECT TECHNICAL INQUIRIES TO:
J. Shapiro
Harvard School of Public Health
Data Center
1 Shattuck Street
Boston, Mass.

DESCRIPTION - The Format Compile Subroutine enables the programmer to alter FORTRAN II Version 2 format statements at object time. This routine is available as a library subroutine. The subroutine will compile all valid FORTRAN II Version 2 format statements. In addition, the specification -NX where N is a positive integer, will compile correctly. The FORTRAN II Version 2 subroutines will handle -NX as a specification to backspace N times. As in standard FORTRAN II, this subroutine accepts only 1 level of inner parentheses.

PROGRAMMING SYSTEMS - Written in SPS, 1620-SP-020 as a subroutine.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program is 2324 positions. Equipment required by program - 1620 card system with Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016138

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.139GRADE NORMALIZING AND PLOTTING

AUTHORS: P. R. Schneider J. Podor

DIRECT TECHNICAL INQUIRIES TO:
Prof. C. H. Davidson, Director
Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - Grade Normalizing and Plotting was designed to perform five basic operations used by many instructors in the course of a semester- First, the average and standard deviation for any numerically graded performance (exam, homework, lab, report, average, etc.) can be computed. Second, a weighted average of any subset of a students grades may be made. Third, any graded performance may be normalized to an average and standard deviation specified by the user. Fourth, the output class list can be numerically ranked according to student performance on any grade or average. Fifth, a distribution for any graded performance or average may be plotted on the printer. The program is presently written so it uses three sections linked together with a CALL LINK statement. It could easily be combined into one section and be used with any FORTRAN what allows format statements. The alphabetic variable definition may need to be redefined.

PROGRAMMING SYSTEMS - Written in FORTRAN II-D.

MINIMUM SYSTEM REQUIREMENTS - A 60K card system with one 1311 Disk Drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016139

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.140STRAIGHT LINE PLOTTING SUBROUTINE

AUTHOR: D. E. Owens

DIRECT TECHNICAL INQUIRIES TO:
D. E. Owens
E.S. Preston & Associates, Ltd.
939 Goodale Boulevard
Columbus, Ohio 43212

DESCRIPTION - Straight Line Plotting Subroutine enables a 1620 FORTRAN program to drive a digital line plotter between two points. The pen status may be interrogated or initialized at any time by the driver program. The subroutine is written in SPS for use by FORTRAN under control of Monitor 1 on a basic 20K 1620 computer. The subroutine occupies only 568 core locations and may be

CONTINUED FROM PRIOR COLUMN

optionally used as a local subroutine.

PROGRAMMING SYSTEMS - Programmed in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - A card system with disk file, Auto divide, Model I, 1443 Printer, and digital line plotter. Program can be used on machine with only digital line plotter.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016140

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.141DIP - DISK INSPECTION PROGRAM

AUTHOR: P.B. Armstrong

DIRECT TECHNICAL INQUIRIES TO:
P.B. Armstrong
Computer Center
Bowling Green State University
Bowling Green, Ohio

DESCRIPTION - DIP analyzes the Monitor I System tables to produce a clean, easy to read disk pack map giving information about, and locations of, both available and assigned disk areas. The DIP map shows the user what has been stored on the disk pack and what areas are available for use. DIP entries are arranged in the same sequence as the corresponding programs or free areas appear on the pack. DIP performs no diagnostics, the monitor system table entries must be exactly as described in the reference manual before DIP can operate effectively. DIP was designed to operate on a one file system.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - Card input/output, one disk drive, TNF, MF, Indirect addressing, 1620 Model I. TNF and MF requirement could be removed by recompiling with programmed subroutines. Storage used - 18,180 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016141

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.142CAREFREE PROGRAM DUMPER

AUTHOR: P.J. Jutsum

DIRECT TECHNICAL INQUIRIES TO:
P.J. Jutsum
Computing centre
University of the West Indies
Kingston 7, Jamaica

DESCRIPTION - This program enables any program in store to be punched on cards as a self loading object deck. Each card in the object deck produced is numbered (except for the first card), but as long as the first six and last four cards are in the proper positions, the bulk of the object deck can be in random order. This means that if the deck is dropped it can be reassembled without much trouble. The object program may be punched in sections, and the resulting deck achieves the maximum economy of cards.

MINIMUM SYSTEM REQUIREMENTS - The program is written for a Model I, 20K machine. It is compatible with Indirect Addressing, but does not use it, and it is readily adaptable to increased storage. The program occupies the load product and multiplication table areas only while running. It replaces the table when the punching is finished, and halts before branching to the start of the undisturbed object program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016142

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.143MONITOR I DISK DUMP PATCH

AUTHOR: Howard Givner

DIRECT TECHNICAL INQUIRIES TO:
Howard Givner

CONTINUED FROM PRIOR PAGE

Office Of Testing and Research
Brooklyn College
Avenue B and Bedford Avenue
Brooklyn, N.Y. 11210

DESCRIPTION - This program, when loaded onto a monitor disk pack, will permanently alter the DUF*DDUMP routine so that whenever card output is specified by either a *outputcard or a *DDUMP Control Record, if the data to be outputted is a program in system output format which does not require subroutines normally loaded by the subroutine supervisor, then the deck that is punched will be in the format of a self-loading SPS-020 object deck. Incorporating this patch enables the user of Monitor I to DORG 402 when using SPS2D and then load his object deck independently of the monitor loader into an entirely zeroed memory.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 1620 with 1622, 1311, and Monitor I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016143

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.144

PART - PROCESSOR AND RESULT TESTER

*M

AUTHOR: James A. Lawler

DIRECT TECHNICAL INQUIRIES TO:
H.B. Kerr, Director
Tennessee Technological University
The D.W. Mattson Computer Center
Box 21a
Cookeville, Tenn.

DESCRIPTION - The purpose of PART is to provide a means of processing, executing and checking large volumes of student written machine language (or SPS) programs, and at the same time give the student a definite answer as to the status of their program(s). It yields to the instructor a convenient means of analyzing the progress of each of the students. Furthermore, the students are given pertinent information relating to the source of their errors. The PART program permits wide use of mark sensing; however there is no reason why, as long as proper card formats are followed, the PART program could not be used with all information being hand punched and the use of mark sense equipment eliminated. Storage used by program: 00000 through 00400, 00000 through 20000.

PROGRAMMING SYSTEM - Written in SPS two pass for cards.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, and 1620 Model I. The PART program itself does not use Auto Divide and Floating Point hardware, but allows student written programs to use these features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016144

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.145

PICTURE OF DISK PACK

*M

AUTHOR: A. G. Bisenius

DIRECT TECHNICAL INQUIRIES TO:
A. G. Bisenius
Martin Harietta Corp.
P.O. Box 179, Mail No. a-6632
Denver, Colo.

DESCRIPTION - This program causes four lists describing the contents of the disk pack to be printed out. The first two lists pertain to named non-system programs and will be in alphabetic and DIM number order. The third list is in cylinder order and covers cylinders 24 through 99. The fourth list gives the unnamed DIM numbers. Each item in the first three lists contains the following information when it exists. Cylinder number, DIM number, program name, memory address to which the program will be loaded, memory address where the program will be entered, the beginning and ending sector locations, the number of sectors used or available, a minus or plus sign depicting whether the sectors were used or available, and a comment on protection and permanence.

This program is set up for handling a disk pack with sector addresses 00000 through 99999 and the disk pack must have equivalence, DIM and sequential tables.

CONTINUED FROM PRIOR COLUMN

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I, 1622 Card Read/Punch, 1311 Disk Drive, 1443 Printer and Indirect Addressing. (The Indirect Addressing feature could be easily removed).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016145

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.146

FIVE-CARD PRINTER CORE DUMP PROGRAMS

AUTHOR: J.S. Taylor

DIRECT TECHNICAL INQUIRIES TO:
J.S. Taylor
Data Corp.
7500 Old Xenia Pike
Dayton, Ohio

DESCRIPTION - These programs dump the memory of any size. Three initial unformatted lines display 120 positions beginning at 00000, 00200 and 00300. Subsequent lines are formatted as follows- Starting address, Asterisk, ten groups of ten digits each followed by an asterisk, and asterisks to fill the rest of a 120 character line. On machines having 144 print positions, positions 121-144 always display the same data. Only positions 00000-00079 are destroyed by the program. The program stops on a MAR check when the end of core is reached. Storage used- 0-399.

PROGRAMMING SYSTEMS - Written in machine language.

MINIMUM SYSTEM REQUIREMENTS - Model I or Model II 1620 on the 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016146

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.147

SUPER LISTER

AUTHOR: R. L. Dunbar

DIRECT TECHNICAL INQUIRIES TO:
R. L. Dunbar
Sunset Trailer Park
Oswego, N.Y.

DESCRIPTION - Under sense switch control, operator may read out FORTRAN, SPS, 80 columns of machine language, or print any number of fields from a single card, in any

order, in tabular form. Fields to be listed may be specified by a prepared format card or entered on the console typewriter. Lister is considerably faster than those available, and prints record marks in both alphanumeric and numeric fields.

PROGRAMMING SYSTEMS - Written in NCE.

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model 1 with card I/O and Indirect Addressing is required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016147

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.148

MULTIPOINT PLOTTER

AUTHOR: R. G. Gates, Jr.

DIRECT TECHNICAL INQUIRIES TO:
R. Gates, Jr.
University of Delaware
Computing Center
Newark, Delaware 19711

DESCRIPTION - The purpose of the Multipoint Plotter is to accept data in the form of independent points, each data point being given by its X and Y coordinates, scale the data, and plot it on cards. Each data point may be given a separate symbol, data need not be presorted and scaling may be controlled by the user if desired.

CONTINUED FROM PRIOR PAGE

Specifications - Subroutines VAFP1F and VAFP2F (Program Number 13.0.010) must be in the library deck or on a disk.

PROGRAMMING SYSTEMS - Written in FORTRAN II with SPS Subroutines VAFP1F and VAFP2F.

MINIMUM SYSTEM REQUIREMENTS - Storage used is 40K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016148

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.149DATMAN - DATA MANIPULATION

AUTHOR: J. L. Barnard

DIRECT TECHNICAL INQUIRIES TO:
J. L. Barnard
Louisiana Polytechnic Institute
Louisiana Tech. Computing Center
Buston, La. 71270

DESCRIPTION - To read information from a predetermined number of cards, arrange the information in any desired format, and print the information in any predetermined number of lines. Storage specifications - 7346 core positions. Type of program - complete mainline program.

PROGRAMMING SYSTEMS - Source language is SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - Assembled on 1620 Model I with 1311 Disk Drive, 1443 Printer, 1623 Core Storage, and card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016149

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.150DISK PACKER FORMONITOR II

AUTHOR: D. Moser

DIRECT TECHNICAL INQUIRIES TO:
Prof. C. H. Davidson
Director Engineering Computing Lab.
University of Wisconsin
Madison, Wisc. 53706

DESCRIPTION - Disk Packer is a program written in SPS II-D (Monitor II) which is designed to pack users programs into the smallest possible area on the disk. Users programs are read from one area of disk and written in another to cause larger gaps to appear than would normally occur if the monitor area assignment process was used. The Monitor II System normally reserves cylinder 25 to 78 for users programs and it is these cylinders that are affected by Disk Packer. Both the DIM Table and the Sequential Program Table are updated by Disk Packer after the packing operation is complete. The packing allows more users programs to be stored on any one disk than was previously possible because there are no holes too small to be profitably used.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - Disk Packer is restricted to a 1620 Model I or II with one 1311 Disk File, 20K memory, card I/O and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016150

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.151FORTRAN II-D DISK SUBROUTINES TO READ OR WRITE IN OTHER THAN THE WORK AREA

AUTHOR: D. L. Wright

DIRECT TECHNICAL INQUIRIES TO:
D. L. Wright
Georgetown University
Computation Center
Washington, D.C.

DESCRIPTION - The purpose of these two subroutines is to allow a FORTRAN program to store or retrieve data on a disk pack outside the monitor work area. The subroutines

CONTINUED FROM PRIOR COLUMN

assume a three disk drive system with the Monitor System on one pack, the work area on a second and the free area on a third. The assumption is also made that all disk packs have sector addresses 00000 to 19999.

PROGRAMMING SYSTEMS - Written in FORTRAN II-E.

MINIMUM SYSTEM REQUIREMENTS - Program requires a 1620 system with three disk drives, although with modification, it can be run on a system with two drives.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016151

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.152TRUTH TABLES FOR SYMBOLIC LOGIC STATEMENTS

AUTHOR: J. K. Ward

DIRECT TECHNICAL INQUIRIES TO:
J. K. Ward
Westminster college
Fulton, Mo.

DESCRIPTION - This program accepts a logical statement up to 79 spaces long, containing up to 24 variables, and prints out the Truth Table. Instructions are included for compiling with 1620/1710 SPS. Object tapes are included for both systems. Card input would require the change of one card instruction included in the write-up.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - Program requires a paper tape, disk file system with Indirect Addressing and 6142 positions of storage.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016152

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	none		none

1620-01.6.153TABLE LOOKUP, NO BRANCH AND TRANSMIT - (TLUNBT)

AUTHORS: T. Noyes D. Mann

DIRECT TECHNICAL INQUIRIES TO:
T. Noyes
C/o Computer Center
Oakland University
Rochester, Mich.

DESCRIPTION - TLUNBT is a binary table search of a core stored table. Given a search argument, TLUNBT finds the associated entry of a table with ascending arguments. The table must have ascending arguments. A table may not contain more than 999 entries. The arguments must be at least two digits in length.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Program requires a 1620 Model I with 1200 positions of storage and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016153

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.154FRAME SUBROUTINE

AUTHORS: P. Juell D. G. Olson

DIRECT TECHNICAL INQUIRIES TO:
P. Juell
North Dakota State University
Fargo, N.D.

DESCRIPTION - This subroutine provides the ability to edit output data in a FORTRAN program into a common business type format. This includes the addition of commas dollar signs, blanks, and other special characters into output numbers. The length of the number plus editing characters

CONTINUED FROM PRIOR PAGE

cannot exceed ten(10) positions. Special Kingston FORTRAN II statements are used so this subroutine is restricted for use only with the Kingston FORTRAN II Compiler and subroutines. Each number edited takes approximately one (1) second of computer time.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - The program requires a 40K 1620 system with Auto Divide and TNS-TNF-MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016154

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

systems using Monitor I which do not have these features.

PROGRAMMING SYSTEMS - PSS-II-D under the Monitor System.

MINIMUM SYSTEM REQUIREMENTS - Routines were developed on a 1620 Model I with 20K. Any 1620 capable of using Monitor I can use these routines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016157

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.158
DISK DUMP

AUTHOR: R. P. Frisard

DIRECT TECHNICAL INQUIRIES TO:
R. P. Frisard
Louisiana Polytechnic Institute
Computing Center
Ruston, La. 71270

DESCRIPTION - Disk to printer sector dump using 3090 core positions.

PROGRAMMING SYSTEMS - Written in SPS II D.

MINIMUM SYSTEM REQUIREMENTS - Card input, typewriter input, 1442 Printer and a 1311 Disk Drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016158

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.159
TNS, TNF, AND MF SIMULATION SUBROUTINES

AUTHOR: J. D. Rose

DIRECT TECHNICAL INQUIRIES TO:
J. D. Rose
California State College at Hayward
Instructional Computation Center
25800 Hillary Street
Hayward, Calif. 94542

DESCRIPTION - These subroutines simulate the TNS, TNF, and MF instructions, and have a simple linkage designed to facilitate modification of SPS programs written for machines equipped with the special feature hardware. These subroutines require less core storage than those of 1620-01.6.121; the known execution errors of the TNS subroutine of 1620-01.6.121 have been corrected, and MF simulation is included. The subroutines may be used individually or in any combination, are written in SPS, and occupy a total of 392-394 core positions when assembled

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Any 1620 card system with Indirect Addressing may be used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016159

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.160
LABELL - A REPORT GENERATOR *N

AUTHOR: R. C. Strunk

DIRECT TECHNICAL INQUIRIES TO:
R. C. Strunk
Xavier University
Cincinnati, Ohio

DESCRIPTION - LABELL is a data handling one-pass compiler. It has very low powered arithmetic and decision-making capabilities but very fast and powerful data movement instructions. The purpose of this program is to -- A) read in a variable number of input records (cards), B) arrange and edit the data from these cards into output lines, C) add constants and titles to this data, D) print and/or punch and/or type these prepared lines, E) count cards, card sets, output lines, sets of lines, pages. This program will simulate all of the operations of an IBM 024, most of the operations of an IBM 514, many of the operations of an IBM 407, and a few of the operations of an IBM 085. Execution times are as flexible as the

1620-01.6.155
GETAG SYSTEM

AUTHOR: T. J. Noyes

DIRECT TECHNICAL INQUIRIES TO:
T. J. Noyes
Computer Center
Oakland University
Rochester, Mich.

DESCRIPTION - The GETAG System is a package of programs designed to allow the user direct access to randomly stored disk file. Seven programs comprise the system. Three - STOTAG, GENTAG, and GETAG2 are mainline. The other four - GETAG1, GETAGM, GETAGA, and GETAGB, are relocatable subroutines. A tag file of the users disk file is formed sort, and STOTAG executed to build an index file. Then the user uses GETAG1 or GETAGM, which use the tag and index files, as subroutine to access the disk file. The tag file must not exceed one disk pack.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 1620 I, 20K card - disk file system, any number of packs, TNS, TNF, and Indirect Addressing. The users system must also have the 1620 library program, sort, and a 1620 Users Group Program, TLUNBT (Program No. 01.6.153).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016155

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.156
INVENT

AUTHOR: T. W. Oneal

DIRECT TECHNICAL INQUIRIES TO:
T. W. Oneal
Scientific Computation Facility
Loma Linda University
Loma Linda, Calif. 92354

DESCRIPTION - Invent lists the user written programs and/or monitor programs and/or available disk areas of all drives defined under Monitor. The listing may be sequential from drive "0" (zero) to the last drive or may be sorted, alphabetically for programs and numerically for available areas.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - Requires a 20K card disk system with one 1311 Disk Drive, TNF, Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620016156

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-01.6.157
TNS, TNF AND MF MACRO SUBROUTINES *M

AUTHOR: J. P. Cantlin

DIRECT TECHNICAL INQUIRIES TO:
D. Crowe
3141 Killarney
Costa Mesa, Calif. 92626

DESCRIPTION - These Macro Instructions allow a programmer to simulate the TNS, TNF and MF edit instructions for 1620

CONTINUED FROM PRIOR PAGE

programmer. A program to print four-line labels, four-up across a page, one label per card will require about one minute to compile and will print 250 labels per minute (fast I/O equipment). This program is capable of being operated either under Monitor control (version A) or by means of its own card loader (version B). Standard material consists of all listings and all documentation; the four object decks supplied consist of both version A and version B of the compiler and of the Program Executor, both for use on any 1620-20K card system with Indirect Addressing. Optional material consists of four SPS-IID source decks corresponding to the four object decks. Directions are included for altering the source decks to utilize any additional core storage available.

PROGRAMMING SYSTEMS - The LABELR language is more user-oriented than FORTRAN while its execution times approach those of SPS. The LABELR system consists of two core loads; a Compiler and a Program Executor. The entire system is capable of being operated on any 1620-I or 1620-II card system with Indirect Addressing.

MINIMUM SYSTEM REQUIREMENTS - The system will use any model 1311, 1621, 1622, 1627, and/or 1443 attached to the 1620. Floating Point hardware, Automatic Divide, and additional instructions are not required. The program will operate with no limitations in 40-K, minor limitations in 20-K. The entire system will operate on a 360/20 1620 Emulator without modification.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object code and sample problem.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620016160

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	CARDS	15	none

1620-02.0.008FORGO - LOAD AND GO FORTRAN

AUTHORS: C. W. McClure K. Sanderson
J. Davis

DIRECT TECHNICAL INQUIRIES TO:
C. W. McClure
Engineering Computing Laboratory
University of Wisconsin
Madison 6, Wisconsin

DESCRIPTION - This program converts source programs written in FORTRAN Language into a pseudo-machine language coding which is then executed without intermediate punchout in a simple interpretive mode. This program is designed as an educational programming system with very extensive diagnostic and tracing features.

MINIMUM SYSTEM REQUIREMENTS - The minimum memory is 40K. The processor uses about 35K, thus leaving only 5K for the compiled object program in a 40K machine. 1620 Central Processing Unit, 1622 Card Read-Punch Unit, 1623 Core Storage Unit, Indirect Addressing and Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Appropriate material delivered.

ORDERING INFORMATION: PROGRAM NUMBER 1620020008

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	CARDS	15	none

1620-02.0.009FOR-TO-GO (2 PASS FORGO)

AUTHORS: C.W. McClure K.R. Sanderson
J. Davis

DIRECT TECHNICAL INQUIRIES TO:
Professor C.H. Davidson
Engineering Computing Laboratory
University of Wisconsin
Madison 6, Wisconsin

DESCRIPTION - This program is designed to retain most of the desirable features of FORGO, but to allow larger programs to be processed by a two-pass operation.

MINIMUM SYSTEM REQUIREMENTS - The minimum memory is 40K.

CONTINUED FROM PRIOR COLUMN

The processor uses about 18K, thus leaving about 22K for the compiled object program in a 40K machine.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020009

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.011INTERPRETIVE SYSTEM FOR PERFORMING OPERATIONS WITH COMPLEX NUMBERS

AUTHORS: W.D. Glauz J.O. Hancock

DIRECT TECHNICAL INQUIRIES TO:
W.D. Glauz
Furdue University
Sch. of Aeronautical & Engr. Sciences
Lafayette, Indiana

DESCRIPTION - The program performs various operations with complex numbers. It is written as an interpretive system which interprets OP Codes 80-99 and performs the indicated operation with Floating Point numbers.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020011

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.014FORTRAN 90 COMPILER AND SUBROUTINES

AUTHOR: Richard Forst

DIRECT TECHNICAL INQUIRIES TO:
Richard Forst
Bausch & Lomb Optical Co.
Computing Section
635 St. Paul Street
Rochester, N.Y.

DESCRIPTION - Modified Format FORTRAN Compiler, allowing the input flexibility of the old FORTRAN without format, with the advantages of format output. FORTRAN 90 also contains procedure for correcting source errors during compilation. Subroutine deck also contains an Absolute Value Subroutine -- AVS.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K, Automatic Divide, Indirect Addressing and other special feature required - MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.017UTO FORTRAN PROCESSOR AND SUBROUTINES

AUTHORS: E. Stewart Lee James A. Field

DIRECT TECHNICAL INQUIRIES TO:
James A. Field
University of Toronto
Electrical Engineering Department
Toronto, Ontario, Canada

DESCRIPTION - A FORTRAN compiler with rapid, batch compiling, and additional language facilities. Improvements have also been made in the subroutine package.

PROGRAMMING SYSTEMS - The language is an extension of IBM Format FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020017

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.029

NCE LOAD AND GO FORTRAN FOR 20K

AUTHORS: George Rumrill Bruce Fowler

DIRECT TECHNICAL INQUIRIES TO:
George Rumrill
Computing Center
Newark College of Engineering
323 High St.
Newark 2, N.J.

DESCRIPTION - This program is a compiler-interpreter capable of batch processing source decks written in a modified form of the FORTRAN Language. Answers are immediately available without any handling of object decks. The program is intended to bring to the user of the 20K 1620 the advantages of load and go operation, especially when processing short student programs. Cannot be damaged by errors in programs. Many error checks are made, both during compilation and execution. No format specifications are used. Output format is determined by the type and range of the variable, input format is free form.

FEATURES - Built-in trace, array input and output, provision for sub-program linkages, limited Hollerith listing, and undefined variable detection. Specifications-A.

PROGRAMMING SYSTEMS - Other programming language OSAP (Ohio State University Assembly Program), a modified form of SPS library No. 01.1.012.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program- 20,000 positions. Equipment required by program - Auto Divide, Indirect Addressing, card or paper tape, not both; Model I machines only.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620020029

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	CARDS	15	none

*M 1620-02.0.031

PDQ FORTRAN (AN INTERPRETIVE PROGRAM)

AUTHOR: Frank H. Maskiell

DIRECT TECHNICAL INQUIRIES TO:
Frank H. Maskiell
Pennsylvania Transformer Division
McGraw-Edison Company
Canonsburg, Pa.

DESCRIPTION - PDQ FORTRAN is a modification of the UTO FORTRAN and FORTRAN with FORMAT, which utilizes floating point variables in the excess 50 notation. In the hundred plus programs compiled to date by the system, the object time running is less, the size of the object deck is smaller, and core storage requirements for the object program, subroutines, and data is less than any other FORTRAN system without Floating Point hardware. Specifications - Storage used by program - the Processor requires 18000 digits permitting 199 Symbol Table entries on 20K, 2199 Symbol Table entries on 40K. Class A subroutines for the object program require 6600 digits. Instructions of the object program begin loading in location 6600.

The FO-004 Language has been expanded in the PDQ FORTRAN System to include (a) Common statement for reserving locations in the symbol table for nonsubscripted and subscripted variables. (b) Batch compilation of programs without subroutines, (c) Continuation cards for format and input/output statements, (d) Repetition of field format (NFW.D) etc.--Format also includes an A and A D specification, (e) Listing or punching of referenced source statements and symbol table, (f) Procedure statements permitting a group of FORTRAN statements to be utilized as a subroutine similar to the FORTRAN II subroutine subprogram, (g) Trace facility without generating additional instructions in line and including the address as well as the magnitude of the variable at running time.--The format of trace at object time may be altered by a single instruction, (h) Two subroutine decks, one permitting a relaxed input format requiring only that a space or blank column separate input variables, and the second requiring input data to be in the precise format of the input statements--Either subroutine deck may be used with the compiled object program depending on the format of data to be used.

PROGRAMMING SYSTEMS - Written in SPS and then compressed.

MINIMUM SYSTEM REQUIREMENTS - Card system- Auto Divide. Program will operate on 20K and will internally adjust for any additional storage available. Programs may be compiled on a machine of 40K or greater, for a machine of lesser capacity by means of a control digit. Any program in FO-004 language may be compiled in the system, however, additional language facilities are included.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020031

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-02.0.030

ABSOLUTE ASSEMBLY SYSTEM 7094 FAP (FOR THE IBM 1620 DIGITAL COMPUTER)

AUTHOR: R. M. Malinoski

DIRECT TECHNICAL INQUIRIES TO:
R. M. Malinoski
HRE-Singer, Inc.
Science Park
P.O. Box 60
State College, Pa.

DESCRIPTION - This system is designed to assemble FAP Language instructions written for the IBM 7094. Its primary purpose is to aid users of the 1620 who also use the 7094, but do not have as much access to the 7094. It may also be used for debugging 7094 programs in that it performs some logical checks which are not performed by the 7094 FAP Assembler. Restrictions/range - this system makes the following major restrictions on the 7094 source deck: symbolic names longer than six characters are not acceptable-logical tag designations are unacceptable, relocatable pseudo-operations are unacceptable, literals are unacceptable, address or decrement arithmetic is restricted to the operations + and -, and the source deck cannot contain more than 947 symbolic names. There are other minor restrictions which are specified in the program manual. Storage requirements- Phase I of this system requires 23895 locations for the program and arithmetic table, the remainder of the core is used for the symbol table. Phase II of this system requires 01616 locations for the program and arithmetic tables. Phase III of this system requires 03038 for the program and arithmetic tables- the remainder of the core is used for the assembly of the post-processor output.

PROGRAMMING SYSTEMS - The program is written in the SPS Language and does all calculations in fixed point.

MINIMUM SYSTEM REQUIREMENTS - 40K, Automatic Divide, Indirect Addressing, other special features required- TNF, TNS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020030

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.035

CARLETON BINARY SIMULATOR

AUTHOR: William Gage

DIRECT TECHNICAL INQUIRIES TO:
William Gage
Computation Center
Carleton College
Northfield, Minn.

DESCRIPTION - The Carleton Binary Simulator is an interpretive program which converts the 1620 into a single address, fixed work length, binary computer. It has 4096 words of 16 bits (15 bits and sign) each, a 32 bit Accumulator-Remainder Unit, and a 12-bit Index Register. There is a generous supply of arithmetic, Boolean, control, and input/output instructions.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 20K machine configuration-card system, Indirect Addressing, Edit Instructions (MF, TNS, TNF), Automatic Divide. The program can be fairly easily modified for use on machines without the edit instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020035

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR PAGE

in columns 4-13 on the IBM Program Order Form.

1620-02.0.036BG-UTO FORTRAN

*M

AUTHOR: Werner Frank

DIRECT TECHNICAL INQUIRIES TO:

Werner Frank
Computer Center
Bowling Green St. Univ.
Bowling Green, Ohio

DESCRIPTION - This program is a modification of the UTO FORTRAN Compiler (02.0.024) to permit a series of separate FORTRAN object programs that have been compiled without the relocatable subroutines to be run without reloading of the subroutine deck for each program. All relocatable subroutines have been assigned a permanent location in memory immediately above the arithmetic and input output subroutines. All subroutines are loaded once in memory at object time and then any number of compiled object programs may be run without individually reloading the subroutines. All statements acceptable in the original version of UTO FORTRAN are acceptable in BG-UTO FORTRAN. This program has been found to be especially suitable for compiling and running many short student FORTRAN programs on a 20K machine.

PROGRAMMING SYSTEMS - Mainline complete.

MINIMUM SYSTEM REQUIREMENTS - Card system. Language used in the writeup- English. If all relocatable subroutines are permanently stored in memory, the origin of object programs is 11120. In order to compile and run larger object programs, the origin may be reduced to 09100 by eliminating the trigonometric and sign subroutines, or to 08466 by eliminating all but the exponential and log subroutines. These last two subroutines must be retained since they are used in evaluating A**B.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020036

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.037SIMULATION OF THE IBM 7040/7044 ON THE IBM 1620

AUTHOR: William E. Wright

DIRECT TECHNICAL INQUIRIES TO:

E. Robert Ashworth
D.P. & Computing Center
Southern Illinois Univ.
Carbondale, Ill.

DESCRIPTION - The 7040 Simulator reads in programs written in a limited 7040 Macro Assembly Program (MAP) Language, converts each program to a machine language representation, and uses these representations to execute the programs as would an IBM 7040. The groups of instructions which are not legal are- (1) Trapping Instructions, (2) Double-Precision Floating Point Instructions, (3) Memory Protect Instructions, (4) Input-Output Instruction, (5) Direct Data Connection Instructions, all MAP. Pseudo-Instructions except OCT, DEC, BCI, BSS, BES, ORG, END, and EQU. The 7040 core storage is limited to a maximum of between 1,009 words and 2,705 words.

PROGRAMMING SYSTEMS - Written in SPS Mainline complete.

MINIMUM SYSTEM REQUIREMENTS - 40K. Equipment required by program - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware. Program can be used on lesser machine. Requirements that can be easily removed- 40K, TNF.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020037

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.038CARLETON COLLEGE COMPILER

*M

AUTHOR: D. H. Taranto

DIRECT TECHNICAL INQUIRIES TO:

D. H. Taranto
Carleton College
Northfield, Minnesota

DESCRIPTION - The Carleton College Compiler is a load-and-go algebraic compiler designed especially for the 20K, Automatic Floating-Point card system with Indirect

CONTINUED FROM PRIOR COLUMN

Addressing and Additional Instructions. Compilation and execution are fast, and batch operation is handled quickly. The language includes the usual 4-digit fixed-point, 10-digit mantissa floating-point, and elementary function arithmetic. In addition, there are double precision, Boolean, maximum-minimum, and remainder operations. Subroutine calls are allowed and flexible alphabetic typed output is available. There is also the capability of compiling 1620 Absolute instructions. The entire compiler occupies 8-11K of core. Source statements are thoroughly checked for legality during compilation. The source program listing conveys much useful information about the object program.

PROGRAMMING SYSTEMS - Written in SPS, Mainline complete.

MINIMUM SYSTEM REQUIREMENTS - 20K card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware. Columns 107 of the last card of the object deck (deck 1) must be modified so as to contain 3200100. This compiler, with suitable modifications, may be used on 40 or 60K machines.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020038

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.039CARLETON SPS

AUTHOR: W. R. Gage

DIRECT TECHNICAL INQUIRIES TO:

W. R. Gage
Carleton College
Northfield, Minnesota

DESCRIPTION - Carleton SPS is a modification of IBM SPS with increased speed and symbol table room. Storage used by program - 16K plus 4K for symbol table.

PROGRAMMING SYSTEMS - SPS, Mainline, Complete.

MINIMUM SYSTEM REQUIREMENTS - Equipment required by program is card system, Indirect Addressing.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020039

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.043FORGO-D

AUTHOR: Alan Purcell

DIRECT TECHNICAL INQUIRIES TO:

Prof. C. H. Davidson, Director
University of Wisconsin
Engineering Computing Laboratory
Madison, Wisconsin 53706

DESCRIPTION - This allows the running of FORGO under Monitor I control. The modified Monitor has complete compatibility with Monitor I and the modified supervisor recognizes control cards for FORGO and transfers control to FORGO whenever specified. Control is returned to the supervisor whenever a job card is encountered. Storage - 40K or larger (self adjusting). This is an adaption of FORGO 02.0.008.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system, 1 disk drive, Automatic Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020043

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.044ALGOL

*M

AUTHORS: W. F. Blose D. Rector
N. Jones S. Pope
C. T. Wright W. Wright
R. D. Bryant K. Beyler

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR PAGE

E. R. Ashworth
Data Processing and Computing Center
Southern Illinois University
Carbondale, Illinois

DESCRIPTION - 1620 ALGOL is the full ALGOL 60 less own arrays, integer labels, and a few other restrictions imposed on the system by the character set and 40K memory positions of the IBM 1620. Storage used by program - 40K.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware. Requirements which can be easily removed - TNS, TNF, Floating Point hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020044

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.045SUPER-GO FORTRAN PROCESSOR

AUTHOR: R. S. Eikenberry

DIRECT TECHNICAL INQUIRIES TO:
R. S. Eikenberry
Dept. of Aeronautical Eng.
University of Notre Dame
Notre Dame, Ind.

DESCRIPTION - The Super-Go System is a major modification of FORTRAN with Format featuring ease of operation and extended FORTRAN capability. Load and go or object deck. Processing of stacked programs entirely automatic by means of simple control cards. Under control card option are (program listing) trace compilation (load and go or object deck). Program listing and trace are punched. Trace includes statement address. Undefined variables detected and address given. Object decks are comparable in size with source deck. Program origins (load and go 29238/object deck 07600 or 29238). Additional FORTRAN features (optional free style input) optional fixed format output (full FORTRAN II Format) indexed I/O Statements (call and subroutine statements).

PROGRAMMING SYSTEMS - Written in AFIT SPS.

MINIMUM SYSTEM REQUIREMENTS - 1622 Card Reader-Punch, memory of at least 40K Floating Point hardware, Indirect Addressing, MF-TNF-TNS. Storage used by program - All available. Equipment required by program - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, at least 40K memory; self adjusting for 60K.

Note - AFIT SPS Processor No. 01.1.023 must be used for assembly.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020045

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.0466-64 FORMO/FORTRAN OF ROLLA MISSOURI

AUTHOR: H. R. Alcorn

DIRECT TECHNICAL INQUIRIES TO:
H. R. Alcorn
University of Missouri
Computer Science Center
Rolla, Missouri

DESCRIPTION - FORMO is a load-and-go, batch operation educational programming system which accepts FORTRAN type source programs. The system is strictly card oriented, however, console operations may be performed by first setting an internal control digit. Error messages referring to the original source statement in error are produced at either compile or execution time depending upon the nature of the error. This system makes use of Floating Point hardware and Special Instructions. Storage used by program - 31500 digits. Compiled program and symbol table use the rest of available memory.

PROGRAMMING SYSTEMS - Written in SPS 1620/1710 - Mainline Complete.

MINIMUM SYSTEM REQUIREMENTS - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point Hardware. Automatically adjusts to all of the memory, 40K or greater.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR COLUMN

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020046

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.047WITRAN - A LOAD AND GO FORTRAN SYSTEM

AUTHORS: D. S. Henderson P. Doepel

DIRECT TECHNICAL INQUIRIES TO:
D. S. Henderson
Computing Centre
University of the Witwatersrand
Johannesburg, South Africa

DESCRIPTION - This is a load-and-go system whose source language is a modification of FORTRAN, and whose object language consists of a string of two and three digit syllables, which are interpreted by the 1620. A WITRAN object program is approximately 2/7 the length of the corresponding conventional program. This advantage is paid for by an operating time penalty of the order 2-1, compared with FO-004 FORTRAN. Compilation times are at least twice as rapid as conventional systems.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - A 16K 1620 card system with Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020047

	PROGRAM NUMBER EXTENSION	DISTRIBUTION MEDIUM TYPE	USER VOLUME CODE	REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-02.0.049PDQ THIRD ALTERNATE SUBROUTINE

*M

AUTHOR: H. W. Kidder

DIRECT TECHNICAL INQUIRIES TO:
H. W. Kidder
R. W. Beck & Associates
200 Tower Building
Seattle, Washington 98101

DESCRIPTION - A third subroutine to be used with PDQ FORTRAN Processors C-2, CLC2 and CLT2. Allows all card columns to contain data on output. No decimal point space required for Floating Point Integers. Free and fixed format specifications may be used in one input format statement. All data input with a specification will give valid results when used in compare statements regardless of position of blanks in field. Output data are rounded at appropriate digit, if desired, without changing value of variable in storage. The exponential format specification, Type E, has been eliminated. All relocatable subs. And the arithmetic portion of the class A subs remain identical to PDQ Fixed Format Subs 11/63 with revisions of May 29, 1964. Subroutine occupies the first 6,600 digits of storage similar to PDQ FORTRAN fixed format and free form subroutines. This is a subroutine for use with programs compiled in PDQ FORTRAN. The intent of the third alternate subroutines is to provide a system oriented to the needs of the normal engineering program. The original E specification has been sacrificed in favor of other features because it is least used by the engineer.

PROGRAMMING SYSTEMS - Written in machine language.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system, 20K, Auto/Divide, no other special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020049

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.050MACRO PROCESSOR FOR 1620-1443 MONITOR I VERSION 2

AUTHOR: Merle T. Proulx

DIRECT TECHNICAL INQUIRIES TO:
Merle T. Proulx
10436 17th So.
Seattle, Wash. 98168

CONTINUED FROM PRIOR PAGE

DESCRIPTION - The Macro Processor, when incorporated into the 1620-1443 Monitor I Version 2 System, will give the programmer the ability to easily define his own macro-operations.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model 1 card system with 1 disk file and Indirect Addressing and a 1443 Printer is required by the program. Could be made adaptable to system without a printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020050

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.051TABTRAN INTERPRETIVE PROGRAMMING SYSTEM

AUTHOR: W. R. Best, M. D.

DIRECT TECHNICAL INQUIRIES TO:
W. R. Best, M. D.
Biostatistics Research Support Center
Veterans Admin. Hosp.
Hines, Ill.

DESCRIPTION - TABTRAN is a load-and-go language and its Compiler-Interpreter, encompassing a sub-set of FORTRAN, modified from GOTRAN, plus additional statements to facilitate tabulation (numeric as well as alphabetic characters), cross-tabulation between columns of the same or different cards, and transformation of punched card data in which one or more cards are used for the data of each sampled entity. Card-column designations are naturally related to individual coding systems. There is considerable flexibility in the extraction of Floating-Point data from cards. Dates are readily converted to an absolute scale. This language is particularly adapted to data analyses in the medical, biological, and social sciences. Storage used - 20,000 positions for compiler-interpreter plus pseudo-commands and symbol table of object programs processed. SPS program of changes engrafted on GOTRAN for cards, program 1620-PR-011. SPS program is in two sections, 1st is major program containing program sections necessary with most loading options; 2nd section repeats tab routines at a different location for the option of tab routines only. Some additional transition loading cards have been written in machine language. All of these are combined in the master object deck.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020051

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.052
COMPUTEST

AUTHOR: J. A. Starkweather

DIRECT TECHNICAL INQUIRIES TO:
J. A. Starkweather
Computer Center
University of Calif.
San Francisco, Calif. 94122

DESCRIPTION - COMPUTEST is a problem-oriented programming language for computer-assisted instruction, testing and interviewing. Sequences of instructional material and test questions may be written in natural language and a variety of cues may be used for the recognition of a right answer from typewriter input. Variable comments and choice of the next question to be asked may be determined by the evaluation of an answer. Scoring and data collection is optional for each question. COMPUTEST acts as an interpretive translator of program material which is present in the card reader and read in the course of typewriter interaction with a subject. Storage used by program: 00402-19999. (Area 19045-19999 is used as input buffer, so upper core may be available if input is restricted).

PROGRAMMING SYSTEMS - Written in 1620/1710 SPS.

MINIMUM SYSTEM REQUIREMENTS - Card, Auto Divide, Indirect Addressing, 1620 Model I. Program cannot be used on lesser machine. Typewriter input is limited to a maximum of 477 characters including blanks.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020052

CONTINUED FROM PRIOR COLUMN

	PROGRAM NUMBER EXTENSION	DISTRIBUTION MEDIUM TYPE	CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-02.0.053JANET - DIGITAL ANALOG SIMULATION PROGRAM

AUTHOR: J. D. Matlock

DIRECT TECHNICAL INQUIRIES TO:
J. D. Matlock
Box 1795
San Francisco, Calif. 94101

DESCRIPTION - The JANET program is a compiler for the IBM 1620 computer whereby the actions of an analog computer are simulated using digital methods. A source program for the JANET language is similar to that of an analog schematic diagram using analog techniques. However, the program output is obtained through digital computation.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN, compiled using the C-2 Version.

MINIMUM SYSTEM REQUIREMENTS - Card, Auto Divide, Indirect Addressing, 1620 Model I. Storage - 19938 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020053

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.054JANET-II - DIGITAL ANALOG SIMULATION PROGRAM

AUTHOR: J. D. Matlock

DIRECT TECHNICAL INQUIRIES TO:
J. D. Matlock
Box 1795
San Francisco, Calif. 94101

DESCRIPTION - The JANET II program is a compiler version of the JANET interpretive compiler for the IBM 1620, whereby the actions of an analog computer are simulated using digital methods. The JANET II Compiler is written to be compatible with the JANET compiler.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN compiled using C-2 Version.

MINIMUM SYSTEM REQUIREMENTS - Card, Auto Divide, Indirect Addressing, 1620 Model I. Storage - 19873 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020054

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.055PDQ FORTRAN COMPRESSOR

AUTHOR: K. J. Diggins

DIRECT TECHNICAL INQUIRIES TO:
K. J. Diggins
A. S. Thomas, Inc.
355 Providence Hwy.
Westwood, Mass. 02090

DESCRIPTION - PDQ FORTRAN COMPRESSOR reads an object deck compiled with the PDQ-CLT2 Processor and punches a new object program which requires less storage space and is slightly smaller and faster running than the original program. On long scientific programs it has saved over 600 core storage positions. (Program processing time - 50 seconds plus input/output time). It eliminates program steps in execute procedure and branch instructions and eliminates the branch instructions in the Symbol Table and around FORMAT statements. It identifies the following errors which the PDQ Processor does not detect - (a) Undefined statement numbers contained in any branch or input/output statement, (b) Statement numbers which are used more than once.

PROGRAMMING SYSTEMS - Written in N.C.E. SPS.

MINIMUM SYSTEM REQUIREMENTS - 20K memory, card system, Auto Divide and Indirect Addressing. Storage used - 18,946 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR PAGE

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020055

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.057N.C.E. LOAD AND GO FORTRAN FOR 20KAUTHORS: G. Rumrill B. Fowler
H. Seward

DIRECT TECHNICAL INQUIRIES TO:

G. Rumrill
Newark College of Engineering
Computing Center
323 High Street
Newark 2, N.J.

DESCRIPTION - This program is a compiler-interpreter capable of batch processing source decks written in a subset of the FORTRAN Language. Answers are immediately available without any handling of object decks. The program is intended to bring to the user of the 20K 1620, the advantages of Load-and-Go operation, especially when processing 100 to 200 card source decks. The system cannot be damaged by errors in programs. Many error checks are made, both during compilation and execution. No format specifications are used. Output format is determined by the type and range of the variable, input format is free form.

Built-in trace, single and double subscription, computed Go to statements, limited Hollerith listing, and undefined variable detection.

PROGRAMMING SYSTEMS - Written in N.C.E. High Speed Assembler.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I or II, 20K, Auto Divide, Indirect Addressing, card or paper tape, not both. Other programming language used N.C.E. High Speed Assembler. Library Number - 01.1.029

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020057

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-02.0.058WISAL PROCESSOR FOR COMPUTER ACCOUNTING CASE

AUTHOR: C. MacKenna

DIRECT TECHNICAL INQUIRIES TO:

R. McCoy
University of Wisconsin
Commerce D.P. Center
Madison, Wisc. 53706

DESCRIPTION - WISAL is an accounting language designed for educational use. This system deals with a single pre-set accounting case, the Wholesale Paper Company, decks for which are included. Input consists of student prepared programs in the WISAL Language, output being accounting statements.

PROGRAMMING SYSTEMS - Problem and processor written in 1620-1710 SPS II-D, sample program in WISAL Language. Utilizes 1620 Monitor I or II.

MINIMUM SYSTEM REQUIREMENTS - Card reader-punch... 20K storage... 1 1311 Disk Drive... Indirect Addressing. 1620 Monitor I or II can utilize 1443 Printer, but the printer not required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020058

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.059C4D - AN OPERATING SYSTEM FOR PDQ FORTRANAUTHORS: J. Grant G. Lilly
F. Maskiell L. Powell

DIRECT TECHNICAL INQUIRIES TO:

F.H. Maskiell

CONTINUED FROM PRIOR COLUMN

Pennsylvania Transformer Div.
Box 330
Canonsburg, Fla.

DESCRIPTION - C4D is a PDQ FORTRAN Operating System providing batch processing, a mixed group of FORTRAN compilation and execution runs. It permits storage of programs and data on one or more 1311 Disk Drives. Segmentation of programs is possible. The system contains very comprehensive error checking. The Operating System resides on the disk and occupies less than 5 percent of a single disk.

PROGRAMMING SYSTEMS - Written in AFIT SPS, program number 01.1.023.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card-disk file system with TMS, TNF, MF, Auto Divide and Indirect Addressing. A 1443 Printer may be used for output if available but is not required for the use of the system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020059

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.060FORTE

AUTHOR: C. D. McKay

DIRECT TECHNICAL INQUIRIES TO:

C. D. McKay
Royal Military College of Canada
Kingston, Ontario, Canada

DESCRIPTION - A development from FOR-TO-GO made disk resident to combine the load and go features of FORGO with the capacity of FOR-TO-GO. Floating Point hardware used and a rewrite of library function and subscription subroutines has increased the speed significantly, improved error messages, counts and records number of programs accepted, not accepted and completed. Array I/O, reread and plot statements, random number generator have been added.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 40K card/disk system with TMS, TNF, MF, Auto Divide, Indirect Addressing and Floating Point hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020060

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-02.0.061PDQ FORTRAN DISK SYSTEM FOR 1620

AUTHOR: R. A. Russell

DIRECT TECHNICAL INQUIRIES TO:

R. A. Russell
The Badger Co. Inc.
Cambridge, Mass. 02142

DESCRIPTION - The PDQ FORTRAN Disk System is an extension of the original PDQ FORTRAN (1620-02.0.031) written to permit storage of object programs on disk and linkage of program segment via CALL LINK. The Supervisor, Processor C2, Arithmetic-I/O subroutines, call link and Indexed I/O routines, and Common Save area occupy cylinders 0-3 and part of cylinder 4. The rest of the disk, starting with sector 00920, is available for storage of programs. The processor requires 18130 digits of storage, permitting 166 symbol table entries after the relocatable subroutine names on a 20K machine. Instructions in object programs begin at 06650 unless the 1443 Printer-oriented subroutines are used, in which case the origin is 06850. PDQ FORTRAN reduces the running time of object programs to an average of one-third the time that would be required using FORTRAN II-D without Automatic Floating Point hardware.

MINIMUM SYSTEM REQUIREMENTS - Card system, Automatic Divide, Indirect Addressing, the 1311 Disk Storage Drive. The system will operate on 20K and will adjust for additional core storage available. The system can utilize the 1443 Printer if available.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020061

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

*M

1620-02.0.062FOR-D-PRINTER

AUTHOR: Joyce Fodor

DIRECT TECHNICAL INQUIRIES TO:
 Prof. C. H. Davidson
 Director, Engineering Computing Lab.
 University of Wisconsin
 Madison, Wisc.

DESCRIPTION - This allows the running of FOR-TO-GO-P under Monitor I-Version II control. The modified monitor has complete compatibility with Monitor I-Version II and the modified supervisor recognizes control cards for FORGO-D-P and transfers control to FORGO-D-P whenever specified. Control is returned to the supervisor whenever a JOB card is encountered. This program is an adaptation of FOR-TO-GO-P (1620-02.0.063). The write-up assumes the reader is familiar with FOR-TO-GO-P and FOR-TO-GO (1620-02.0.009), and has the documentation for them available.

PROGRAMMING SYSTEMS - Written in AFIT SPS or DATA SPS.

MINIMUM SYSTEM REQUIREMENTS - 1620 40K, card, printer,
 1 disk drive, Automatic Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020062

Indicate "E N 1" in columns 1-3 and the Program Number
 in columns 4-13 on the IBM Program Order Form.

1620-02.0.063FOR-TO-GO-P PRINTER

AUTHORS: Joyce Fodor Dennis Moser

DIRECT TECHNICAL INQUIRIES TO:
 Prof. C. H. Davidson
 Director, Engineering Computing Lab.
 University of Wisconsin
 Madison, Wisc.

DESCRIPTION - This permits the use of FOR-TO-GO with a 1443 (on-line) Printer. In it, PRINT, TYPE, and PUNCH now produces three distinct outputs. A source listing on the printer may be obtained during compilation with interspersed error comments. This program is an adaptation of FOR-TO-FO (1620-02.0.009). The write-up assumes the reader is familiar with FOR-TO-GO, and has the documentation for it available.

PROGRAMMING SYSTEMS - Written in AFIT SPS or DATA SPS.

MINIMUM SYSTEM REQUIREMENTS - 40K 1620, card, printer,
 Indirect Addressing hardware, and Divide.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020063

Indicate "E N 1" in columns 1-3 and the Program Number
 in columns 4-13 on the IBM Program Order Form.

1620-02.0.064FORGO P PRINTER

AUTHORS: Joyce Fodor Dennis Moser

DIRECT TECHNICAL INQUIRIES TO:
 Prof. C. H. Davidson
 Director, Engineering Computing Lab.
 University of Wisconsin
 Madison, Wisc. 53706

DESCRIPTION - This permits the use of FORGO with a 1443 (on-line) Printer. In it, PRINT, TYPE, and PUNCH now produce three distinct outputs. A source listing on the printer may be obtained during compilation with interspersed error comments. This program is an adaptation of FORGO (1620-02.0.008). The write-up assumes the reader is familiar with FORGO, and has the documentation for it available.

PROGRAMMING SYSTEMS - Written in AFIT SPS or DATA SPS.

MINIMUM SYSTEM REQUIREMENTS - 1620 40K, card, printer,
 Indirect Addressing hardware and divide.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020064

Indicate "E N 1" in columns 1-3 and the Program Number
 in columns 4-13 on the IBM Program Order Form.

1620-02.0.065INSPEC - INVESTIGATE NUMERICALLY STUDENTS PROGRAM EXECUTE AND CONTROL

*H

AUTHOR: G. J. Germann

DIRECT TECHNICAL INQUIRIES TO:
 G. J. Germann
 The Computer Center
 Seton Hall University
 South Orange, New Jersey 07079

DESCRIPTION - INSPEC is an interpretive program which allows 1620 machine language programs to be read and executed under supervisory control. It will list and execute machine language programs and also list any card format or program errors at load and execution time, thus eliminating the Check Stop. INSPEC remains resident in core so that student programs may be batch compiled. INSPEC examines the contents of arithmetic data fields for Record Marks and High-Order Flags. It provides variable data field lengths, allows indirect addresses and will interrupt programs if looping or if they have exceeded a specified time limit. Essentially a student can approach the 1620 with a minimum of button pushing, load his program, get a program listing and error messages if he has made any execute his program, and get off the computer quickly to allow the next student access to the computer.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 20K, card reader, Auto Divide,
 Indirect Addressing, 1620 Model I and 1443 Printer. Note;
 printer output can be changed to the typewriter.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020065

Indicate "E N 1" in columns 1-3 and the Program Number
 in columns 4-13 on the IBM Program Order Form.

1620-02.0.066A MODIFIED PDQ FORTRAN SYSTEM

AUTHOR: J. H. Wise

DIRECT TECHNICAL INQUIRIES TO:
 J. H. Wise
 Washington & Lee University
 Lexington, Virginia 24450

DESCRIPTION - The PDQ system (1620-02.0.031) has been modified to include the following features: 1443 Printer options - list with Sense Switch 1 on, symbol table list (four items per line) upon successful compilation, and output for PRINT commands... a pre-compile option with Sense Switch 2 on which suppresses card punch... an E-format which fills the width with proper decimal point placement for .d. Sense switch options are reversed, the option to punch referenced source statements is deleted, and TRACE output is in a two-line format - address/value.

PROGRAMMING SYSTEMS - Mainline, complete...machine language modifications to PDQ system.

MINIMUM SYSTEM REQUIREMENTS - Storage used is 18170
 positions... Card reader... TNS, TNF, MF... Auto Divide...
 Indirect Addressing... 1620 Model 1... 1443 Printer.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620020066

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-03.0.001VARIABLE FIELD SQUARE ROOT SUBROUTINE

*H

AUTHOR: W. H. Jefferys

DIRECT TECHNICAL INQUIRIES TO:
 W. H. Jefferys
 Van Vleck Observatory
 Wesleyan University
 Middletown, Conn.

DESCRIPTION - To take the square root of any number, given an arbitrary number of digits. The resulting square root has as many digits as the number input to the subroutine. Mathematical Method: Odd-Integer. X, the number whose square root is to be taken, must be greater than or equal to zero. If it is negative, the routine will halt after printing *SQRT NEG NO*, and then take the square root of (X). If N is the number of digits in the longest number

CONTINUED FROM PRIOR PAGE

whose square root is to be taken, the routine requires 434 plus 2N digits for the Indirect addressing version, and 554 plus 2N digits for the version which does not require Indirect Addressing.

PROGRAMMING SYSTEMS - Written in SPS, 2-Fass.

MINIMUM SYSTEM REQUIREMENTS - Any 1620 machine configuration.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030001

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.003ORTHOGONAL POLYNOMIAL COEFFICIENTS

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Computer Center
Utah State University
Logan, Utah

DESCRIPTION - This program computes orthogonal polynomial coefficients in the general case. The degree of the polynomial may be from 1 to 5. The X values may have any spacing but must be integers. The number of X values must be less than 501.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, Indirect Addressing, and additional instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030003

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.005COMPUTATION OF BESSEL FUNCTIONS OF INTEGRAL ORDER

AUTHOR: C. E. Grosch

DIRECT TECHNICAL INQUIRIES TO:
C. E. Grosch
Davidson Laboratory
Stevens Institute of Technology
Hoboken, New Jersey

DESCRIPTION - For a given argument X, an integer N is calculated, such that $J_N * X \approx 1$. $J_N * X$ is calculated using an approximation for N X and $J_{N-1} * X$, . . . , $J_0 * X$ are calculated from the recursion relation - each $J_P * X$ differs from the correct value by a constant, K. K is calculated, and each value of $J_P * X$ is corrected. Memory 20K.

MINIMUM SYSTEM REQUIREMENTS - An IBM 1622 Card Read-Punch Unit.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.007KELVIN FUNCTIONS OF FIRST ORDER

AUTHOR: S. C. J. Smith

DIRECT TECHNICAL INQUIRIES TO:
S. C. J. Smith
Chemical Engineering Dept.
University of Canterbury
Christchurch 4, New Zealand

DESCRIPTION - Computes first order BER, BEI, KER and KEI functions and their first derivatives, relevant to problems of viscous fluid flow about a torsionally oscillating circular cylinder and high frequency electric and electromagnetic effects in circular conductors.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K, Automatic, Divide, Indirect Addressing, SPS I. 1622

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR COLUMN

ORDERING INFORMATION: PROGRAM NUMBER 1620030007

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.008CONVERSION OF KELVIN FUNCTIONS TO THEIR POLAR FORMS

AUTHOR: S. C. J. Smith

DIRECT TECHNICAL INQUIRIES TO:
S. C. J. Smith
Chemical Engineering Dept.
University of Canterbury
Christchurch 4, New Zealand

DESCRIPTION - Auxiliary to the program titled Kelvin Functions of the First Order, the card output of which it converts to the polar forms often more useful in solving hydrodynamic, electric and electromagnetic oscillation problems embodying these functions.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K, Automatic Divide, Indirect Addressing, SPS I 1622.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.009REAL ROOTS OF CUBIC POLYNOMIALS

AUTHOR: E. J. Ryan

DIRECT TECHNICAL INQUIRIES TO:
E. J. Ryan
1130 N. Sheridan Road
Waukegan, Illinois

DESCRIPTION - Given the coefficients of a cubic polynomial, this program finds the real roots. It can be used as a separate program or included in a larger program. Cubic solution formula. Finds 1 real root - 3 real and unequal roots - 3 real and equal roots - 3 real roots, at least 2 of which are equal.

PROGRAMMING SYSTEMS - Language - Fixed/Float relocatability.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030009

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-03.0.011GRAPHING

AUTHOR: G. B. Miller

DIRECT TECHNICAL INQUIRIES TO:
G. B. Miller
West Virginia Univ.
Computer Center
Morgantown, W. Virginia

DESCRIPTION - Graphs one or two curves (easily modified to handle any number) which are single or double valued. Handles discontinuities, no real values existing (imaginary values) with adjustable scaling factor, starting and ending points, increments and axis location. Curves can be plotted using any normal 1620 character (+, *, -, #, etc.) as can axis. Also provides for titles of curves and table of values for curves. Specifications - Storage 18808 + subroutine, card system, Auto Divide, Flt. Pt. hardware. Program can be used on lesser machine. Table of Values can be removed. Program type is FORTRAN II. Subroutine or function subprogram - sub.

MINIMUM SYSTEM REQUIREMENTS - The program was written for a 60K machine. However, because of the small amount of storage space required and a part which may be removed, it should be adaptable to any machine. A one card (program) is included to determine the amount of storage space used (written for 60K machine).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030011

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR PAGE

in columns 4-13 on the IBM Program Order Form.

1620-03.0.012FIXED POINT DIVISION OR MULTIPLICATION REGULATOR FOR DATA WITHOUT EXPLICIT DECIMAL ECINT

AUTHOR: A. R. Eckert

DIRECT TECHNICAL INQUIRIES TO:

A. R. Eckert
Department of Agricultural Economics
University of Nebraska
Lincoln, Nebraska 68503

DESCRIPTION - The routine is a linkage which inserts data and returns results in the form required to maintain decimal aligned fields irrespective of varying numbers of high-positions zeroes in either data. In contrast to inflexible mantissa lengths in Floating Point systems the routine permits full use of variable field lengths available in modern computers; combinations of various field lengths in one program are unlimited. Specifications programmed as "assumed" or "demanded" numbers of decimal positions permit the user to obtain fields of computed results from 2 digit to storage capacity minus 10K.

Computations are specified in a 41-digit record which is contained in the routine. A log of records can be obtained which permits tracking the computations.

Triggers in the record are used to:

- Obtain either division or multiplication.
- Retain the computed-field flag or replace it by the programmed-field flag.
- Include or omit rounding prior to truncations.
- The result to be added/subtracted or transmitted to a specified field in the main area, or
- Obtain print from the computing area (1) without, or (2) with printed decimal point.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Model 1, Automatic Divide and Indirect Addressing features. card system (tape adaption is simple) Move-Flag is optional. Programming type - actual machine language, open subroutine. An experiment and test program with test data and printout is provided. Inclusion into various subroutine decks is possible, but not profitable where programming system restricts fixed point.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620030012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-04.0.001SOLUTION FOR INITIAL VALUE PROBLEM INVOLVING ONE FIRST ORDER DIFFERENTIAL EQUATION

AUTHOR: R. H. Owens

DIRECT TECHNICAL INQUIRIES TO:

R. H. Owens
University of New Hampshire
Computation Center
Durham, New Hampshire

DESCRIPTION - This program numerically approximates the solution to any initial value problem involving either *A* N first order differential equations or *B* an Nth order differential equation in which the Nth derivative can be obtained explicitly so that the differential equation can be reduced to *A*. When utilizing Hamming's method, truncation error can be controlled. Memory 40K, cards.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620040001

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-04.0.002SOLUTION FOR INITIAL VALUE PROBLEM INVOLVING ONE FIRST ORDER DIFFERENTIAL EQUATION

AUTHOR: R. H. Owens

DIRECT TECHNICAL INQUIRIES TO:

R. H. Owens
University of New Hampshire
Computation Center
Durham, New Hampshire

DESCRIPTION - The arithmetic computation for F^*X, Y^* in any differential equation of the form DY/DX equals F^*X, Y^* may be altered by inserting cards at one place in the program deck. By a control number, PLT, the program will

CONTINUED FROM PRIOR COLUMN

plot the results on the typewriter. Memory 20K, cards.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620040002

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-04.0.004NUMERICAL SOLUTION OF A FIRST ORDER DIFFERENTIAL EQUATION BY MILNE'S METHOD USING RUNGE KUTTA

AUTHOR: J. M. Karon

DIRECT TECHNICAL INQUIRIES TO:

J. M. Karon
Mathematics Department
Standard University

DESCRIPTION - This routine can be used to solve any first order differential equation of the form DY/DX equals $F(X, Y)$, by the insertion of three cards. It uses Milne's method for the actual computation, and the Runge Kutta method to start. Milne's method is an iterative method in which at each step an indication of the truncation error can be obtained with little extra computation. The routine is self checking for convergence. Different delta X's can be used for the Milne computation, the Runge Kutta computation and for output. Output can be either printed or punched, each in three possible formats, depending on the amount known about the solution. The program can easily be modified to use any other predictor corrector method. Storage used by program 20K equipment required by program-card system. The routine is written in AFIT FORTRAN but can easily be modified to be run in FORTRAN.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620040004

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-04.0.005SUBROUTINE RUNK

AUTHOR: R. Vachss

DIRECT TECHNICAL INQUIRIES TO:

R. Vachss
ITT Federal Labs.
Computation Center
492 River Road
Nutley, New Jersey

DESCRIPTION - This subroutine performs one step of numerical integration of a set of ordinary differential equations. The equations need not be linear and no special starting procedure is needed. It is not necessary to provide storage for previously computed results. The fourth order Runge Kutta method is used. The error per step varies as the fifth power of the step size.

Restrictions are as follows - Dimension statements provide for a total of nine simultaneous first order equations or a smaller number of higher order equations in which the sum of the orders of the equations has a maximum of none. The Dimension statement may be modified for larger systems. Requires an auxiliary subroutine provided by user to specify differential equations. Storage used is 2000 positions; equipment required - any configuration (which will compile FORTRAN II which the program is written in).

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620040005

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-04.0.006SOLUTION OF N SIMULTANEOUS FIRST-ORDER DIFFERENTIAL EQUATIONS

AUTHOR: F. F. Taranto

DIRECT TECHNICAL INQUIRIES TO:

F. F. Taranto
EDO Corporation
College Point, New York 11356

DESCRIPTION - This program supplies the FORTRAN source statements required to solve up to six simultaneous first order differential equations. It is a modification of the 1620 Library Program No. 04.0.001. This modification

*#

CONTINUED FROM PRIOR PAGE

provides the user with considerably more core space for the input, output and other source statements peculiar to his own problem.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card system with 13,000 positions of core storage, Auto-Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620040006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.002

SIMULTANEOUS EQUATION SOLUTION

AUTHOR: D. N. Leeson

DIRECT TECHNICAL INQUIRIES TO:
D. N. Leeson
IBM Corporation
40 Saw Hill River Road
Hawthorne, New York 10532

DESCRIPTION - This program generates the solutions to a linear system of maximum rank 39 x 39. One may have 99 constant vectors per matrix of coefficients. Calculation of the product matrix.

PROGRAMMING SYSTEMS - This program is written in SPS language, and is non-relocatable.

MINIMUM SYSTEM REQUIREMENTS - Arithmetic - Floating, 1620 with 1622 attachment. Division feature not required. All of core is required for the maximum problem.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Program write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050002

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-05.0.007

SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS

AUTHOR: B. Preston

DIRECT TECHNICAL INQUIRIES TO:
B. Preston
IBM Corporation
1st Data Processing Unit
A.F.O. 343
San Francisco, California

DESCRIPTION - This program solves sets of non-homogeneous simultaneous linear equations with either printed or punched output. It is designed for ease of use. Operating instructions and error messages are automatically typed. Data values are entered in free form notation as a group of digits with a decimal point. An optional power of ten may be added to each value. The Jordan method of elimination is used, a test for zero divisor is included. A maximum of 25 equations in 25 unknowns may be solved. A maximum of 8 significant digits per matrix element is allowed.

PROGRAMMING SYSTEMS - The program is written in FORTRAN without Format.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, card input-output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050007

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-05.0.010

MATRIX-MATRIX MULTIPLICATION SUBROUTINE

AUTHOR: G. R. Jackson

DIRECT TECHNICAL INQUIRIES TO:
G. R. Jackson
Computing Center
University of Alberta
Edmonton, Alberta,
Canada

DESCRIPTION - To multiply two matrices together and store the result separately from the other two matrices, using (Excess-50) Floating Point Format.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Storage 500 locations for the subroutine, and SPS storage requirements. Paper tape 1620, Indirect Addressing, and Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.013

MATRIX INVERSION SUBROUTINE

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This program provides a basic operation in matrix arithmetic matrix inversion.
PROGRAMMING SYSTEMS - It is written in SPS with a four instruction calling sequence and is relocatable.

MINIMUM SYSTEM REQUIREMENTS - Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050013

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-05.0.015

HADAM - MATRIX DIAGONALIZATION, AUTO MINIMIZATION OF ERROR

AUTHOR: J. B. Kaplan

DIRECT TECHNICAL INQUIRIES TO:
J. B. Kaplan
University of Miami
Scientific Computing Center
P. O. Box 8011
Coral Gables 46, Florida

DESCRIPTION - Given a system of simultaneous linear equations with a determinable maximum number of constant vectors, this program will, 1. Compute determinant of coefficient matrix. 2. Identify singular coefficient matrix. 3. Find solution vectors and perform error iteration. 4. Find inverse matrix and perform error iteration. 5. Perform error iterations on submitted solution vector. 6. Perform error iteration on submitted inverse matrix. 7. Find refined solution vectors and perform error iteration. 8. Find refined inverse matrix and perform error iteration. 9. Refine submitted solution vectors and perform error iteration on refined solution vectors. 10. Refine submitted inverse matrix and perform error iteration on refined inverse matrix. 11. Refine in terms of submitted absolute error bound. 12. Refine in terms of stored absolute error bound. 13. Refine in terms of submitted significant figures. 14. Refine in terms of stored significant figures. And many combinations of the above.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, 40K, or 60K. Automatic Divide - Yes or No, Indirect Addressing - Yes or No.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620050015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.016CALCULATION OF EIGENVALUES AND EIGENVECTORS OF ZY EQUALS LAV

AUTHOR: Robert G. Howe

DIRECT TECHNICAL INQUIRIES TO:
Robert G. Howe
The Nitre Corporation
Bedford, Massachusetts

DESCRIPTION - In addition to providing eigenvalues/vectors, the program under Sense Switch control, will compute square roots of eigenvalues, (i.e. vibration frequencies in whatever system of units may be desired) and will modify the eigenvectors so that in each the largest element is unity.

PROGRAMMING SYSTEMS - Written in FORTRAN without Format.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, cards, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.ORDERING INFORMATION: PROGRAM NUMBER 1620050016
Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.1620-05.0.019EVALUATION OF A DETERMINANT

AUTHOR: R. T. Harling

DIRECT TECHNICAL INQUIRIES TO:
R. T. Harling
Math Department
Air Force Institute of Technology
Wright-Patterson AFB, Ohio

DESCRIPTION - This program will evaluate a determinant of Order 40 or less.

PROGRAMMING SYSTEMS - Written in SPS language.

MINIMUM SYSTEM REQUIREMENTS - 20K, IBM 1620, with 20,000 digits of memory, card input-output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050019

	PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
	EXTENSION	TYPE	CODE	REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-05.0.020SOLUTION OF HOMOGENEOUS AND NON-HOMOGENEOUS SIMULTANEOUS LINEAR EQUATIONS

AUTHOR: Heberto Pachon

DIRECT TECHNICAL INQUIRIES TO:
Heberto Pachon
Automatic Electric Laboratories, Inc.
400 North Wolf Road
Northlake, Illinois

DESCRIPTION - The program solves homogeneous and non-homogeneous systems of linear equations. At the same time, it provides a measure of the accuracy of the computed solution. If the system has a unique solution, this solution is typed. If the system has an infinite number of solutions, a general solution can be obtained. If the system is inconsistent, it has no solution and this is the answer typed. The program is restricted to non-ill-conditioned systems, and to a maximum of 17 equations with 17 unknowns.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 1620 with card I/O, 20K memory, Automatic Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050020

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR COLUMN

in columns 4-13 on the IBM Program Order Form.

1620-05.0.021CROUT REDUCTION

AUTHOR: S. S. Millwright

DIRECT TECHNICAL INQUIRIES TO:
R. C. Wenrick
336 Woodward Road, S. E.
Albuquerque, New Mexico

DESCRIPTION - Will evaluate determinants of maximum order 36, solve simultaneous linear systems with an indefinite number of constant vectors, and/or determine the inverse of maximum order 36 matrices. Singular input matrices are detected. Output includes data which indicates accuracy of solution vector. Mathematical method- Crout Reduction. Element in first row and first column of input matrix must not be zero.

PROGRAMMING SYSTEMS - This program was written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - All of core. Memory 60K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050021

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.024SOLUTION OF M REAL LINEAR EQUATIONS IN N REAL VARIABLES

AUTHOR: Mr. Donald S. Miller

DIRECT TECHNICAL INQUIRIES TO:
Mr. Donald S. Miller
Applied Mathematics Section
Management Systems Development Department
Eastman Kodak Company
Rochester 4, New York

DESCRIPTION - Will calculate the numeric solution of from 1 to 999 different MXN systems of linear equations. For the restrictions on the system size, see the restrictions section of the program description. The Jordan Elimination Procedure was used to solve all linear systems. See the article entitled Theory of Selected Methods of Finite Matrix Inversion and Decomposition by George E. Forsythe, U. S. Department of Commerce, National Bureau of Standards, Page 18. All calculations are subject to the laws of rounding error and the precision defined by the FORTRAN system.

PROGRAMMING SYSTEMS - Written in FORTRAN Language.

MINIMUM SYSTEM REQUIREMENTS - Basic 1620 card machine. Three object programs are associated with the given source program. Object program I was compiled on a 20K-machine using FORTRAN with Format compiler. Object programs II and III were compiled on a 40K-machine (Floating Point Hardware) using FORTRAN II Compiler.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050024

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.025BOOLEAN FUNCTION TRANSFORMATION

AUTHOR: Katherine A. Wier

DIRECT TECHNICAL INQUIRIES TO:
Katherine A. Wier
University of Illinois Medical School
Chicago, Illinois 60612

DESCRIPTION - A Boolean Function F is transformed according to three given explicit Boolean functions which are used for form a unitary transformation matrix R. The product function E equals F * R is the consequence solution of F and R. Source check is optional and will only be forwarded when specifically requested. Storage used by program is 11,322 positions. Equipment required by program card system, Indirect Addressing. Programming type is SPS 1620/1710.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050025

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-05.0.026GAUSS JORDAN WITH PARTIAL PIVOTAL

AUTHOR: D. J. Nelson

DIRECT TECHNICAL INQUIRIES TO:

D. J. Nelson
 Computing Center
 University of Nebraska
 Lincoln, Nebraska 68508

DESCRIPTION - Gauss-Jordan with Partial Pivotal Condensation 20x20 matrix with a 20K machine. Storage used by program is basic 20K core. Equipment required by program - Paper tape system, Auto Divide, Floating Point hardware. Programming language is UTC FORTRAN. Language used in the write-up is UTC FORTRAN.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050026

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.030TWELVE - TONE MATRIX GENERATION

AUTHOR: Prof. A. Tepper

DIRECT TECHNICAL INQUIRIES TO:

Prof. A. Tepper
 Associate Professor of Music
 Hofstra University
 Hempstead, New York

DESCRIPTION - The production of matrices (numerical, alphabetical with sharps, alphabetical with flats) based on twelve-tone rows. Solving for "combinatoriality"; positive results allow for permutations and generation of secondary matrices. Restrictions: data must be numeric and occupy card columns 1 and 2 with high order zero inserted. Storage requirements are 00402 - 05100.

Equipment: Card, 20K memory, Indirect Addressing, no other special features required. Language - SPS - Fixed Point.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050030

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.031MAGIC II - MATRIX ALGEBRA

AUTHOR: Dr. J. A. N. Lee

DIRECT TECHNICAL INQUIRIES TO:

Dr. J. A. N. Lee
 Queens Univ.
 Computing Center
 Ontario, Canada

DESCRIPTION - This program is a fixed address problem oriented interpreter which enables the user to write a program, each instruction of which performs a single matrix operation. The user can thereby do a succession of matrix operations under program control. There are two matrix areas, A and B, each limited to the storage of not more than 324 elements. Hence, if the matrix is square it cannot exceed 18 by 18, while an oblong matrix can be accepted provided no dimension exceeds 99 and the total number of elements is within the 324 limit. No provision is made for finding Eigenvalues. The inversion and simultaneous solution routine used here (and loaded automatically in this package) is the subroutine prepared by Leeson of IBM (IBM Program No. 5.0.001, first issue).

Machine configuration - 1620 with 40K, card I/O, Indirect Addressing, Automatic Divide.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050031

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.032PROGRAM TO CONVERT A COMPLEX MATRIX

AUTHOR: G. B. Miller

DIRECT TECHNICAL INQUIRIES TO:

G. B. Miller
 W. Virginia Univ.

Computer Center
 Morgantown, W. Va.

DESCRIPTION - This program computes the (N 2) cosines of the acute angles between (N) hyperplanes represented by a set of N simultaneous equation - then types and punches the results. It will handle up to a 20 x 20 set. It is used to check for ill-conditioning between pairs of equations before solving, to determine if there is a solution. Especially valuable when an iteration method is to be used for solution. Also valuable for use in determining if a given matrix has an inverse, especially if it is (nearly) singular. Specifications - Storage 24390 + subroutines. Equipment - Card System, Auto Divide, Ft. Pt. Hdw. This program can be used on lesser machine - The Dimension statement calls for a 20 x 20 set of equations. This may be reduced to be useable on a 20K machine. Language used is FORTRAN II.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050032

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.035SUBROUTINE CROUT FOR SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS

AUTHOR: Mrs. J. Fodor

DIRECT TECHNICAL INQUIRIES TO:

Prog. C. H. Davidson
 Director
 Engineering Computing Laboratory
 University of Wisconsin
 Madison, Wisconsin 53706

DESCRIPTION - This subroutine will solve a system of simultaneous linear equations using the Crout method. The number of equations is limited only by the size of the main program and the core available. Specifications - IBM 1620 able to use FORTRAN II.

Programming type - FORTRAN II subroutine.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050035

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.037DOES - DISK ORIENTED EQUATION SOLVER

AUTHOR: R. Stephenson

DIRECT TECHNICAL INQUIRIES TO:

Dr. C. F. Evert, Dir.
 University of Cincinnati
 University Computing Center
 Cincinnati, Ohio

DESCRIPTION - This program utilizes the 1311 Disk to extend the capacity of the 1620 for the solution of simultaneous algebraic equations or matrix inversion. 200 x 200 matrices may be inverted. Written in SPS II D. A 1620 card system with 40K, a 1311 Disk and TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware. Program could be used on a 20K machine, and with reassembly, it could be used on machines without the Automatic Floating Point feature.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050037

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.038MARKOV CHAIN PROCESS

AUTHOR: J. Stafford

DIRECT TECHNICAL INQUIRIES TO:

W. R. Reilly
 Dept. of Agric. Economics
 Univ. of Connecticut
 Storrs, Connecticut 06268

DESCRIPTION - This program finds the steady state and transitional state matrices for a Markov Chain Process with m states, "m" less than or equal to ten. The program may be altered, with minor changes, to provide for (m) greater than ten. The program also multiplies the steady

CONTINUED FROM PRIOR PAGE

state and transitional state matrices by an initial state $1 \times n$ vector to find the steady state and transitional state vectors. The n -stage transitional state matrices are derived by matrix multiplication. The steady state matrix is found by using the Gauss Elimination Method to solve the (m) linearly independent simultaneous equations. Storage used is under 20K. Equipment required: 1620 DFS with card I/O. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050038

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.039MATRIX INVERSION AND SOLUTION OF LINEAR EQUATIONS

AUTHOR: Frank M. Oliva

DIRECT TECHNICAL INQUIRIES TO:

Frank M. Oliva
1441 W. Howard
Apt. 516
Chicago, Illinois 60626

DESCRIPTION - This program is for inversion of matrices and/or the solution of systems of linear equations by a direct (i.e. non-iterative) method. Given a square matrix A , the inverse of A can be calculated by the program. The reciprocal matrix is always given in the output. When the inverse matrix is not of interest, and the primary purpose is the solution of linear equations, a special matrix called the Product Form of the inverse can be obtained; this process requires approximately half the time as that for the inverse. This Product Form is as efficient as the inverse for the solution of equations. As an option, when solving equations, the program can multiply the original matrix by the solution vector; this provides a check for the solutions. To check computation of the inversion of a matrix, the product of the original and reciprocal matrices can, also as an option, be calculated by the program. Any number of vectors K , up to 999, can be processed with a given matrix; it is unnecessary to specify their number. The determinant of the matrix is always calculated and obtained in the output; it gives an indication of the ill-condition of the specified matrix. The matrix to be processed may be of no order greater than 30; its elements must be within the internal plus and minus 10^8 to the eighth power. No element may have more than eight digits, nor should the elements corresponding to a vector, when solving equations, have more than eight digits. This program as it stands cannot be used on a machine of less than 60K, however, if a 60K memory is not available, either the dimension of the arrays involved, or the Floating Point Precision, or both, can be reduced to save core. The Fixed Point Precision is 4; The Floating Point Precision, or both can be reduced to save core. The Fixed Point Precision is 4; The Floating Point Precision is 15. Speed is increased by decreasing the Floating Point Precision. However, accuracy is sacrificed. The Fixed Point Precision is unalterable, because two alphanumeric characters, read into Fixed Point locations, are operated on in the program.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I or II with 60K memory, Auto Divide, Indirect Address, 1622 Card-Read-Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050039

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.040MOSES - MAXIMUM ONE PASS SIMULTANEOUS EQUATIONS SOLUTION

AUTHOR: Ronald Hollmeier

DIRECT TECHNICAL INQUIRIES TO:

Ronald Hollmeier
Pioneer Service & Engineering Co.
2 N. Riverside Plaza
Chicago, Illinois 60606

DESCRIPTION - Solves sets of linear simultaneous equations by Gaussian elimination. Pivoting for size to promote accuracy and eliminate zero diagonal terms is automatic. Equation sets of Rank 2 thru 41 can be solved. One constant vector per equation set is allowed. Card I/O on a 1620 Model I with 20K storage. FORTRAN without Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050040

CONTINUED FROM PRIOR COLUMN

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-05.0.041MIN 3

AUTHOR: Peter Schneider

DIRECT TECHNICAL INQUIRIES TO:

Prof. C. H. Davidson
Director Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - MIN 3 generates the prime implicants of a Boolean function and extracts the essential prime implicants. The algorithm is a decimal modification of the Quine-McCluskey procedure. An option allows all intermediate columns to be punched out. 60K (could be reduced to 40K by reducing maximum size problem). Card system. FORTRAN II-D (P equals 10, K equals 5).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620050041

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.006STEPWISE MULTIPLE LINEAR REGRESSION

AUTHORS: R. Bukacek W. Gelle

DIRECT TECHNICAL INQUIRIES TO:

W. J. Galle
Armour & Company
Operations Research
401 N. Wabash
Chicago, Illinois

DESCRIPTION - Accepts sets of observations and forms linear regressions in a stepwise fashion subject to statistical criterion (F-TEST). Stepwise linear regression memory 20K, and paper tape.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.008COMPLEX FORTRAN FOR THE 1620

AUTHOR: Frank H. Maskiell

DIRECT TECHNICAL INQUIRIES TO:

Frank H. Maskiell
The Pennsylvania Transformer Division
McGraw-Edison Company
Box 330
Canonsburg, Pennsylvania

DESCRIPTION - The FORTRAN processor and subroutine tapes have been revised to utilize certain variables as complex numbers. This permits the addition, subtraction, multiplication or division of two or more complex variables by the simple instruction D equals A op (B OP C). The complex numbers are treated in rectangular component form and the arithmetic operations accomplished by means of FORTRAN Class A subroutines. The complex variable is accepted only as a floating point number. 8600 positions are required for the subroutine package at the time of object running. Tape 1620, memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.011NON-LINEAR PATCH FOR MULTIPLE LINEAR REGRESSION PROGRAM OF E. L. WILDER 8/8/61

AUTHOR: H. H. Stevens, Jr.

DIRECT TECHNICAL INQUIRIES TO:

H. H. Stevens
Texas Instruments Incorporated
M & C Nuclear Products
P. O. Box 898
Attleboro, Massachusetts

CONTINUED FROM PRIOR PAGE

DESCRIPTION - To select, rearrange, and algebraically operate on variables in the data of a multiple linear correlation/regression experiment to code data, combine terms, make polynomial terms, eliminate nonsignificant variables and dependencies. To do non-linear regression, response surfaces, fitted to non-uniformly located coordinates, and more efficient fits. Up to 10,000 observations with up to 41 variables per observation may be read in but only 29 selected and transformed variables can be handled by the matrix inversion. Input record lengths per observation, 310 Alpha Numeric characters, 10 variables, can be omitted at read-in. Control work 150 digits, (250 if print out of transformed variables is not used). Memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060011

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.015CORRELATION 40-40

AUTHOR: Lew D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
Lew D. Harkins
Louisiana State University
Computer Research Center
Baton Rouge 3, Louisiana

DESCRIPTION - Program gives means, standard deviations, and correlation coefficients for all combinations of variables by pairs up to a total of 40 variables. Variables are entered in Fixed Point form and may be from 2 to 7 digits in length. Sums of squares and cross products are obtained in 16 digit fixed point sums, in 10 digit fixed point N, the number of observations, limited to 5 digits. Final calculations are performed in Floating Point.

Card system, memory 20K, Automatic Divide, Indirect Addressing, and additional instruction #1021.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060015

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.016FREQUENCY DISTRIBUTIONS - SINGLE AND DOUBLE COLUMN

AUTHOR: Lew D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
Lew D. Harkins
Louisiana State University
Computer Research Center
Baton Rouge 3, Louisiana

DESCRIPTION - Allow the selection of from 1 - 5 card columns for control. Single column program allows 1-80 columns for frequency count and the double column program allows 1-40 parts of columns. Frequencies and/or percentages are given. Only non-negative integers allowed in control or frequency columns of data cards. Card system memory 20K, Automatic Divide, Indirect Addressing, and Additional Instructions feature #1021.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060016

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.019MANN-WHITNEY TEST

AUTHOR: H. E. Anderson

DIRECT TECHNICAL INQUIRIES TO:
H. E. Anderson
Sandia Corporation
Sandia Base
Albuquerque, New Mexico

DESCRIPTION - The Mann-Whitney U Test is used to test whether two independent random samples have been drawn from similar populations. It is among the most powerful non-parametric tests. Storage program - 02178-09095 plus subroutines data 09999-19999. Memory 20K, card input/output.

BASIC PROGRAM PACKAGE

CONTINUED FROM PRIOR COLUMN

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060019

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.021CORRELATION COEFFICIENTS

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of a complete correlation matrix from an upper triangular matrix of sums of squares and cross products. May be used to prepare for entry into UCRBL 18. Memory 20K and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060021

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.022PRODUCT MOMENT CORRELATIONS

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of product-moment correlation coefficients from raw data. Output tape may be used as input to UCRBL 18. 19,329 positions. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060022

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.023ANALYSIS OF COVARIANCE - SPLIT PLOT FACTORIAL

AUTHOR: Martha Orth

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares and cross products for one replicated main plot factor and two subplot factors. Part I, 13,073 positions. Part 2, 14,365 positions. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060023

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.024ANALYSIS OF COVARIANCE - TWO-FACTOR FACTORIAL

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares and cross products. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBERS 1620060024

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.025ANALYSIS OF COVARIANCE - TWO-FACTOR FACTORIAL

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares and cross products. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060025

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.026ANALYSIS OF VARIANCE - FOUR-FACTOR FACTORIAL

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares for a four-factor factorial (randomized complete blocks). Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060026

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.027ANALYSIS OF VARIANCE - FOUR-FACTOR FACTORIAL

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares for a Latin Square. 19,733 positions. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-Up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060027

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.028ANALYSIS OF VARIANCE - TWO-FACTOR FACTORIAL

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares for a two-factor factorial. 19,393 Positions. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060028

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.029ANALYSIS OF VARIANCE - THREE-FACTOR FACTORIAL

AUTHOR: E. C. Beckwith

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computation of means and adjusted sums of squares for a three-factor factorial. 19,115 positions. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060029

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.030ANALYSIS OF VARIANCE (SPLIT PLOT FACTORIAL)

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of Calif.
Biometrical Lab.
Riverside, Calif.DESCRIPTION - Computation of means and adjusted sums of squares for a three-factor factorial (one replicated main plot factor and one subplot factor).
PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060030

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.031STEPWISE REGRESSION (MODIFICATION OF BMD09)

*M

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of Calif.
Biometrical Lab.
Riverside, Calif.

DESCRIPTION - Multiple linear regression. Only significant variables are included in the final equation. A variable which is approximately a linear combination of others is not entered.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060031

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.032ANALYSIS OF COVARIANCE

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
Univ. of Calif.
Biometrical Lab.
Riverside, Calif.

DESCRIPTION - Simple correlation and regression analysis between slopes sum of squares is computed. Variable count per set is allowed.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060032

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.033ANALYSIS OF VARIANCE (ONE FACTOR)

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:

M. J. Garber
Univ. of Calif.
Biometrical Lab
Riverside, Calif.

DESCRIPTION - Computation of means and adjusted sums of squares. Variable count per treatment is allowed.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060033

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.034NORMALITY

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:

M. J. Garber
Univ. of Calif.
Biometrical Lab
Riverside, Calif.

DESCRIPTION - Test of departure from a normal distribution. K and G statistics are computed.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060034

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.035HOMOGENEITY OF VARIANCE

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:

M. J. Garber
Univ. of Calif.
Biometrical Lab
Riverside, Calif.

DESCRIPTION - Bartlett's test for Homogeneity of Variance. If CHI-squared is significant, a weighted analysis of the means is made. Variable count per treatment is allowed.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060035

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.036MULTIPLE RANGE TEST OF MEAN DIFFERENCES

AUTHOR: F. C. Beckwith

DIRECT TECHNICAL INQUIRIES TO:

M. J. Garber
Univ. of Calif.
Biometrical Lab
Riverside, Calif.

DESCRIPTION - The standard error and least significant ranges are computed. Means are ranked, and all mean differences are computed and compared with appropriate least significant ranges.

PROGRAMMING SYSTEMS - Written in FORTRAN.

CONTINUED FROM PRIOR COLUMN

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060036

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.037MATRIX INVERSION AND SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS

*M

AUTHORS: Mr. R. H. Hill M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:

M. J. Garber
Univ. of Calif.
Biometrical Lab
Riverside, Calif.

DESCRIPTION - All independent variables are entered. The smallest contributor is deleted. The original matrix is condensed, and the process is repeated with N-1 variables. Recycling occurs until only one independent variable remains.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060037

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.038LINEAR CORRELATION COEFFICIENT

AUTHOR: Robert J. Robinson

DIRECT TECHNICAL INQUIRIES TO:

Robert J. Robinson
Marquette University
1515 W. Wisconsin Avenue
Milwaukee 3, Wisconsin

DESCRIPTION - This program computes the linear correlation coefficients between up to 50 variables, and gives the standard deviation, and standard error of the correlation coefficient for each. FORTRAN Floating Point. Maximum of 50 variables, and not more than 9999 observations (or data sets).

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 40K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060038

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.039STATISTICS I

AUTHOR: Robert J. Robinson

DIRECT TECHNICAL INQUIRIES TO:

Robert J. Robinson
Marquette University
1515 W. Wisconsin Avenue
Milwaukee 3, Wisconsin

DESCRIPTION - This program computes the sum, mean, standard deviation, error of estimate, sum of squared deviations, and coefficient of variation, for each variable, and T-ratio and degree of freedom, between all pairs of variables, for up to 50 variables. Missing data is accounted for. Maximum of 50 variables. If the data is drawn from the same related group the formulas used are not valid. If the mean of variable is zero, the coefficient of variation has no meaning as calculated.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 40K, and 1622 Card Read/Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060039

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.040SUM OF SQUARES AND PRODUCTS, CORRELATIONS

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes total, means, sums of squares and products, standard deviations, correlations for up to 50 variables in 40K version and 30 variables in 20K version, or 40K.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 20K, Automatic Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060040

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.041FACTORIAL ANALYSIS OF VARIANCE

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This program will compute the final analysis of variance and the treatment means for any analysis of variance that is balanced and can be analyzed by a factorial or pseudo factorial approach. The punching of means is under the control of the operator.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 40K, Automatic Divide, and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060041

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.043CONTINUOUS FOREST INVENTORY STATISTICAL CHECK PROGRAM

*M

AUTHOR: Otto Dykstra, Jr.

DIRECT TECHNICAL INQUIRIES TO:
Otto Dykstra, Jr.
General Foods Research Center
55 South Broadway
Tarrytown, New York

DESCRIPTION - A complete multiple regression package with convenient input-output formats. One program will multi-process as many as 18 variables without intermediate output. A three-part program will handle up to 44 variables. An auxiliary program will give predictions and obtain residuals for the actual data and predictions for supplementary combinations. A follow-up program will prepare various plots of the residuals.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060043

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.044ANALYSIS OF 2 - LEVEL FACTORIAL EXPERIMENTS

AUTHOR: Otto Dykstra, Jr.

CONTINUED FROM PRIOR COLUMN

DIRECT TECHNICAL INQUIRIES TO:
Otto Dykstra, Jr.
General Foods Research Center
555 South Broadway
Tarrytown, New York

DESCRIPTION - Performs the analysis of two-level, unreplicated or fractionally replicated factorial experiments. Almost all of memory is used.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060044

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.049PROGRAM TO PLOT CONTOURS OF CONSTANT RESPONSE FOR A QUADRATIC REGRESSION

AUTHOR: Otto Dykstra, Jr.

DIRECT TECHNICAL INQUIRIES TO:
Donald S. Gardner
Research Center
General Foods Corporation
555 South Broadway
Tarrytown, New York

DESCRIPTION - This program will accept the coefficients of at most a quadratic function and plot contours of constant response, for a specified X on the horizontal scale and another specified X on the vertical scale. Multiple plots are given if there are more than two Xs.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060049

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.050FISHERS EXACT PROBABILITY FOR A 2X2 TABLE

AUTHOR: Thomas C. Teeple

DIRECT TECHNICAL INQUIRIES TO:
Thomas C. Teeple
George Washington University
Human Resources Research Office
2013 *G* Street, N. W.
Washington, D. C.

DESCRIPTION - Calculates the exact probability of all possible patterns keeping the marginal totals fixed. Also computes cumulative probabilities and one minus the cumulative probabilities.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Card system, Automatic Divide, 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060050

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.051MEAN STANDARD DEVIATION AND VARIANCE

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute and output the mean, standard deviation, and variance for up to 15 by N input matrix, for the rows (if Sense Switch 4 is on) and for the columns. N equals No. of rows, M equals No. of columns.

PROGRAMMING SYSTEMS - Written in FORTRAN.

CONTINUED FROM PRIOR PAGE

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 card system, 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060051

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-06.0.055

CHI-SQUARE #2

AUTHOR: L. D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
L. D. Harkins
Louisiana State University
Computer Research Center
Baton Rouge, Louisiana

DESCRIPTION - Calculate Chi-Square value for contingency table of up to 120 columns. 20K or greater. Automatic Divide, Indirect Addressing, I/O card, and Additional Instructions feature.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060055

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.052

SIMPLE CORRELATION COEFFICIENT MATRIX

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute the simple correlation coefficient matrix as input to the factor analysis routine by the same author and as a general routine for the coefficients. Uses the standard form.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 card system, 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060052

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.056

FINITE FOURIER ANALYSIS; A. COEFFICIENTS PROGRAM;
B. PLOT-BACK PROGRAM

AUTHORS: J. C. Baker R. H. Brown

DIRECT TECHNICAL INQUIRIES TO:
J. C. Baker
University of California
Computing Center
Davis, California

DESCRIPTION - These two programs provide a convenient means of applying finite Fourier analysis to experimental data. Many options are provided, so that the output will contain only that which is of interest to the user in his particular problems. We have attempted to make the formats as general as possible, and the output of the coefficient program feeds directly with no change into the plot back program. 20K or more. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060056

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.053

FACTOR ANALYSIS BY THE CENTROID METHOD.

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute the factor loadings for a set of simple correlation coefficients using Thurston's Centroid Method. Will accept up to a 15 by 15 correlation matrix.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 card system, 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060053

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.058

MANN-WHITNEY U TEST WRITTEN IN FORTRAN

AUTHORS: M. Burns P. Good

DIRECT TECHNICAL INQUIRIES TO:
M. Burns
Baylor University of Medicine
Biostatistics Laboratory
Houston, Texas

DESCRIPTION - When at least ordinal measurement has been achieved, the Mann-Whitney U Test may be used to test whether two independent groups have been drawn from the same population. Memory 20K, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060058

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.054

SEASONAL ADJUSTMENT

AUTHOR: Milo O. Peterson

DIRECT TECHNICAL INQUIRIES TO:
Milo O. Peterson
Federal Reserve Bank
73 South Fifth Street
Minneapolis 2, Minnesota

DESCRIPTION - Seasonal adjustment of monthly statistical series. At the direction of the lead card, this program will also index to any base (computed internally or provided in the lead card) and/or make working day adjustments.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Card system, 20K, Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060054

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.060

ONE PASS ANALYSIS OF VARIANCE

AUTHOR: L. D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
L. D. Harkins
Computer Research Center
Louisiana State University
Baton Rouge, Louisiana

DESCRIPTION - Calculate analysis of variance without sorting data cards on sorter. 20K or greater. Automatic Divide, Indirect Addressing, I/O card, Additional Instructions required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060060

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR PAGE

in columns 4-13 on the IBM Program Order Form.

1620-06.0.061

SPLIT PLOT ANALYSIS OF VARIANCE

AUTHOR: L. D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
L. D. Harkins
Computer Research Center
Louisiana State University
Eaton Rouge, Louisiana

DESCRIPTION - Calculate analysis of variance for problems with large numbers of observations. Can be used on 20K or greater. Automatic Divide, Indirect Addressing, I/O card, Additional Instructions required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060061

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.062

ANALYSIS OF VARIANCE - BALANCED LATTICE DESIGN

AUTHOR: R. L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
R. L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computer analysis of variance, unadjusted and adjusted treatment means for balanced lattice designs. Standardized card form not required. The larger the memory the larger the size of problem that can be handled. As written the program requires Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060062

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.063

FISHERS EXACT METHOD

AUTHOR: H. E. Anderson

DIRECT TECHNICAL INQUIRIES TO:
H. E. Anderson
Sandia Corporation
Sandia Base
Division 1442
Albuquerque, New Mexico

DESCRIPTION - The program determines whether a significant difference exists between two fractions. The need for calculating logarithms of factorials is eliminated by using an equivalent recursive technique.

Memory 20K, card I/O, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060063

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.064

PARTIAL CORRELATIONS - FIRST OR FIRST AND SECOND ORDER

AUTHOR: R. L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
R. L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes on control card demand any set of first or first and second order partial correlations, and any number of sets. Either raw data or the correlation matrix may be used as input. Can be dimensioned for any size memory. As written, the program requires Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE

CONTINUED FROM PRIOR COLUMN

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060064

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.065

NESTED ANALYSIS OF VARIANCE FOR UNEQUAL SUBCLASS NUMBERS

AUTHOR: Allan L. Heath

DIRECT TECHNICAL INQUIRIES TO:
Allan L. Heath
Biometrical Services
U.S.D.A.
Beltsville, Maryland

DESCRIPTION - Program computes for a hierarchical classification the degrees of freedom, sums of squares (or sums of cross products), mean squares, coefficients of variance or covariance components, relative amount of variability each component represents, overall mean, error standard deviation, and coefficient of variability. Special features are: Computes analysis of variance or covariance, no detail card format necessary, sequence checking of detail cards, handles 60 variables for AOV or 78 covariance analyses, handles 5 way hierarchical classification. 20K memory, Automatic Divide, Indirect Addressing, 1622.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060065

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.066

STRAP - STEPWISE REGRESSION ANALYSIS PROGRAM

AUTHOR: A. R. Colville

DIRECT TECHNICAL INQUIRIES TO:
A. R. Colville
IBM Corporation
2601 S. Main Street
Houston 2, Texas

DESCRIPTION - STRAP is a multiple linear Stepwise Regression Analysis Program containing extensive provisions for the transformation of input variables.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060066

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-06.0.069

ANALYSIS OF VARIANCE, SPLIT-LOT FACTORIAL DESIGN

AUTHORS: Henry A. Pribourg Michael Kennedy

DIRECT TECHNICAL INQUIRIES TO:
Dr. Henry A. Pribourg
Department of Agronomy
University of Tennessee
Knoxville, Tennessee

DESCRIPTION - To analyze data according to a split-plot factorial design analysis, and to provide an orderly analysis of variance table and an orderly array of treatment means at all levels. Approximately 35,000 memory positions. Memory 40K, INS, TNP, MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060069

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.070ANALYSIS OF VARIANCE, RANDOMIZED COMPLETE BLOCK DESIGN, NO SUB-SAMPLES

AUTHORS: Henry A. Fribourg Fred W. Roberts

DIRECT TECHNICAL INQUIRIES TO:
Henry A. Fribourg
Department of Agronomy
University of Tennessee
Knoxville, Tennessee

DESCRIPTION - To analyze the data in a randomized complete block design when no sub-samples are allowed, and to furnish the completed analysis of variance table and the means for each treatment. Approximately 26,000 memory positions. Memory 40K, TNS, TNF, NF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060070

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.075ROUNDING SUBROUTINE

AUTHOR: Fred W. Roberts

DIRECT TECHNICAL INQUIRIES TO:
Fred W. Roberts
University of Tennessee
University Computing Center
Knoxville, Tennessee

DESCRIPTION - To round a floating point number to the number of significant digits specified by the user. 230 positions. Memory 20K, Move Flag OP. Code (71).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060075

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.077RIDGE ANALYSIS FOR HIGHLY CORRELATED DATA

AUTHOR: Frank Gibbard, Jr.

DIRECT TECHNICAL INQUIRIES TO:
Mr. E. T. Rhodes, Jr.
Humble Oil & Refining Company
Research & Development
Baytown, Texas

DESCRIPTION - This program is a useful supplement to the least squares technique in regression analysis of highly correlated data. In such cases the least squares coefficients are often inflated beyond a reasonable size. Ridge analysis decreases the coefficients, while keeping a good fit. 17,925 storage positions are used. Memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060077

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.078WEIBULL ANALYSIS PACKAGE

AUTHOR: R. E. Wilder

DIRECT TECHNICAL INQUIRIES TO:
R. E. Wilder
Motorola, Inc.
5005 E. McDowell Road
Phoenix, Arizona

DESCRIPTION - The package consists of eight programs which will perform a Weibull Reliability Analysis. The programs can be used in varying sequences. Memory 20K, paper tape, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060078

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.079THREE WAY INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT TABLE OR RAW DATA

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Will compute three way independence Chi-Square Analysis from either the three way count table or will compute the three way count table from raw data and proceed. Computes all possible two way independence Chi-Squares as a byproduct. Memory 40K, Indirect Addressing, and additional instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060079

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.080COVARIANCE ANALYSIS - COMPLETELY RANDOMIZED DESIGN - SIMPLE OR MULTIPLE USU 29

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - The program will compute a covariance analysis on a completely randomized design. Either simple or multiple covariance with variable counts per group. Memory 40K and Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060080

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.081HOMOGENEITY OF VARIANCE TEST AND T TEST USU 32

AUTHOR: Dinesh G. Patei

DIRECT TECHNICAL INQUIRIES TO:
Dinesh G. Patei
Computer Center
Utah State University
Logan, Utah

DESCRIPTION - Bartlett's test of homogeneity of variance and T test, two groups at a time, for all possible combinations. Analysis of variance (unadjusted) as a by-product.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060081

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.082TWO WAY INDEPENDENCE CHI-SQUARE ANALYSIS, COUNT TABLE OR RAW DATA, USU 22

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Will compute two way Chi-Square analysis from either the two way count table or will compute the two way count table from raw data and proceed.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Indirect Addressing and Additional Instructions to enable FORCOM to be added to FORTRAN Format.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060082

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.083ANALYSIS OF VARIANCE - RECTANGULAR LATTICE DESIGN USU 51

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes the analysis of variance, unadjusted means, adjusted means and pertinent statistics for rectangular lattice designs.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, and Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060083

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.084MODEL BUILDING IN MULTIPLE REGRESSION USU 15, 16

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - To provide basic data reduction techniques to enable research workers to evaluate the possible necessary terms in a multiple regression model. Provides tables for a graphic approach to looking at all possible main effects and first order interactions in multiple regression problem.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, Automatic Divide, and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060084

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.085PROBIT ANALYSIS

AUTHORS: Dr. R. J. Daum Clyde Givens
Gary Bearden

DIRECT TECHNICAL INQUIRIES TO:
Dr. F. J. Daum
U. S. Department of Agriculture
Biometrical Services
Beltsville, Maryland

DESCRIPTION - An iterative procedure is used to obtain a weighted linear regression of PROBIT-response on LOG sub 10 (dose) where the responses are quantal. The procedure used is that described in PROBIT analysis by D. J. Finney, Cambridge University Press, 1952.

MINIMUM SYSTEM REQUIREMENTS - 20K card system with Auto Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060085

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.086ANALYSIS OF VARIANCE-REPEATED LATIN SQUARES USU 31

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR COLUMN

Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Will compute a single Latin square analysis of variance or will compute any number of single Latin square analyses of variance of the same dimensions and compute a pooled analysis of variance.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, Indirect Addressing, and Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060086

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.087ANALYSIS OF VARIANCE - REPEATED RANDOMIZED BLOCKS USU 12

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Will compute a single randomized block analysis of variance or will compute any number of single randomized blocks analyses of variance of the same dimensions and pool them into a pooled analysis of variance.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, Indirect Addressing, and Additional Instructions to enable FORCOM to be added to FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060087

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.088UCRBL 54-ANALYSIS OF VARIANCE (FACTORIAL DESIGN WITH NESTING OPTION) UCRBL 54

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Computes means and adjusted sums of squares with the following options for any combination:

CODE	SUM OF SQUARES	MEANS
1	No	No
2	Yes	No
3	Yes	Yes

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 40K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060088

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.090COMPLETELY GENERALIZED ANOV

AUTHOR: Allan I. Heath

DIRECT TECHNICAL INQUIRIES TO:
Allan I. Heath
Biometrical Services, ARS
Agricultural Research Center
Beltsville, Maryland

DESCRIPTION - The program computes an analysis of variance for any factorial of pseudo-factorial experiment where subclass numbers are balanced. Selected subclass means may be obtained at the option of the operator. All sources or any selected sources in the analysis of variance, including both cross classified and/or nested effects, are under operator option. This program will handle up to 18 factors with a maximum of 999 levels per factor. All data must be stored prior to the computation of the

CONTINUED FROM PRIOR PAGE

analysis. The data field may be of any size, located in any position on the detail card, with the only restriction being that the total uncorrected sum of squares may not exceed 34 digits.

MINIMUM SYSTEM REQUIREMENTS - 20K memory, Automatic Divide, Indirect Addressing, 1622.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060090

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.091PRINCIPAL AXES FACTOR ANALYSIS USING HOTELLINGS ITERATIVE PROCEDURE

AUTHOR: Thomas C. Teeples

DIRECT TECHNICAL INQUIRIES TO:
Thomas C. Teeples
HUMRRO
2013 G Street N. W.
Washington, D. C.

DESCRIPTION - Extracts any number of factors from correlation matrix. Trace of matrix is computed and printed out. The sum of squares of each set of factor loadings (latent root) is computed and printed out. Also the cumulative percentage of total variance accounted for is printed out. Program pauses after each factor. Pushing start causes another factor to be extracted.

MINIMUM SYSTEM REQUIREMENTS - 19,999 positions, memory 20K and Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060091

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.093ERCBIT ANALYSIS

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Calculation of the constants of the probit regression line. Dosage levels may be retained in their input scale or transformed to log(10). Natural mortality may be set equal to or greater than zero.

PROGRAMMING SYSTEMS - Coded in Format FORTRAN for Floating Point Arithmetic.

MINIMUM SYSTEM REQUIREMENTS - Memory 40K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060093

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.094VARIANX MATRIX ROTATION

AUTHOR: Thomas C. Teeples

DIRECT TECHNICAL INQUIRIES TO:
Thomas C. Teeples
George Washington University
Human Resources Research Office
2013 G. Street, N.W.
Washington, D.C.

DESCRIPTION - This program uses the output from the principal axes factor analysis program by the same author. The factor loadings are stored, communalities computed, square roots of communalities punched, matrix is normalized, rotated, denormalized, and punched.

PROGRAMMING SYSTEM - FORTRAN with Format, Floating Point.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, and no other special features required.

BASIC PROGRAM PACKAGE

CONTINUED FROM PRIOR COLUMN

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060094

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.095FREQUENCY DISTRIBUTION GENERATOR PROGRAM - SINGLE AND DOUBLE COLUMN

AUTHOR: Howard Givner

DIRECT TECHNICAL INQUIRIES TO:
Howard Givner
Brooklyn College
Testing and research
Brooklyn 10, New York

DESCRIPTION - This program is designed to compute the absolute frequency and percentage of response for each of 10 digits (0-9) in a column, or each of 100 two-digit combinations (00-99) in a field. The program will handle 80 single column fields or 40 double column fields as well as any combination of single and two-digit fields occupying an 80-column card at maximum and up to 9,999 cases. There is no required format since data format is under the control of a header (parameter) card. Other information, not to be processed by the program may appear elsewhere on the data card and may be non-numerical. The program gives options to type out or punch out and to compute or not compute percentages.

PROGRAMMING SYSTEMS - Written in Machine Language.

MINIMUM SYSTEM REQUIREMENTS - Basic 1620-1622 System.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060095

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.096STUDENT T TEST

AUTHOR: W. E. Milner

DIRECT TECHNICAL INQUIRIES TO:
W. E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute the T test of significance between from two to fifty columns of data.

PROGRAMMING SYSTEM - Written in FORTRAN Language (non-Format).

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060096

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.097SIMPLE CORRELATION COEFFICIENT MATRIX WITH MISSING DATA POINTS

AUTHOR: W. E. Milner

DIRECT TECHNICAL INQUIRIES TO:
W. E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute all possible correlation coefficients from an input matrix. The data may have missing points within a set, yet the entire set is not deleted. Written in FORTRAN; requires (card system) 20K memory and no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060097

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-06.0.098INDEX OF ORDER OF ASSOCIATION

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To compute the index of order of association for up to a 10 x 10 matrix, see statistics, a new approach, by Wallis and Roberts.

PROGRAMMING SYSTEM - Written in FORTRAN (non-Format).

MINIMUM SYSTEM REQUIREMENTS - Any 1620 with FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162006098

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.099CHI SQUARE

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To simply calculate CHI square without the normally complex programs available.

PROGRAMMING SYSTEM - Written in FORTRAN (non-Format).

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 162006099

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.100NEWTONS FORWARD INTERPOLATION

AUTHOR: William E. Milner

DIRECT TECHNICAL INQUIRIES TO:
William E. Milner
North Texas State University
Computer Center
Denton, Texas

DESCRIPTION - To calculate a polynomial from a set of point sets using Newtons Forward Interpolation Method.

MINIMUM SYSTEM REQUIREMENTS - Card system, Memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060100

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.101DATE ANALYSIS PROGRAM

AUTHORS: A. J. Santilli F.W. Wood

DIRECT TECHNICAL INQUIRIES TO:
A. J. Santilli
Research and Development Department
National Steel Corporation
Weirton Steel Company Division
Weirton, West Virginia

DESCRIPTION - To enable one to determine from a given set of data (the following) what functional relationship exists and how well this relationship describes the data presented. 1. A scatter plot of the data. 2. A plot of the average values. 3. A simple correlation analysis. 4. A possibility of six different least squares fits. 5. A test for the goodness of the chosen fit. 6. A plot of the chosen fit or a group of fits on the original data.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

Running time - this is a function of the number of data points to be considered.

MINIMUM SYSTEM REQUIREMENTS - Any computer with the ability to compile 1620 FORTRAN with format. The memory limitation is 40K, however, the program as listed was compiled on a 60K machine with Automatic Divide hardware. Program compilation - it will be necessary to compile the course statements for each different machine configuration.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060101

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.102ANALYSIS OF VARIANCE

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California, Biometrical Lab.
Riverside
California

DESCRIPTION - Analysis of variance of data for a 2**n factorial design for n between 2 and 10 factors, inclusive. The total effect and sum of squares will be calculated for any or all single degrees of freedom. Input data may be single observations, sums of observations, or means of observations.

MINIMUM SYSTEMS REQUIREMENTS - A 1620 with Floating Point.

PROGRAMMING SYSTEM - Format FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060102

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.103FACTOR ANALYSIS - CENTROID METHOD

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Factor Analysis of a correlation matrix using the centroid method of factoring. Equipment specifications: 1620 card. Format FORTRAN - Floating Point.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060103

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.104CORRELATION MATRIX WITH OUTPUT IN MATRIX FORM

AUTHOR: P. K. Olson, Jr.

DIRECT TECHNICAL INQUIRIES TO:
P. K. Olson, Jr.
NROTC Unit
Miami University
Oxford, Ohio

DESCRIPTION - This program is designed to compute mean, standard deviation and Pearson's correlation coefficient for from two to fifty-two variables. The distinguishing feature of this program (compared with other programs which compute Pearson's correlation coefficient) is that the computed correlations are punched in a matrix form which makes identification of values easy. Card system, memory 40K, Automatic Divide, Indirect Addressing is required. Written in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060104

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-06.0.105ANALYSIS OF VARIANCE - PARTIALLY BALANCED LATTICE - USU 52

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes the analysis of variance, unadjusted and adjusted treatment means, and pertinent statistics for a partially balanced lattice design. Subsampling optional. Standardized card form not required. Additional instructions are necessary to allow usage of FORCOM subroutines, FORTRAN Format plus FORCOM subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060105

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.106HYPERGEOMETRIC STATISTICS - HYPHG

AUTHORS: W. H. Robertson H. E. Anderson

DIRECT TECHNICAL INQUIRIES TO:
H. E. Anderson
Div. 1442, Sandia Corporation
Sandia Base
Albuquerque, New Mexico

DESCRIPTION - Computes discrete points of the cumulative hypergeometric distribution, i. e., operating characteristic curves, for given lot and sample size, acceptance number, and probability level. Second option produces only the upper and lower confidence limits on the fraction defective of a finite population. Card system, memory 40K, Automatic Divide and Indirect Addressing. FORTRAN II (easily adapted for FORTRAN with format for smaller machine).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060106

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.107COVARIANCE ANALYSIS - RANDOMIZED BLOCK DESIGN - SIMPLE OR MULTIPLE USU 10

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This program was written to serve as a utility program in a statistical service laboratory. Only a limited control of card form is assumed. The output is labeled profusely. Memory 40K - Automatic Divide - Indirect Addressing - and additional instructions to enable FORCOM to be added to FORTRAN format. The read loop may be rewritten to eliminate the need for FORCOM.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060107

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.109ANALYSIS OF VARIANCE AND COVARIANCE

AUTHOR: Eleanor Beckwith

DIRECT TECHNICAL INQUIRIES TO:
H. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Analysis of variance and covariance for 2 less than or equal to K less than or equal to 4 factors in a balanced factorial design. Additionally, the error sum of squares is pooled with each effect sum of squares for later use in testing adjusted effects. Memory 40K. Written in specially modified Format-FORTRAN. Floating Point.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060109

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.110ANALYSIS OF VARIANCE - UNEQUAL SUBCLASS FREQUENCIES-UCRBL63

AUTHOR: R. C. Noble

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Analysis of variance of data with unequal subclass frequencies, either proportionate or disproportionate. A disproportionate set of subclass frequencies will have constants fitted and interaction will be tested. Written in specially modified Format-FORTRAN for paper tape.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060110

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.111RANDOM EXPONENTIAL NUMBER GENERATOR SUBPROGRAMAUTHORS: M. D. MacLaren G. Marsaglia
T. A. BrayDIRECT TECHNICAL INQUIRIES TO:
T. A. Bray
Boeing Scientific Res. Laboratories
P. O. Box 3981
Seattle 24, Washington

DESCRIPTION - A FORTRAN II function subprogram to generate a sequence of random exponential variables with mean one. FORTRAN II minimum requirements. The subprogram is coded in the SPS language for use as a FORTRAN II function subprogram which may be used in any FORTRAN II program with standard mantissa length (f equals 8). The average time required to generate an exponential random number is approximately 11 ms.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060111

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.112HOTELLINGS T-SQUARE

AUTHOR: G. E. Culbertson

DIRECT TECHNICAL INQUIRIES TO:
G. E. Culbertson
Hercules Powder Co.
Radford, Virginia

DESCRIPTION - This program is designed to compute the T-square value and connect it to a F value using the formulas of Hotelling. The program, as written, can handle at most the variates while the number of observations is unlimited. Users with more than 20K storage may increase the number of variates by making appropriate changes in the dimension statements. 1620 20K with card input and output. Written in FORTRAN.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060112

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.113ANALYSIS OF VARIANCE, CROSS-OVER DESIGN

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University

CONTINUED FROM PRIOR PAGE

Computer Center
Logan, Utah

DESCRIPTION - Computes the analysis of variance, treatment means and other statistics for a cross-over design. A standard card form is not required. As written the program requires Additional Instructions to enable FORCOM to be added to FORTRAN format. The program may be easily modified to use straight FORTRAN Format without FORCOM. This will require a rigid card form. 1620 with card I/O and 40K, Automatic Divide and Indirect Addressing are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060113

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.114

CORRELATION PROGRAM FOR SYMMETRIC AND ASYMMETRIC MATRICES

AUTHOR: W. E. Wright

DIRECT TECHNICAL INQUIRIES TO:
W. E. Wright
Data Processing and Computing Center
Southern Illinois University
Carbondale, Illinois

DESCRIPTION - This program, which will handle up to 999 variables, will compute all possible simple pairwise correlation coefficients among a set of variables or between two sets of variables. Variables may be from one to ten digits in length. There may be as many as 999 variables and 99999 observations. Storage requirements: The entire core (40K) memory is utilized. The following are required: Card input/output, 40K, Indirect Addressing, and Move Flag.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060114

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.115

PERCENTILE SCORES FREQUENCY DISTRIBUTIONS, AND CUMULATIVE FREQUENCIES

AUTHOR: W. E. Wright

DIRECT TECHNICAL INQUIRIES TO:
W. E. Wright
Data Processing and Computing Center
Southern Illinois University
Carbondale, Illinois

DESCRIPTION - This program punches percentiles, frequency distributions, and cumulative frequencies from scores read in on data cards. Its advantages come from the variability and in some cases the size of the following: (1) score range, (2) number of variables, (3) location of variables on the input cards, (4) intervals, (5) missing data, (6) storage allocations. The following features are required: Card input-output, Indirect Addressing, 20K, Move Flag, Transfer Numerical Strip, and Transfer Numerical Fill.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060115

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.116

POWER CURVES FOR THE NEGATIVE BINOMIAL DISTRIBUTION

AUTHOR: C. J. Gardner

DIRECT TECHNICAL INQUIRIES TO:
C. J. Gardner
Applied Mathematics Section
Mgmt. Systems Development Department
Eastman Kodak Co.
Rochester 4, New York

DESCRIPTION - The purpose of this program is to calculate power curves for a test of significance on the average of a sample of N observations each of which is independently distributed as a negative binomial distribution with parameters K, P and Q. The program will calculate power curves for left, two, and right tail tests. Values of the average, the parameter K and the desired sample size must be entered as data. Critical points may be calculated internally by giving the desired level of Type I error or may be entered as data. Memory 40K, Automatic Divide and Indirect Addressing. The program is written in FORTRAN

CONTINUED FROM PRIOR COLUMN

Language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060116

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.117

ESTIMATION OF CONSTANTS IN THE NEGATIVE BINOMIAL DISTRIBUTION

AUTHOR: C. J. Gardner

DIRECT TECHNICAL INQUIRIES TO:
C. J. Gardner
Applied Mathematics Section
Mgmt. Systems Development Department
Eastman Kodak Co.
Rochester 4, New York

DESCRIPTION - The purpose of this program is to estimate the constants K, P, and Q in the Negative Binomial Distribution. It will also calculate expected frequencies from the estimated values of the parameters or from values given as input. It will calculate values of X square and cumulative probabilities. The number of cells must be less than or equal to 100. Memory 40K, cards with Automatic Divide and Indirect Addressing. The program was written in FORTRAN Language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060117

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.118

CURVE FITTING (UCRBL 0065)

AUTHOR: M. J. Garber

DIRECT TECHNICAL INQUIRIES TO:
M. J. Garber
University of California
Biometrical Lab.
Riverside, California

DESCRIPTION - Curve fitting by multiple regression procedures. The polynomial fit, $Y_{sub J}$ equals the sum of $B_{sub I}$ times I divided by J , for I equal 0, 1, ..., K, is developed up to a maximum tenth degree. Standard errors of the regression coefficients are computed if the total B square (square of the multiple correlation coefficient) is less than 1.0. Card I/O and a memory of 40K. Written in a modified version of Format FORTRAN Floating Point.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060118

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.120

VARIABLE PRECISION MULTIPLE REGRESSION AND VARIABLE PRECISION MATRIX INVERSION PACKAGE

AUTHOR: Lew D. Harkins

DIRECT TECHNICAL INQUIRIES TO:
Lew D. Harkins
Louisiana State University
Computer Research Center
Baton Rouge, Louisiana

DESCRIPTION - Regression Program: Utilizes a selective input format, determines proper field sizes and accumulates sums of squares and cross products in fixed point. Converts to variable length Floating Point for regression calculations. Operator can select precision carried in computations (2-90 digits). All standard regression terms are calculated. More than one regression equation may be fitted without re-entering data.

Inversion program: Can be used as an accuracy check for the regression program as well as independently for inversion of symmetric matrices. Operator can select precision carried in computations. Both programs determine maximum precision available based on storage space for each problem. 1620 with Card I/O, Indirect Addressing, Special Instruction Set No. 1021, and variable length Floating Point hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR PAGE

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060120

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060123

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.121MISSING DATA CORRELATION PROGRAM FOR SYMMETRIC AND ASYMMETRIC MATRICES

AUTHOR: William E. Wright

DIRECT TECHNICAL INQUIRIES TO:

William E. Wright
Southern Illinois University
Carbondale, Illinois

DESCRIPTION - This program, which will handle up to 999 variables, will compute all possible simple pair-wise correlation coefficients among a set of variables or between two sets of variables, with or without missing data. Variables may be from one to ten digits in length. The maximum number of variables in a study depends on several factors: The smallest maximum is 277, and the largest is 999. There may be as many as 99999 observations. Sums are accumulated as fixed-point numbers, means are truncated to five decimals, standard deviations are rounded to five decimals, and correlation coefficients are rounded to six decimals. The following features are required: Card input/output, Indirect Addressing, 40K, MF, and TNS. The program may be altered for 20K and 60K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060121

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.124DUNCANS MULTIPLE RANGE TEST, USING HARTERS CRITICAL VALUES, FOR F LEVELS OF .10, .01, .005

AUTHORS: H. A. Fribourg R. F. Ling

DIRECT TECHNICAL INQUIRIES TO:

H. A. Fribourg
Department of Agronomy
University of Tennessee
Knoxville, Tennessee

DESCRIPTION - To rank means in ascending order, together with their respective identification, and to calculate the shortest significant ranges, according to Duncans Multiple Range Test (Biometrics 11-1-42, 1955) using Harters Critical Values (Biometrics 16-671-685, 1960.) Card input/output. Equipment specifications: 60K Automatic Divide. Indirect Addressing: TNS, TNF, and MF. Language: Fixed/Float Relocatability (Optional: Running time; Approximate number of times run successfully: Programming Hours). FORTRAN II, with FORCOM (GET Subroutine) data and identification input can be located by FORCOM any where in the card, or can be taken directly from Randomized Complete Block program output (6.0.069) on Sense Switch control. Any one of the five tables published by Harter can be used for any one run at a specified level of probability. Hester card is needed to provide number of degrees of freedom for error, number of observation per mean, number of means, error variance estimate, probability level, and locations of data and of identification.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060124

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.122TRAP - TRANSFORMATIONAL REGRESSION ANALYSIS PROGRAM

AUTHORS: J. F. Muldoon A. J. Capato

DIRECT TECHNICAL INQUIRIES TO:

J. F. Muldoon
Chemical Engineering Department
Columbia University
New York 27, New York

DESCRIPTION - This program fits by least squares technique a functional relationship of the form $F(Y)$ equals A plus $B G(X)$ to data pairs (Y, X) . The functions F and G are chosen from among 22 transformations that may be applied to the raw data (including the identity). The restricted form $F(Y)$ equals $B G(X)$ is also handled at the operator's discretion. Primary output is composed of estimates and variance of estimates of A and B , residual variance of fit, correlation coefficient, means and variances $F(Y)$ and $G(X)$ and the transformed point $(F(Y), G(X))$ for each (X, Y) point. Secondary optional output includes deviations of point from line and true confidence limit curves for fit at 90, 95, and 99 per cent confidence levels using built-in T-tables. Original data are not destroyed and program may be restarted by Sense Switch option to perform different transformations on same data. Restrictions/Range: Up to 250 data points may be handled by program as written. This may be easily modified with new DIMENSION statement. Storage requirements: 37,000 digits. Equipment specifications: IBM 1620, 60K Card Read/Punch. Written in FORTRAN with Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060122

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.127OGIVE FREQUENCY CURVE PROGRAM

AUTHOR: K. W. Brady

DIRECT TECHNICAL INQUIRIES TO:

K. W. Brady
Long Island Lighting Company
250 Old Country Road
Mineola, New York

DESCRIPTION - This is a two pass program to develop factors necessary for the plotting of OGIVE frequency distribution curves. T-241 (Pass I) This pass provides the percentage of bills and consumption by block and an accumulation of these percentages up to 100%, also, starting with 100% and descending to 0%. This pass provides the average use for the group; ratio of use to the average use (steps divided by average use); percentage of consumption in block related to total consumption and an accumulation of this percentage to 100%. Program written in Floating Point, data therefore must be in Floating Point with the exception of rate code, month and year, and maximum entry cards. Both passes utilize almost all of 20K memory. Equipment specifications: Card system, memory 20K, and no other special features required. Program written in Format FORTRAN to allow control of input and output data. Sense switch 1 is also used to provide the processing of an individual monthly data deck, or an annual data deck.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060127

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.123ANALYSIS OF VARIANCE RANDOMIZED COMPLETE BLOCK DESIGN, INDIVIDUAL AND COMB. STATION SUMMARIES

AUTHOR: Donald Peterson

DIRECT TECHNICAL INQUIRIES TO:

Donald Peterson
Data Processing Laboratory
North Dakota State University
Fargo, North Dakota

DESCRIPTION - Randomized Complete Block Design - giving analysis of variance by station and summary of all stations. Mathematical Method: Conventional statistical procedure. Restrictions/Range: 40 treatments - 6 replications. Storage Requirements: 20K. Equipment Specifications: Memory 20K. No Automatic Divide. No Indirect Addressing. No other special features required. Language: Fixed/Float Relocatability.

1620-06.0.128COMPUTATION OF THE CUMULATIVE BINOMIAL POISSON NORMAL STUDENT T/CHI-SQUARE F PROBABILITIES

**

AUTHOR: G. Walton

DIRECT TECHNICAL INQUIRIES TO:

G. Walton
University of California
312 Gianni Hall
Berkeley, California

DESCRIPTION - To allow the user to compute, a FORTRAN II routine, the probability that X less than K where K is a constant and X is distributed according to the binomial,

CONTINUED FROM PRIOR PAGE

Poisson, normal student's T, chi-squared or F distribution with known parameters. A separate function subroutine is used for each distribution. Finite and infinite series. All of the above routines are less restrictive in terms of range of parameters than tables of these distributions. Specific restrictions are included in the program write-ups.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 40K, 60K, Automatic Divide, and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060128

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.130DIGIT COUNTING USU-II

AUTHORS: D. V. Sisson W. L. Pope

DIRECT TECHNICAL INQUIRIES TO:
D. V. Sisson
Computer Center, Utah
State University
Logan, Utah

DESCRIPTION - Counts the number of times each digit, zero through nine, occurs in a card column or series of columns. Used in obtaining one and two-way count tables. Mathematical Method: Card counts are accumulated in fixed point for each punching position of each column. Restrictions/Range: Only numeric punches should be used and no group should contain more than 9999 cards. Each column is treated as a separate field. Storage Requirements: 40K. Equipment Specifications: 40K. Automatic Divide: Yes. Indirect Addressing: Yes. The language is FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060130

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.131BIOASSAY ANALYSIS/PARLOW

AUTHOR: D. V. Sisson

DIRECT TECHNICAL INQUIRIES TO:
D. V. Sisson
Computer Center
Utah State University
Logan, Utah

DESCRIPTION - Computes all group totals and means, detailed analysis of variance with partitioned group sum of squares, natural logs of the relative potencies, and natural logs of the confidence intervals for the relative potencies. Mathematical Method: Basic statistical procedures. Restrictions/Range: Maximum of 50 preparations including control, 2 levels, and no more than 999 observations in any group. Storage Requirements: 40K, unless recompiled with new dimension statements. Equipment Specifications: Memory 40K. Automatic Divide: Yes. Indirect Addressing: Yes. Program is written in FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060131

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.132ANALYSIS OF VARIANCE AND COVARIANCE-UNEQUAL SUBCLASS FREQUENCIES

AUTHOR: R. L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
R. L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This series of programs computes the count matrix and right hand sides of the information matrix from raw data cards, eliminates dependencies, inverts the full rank information matrix, computes the solution vector and computes the sums of squares due to subsets and linear hypothesis of the coefficients. It may be used for covariance situations. General least squares. Restrictions/Range: The program as written works for one,

CONTINUED FROM PRIOR COLUMN

two or three factors. The logic may be extended for additional factors but may not be practical for this size of machine. Any sub matrix may be up to the order of 50 x 50. There may be up to 7 continuous variables, or mixture of covariates and right hand sides. The resultant full size matrix may be up to 46 x 46 with right hand sides. The resultant full size matrix may be up to 46 with right hand sides included in the 46. Storage Requirements: 40K. Equipment Specifications: 40K. Automatic Divide: Indirect Addressing. Other special features required: Additional instructions to enable FORCOM to be added to FORTRAN Format. FORTRAN Format plus FORCOM. May be modified to eliminate FORCOM but will then require rigid data card forms.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060132

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.134NON-LINEAR LEAST-SQUARES CURVE FITTING PROGRAM

AUTHOR: G. Struble

DIRECT TECHNICAL INQUIRIES TO:
G. Struble
Statistical Laboratory and Computing Center
University of Oregon
Eugene, Oregon

DESCRIPTION - Fits finite number of points with a function of arbitrary non-linear form, in least-squares sense. Form of function must be supplied in FORTRAN II subroutine by the user. Method is Newton iteration from first guess at parameters in function, each iteration linearizing function at current estimate of parameters. Restrictions: Handles an unlimited number of observations or up to 8 independent variables. 1 dependent variable, and functions of up to 6 parameters. Newton iteration method does not always converge for all functions and all initial guess.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 40K, card system, Auto Divide, Indirect Addressing, FORTRAN II mainline, requires subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060134

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.135ITEM ANALYSIS AND SCORING

AUTHOR: H. Givner

DIRECT TECHNICAL INQUIRIES TO:
H. Givner
Office of Testing and Research
Brooklyn College
Bedford Avenue & Avenue H.
Brooklyn 10, New York

DESCRIPTION - This program is designed to do an item analysis and/or scoring of cards prepared by mark sense punching. A format specification provides flexibility of input for up to 200 items and up to 999 students. The program furnishes a serial number for each student in the listing of scores. This program finds the difficulty (D) of each item by determining the proportion of students answering it correctly, and the validity (V) of each item by calculating the point-biserial coefficient. The mean score and standard deviation of the total group is also found.

PROGRAMMING SYSTEMS - FORTRAN with Format, SPS - 1620/1710, mainline, complete. Most of the program was written in FORTRAN. After compilation with a FORTRAN/Format processor, the I/O subroutines in the object deck were modified. Other changes were made to allow lists to be read. A Format decoding processor routine written in SPS was added to complete the program. This program can distinguish blanks, zeros and twelve punches from each other.

MINIMUM SYSTEM REQUIREMENTS - Card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060135

PROGRAM NUMBER	DISTRIBUTION MEDIUM	USER VOLUME
EXTENSION	TYPE	REQUIREMENT

CONTINUED FROM PRIOR PAGE

BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-06.0.139MULTIVARIATE ANALYSIS OF VARIANCE RANDOMIZED BLOCK DESIGN-USU 63

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes treatment mean vector and pertinent dispersion matrices. Provides statistics for all univariate and multivariate tests of equality of means. Mathematical method: Wilks Lambda. Restrictions/Range: Up to ten blocks, fifty treatments and twenty variables. Storage requirements: 40K. Equipment specifications - Memory 40K X FORTRAN Format plus FORCOM subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060139

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.136MEAN, STANDARD DEVIATION, AND VARIANCE BY ROWS AND COLUMNS

AUTHOR: Jack Ward

DIRECT TECHNICAL INQUIRIES TO:
Jack Ward
Westminster College
901 Vernon Ave.
Fulton, Missouri

DESCRIPTION - To compute and print the mean, standard deviation, and variance of an array by rows and columns (sense switch 4) or only by columns (no sense switch). Standard methods of computation. Restrictions/Range: Up to 15 columns. No limit to the number of rows. This is a revision of Gene Milner's FORTRAN without Format card program. The program is now tape FORTRAN with Format. Included is the same sample program and data as in 06.0.051. The format statements could be easily altered to allow for more than 15 columns.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Tape system - Memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060136

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.140ANALYSIS OF VARIANCE, MEANS, AND SDS FOR SUBGROUPS WITH UNEQUAL OR EQUAL N

AUTHOR: Sigmund Tobias

DIRECT TECHNICAL INQUIRIES TO:
Sigmund Tobias
School of Education
City College
City University of New York
135th St. and Convent Ave.
New York 31, New York

DESCRIPTION - Research in the Social Sciences often involves an unanticipated loss of subjects giving rise to an experimental sample with unequal number of cases, or observations, in the component groups. The present program is specifically designed for such contingencies, and will compute a one way analysis of variance, means, variances, and standard deviations even though each of the subgroups has a different number of subjects. The program may also be used for problems where an equal number of cases is found in each group. Output is available with several options, and in the typical case gives fully labeled analysis of variance table, and means, variances, standard deviations and NS for each subgroup. Standard statistical method is used. Storage Requirements: 20K or above.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060140

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.137CANONICAL CORRELATION

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This series of two programs is part of a Multivariate Analysis Package. They will compute a canonical correlation analysis from any possible subset of terms used in multivariate data collection USU 55. They were modified from and replace 06.0.137. This program requires the output of Multivariate Data Collection USU 55, 06.0.167.

PROGRAMMING SYSTEM - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - Equipment required by program is a 40K card system. See also:

Multivariate Data Collection	USU 55	06.0.167
Multiple Regression (I,II,III)	USU 56, 58, 60	06.0.168
Factor Analysis	USU 57	06.0.169

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060137

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.141EDWARDS PERSONAL PREFERENCE TEST SCORING BY THE IBM 1620

AUTHOR: Jack Ward

DIRECT TECHNICAL INQUIRIES TO:
Jack Ward
Director of Computer Center
Westminster College
Fulton, Missouri

DESCRIPTION - To score the EPPS on the 1620, giving scores and norms for the 16 scales as output. (Hand scoring requires 16 keys, regular machine scoring requires 8 keys.) Storage Requirements - Program 00403 to 03327, tables 18000 to 19541. Equipment specifications - Tape system, memory's 20K. The program is written in SPS. It will run on any size memory. Special features should not interfere.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060141

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.138MULTIVARIATE ANALYSIS OF VARIANCE COMPLETELY RANDOMIZED DESIGN-USU62

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - Computes mean vector and dispersion matrix for each group. Tests equality of dispersion matrices and mean vectors. Mathematical method: Bartlett's M and Wilks Lambda. Restrictions/Range: Up to twenty variables. Storage Requirements: 40K. Equipment Specifications: Memory 40K, FORTRAN Format plus FORCOM subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060138

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.142LEAST SQUARES COSINE FIT-IBM 704 COFIT PROGRAM ADAPTED TO THE IBM 1620

AUTHOR: Judith Koerner

DIRECT TECHNICAL INQUIRIES TO:
Judith Koerner
Argonne National Laboratory

CONTINUED FROM PRIOR PAGE

Idaho Division
P. O. Box 2528
Idaho Falls, Idaho

DESCRIPTION - Least Squares Cosine fits by a least squares technique the curve Y equals a $\cos(b) X-C$ for a maximum of 40 observed points. Mathematical method - A least squares, iterative procedure. Restrictions, range - A maximum of 40 observed points may be fitted. Equipment specifications: Memory 20K, Automatic Divide, Indirect Addressing. This program was written in UTO FORTRAN. It takes 60 seconds to fit 15 points.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060142

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.14380-SERIES MULTIPLE LINEAR REGRESSION SYSTEM

*M

AUTHOR: James N. Boles

DIRECT TECHNICAL INQUIRIES TO:
James N. Boles
Dept. of Agriculture Economics
University of California
Berkeley, California

DESCRIPTION - This system solves the General Multiple Linear Regression problem. By means of a variety of transformations, it may also be used to fit curved surfaces to data points providing only that the function representing the surface be linear in its parameters. Three alternative forms of regression are - (a) Stepwise, (b) Multiple Dependent Variable, and (c) Alternate Dependent Variable. The system is quite flexible as to input and output. Options are selected mainly by control card. Complete residual or error analysis is provided. Storage used by program - 13,400.

PROGRAMMING SYSTEMS - Written in SPS 1620/1710 Mainline Complete.

MINIMUM SYSTEM REQUIREMENTS - Equipment required by program- Card system, Auto Divide; program can be used on lesser machine. Recompile with subroutine deck without Automatic Divide feature. Allocation of memory is made by the program for each problem. The programs are independent of memory size. For 20, 40, and 60K memories, approximately 30, 65 and 85 variables may be used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060143

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.144DICHOTOMIZE DATA

AUTHORS: Lowry L. McKee George Goldberg

DIRECT TECHNICAL INQUIRIES TO:
Mr. Lowry L. McKee, Asst. Dir.
Computer Center
Hofstra University
Hempstead, New York

DESCRIPTION - Program will dichotomize one or two digit fields in a punched card. No similar routines exist to our knowledge. Restrictions - data must be positive and numeric. If data cards are numbered, only card columns 1-77 can be used. The identification number, if used, must be in card columns 78-80. Storage requirements - 00402 - 02590. Equipment - Card, 20K memory, Indirect Addressing, no other special features required. Language - SPS, Fixed Point.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060144

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.145CORRELATION MATRIX WITH OPTIONAL FACTOR ANALYSIS AND ROTATION OF FACTORS

*M

AUTHOR: P. K. Olson, Jr.

DIRECT TECHNICAL INQUIRIES TO:
P. K. Olson, Jr.
NROTC Unit

CONTINUED FROM PRIOR COLUMN

Miami University
Oxford, Ohio

DESCRIPTION - This program is a package of three programs each of which is run separately. Program 1 is titled (Correlation Matrix with Output in Matrix Form) and will output the intercorrelations for from 2 to 52 three digit variables in a triangular matrix which permits easy location of any specific correlation coefficients. The coefficient obtained is Pearsons (R). Program 2 is titled (Factor Analysis by Thurstones Centroid Method) and will extract up to eleven factors from the outputted correlation matrix of program 1. Program 3 is titled (Rotation of Factors by Kaisers Varimax Method) and will rotate any number of the outputted factors extracted by program 2. The input data to program 1 must be three digit integers. However, changing one format statement will permit input of any desired data.

PROGRAMMING SYSTEMS - Written in FORTRAN II Mainline Complete.

MINIMUM SYSTEM REQUIREMENTS - Storage used by Program - Approximately 36,000 - Card system, MF, Auto Divide, Indirect Addressing, Floating Point hardware program can be used on a lesser machine, simply compile using FORTRAN II appropriate for machine.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060145

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.146CROSS AND SIMPLE TABULATION PROGRAM C. A. S. T.

AUTHOR: Howard Givner

DIRECT TECHNICAL INQUIRIES TO:
Howard Givner
Office of Testing & Research
Brooklyn College
Bedford Avenue & Avenue H
Brooklyn, New York 11210

DESCRIPTION - This program is designed to tabulate punch-card coded responses that are numerical (0-9), or consist of a single zone punch by itself (+ or -), or are blank, for up to 200 items. Responses for an individual can be on more than one card if necessary. The number of response values and individuals to be counted is limited by core size and the number of tabulations to be done in one pass. Format cards entered prior to the data provide for flexible data preparation. One control item may be cross tabulated with all other items with one pass of the data. No Direct Divide, Indirect Addressing, or special instructions are required. Coding is in SPS. FORTRAN with format input/output routines are used, with slight modifications.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060146

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.147AUTO CORRELATION-POWER SPECTRUM

AUTHORS: William Lawton Franklin Puff

DIRECT TECHNICAL INQUIRIES TO:
Franklin Puff
Eastman Kodak Company
Building 56, Kodak Park
Rochester, New York

To compute from time series data the Autocovariance $\Phi(K)$, the Autocorrelation $\rho(K)$, and the spectral density $\beta(K)$ (W SUB J). Method- Bartlett Lag Window. Restrictions (range-XT) read in equal to or less than 1500 observations, $\Phi(K)$ computed equal to or less than 150, $\rho(K)$ computed equal to or less than 150, $\beta(K)$ (W SUB J) computed equal to or less than 1500. Storage used by program- Internal core storage 40K. Machine equipment required by program- Card system, Auto Divide, Indirect Addressing object deck was compiled using Floating Point hardware. Programming Type- FORTRAN II Mainline, complete. Other programming language machine, used for patching for end-of-data and variable input. The machine language patch is not necessary if an end-of-data routine is used in the source deck and if format number 84 is changed to agree with the data.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060147

CONTINUED FROM PRIOR PAGE

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.148SINGLE AND MULTIPLE LINEAR REGRESSION ANALYSIS PROGRAM

*H

AUTHOR: Anthony J. Capato

DIRECT TECHNICAL INQUIRIES TO:

Anthony J. Capato
Chemical Engineering Department
Columbia University
New York 27, New York

DESCRIPTION - This program uses a least squares procedure to calculate the estimates of the Partial Regression Coefficients $B_{SUB\ 0}$, $B_{SUB\ 1}$, $B_{SUB\ 2}$, ..., $B_{SUB\ K}$ in the Multiple Linear Model Y equals $B_{SUB\ 0}$, plus $B_{SUB\ 1}$, $X_{SUB\ 1}$, plus, $B_{SUB\ 2}$, $X_{SUB\ 2}$ plus Plus $B_{SUB\ K}$, $X_{SUB\ K}$. The maximum number of independent variables, $X_{SUB\ K}$, is ten- that is, K is equal to or greater than 1 and equal to or less than 10. When K equals 1, the program estimates $B_{SUB\ 0}$ and $B_{SUB\ 1}$ in the single linear Model Y equals $B_{SUB\ 0}$ plus $B_{SUB\ 1}$, $X_{SUB\ 1}$. The program also computes the simple correlation coefficients, the multiple correlation coefficient, the standard error of the Y data, the standard error of the estimate, the significance of the regression (g), and the standard error of the partial regression coefficients. The output is via the console typewriter and is complete with table headings and labels. Mathematical method- standard statistical formulas as given in the write-up. Restrictions/range- the maximum number of independent variables is ten but the number of data points allowed is unrestricted. The original input data are destroyed during the computations.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - Storage requirements- about 20,000 digits.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060148

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.150FEED-MUENCH 50 PERCENT END-POINT DETERMINATION

AUTHOR: William F. Brown

DIRECT TECHNICAL INQUIRIES TO:

John R. Hatfield
Technical Information Processing and Control Recor
Lilly Research Laboratory
Indianapolis, Indiana 46206

DESCRIPTION - To calculate the estimated ED-50, 1n ED-50, variance (1n ED-50), and the 2 and 3 Sigma upper and lower control limits with up to M number of doses and a fixed number of N animals at each dose. Restriction/range- Number of dose levels cannot exceed 10. The number of animals is unlimited but must be the same at all dose levels. Auto Divide. Source programs are included for those machines of other configurations. Language- FORTRAN with Format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060150

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.152MEETING ASSUMPTIONS OF HOMOGENEITY OF VARIANCE, NONLINEAR DATA TRANSFORMATIONS

AUTHOR: Richard C. Irons

DIRECT TECHNICAL INQUIRIES TO:

Richard C. Irons
Building 16
U. S. Naval School of Aviation Medicine
Pensacola, Florida

DESCRIPTION - Two programs have been developed to accomplish the data transformations and the Bartlett's Test for Homogeneity of Variances. The first program generates a table of the original data and four sets of transformed data. The summation X and summation X squared for the original and the transformed scores are punched on cards to be used as input for the second program. The second program utilizes the output of the first and performs Bartlett's Test for Homogeneity of Variances on the original and transformed data sets. The investigator can then select for further statistical analysis the set of data

CONTINUED FROM PRIOR COLUMN

for which the variances are shown to be homogeneous. Storage used by program- Full 20K. Equipment required by program- Card system. Programming type- FORTRAN with Format. Program compiled using a modified version of the U.T.O. FORTRAN Processor. It may be compiled on any size machine with any FORTRAN with format processor. Output must be sorted before listing on a 407 or the 1620 typewriter.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060152

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.154TWO-IN-ONE LEAST SQUARES PROGRAM

AUTHOR: Ronald C. Read

DIRECT TECHNICAL INQUIRIES TO:

Ronald C. Read
Department of Mathematics
University of the West Indies
Kingston 7, Jamaica

DESCRIPTION - This program effects the solution, on the basic tape 1620, of two common types of least squares problems, as follows: Problem A. Given M linear equations in N unknowns (N greater than M) to find the solution of them which minimizes the sum (possibly weighted) of the squares of the unknowns. Problem B. Given N linear equations in M unknowns, (N greater than M) to find the values of the unknowns which minimize the sum (possibly weighted) of the squares of the left-hand sides of the equations. These problems are common occurrence in surveying practice, and in many other fields. Storage used by program- for the program- up to location 6219. Data storage - the rest of memory (20K). Equipment required by program basic tape 1620. Program Type- S.P.S. Language used in the writeup - S.P.S. The program handles problems for which the value of M is less than or equal to 50. The value of N is virtually unrestricted.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060154

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.155CALCULATION OF CLEBSCH-GORDAN COEFFICIENTS

AUTHOR: J.H. Hughes

DIRECT TECHNICAL INQUIRIES TO:

H.B. Kerr
Computer Center
Tenn. Tech.
Cookeville, Tenn.

DESCRIPTION - This is a program which will calculate Clebsch-Gordon coefficients.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 8K storage, and a card system.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060155

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.157FOUR TYPE POLYNOMIAL CURVE FITTING BY LEAST SQUARES

AUTHOR: A.C. Housman

DIRECT TECHNICAL INQUIRIES TO:

A.C. Housman
Royal McBee Corp.
Research & Development Division
West Hartford, Connecticut

DESCRIPTION - This program fits any of four different types of polynomials to a given set of data by the method of Least Squares. The program also calculates a statistical measurement of the standard error and standard deviation for each polynomial fitted and allows various print out options as well as weighting of the data points.

PROGRAMMING SYSTEMS - Written in 1620 PDQ FORTRAN, also should compile on a 40K system without change.

CONTINUED FROM PRIOR PAGE

MINIMUM SYSTEM REQUIREMENTS - A card system, also TNS, TNF, MF, Auto Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060157

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.158BASIC STATISTICS/FUNDAMENTAL ANALYSIS OF FINITE SERIES OR SAMPLE DATA

AUTHOR: H. J. Highland

DIRECT TECHNICAL INQUIRIES TO:
H. J. Highland
Director of Computer Laboratory
Long Island University
Brooklyn 1, New York

DESCRIPTION - Basic statistical analysis of data in Scientific, Educational, Psychological, Industrial Engineering, Testing and Business Research. Program provides 25 disparate measures of central tendency, dispersion, normality as well as fundamental summations for a series of data. Furfurated analysis permits use of different formulas for treatment of finite series as compared with sample data. Standard statistical formulas are used throughout for analysis of raw data. Up to 999,999 individual 10-digit (2 decimal place) values may be processed by the program. Storage used by program - program storage from 18439 to 20000. Programming type - FORTRAN with Format, Mainline, complete. Although the program is written to accept raw data in an F10.2 Format, most significant output data are in F 12.4 Format and summations (Y, X squared, X cubed, and X to the 4th power) are in E-Format. If greater number of decimal values are required for raw data input or in output, program will operate with change of format statements only.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Equipment required by program requires a 407 or other card listing unit. Can be used with minimum 1620 with 1622 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060158

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.159TESTING REGRESSION

AUTHOR: S. A. Raymond

DIRECT TECHNICAL INQUIRIES TO:
S. A. Raymond
Ohio Agricultural Experiment Station
Wooster, Ohio

DESCRIPTION - The program tests whether or not three or more linear regression equations can be pooled into one. Input can consist of paired X, Y values for up to 50 groups or corrected sums of squares and cross products of X and Y for each group. Output consists of linear regression coefficients and appropriate F statistics to test four hypothesis according to Ostle, Bernard 1954. Statistics in research, Iowa State College Press, Ames, Iowa, 487 pages, section 6.III. Storage used by program - 19,000. Equipment required by program - card system. Programming Language - AFIT-FORTRAN. Language used in the writeup - AFIT FORTRAN. Compiled on a 40K with Automatic Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060159

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.160SUSPENDED SEDIMENT-LOAD COMPUTATION FOR RIVERS AND STREAMS

AUTHOR: J. W. Lafon

DIRECT TECHNICAL INQUIRIES TO:
J. W. Lafon
U. S. Army Engineer District
Albuquerque, New Mexico

DESCRIPTION - Accepts as data the daily flows and

CONTINUED FROM PRIOR COLUMN

percentages of sediment concentration, as recorded at a given stream-gaging station for a maximum period of one year, and computes the daily sediment-loads in tons and acre-feet. Daily data is printed one month to the page, followed by an annual-summary sheet. Maximum and minimum values are isolated from the year's coverage, along with their dates of occurrence. Program contains a provision for accepting partial-day values of flow and concentration when required. Storage used by program - 19,959. Equipment required by program - Paper Tape system. Programming type UTO FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.
ORDERING INFORMATION: PROGRAM NUMBER 1620060160

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.161ANALYSIS OF VARIANCE SPLIT-SPLIT-PLOT DESIGN

AUTHORS: Earl Foster Donald Peterson

DIRECT TECHNICAL INQUIRIES TO:
Earl Foster
North Dakota State University
Agronomy Dept.
Fargo, North Dakota

DESCRIPTION - Performs and punches a complete analysis of variance, and punches means for the three main effects, the three two-factor interactions, and the replications of a split-split-plot design. The analysis of variance is completely labeled and is listed in tabular form. The mean values are listed in single horizontal arrays for the two-factor interactions. Output is designed especially for easy study of the results even though storage space was sacrificed. The program will handle from two through nine levels of whole plots, two through six levels of sub-plots and sub-sub-plots, and two through four replications. Storage used by program - 40K. Equipment required by program - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing. Programming Type - FORTRAN II, Mainline, complete.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060161

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.162CORRELATION MATRIX PROGRAM

AUTHOR: Hyman Burshtyn

DIRECT TECHNICAL INQUIRIES TO:
Hyman Burshtyn
Dept. of Sociology
Carleton University
Ottawa, Ontario, Canada

DESCRIPTION - This program is designed to compute a correlation matrix of variable size, maximum 80X80, from raw scores. It also produces, at user's option, means, standard deviations, standard errors squared, sums of scores, of squares, and of crossproducts. Has special "Interrupt" Feature permitting easy interruption during data input phase and resumption at later date. Designed for behavioral science data where scores are often just one digit in length but numbers of observations often large. Output is in form immediately acceptable to author's centroid factor analysis program, and author's special transposition program producing a highly readable correlation matrix. Standard statistical techniques. Summations are carried out in fixed point. As written, can handle up to 80 variables, number of observations limited only by necessity to keep maximum sums of squares smaller than 100,000. Input format requires single digit integer scores. Writeup suggests alterations to increase size of matrix, and/or sums of squares word size limit and/or size of data words (all may not be realized at once). Equipment specifications - Compiled on a 1620 Model I with card input-output, 40K, and all optional features except Floating Point hardware. Program Language - FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060162

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRICE COLUMN

1620-06.0.164INVERSE LAPLACE TRANSFORM

*M

AUTHOR: Eng. Comp. Lab.

DIRECT TECHNICAL INQUIRIES TO:

D. W. Peterson
Eng. Comp. Lab.
University of Wisconsin
Madison 6, Wisconsin

DESCRIPTION - IIT is designed to find the time domain function corresponding to an S-plane or complex frequency. The output is an expression containing impulses, exponentials, and sinusoids. There are three decks to IIT - IIT-A, IIT-B, and IIT-C. IIT-A finds the zeros of the denominator and multiplies out the numerator and denominator factors. Using the output of IIT-A as data, IIT-B computes appropriate values for real and imaginary frequencies, and coefficients of individual exponential and/or impulse time responses. Using this information, IIT-C chooses appropriate formats and supplies a FORTRAN language representation of the prescribed time domain function. The basic procedure is to break the given expression into partial fraction form, using Cauchy Residue Theorem to obtain numerators. Denominator zeroes are found by a modified Bairstow-Horner method. Storage requirements - Deck IIT-A - 25130* digits when compiled by FORGO or FOR-TO-GO, 32400* digits when compiled by 1620 FORTRAN. Deck IIT-B - 26900 digits when compiled by FORGO or FOR-TO-GO, 32284* digits when compiled by 1620 FORTRAN. Deck IIT-C - 17280* digits when compiled by FORGO or FOR-TO-GO, 21196* digits when compiled by 1620 FORTRAN. *Excluding 34860 digits used for FORGO, or 18280 digits used for FOR-TO-GO. **Including 9-30-61 1620 FORTRAN and subroutines storage space.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Equipment Specifications
- Deck IIT-A - 60K (using either FORGO or FOR-TO-GO), 40K (using 1620 FORTRAN). Deck IIT-B - 60K (using FOR-TO-GO), 40K (using 1620 FORTRAN). Deck IIT-C - 60K (using FORGO), 40K (using FOR-TO-GO, 1620 FORTRAN). For all three - Indirect Addressing, Automatic Divide.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060164

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

Automatic Divide, Indirect Addressing, and one 1311 Disk Drive is required. Uses FORTRAN II-D with Monitor I System. For full operation of this program, the user's system should contain FORTRAN call subroutines for plotting, Program No. 01.6.123.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060166

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.167MULTIVARIATE DATA COLLECTION

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:

Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This program is intended to be a basic data collection program for a wide variety of multivariate problems. It will compute means, standard deviations, sums of squares and products, and correlations. It will perform both within group and among group calculations. The following programs which we now have available, use the output of this program for their input. Multiple Regression (I, II, III) 06.0.169, Factor Analysis - Principal Components (I, II) 06.0.169, Canonical Correlation (I, II) 06.0.137. Other programs in this series will become available as they are written. A 40K Card 1620 with TNS, TNF, MF, Auto Divide and Indirect Addressing is required. Requirements which can be easily removed are TNS, TNF, MF, Auto Divide and Indirect Addressing. FORCOM subroutines requires (01.6.051 or 01.6.096). The program provides for up to nine transformations and three card forms. Additional transformations may be added by the user. It will handle up to thirty-nine transformed variables.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060167

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.165SCORING, STANDARDIZED SCORES, AND RATINGS FOR THE STRUCTURED, OBJECTIVE BORSCHACH TEST/SCBT

AUTHORS: Rex L. Hurst Philip Langer

DIRECT TECHNICAL INQUIRIES TO:

Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - These programs have been developed to accept the student answer sheet, in punched card form, for the sort and produce the following (1) The raw scores, (2) The standardized "M" scores, and (3) The ratings. Storage requirements - 40K or larger. Language - FORTRAN II. With a 40K machine two passes are required. With a 60K machine or a machine larger than the 1620, a combination program may be used. On a Model One 1620, forty seconds are required per test.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060165

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.168MULTIPLE REGRESSION (I, II AND III)

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:

Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This series of three interlocking programs is part of a Multivariate Analysis Package. Multiple Regression I computes a multiple regression equation from any possible subset of terms used in Multivariate Data Collection. Multiple Regression II uses the output of Multiple Regression I and allows the user to test composite hypotheses. Multiple Regression III uses the input to multivariate data collection and the output from Multiple Regression I It will evaluate the multiple regression equation for each observation. A 40K Card 1620 is required by program.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060168

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.166AUTOCORRELATION-SPECIAL ANALYSIS

*M

AUTHOR: J. E. Turney, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. E. Turney, Jr.
Mgt. Research Dept.
H. P. Hood & Sons, Inc.
Charlestown, Massachusetts

DESCRIPTION - To compute from time series data the Autocovariance PHI (K), the Autocorrelation RHO (K), and the normalized spectral density FT (WSUBJ). The operating speed and computational method offer particular advantage over previous, similar programs.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with 20K

1620-06.0.169FACTOR ANALYSIS-PRINCIPAL COMPONENTS I AND II

AUTHOR: Rex L. Hurst

DIRECT TECHNICAL INQUIRIES TO:

Rex L. Hurst
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This series of two interlocking programs is part of a multivariate analysis package. Factor Analysis I will compute a principal components analysis from any possible subset of terms used in multivariate data collection. Factor Analysis II will perform a varimax matrix rotation. It is modified from 06.0.094 by

CONTINUED FROM PRIOR PAGE

permission. A 40K 1620 card is required by program. See also Multivariate Data Collection, Multiple Regression (I, II, III) Canonical Correlation I and II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060169

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.170ANALYSIS OF DATA

AUTHOR: Edward V. Harris

DIRECT TECHNICAL INQUIRIES TO:
Edward V. Harris
East Texas State College
Commerce, Texas

DESCRIPTION - Up to 10 columns of data can be analyzed. Any number of data points may be used. Options are the mean and standard deviation of each column-slope, intercept, and standard error of the estimate for the straight line curve fit between any two columns-simple correlation coefficients-first order partial correlation coefficients analysis of variance with the F test for one criterion of classification - and analysis of variance with F tests for two criteria of classification, one entry in each box. A 20K card 1620 is required by program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060170

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.171FREQUENCY DISTRIBUTION PROGRAM - SINGLE AND DOUBLE COLUMN

AUTHOR: Joseph C. Mayhew

DIRECT TECHNICAL INQUIRIES TO:
Donald L. Wright
Georgetown University
37th and "O" Streets, N.W.
Washington, D.C. 20007

DESCRIPTION - This program is designed to compute the absolute frequency and percentage of response for each of 10 digits (0-9) in a column, or each of 100 two-digit combinations (00-99) in a field of two adjoining columns. The program will handle 80 single column fields or 40 double columns as well as any combination of single and two-digit fields occupying an 80-column card at maximum; and up to 9999 cases. A 1620 card system with TNF, MF, Auto Divide & Indirect Addressing is required by the program. TNF & Auto Divide can be removed by using subroutines and reccapping.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060171

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.172KENDALL'S TAU AND SPEARMAN'S RHO CORRELATION COEFFICIENT

AUTHOR: E. C. Segraves, Jr.

DIRECT TECHNICAL INQUIRIES TO:
E. C. Segraves, Jr.
University of Oklahoma
Medical Research Computer Center
800 N.E. 13th Street
Oklahoma City, Oklahoma 73104

DESCRIPTION - This procedure ranks, adjusts for ties within ranks and computes the Kendall TAU or the Spearman RHO correlation coefficient. Kendall's statistical procedure is used. This program will handle up to 10 variables and 100 observations. The data is stored prior to the ranking and computation of the analysis. The present form compiled with FORTRAN II-D will use 32,848 positions of core.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060172

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.175MAXIMUM CORRELATION WITH MISSING OBSERVATIONS

AUTHOR: Justus Seely

DIRECT TECHNICAL INQUIRIES TO:
Justus Seely
Utah State University
Computer Center
Logan, Utah

DESCRIPTION - This program was written to obtain the maximum number of observations available between variables I and J when missing observations are assumed to be present in the data, and then to compute the correlations using the maximum number of data points available between variables I and J. With one pass of the data, up to 24 variables can be considered simultaneously. A 40K card system with TNF, TNF, MF, Auto Divide & Indirect Addressing is required by the program. Written in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060175

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.177MEAN AND STANDARD DEVIATION, SUM 3F SQUARES, N

AUTHOR: Kenneth Paston

DIRECT TECHNICAL INQUIRIES TO:
Kenneth Paston
Brooklyn College
Office of Testing and Research
Bedford and Avenue H
Brooklyn 10, New York

DESCRIPTION - To compute means and standard deviations of up to 80 one- to four-digit variables by columns. Input and output formats are specified by header cards. This is a card input-output machine language program that calculates in Fixed Point, uses Indirect Addressing and requires 20K (switch 2 off) or 40K (for all options). More than 40 variables (for 40 means and standard deviations) can be processed at 250 cards/minute on a 1620 Model 1. Switch controlled options are provided for punching sum, sum of squares and n for each variables (switch 3). For batch processing by control numbers (switch 1) and for calculating the means and standard deviations, sum, sum of squares and N for all the groups as a whole (switch 2) while batch processing. Programmed in machine language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060177

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.178COMPUTATION OF THE CANONICAL CORRELATION COEFFICIENT AND REGRESSION WEIGHTS

AUTHORS: E. R. Eisgruber R. J. Rades
L. M. Eisgruber

DIRECT TECHNICAL INQUIRIES TO:
R. Rades
Purdue University
Dept. of Agricultural Economics
Lafayette, Indiana

DESCRIPTION - The program will compute standard deviations, means, and the correlation matrix for all variables in two sets of variables. It will also compute the canonical correlation coefficient and the regression weights for the variables. Aitken's method for finding the largest eigenvalue is employed. Up to 20 variables with up to 999 observations each can be processed. Storage used by program is 53,838. Equipment required by program is card system with TNF, MF, Auto Divide, Indirect Addressing and Floating Point hardware. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060178

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.179SCORIT-SCORING AND ITEM ANALYSIS OF PORTA-PUNCH TEST CARDS

AUTHORS: P. A. Games V. Rousch

CONTINUED FROM PRIOR PAGE

DIRECT TECHNICAL INQUIRIES TO:

F. A. Games
Computer Lab.
Ohio University
Athens, Ohio

DESCRIPTION - Score student punched test cards, provides score for each seat number, plus descriptive statistics of the distribution of scores. Divides scores into upper and lower halves, and reports the frequency of responses to each alternative of each item, plus PHI coefficient and percent passing, if desired. Kuder-Richardson Formula 20 Reliability Estimate completes output. Maximum of 692 score cards with max. of 70 items each. Modifications suggested if more cards are required, at a loss of some optional output.

PROGRAMMING SYSTEMS - Language used is - FORTRAN II-D, Requires Monitor Control.

MINIMUM SYSTEM REQUIREMENTS - 40K memory, with disk pack, Automatic Divide, and Indirect Addressing. Card input and output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTICNAL PROGRAM PACKAGE - None.

ORDERING INFCRMATION: PROGRAM NUMBER 1620060179

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-06.0.180A PROGRAM FOR PAIR COMPARISONS

AUTHORS: C. S. Givens, Jr. W. R. Blount

DIRECT TECHNICAL INQUIRIES TO:

C. S. Givens, Jr.
Northern Illinois University
DeKalb, Ill.

DESCRIPTION - This program will take pair comparison data, either test item choices or the proportion matrix and scale it according to the assumptions of Case V as described by GUILFORD, 1954. (Guilford, J. P. Psychometric Methods, New York - McGraw-Hill, 1954.) It handles from 3 to 10 test items or variables, scaling them and computing a chi-square on the generated scale values. All output is adequately labeled. Card system with 40K and 407 80-80 board. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060180

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.181LEAST SQUARE DIFFERENCES, NON LINEAR CURVE FIT

AUTHOR: R. A. Ward

DIRECT TECHNICAL INQUIRIES TO:

D. L. Wright
Computation Center
Georgetown University
Washington, D. C. 20007

DESCRIPTION - This program provides a method of fitting a non-linear equation to data based on a function supplied by the user in the form of a FORTRAN function subprogram. The method is to consider all possible combinations of parametric values and, for each combination, to compare all observations with computed values and use the method of "least squares" to obtain the best combination of parameters - the best fit of the equation to the data. Any function may be used of up to 7 variables, 6 parameters, and 400 observations provided a 60K memory is available and a disk system. If these are not available, the number of observations permitted will be restricted. In no case, however, is it possible to use this program if only a 20K memory is available.

Equipment required by program - Card 1620 with a disk file having one drive and Floating Point hardware. Programmed in FORTRAN II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060181

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.182THE EXACT MEAN AND VARIANCE OF CHI SQUARE, WHEN EXPECTATIONS ARE SMALL

AUTHOR: M. J. Maloney

DIRECT TECHNICAL INQUIRIES TO:

D. Wright
Computation Center
Georgetown University
Washington, D. C. 20007

DESCRIPTION - The data to be analyzed are arranged in an R by C matrix where R and C must be less than or equal to 40. The program computes CHI square, the standard deviation and the E and T statistics. The procedure has a particular advantage in that it does not assume that the number of samples is large. Storage used by program - 22,540 core positions, with 8 digit accuracy. Equipment required by program - Card... Floating Point hardware... 1620 Model I. The storage needed can be made less than 20,000 and need for Floating Point hardware removed. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060182

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.183TIPS - TENNESSEE INTERPRETIVE PROGRAM FOR STATISTICS

AUTHORS: Mrs. A. McEachran Dr. C. W. Sheppard

DIRECT TECHNICAL INQUIRIES TO:

Mrs. A. McEachran
University of Tennessee
Medical Units Computer Center
26 S. Dunlap
Memphis, Tenn.

DESCRIPTION - TIPS was written for statistical analysis which were too small for the existing larger programs and too large to be done quickly at the desk calculator. With this system, the 1620 is converted into a special-purpose statistical computer which uses an interpretive programming language and system of address codes. An interpretive programming language and by external programming, TIPS can obtain a variety of statistical information (e.g. means, sums of squares of deviations from the mean, coefficients of correlation, and third and fourth moments) as well as perform linear and non-linear regressions, a T test on two means, and one-way and two-way analysis of variance. The program handles groups of data as vectors and has free-form Floating Point input/output.

A 20K 1620 card system with Autodivide is required by the program. The requirements for Autodivide can be easily removed. Written in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060183

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.185ITEM ANALYSIS PROGRAM

AUTHOR: L. L. Havlicek

DIRECT TECHNICAL INQUIRIES TO:

L. L. Havlicek
Wichita State University
Wichita, Kansas 67208

DESCRIPTION - This program is designed to do an item analysis of any 5-choice multiple-choice test, or to analyze responses to any 5-choice questionnaire. The program computes the discrimination index and the difficulty index for each response for each item as well as yielding the number of individuals marking each response if this is desired. For questionnaire analysis, the program computes the percentage responding to each response and/or the frequency responding to each response for each item. The program can handle up to 999 items and an N of 999. The method for the item analysis is an approximation method. Basic 1620, 20K, card system. Programmed in - SPS III.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060185

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-06.0-186
Z SCORE PROGRAM

AUTHOR: L. L. Havlicek

DIRECT TECHNICAL INQUIRIES TO:
L. L. Havlicek
Wichita State University
Wichita, Kansas 67208

DESCRIPTION - The purpose of this program is to convert raw scores to standard Z-scores, to compute a composite Z-score for each individual, and to compute the means and the standard deviation of the composite Z-scores. Program handles up to 8 tests, 4 of which can be weighed doubly for each composite Z-score. The program is not restricted as to the number of cases.

Basic 1620, Model 1, 20K, card system, and Auto Divide and TNF special features. Programmed in - SPS III. The program handles raw scores from 001 to 999, however, the means and standard deviations cannot exceed 99.99. For tests with means above 99.99, a constant can be subtracted from each score and the mean so that this program can be used in this situation.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060186

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

in columns 4-13 on the IBM Program Order Form.

1620-06.0-193CALCULATION OF MULTIPLE CORRELATION COEFFICIENT

AUTHOR: D. Eschback, Jr.

DIRECT TECHNICAL INQUIRIES TO:
D. Eschback, Jr.
University of Toledo
Toledo, Ohio

DESCRIPTION - This program accepts the simple correlation matrix of a set of variables and calculates the multiple correlation coefficient. By typewritten entry subsets of the original matrix can be designated to be used to calculate their multiple correlation coefficients also.

Storage used - 19842. Equipment required by program - 1620 Card system with 1 disk file. Written in FORTRAN II-D. The program can easily be expanded to take advantage of more core.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060193

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0-187AN SFS VARIATE DIFFERENCE PROGRAM

AUTHOR: J. Matlock

DIRECT TECHNICAL INQUIRIES TO:
J. Matlock
Box 1795
San Francisco, Calif. 94101

DESCRIPTION - The variate difference method provides a means of determining a lower limit to the degree of polynomial which will fit a sequence of uniformly spaced data points and give an estimate of the variance of the data. Least squares or other techniques can then be used to determine the coefficients of a polynomial of this order. This program will accept 1633 data points and calculate the variate difference for nine orders. 3589 positions of core needed.

Equipment - Card, Auto Divide, Indirect Addressing, 1620 Model I. As written the program cannot be run on a lesser machine. By decreasing the number of data points it may be recompiled to run without Auto Divide. Programmed in - SPS; Assembled using Ver II Mod 17.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060187

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0-194TEST FOR NORMALITY WITH PROVISION FOR STANDARDIZATION OF VARIABLES

AUTHORS: H. Maisel D. L. Wright

DIRECT TECHNICAL INQUIRIES TO:
D. L. Wright
Georgetown University
Computation Center
Science BLDG. - Rm. 234
Washington, D.C.

DESCRIPTION - This program is designed to compute a single measure of shewness and kurtosis for many separate groups of data combined. It is especially useful for testing for normality prior to performing an analysis of variance. It produces the mean and an unbiased estimate of the standard deviation of each group as a by-product of the computation. Also, a the option of the user, it lists the observations for all groups combined in descending order after transforming them to standard form, such as after subtracting the group mean from each observation and dividing the result by the group standard deviation. This list can then be used to perform a CHI-square test for goodness of fit. The only limitation is that the number of observations in all groups combined cannot exceed 4000 for any one job. Storage used by program - 58084 positions, card I/O. Program can be used with 20 or 40K core. Programmed in - FORTRAN II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060194

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0-188BIVARIATE LINEAR CORRELATION

AUTHOR: A. Wolpin

DIRECT TECHNICAL INQUIRIES TO:
A. Wolpin
Data Corporation
7500 Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - A line of best fit (line of regression) in the form Y equals A&BX is fit to the data by least-squares techniques. Data is supplied in free-form and read to a format supplied at object time. Therefore, it is directly usable in almost any situation. The program will accept up to 1000 pieces each of X and Y data. In addition to computing the line of regression, the program will also compute the standard error of estimate (similar to standard deviation) and the coefficient of correlation. Storage used by program - 35,709 positions.

Equipment required by program - a 1620 card system with TNS, TNF, MF, Auto Divide, Indirect Addressing, 1620 Model I, Model II, 1443 Printer, and additional 20K memory. With simple program changes, any I/O can be used. Programmed in - Kingston FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060188

Indicate "B N 1" in columns 1-3 and the Program Number

1620-06.0-2021 TO 4 WAY ANALYSIS OF VARIANCE WITH REPEATED MEASURES AND UNEQUAL SUBSET CELL FREQUENCY

AUTHOR: Raymond Kurzwell

DIRECT TECHNICAL INQUIRIES TO:
Raymond Kurzwell
221-28 Hartland Avenue
Jamaica, New York 11427

DESCRIPTION - The program is able to do one, two, three and four way analysis of variance with or without repeated measures. Unequal subset cell frequencies are allowed. It can handle up to four variable with up to four levels for each independent variable and up to twenty repeated measures. The program can handle a wide variety of analysis, allowing four choices of number of variables and numerous choices for number of levels and repeated measures. There is no restriction on keeping subset cell frequencies equal. The program punches out sums, sum squares and means of each subset cell, error terms, mean tables, intermediate formulas and the summary table of sums of squares, mean squares, degrees of freedom and F ratios. The program uses a 40,000 address common storage. The largest link program uses about 7,300 addresses. A 60,000 address core storage is required.

It is possible to use the program without a disk-drive by compiling the program and storing the machine language instructions on cards. Every time another link program is required, they can be loaded from the object decks.

CONTINUED FROM PRIOR PAGE

A great deal of time, however, is saved by using a disk memory.

MINIMUM SYSTEM REQUIREMENTS - The 1620 computer and 60K core storage, a 1622 Card-Reader-Punch and a disk drive is required.

PROGRAMMING SYSTEMS - The program uses the Compiler System, Monitor II on the IBM 1620 Model II. The source language is FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060202

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

two groups of data cards. The program is also flexible as to the number, length, and format of the variables. The output for two groups yields the N, Mean, SD, Variance, and the SE of the Mean for each group and the T test and the F ratio between the two groups. The output for one group of data cards contains the Mean, SD, SE of the Mean, and N. Up to 40 1- to 7- digit variables and an N of 99999.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS Basic 1620, Model 1, 20K, card system, Auto-Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060206

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.203

*H

HUNT - HOFSTRA UNIVERSITY NONPARAMETRIC TESTS

AUTHORS: Dr. N. Goldfarb George Goldberg
Michael Goldberg J. B. Rotolo, Jr.

DIRECT TECHNICAL INQUIRIES TO:
Dr. N. Goldfarb
Director
Computer Center
Hofstra University
Hempstead, New York 11550

DESCRIPTION - HUNT is a package of ten programs which may be used to perform nonparametric statistical computations. The following nonparametric statistical tests are included: Binomial test and Fisher exact probability for 2 x 2 table... CHI square with contingency coefficient... Cochran Q tests... Friedman two way analysis of variance... Kendall coefficient of concordance... Kolmogorov-Smirnov one and two sample tests... Kruskal-Wallis one way analysis of variance by ranks... Mann-Whitney U test... Spearman Rank correlation coefficient... Wilcoxon matched-pairs signed ranks test. Storage used by each program - 0402-19999.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Card I/O... Automatic Divide... 20K memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060203

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.207

THREE FACTOR FACTORIAL ANALYSIS OF VARIANCE

AUTHOR: Carl F. Voelz

DIRECT TECHNICAL INQUIRIES TO:
Carl F. Voelz
Office of Computer Services
Ball State University
Muncie, Indiana

DESCRIPTION - The purpose of this program is to perform A P X Q X R or three factor factorial analysis of variance. Inter-cell T-tests are also computed and outputted as well as various sums of squares and other computational evaluations. Any combination of values for P, Q, and R may be used subject to storage limitations.

Any 1620 machine configuration which includes card I/O and an off line printer. The program is coded in FORTRAN and is written in such a manner as to make it compatible with several 1620 FORTRAN Compiler Systems.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060207

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.208

SWEEP OUT METHOD FOR DETERMINING RANK OF A MATRIX AND DISTANCE BETWEEN POPULATIONS

AUTHOR: David W. Morrison

DIRECT TECHNICAL INQUIRIES TO:
David W. Morrison
American Viscose Division
PMC Corporation
621 Salem Avenue
Rolla, Missouri 65401

DESCRIPTION - The program purpose is two-fold - (1) To determine the rank of a matrix by reducing it via the pivotal row, column-sweep-out method. Output for this phase consists of each pivotal row as constructed. Some simple computations utilizing these values will supply the solutions of the matrix should any exist. (2) To provide a discriminating function which can be of use when assigning observed data to population groups. This function is Mahalanobis D squared.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 20K storage.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060208

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.205

VARIABLE FORMAT CORRELATION PROGRAM

AUTHOR: Larry L. Havlicek

DIRECT TECHNICAL INQUIRIES TO:
Larry L. Havlicek
Wichita State University
Wichita, Kansas 67208

DESCRIPTION - This program is designed to compute the Pearson correlation between two variables and is especially useful for pre-punched data. The program is flexible as to the length and position of each variable and can recycle with the same or a different input format. The output also yields the mean and the standard deviation for each variable and the number of pairs of numbers. Program distinguishes blanks from zeros. Up to 99,999 observations.

Basic 1620, Model 1, 20K, card system, Auto-Divide, and Indirect Addressing. SPS. Deck 2 for Floating Point hardware. Deck 3 for computers without Floating Point hardware. Storage used - 5500.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060205

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.210

BARTLETTS TEST FOR HOMOGENEITY OF VARIANCE

AUTHOR: David W. Morrison

DIRECT TECHNICAL INQUIRIES TO:
David W. Morrison
621 Salem Avenue
Rolla, Missouri 65401

DESCRIPTION - It is sometimes necessary to determine if a set of variances could have all come from the same universe. Bartlett's test for homogeneity of variance

1620-06.0.206

VARIABLE FORMAT T TEST MEAN AND STANDARD DEVIATION PROGRAM

AUTHOR: Larry L. Havlicek

DIRECT TECHNICAL INQUIRIES TO:
Larry L. Havlicek
Wichita State University
Wichita, Kansas 67208

DESCRIPTION - This program is designed for the analysis of pre-punched data and can be used with either one or

CONTINUED FROM PRIOR PAGE

provides one method for testing this possibility. The program supplies the statistic of Bartlett's test. This must then be compared with the appropriate CHI-squared value. The program is capable of handling up to 400 sets of variances and degrees of freedom. It is the authors opinion that the program can be rewritten in such a way as to make dimensioning - and, therefore, limits - unnecessary.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 20K and card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060210

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.211DESCRIPTIVE STATISTICS

AUTHOR: Howard K. Morton

DIRECT TECHNICAL INQUIRIES TO:

Howard K. Morton
California State College at Fullerton
800 N. State College Boulevard
Fullerton, California 92631

DESCRIPTION - Produces for each of as many as 6 variable length numeric data fields per card - frequency distribution, cumulative percentile rankings, N, maximum and minimum values, mean, standard deviation, second, third and fourth moments about the mean, measures of skewness and kurtosis (g1 and g2), sum and sum of squared data values. Format of input data and sizes of class intervals for frequency distributions are specified by user. Permits transformation of data values. Especially helpful in producing norms tables on psychological or other types of test data. Storage used by program is approximately 16,600 core and 6,176 on disk.

Equipment required - 1620 Model I card system with disk file, drive, & Indirect Addressing. Program is operable on 1620 Model I with disk and reader.

PROGRAMMING SYSTEMS - Written in FORTRAN II-D.

Output of frequency distributions and associated percentile rankings may be bypassed at option.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060211

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.212KARBER METHOD OF ANALYSIS NONPARAMETRIC ESTIMATES OF MEAN AND STANDARD DEVIATION

AUTHORS: Dr. H. J. Highland Helen Giroffi

DIRECT TECHNICAL INQUIRIES TO:

Dr. H. J. Highland
The Brooklyn Center
Long Island University
Brooklyn, New York 11201

DESCRIPTION - Program provides very good estimates of both the mean, and the standard deviation, of the distribution of critical levels in most laboratory situations. It can

be used with any distribution up to a maximum of 15 class intervals. Storage used - 17,939 to 19,999 for symbol table and 8,300 to 12,634 for program.

Equipment required - Minimum 1620 20K Unit with card I/O.

Programming type - FORTRAN with Format. Language used in writeup - FORTRAN I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060212

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.213TEN MODEL-EQUAL CELL SIZE-NON-SORT-ANOVA

AUTHOR: W. S. Clark, Jr.

DIRECT TECHNICAL INQUIRIES TO:

W. S. Clark, Jr.
Miami University
Computing Center
Oxford, Ohio 45056

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - This program solves 10 common models of analysis of variance with one input pass. The input data is punched directly row by row from a summary table, which is included in the documentation. Output includes sums of squares, degrees of freedom, and mean squares, with a sense switch option for cell sum squares and cell sums.

Equipment required - 1620 card system, with Auto Divide, Indirect Addressing, Floating Point hardware, 1620 Model I, 40K. Software can replace Auto Floating Point.

Programmed in FORTRAN II-D. The program as submitted uses seven (7) digit Mantissa length, but can be increased by, carefully, decreasing dimensions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060213

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.214ONE PASS CANONICAL CORRELATION PROGRAM

AUTHOR: C. Mitchell

DIRECT TECHNICAL INQUIRIES TO:

C. Mitchell
Experimental Therapeutics Unit
P. O. Box 151
Norman, Okla. 73069

DESCRIPTION - An efficient, one-pass version of 1620-06.0.137, Canonical Correlation Program by Rex L. Hurst. This version not only gets the canonical weights to maximize correlations between two sets of variables, but it also gets the canonical loadings which are useful for inferring the factor structure of the input data. Standard mathematical procedures are used. Maximum number of variables is 58 for 60K, 37 for 40K. Equipment required: card, 1620 Model I. Can be used on 40K 1620 machine by reducing dimension statements. Can be broken in two parts to run on 20K 1620. Programmed in: FORTRAN with Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060214

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.215CORRELATION COEFFICIENT PROGRAM

AUTHOR: W. D. Irvin

DIRECT TECHNICAL INQUIRIES TO:

W. D. Irvin
149 Louise Drive, SE
Concord, N. C.

DESCRIPTION - This program is designed to calculate R and R squared (where R equals correlation coefficient) for any two sets of test scores. When there are more than two sets, the program calculates R and R squared for all possible combinations of the sets of test scores, taking them two sets at a time. There may be a maximum of 45 different sets of test scores, and a maximum of 125 individuals who may or may not have taken all tests. The individual scores may not exceed a three digit number. Equipment specifications: 20K memory, 1620 with Automatic Division, and 1622 Card Read Punch features are required, Source language: SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060215

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.216STATISTICAL PROJECT ORGANIZER FOR TEACHING

AUTHOR: Dr. H. J. Highland

DIRECT TECHNICAL INQUIRIES TO:

Dr. H. J. Highland
Computer Laboratory
The Brooklyn Center
Long Island University
Brooklyn, New York

*H

CONTINUED FROM PRIOR PAGE

DESCRIPTION - A Statistical Project Organizer for Teaching consists of two independent but interrelated programs: (a) Frequency array generator, and (b) Basic statistics for frequency array, and is part of the CO/STATS (Computer Oriented/Statistical Teaching and Testing Series) programs. The two programs are an aid to teachers who wish to provide students with individualized raw data for analysis for student statistics projects. The first program consists of two phases under switch control. Phase I, using Sturges rule, will determine the number of class intervals and size of the class interval for the series. Phase II will transform raw data into a statistical array using class interval size and number of class intervals at the users option. The second program will produce the conventional frequency array listing class intervals, frequency, d , d squared, fd and fd squared used in computations. It will also provide the user with various measures of central tendency and dispersion among which are mean, adjusted mode, median, Q sub 1, Q sub 3, quartile deviation, standard deviation, coefficient of variation, coefficient of skewness (both Pearson and quartile methods) and K , the center value of a normal distribution. Also included is a sample student statistical project form for use with these programs.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K IBM 1620 Model I without any special features. Card input/output required, as well as a card printer, such as the IBM 407.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060216

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.219WILCOXON TWO-SAMPLE TEST

AUTHORS: G. Gnugnoli H. Maisel

DIRECT TECHNICAL INQUIRIES TO:
G. Gnugnoli
Georgetown University
Computation Center
Washington, D. C.

DESCRIPTION - The Wilcoxon two-sample test permits a non-parametric, distribution-free comparison of the levels of two sets of observations. It is based on the sum of the rank orders of the observations in one of the samples in the set consisting in the two samples combined. This sum is then converted to a statistic that is approximately normally distributed with mean zero and variance one to facilitate tests of significance. The output includes: the normally distributed statistic, the average rank order of each of the two sets of observations and the number of observations in each of the two sets. The program was written in FORTRAN II-D with punched card input-output. It could be easily modified to permit printer output and to function in the absence of a monitor system. Multiple jobs can be stacked. Storage used: 60K, storage used is a function of sample size; smaller capacity would necessitate reducing the maximum permissible sample sizes - see no. 8 below. Equipment required: Card I/O; Disk File; 1620 Model II. Requirements which can be easily removed are: Card Output, Disk File (only monitor feature is used), Model II Computer (i.e. All requirements can be easily removed). Programmed in: FORTRAN II Mainline, complete.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060219

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.217CORRELATIONS OF ALL PAIR WISE COMBINATIONS OF TWO SETS OF VARIABLES

AUTHORS: D. Wright H. Maisel

DIRECT TECHNICAL INQUIRIES TO:
D. Wright
Georgetown University
Computation Center
37th and O Sts, NW
Washington, D. C. 20007

DESCRIPTION - In many exploratory experiments-particularly in the health sciences-one set of variables is clearly independent and another dependent but little is known about the relationships. This program computes correlation coefficients for all pairwise combinations of these two sets of variables. Means and standard deviations can also be computed at the option of the user. Five digits are allowed for recording the individual observations. This means, for example, that positive integer variables can have no more than five digits and positive variables with digits to the right of the decimal no more than four. The maximum number of variables in each of the two sets is 15. The number of observations for each variable is assumed to be the same for all +N variables. Written in FORTRAN for a 1620 with card I/O, approximately 25,000 positions of core are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060217

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.220ITEM ANALYSIS FOR 1230 OPTICAL MARK SCORING READER OUTPUT

AUTHOR: R. T. Johnson

DIRECT TECHNICAL INQUIRIES TO:
R. T. Johnson
Box 3094
Lagos, Nigeria

DESCRIPTION - The program takes the coded IBM 1230 output and performs an item analysis for each of the five alternatives to a total of up to 150 questions in a single pass. Output is the mean and variance for the criterion score, followed by proportion of the subjects choosing each alternative, and point-biserial correlation of each alternative with the criterion score. Point Biserials are calculated using formula 13.13 of Guilford's Fundamental Statistics in Psychology and Education. The program as written assumes two questions (segments) per 1230 word length of five alternatives each, and a three-column criterion score. If fewer alternatives are used, or only one segment out of a word, the program will punch zeros for the missing information. Thus questions of any size response length can be handled. One card per subject is assumed. Using the output of the IBM 1230 Optical Mark Scoring Reader directly as input to the 1620 presents problems in that the 1230 output is either punched such that it must be read in column binary, or coded in a readable character which bears little relation to the original format. In the former case, a response of alternative "D" for question one and alternative "A" for question two would be punched as a four and a six in a single column. The alternative choice of 1230 output is production of an alphanumeric character to represent both answers -- in this case a /. Equipment Specifications are: A 20K card system with Automatic Divide, and Indirect Addressing, TNS, TNF, MF. Additional remarks: SPS, fixed point calculations, relocatable, input speed approximately 100 cards per minute for a 100 question examination.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060220

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.218NONPARAMETRIC TWO-WAY ANALYSIS OF VARIANCE WITH N OBSERVATIONS PER CELL

AUTHOR: R. F. Ling

DIRECT TECHNICAL INQUIRIES TO:
R. F. Ling
East Tennessee State State University
Johnson City, Tennessee

DESCRIPTION - A nonparametric test of the null hypothesis that the distributions of possible observations for the K levels of the treatment are equal in all blocks. Alternative to the parametric F-test in the analysis of variance problem. The program is written in FORTRAN II for the 1620 Model 1 FORTRAN System with Automatic Divide, Indirect Addressing, and 1622 Card Read Punch, 40K memory. However, program may easily be modified for any 1620 FORTRAN Systems.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060218

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.22180 DE FOR 1443 PRINTER

AUTHOR: A. R. Eckert

DIRECT TECHNICAL INQUIRIES TO:
A. R. Eckert
Dept. of Agricultural Economics
University of Nebraska
Lincoln, Nebraska 68503

DESCRIPTION - This program is a printer adaptation of section 80 D of the 80-Series Multiple Regression System

CONTINUED FROM PRIOR PAGE

by James N. Boles (1620-06.0.143). It computes actual and expected value, and residues for data used in these series. Modifications include the step number which is added to the problem specifications. The printed page is divided into a right and left section thus separating the computed output from the list of data. If raw or transformed data are listed, sense switch 3 permits to punch simultaneously. The card image is that of the printed line with a field of sequence numbers added. The computed output is expanded to include a column of cumulative residues. Indications of curvilinearity and other characteristics become visible when data are processed after appropriate sorting. Storage used by program: 18,000 locations. Equipment required: 1620 Model 1, cards, 1443 Printer, Indirect Addressing, TNF, MF. Programming type: SPS II modified by machine language, self restoring.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060221

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.222

80 BE FOR 1443 PRINTER

AUTHOR: A. R. Eckert

DIRECT TECHNICAL INQUIRIES TO:
A. R. Eckert
Dept. of Agricultural Economics
University of Nebraska
Lincoln, Nebraska 68503

DESCRIPTION - This program is a printer adaptation of section 80 B of the 80-Series Multiple Regression System by James N. Boles (1620-06.0.143). It prints the report from cards produced by sections 80-1 to 80-4. The general layout of the report is retained, however, blank lines that result from supradiagonal matrices are omitted and asterisks are used to indicate the beginning of matrix rows. A new format conversion uses variable decimal point positions to prevent the truncation of information while reducing the need for exponents to conditions of: 8 less than Exp less than 0. Exponents follow the mantissa from which they are separated by their minus sign or the letter E. An error report is added which resets the program to start after typing SEQUENCE DATA. Operator instructions are largely retained. 8170 location positions of storage are used. Equipment required: 1620 Model 1, cards, 1443 Printer, Indirect Addressing, TNF, MF. Programmed in machine language. relocable 12-module, self-restoring.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060222

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.223

BEST K OF 2K-1 COMPARISONS

AUTHORS: H. Maisel D. Wright

DIRECT TECHNICAL INQUIRIES TO:
H. Maisel
Georgetown University
Computation Center
Science Bldg.
Washington, D. C.

DESCRIPTION - The Best K of 2K-1 Comparison is a popular procedure for choosing between two competitors in athletic competitions. In an article in the June 1966 issue of the Journal of the American Statistical Association, this test was studied with a view toward using it to decide between two alternative courses of action, A and B. This computer program permits a potential user of the test to choose K in an optimum manner. The user specifies an a priori density for the parameter, P, and a priori cost functions for the consequences of his decisions. (These cost functions are denoted by CA and CB.) The program will provide as output in each run:

- 1) A plot of the a priori density and cost functions so that the user may verify his input.
- 2) An error message if the area under the a priori density differs from 1 by more than .01.
- 3) The savings to be gained from conducting the test as a function of K.

The program can be used repeatedly to determine the sensitivity of the choice of K to changes in the assumptions regarding the density and cost functions. Sense switch options permit deletion of the plot, verification of input data, and the stacking of several jobs. A plot of the time required to execute the program as a function of K is included in the write-up. No special operational problems - except to note that the program uses subroutines. Because of a loss in accuracy it is necessary to use more

CONTINUED FROM PRIOR COLUMN

than an eight digit mantissa. We have found that with a 20 digit mantissa we can work with K up to 35. Storage used by program is 54,625 with plot and 20 digit mantissa, 31,677 without plot and with 8 digit mantissa. Equipment required by program: 1620 card system with Disk File, Auto Divide, Indirect Addressing, Floating Point hardware, Model II, and a 1627 Plotter. Program can be used on lesser machine with appropriate modification of source program. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060223

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.224

FACTORIAL ANALYSIS OF VARIANCE AND COVARIANCE

AUTHOR: R. L. Hurst

DIRECT TECHNICAL INQUIRIES TO:
R. L. Hurst
Computer Center
Utah State University
Logan, Utah

DESCRIPTION - This set of programs will compute a factorial analysis of variance and/or covariance on most balanced factorial designs. It will handle up to 8 factors, up to 99 levels per factor, up to 9999 observations and up to 27 variables. It will handle some types of fractional replicate designs. Multivariate tests are available either with or without covariance. Provisions are made for partitioning treatment and error sums of squares/degrees of freedom. Treatment means and variances of treatment means, adjusted for covariance, can be obtained. A separate program can be used to sequence check input data.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - A 40K 1620 card system with TNF, MF, Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060224
Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.225

GENERAL PURPOSE ANALYSIS OF VARIANCE SYSTEM

*M

AUTHOR: David Owen

DIRECT TECHNICAL INQUIRIES TO:
David Owen
2822 Minnesota
Joplin, Mo. 64801

DESCRIPTION - A disk-stored system of 31 interdependent routines accomplish a full-model analysis of variance. A summary table identifies the source of each interaction, sums of squares, DF, mean squares, error term index, F, and cumulative probability of F for each interaction. Intermediate output includes an EMS matrix, sums and means of combinations of cells, and term values. The system requires all zero order interactions, a card identifying factors as fixed or random, and score cards with factor indices. The routine types a message and halts at the conclusion of each analysis allowing operator action to determine which of three branches to execute in seeking another job. Treating subjects or replications as a factor in the analysis, up to a seven-way analysis of variance can be executed with any arrangement of nesting factors and fixed/random factors. If an eighth factor is nested within all other factors, the user may process an eight-way analysis of variance. Each cell in the design must contain an equal number of scores, at any particular level. Depending upon the arrangement of nested factors, a sample size up to 9999 may be processed. Storage used by program - All routines must be disk-stored with appropriate DIM and EQUIVALENCE table entries. The system uses 974 sectors for permanent storage with main links in core image. The DISKSS link requires the maximum in-core storage of 19,995 cores; the DISKSS link may use a maximum of 4,368 work sectors.

PROGRAMMING SYSTEMS - Written in FORTRAN II-D and runs under Monitor I System.

MINIMUM SYSTEM REQUIREMENTS - 20K-1620 Model 1; Automatic Divide; Indirect Addressing; one 1311 Disk Storage Drive;

1622 Card Read-Punch; and 1443 Printer. Printed output may be converted to another device with slight program modification.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620060225

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.227

FREQUENCIES SHOWN BENEATH CLASS MAXIMA

AUTHOR: Alfred R. Eckert

DIRECT TECHNICAL INQUIRIES TO:
Alfred R. Eckert
Dept. of Agricultural Economics
University of Nebraska
Lincoln, Nebr. 68503

DESCRIPTION - Frequency counter cells are specified by their positions along a scale or list of class maxima. The program employs a look-up routine to match data with the scale and increases the appropriate count. The look-up routine permits scales of irregular intervals or lists, which can be entered from punch cards. Scales of uniform intervals can be developed by the program from specifications of low-point, high-point and interval, when given on a code card. The number of positions held by significant digits in the numeric-largest class maximum (2 - 7 for computed scales and 2 - 10 for listed scales) specifies the positions available in counter cells. It also specifies the leading sector of the data field that is used in the comparisons. This sector of the data field is increased by one whenever a sector remaining outside comparison is non-zero. The length of the combined sectors may be 2 - 28 positions; sign flag positions could be even further up. Data fields, specified by their card columns, may be read from cards that are consecutive or part of data blocks consisting of up to nine cards. The data format may be numeric fixed point flagged or unflagged, numeric (internal) floating point, alphanumeric fixed point signed or unsigned, or alphanumeric floating point. The number of data cards is limited only by the capacity programmed per counter, since the first of these shows the total of recorded observations. The program occupies core positions 00000 - 05540. The remaining core capacity can be equally divided among scale and corresponding counter cells.

PROGRAMMING SYSTEMS - Written in machine language, relocatable 12-module, self-restoring.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Model 1, Auto-Divide, Ind-Addr., MF, TNF, card and 1443 Printer. Modification to output on typewriter are provided.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060227

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.228

SCATTER DIAGRAM OF DATA FREQUENCIES

AUTHOR: Alfred R. Eckert

DIRECT TECHNICAL INQUIRIES TO:
Alfred R. Eckert
Dept. of Agricultural Economics
University of Nebraska
Lincoln, Nebr. 68503

DESCRIPTION - Arithmetic scales of class maxima form the coordinates to a table of counter cells for frequencies. Codes specify counter cells of 2 - 9 digits; the independent two ranges of maxima and their intervals in 2 - 7 digits. The entire core capacity is normally made available to the program, yet it can be limited. The minimum is 10K plus 1.01 times the positions needed for the counter cells in one X-row. X-scales that exceed the width of the page are continued on an unlimited number of matching pages. Tables that exceed the core capacity are developed in sections along the Y-scale and require repeated read-ins of data. Options include-

- (a) The alignment of data to scales can be typed for inspection.
- (b) Data outside the scales are rejected and these cards can be typed.
- (c) One or more data decks of different formats can be recorded into the same table.
- (d) The core address of every counter increase can be punched along with a specified identifier field copied from the X-data card. (These cards to be used in N-th factor diagrams).
- (e) In lieu of counting frequencies the existence of a given data combination can be symbolized by entering the letter O in counter cells that remained blank. This permits, for example, to read and enter the predicted values from a regression analysis. Data may be on one or two cards in either sequence, or may be parts of data blocks consisting of up to 9 cards. Formats of X and Y data are independent and either may be numeric fixed point flagged or unflagged, numeric floating point, or alphanumeric fixed point unsigned or

CONTINUED FROM PRIOR COLUMN

signed, or alphanumeric floating point.

Data field or exponent may be anywhere along its card, with up to 28 digits being evaluated. No limitation to the sequence or number of observations. Storage used-00100 - 10000 exclusive of table. Speed- Slightly below 1622 Card Reader and output device.

PROGRAMMING SYSTEMS - Machine language, relocatable 12-module, self-restoring.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Model 1, Ind. Addr; MF, TNF, cards and 1443 Printer. Modification for typewriter or card output are provided.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060228

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.229

FIVE CHOICE ITEM ANALYSIS PROGRAM

AUTHOR: John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program sums up the number of omits and choices A to I (1 or 5) made to each question. It also gives percentage choosing each alternative, average difficulty, point biserial correlation. Guildford weight, mean and standard.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 20K Card System with Auto Divide and TNS, TNF, MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060229

	PROGRAM NUMBER	DISTRIBUTION	MEDIUM	USER VOLUME
	EXTENSION	TYPE	CODE	REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-06.0.230

DOUBLE COUNT PUNCH COUNT PROGRAM

AUTHOR: John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program will give the double column punch frequencies for up to forty pairs of numbers on a data card. Blanks are treated separately from zeroes and a count is given for each separately. Each number is checked for blanks on the low order (units) digit only, thus the tens digit may be blank if the units digit is not. Numbers may go from blank to 99. A total of 9,999 cases may be processed at one time. Percentages of the total for each number. Output may be either by typewriter or on cards. Jobs may be stacked.

Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060230

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.231

BREAKDOWN AND TALLY PROGRAM (TALLY)

AUTHOR: John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
John F. Gugel

CONTINUED FROM PRIOR PAGE

Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program breaks down data cards into groups according to a chosen column and gives the sums of blank and zero to nine in each of up to thirty other columns in each of these groups. It gives first the totals of the blanks and zero to nine in each column of the thirty columns of all groups taken together then the same for each group individually. Data may come from one or two cards at a time. Percentages of the total number of cases for each tally may also be given. Jobs may be stacked. Output is either by typewriter or on cards. Non-numeric data is treated as blank data. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060231

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.232TEST SCORE FREQUENCY DISTRIBUTION PROGRAM

AUTHOR: John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program accepts data from anywhere on the data card and gives score, frequency, cumulative frequency, percentile, mean, standard deviation, and quartiles. There is also an option for standard scores. Blank (in low order digit (units) only) cards are not counted in the distribution but a count is made of them and is typed out at the end. Zero scores may be counted or rejected. Jobs may be stacked if a card with a record mark (0-2-8 multi-punch) in column 1 precedes the header card of the next job. Scores may be from 1 to 3 digits in length, and from 000 to 998 in range. Only zero and positive numbers may be used. Program requires a 20K card system with Auto Divide and TNS, TNF, MS. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.
ORDERING INFORMATION: PROGRAM NUMBER 1620060232

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.233ONE/TWO/THREE WAY ANALYSIS OF VARIANCE

AUTHOR: John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program is set up to do either a one way (simple), a two-way, or a three-way analysis of variance. In the two and three way designs each subject is represented only once (not replicated).

Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060233

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.234FIVE CHOICE SPLIT-HALF RELIABILITY PROGRAM WITH UNPACKING OPTION

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - This program scores a test in two designated halves and then correlates the scores of the two halves. Output is means and standard deviations for each half; N and split half correlation followed by the Spearman-Brown Reliability Estimate. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060234

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.235CARD COLUMN PUNCH COUNT

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program will give a count of blanks and the punches 0 to 9 in given columns. Percentages of the total for each count are given as an option. Output may be either on the typewriter or on cards. Jobs may be stacked. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060235

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.236LAPHA TRANS

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program is designed to make it possible to put in the whole alphabet by IBM 1230 Optional Mark Scoring Reader in one passing using a standard 0 to 9 coding answer sheet. The letters A to I are put out by the 1230 as the numbers 1 to 9 and these numbers are translated, in the columns designated on the header card, into the letters A to I by the 1620. Zeros and alphanumeric data in the designated columns and all data outside of the designated columns and all data outside of the designated columns are reproduced without change. A full 80 columns may be used. Program requires a 20K card system. Programmed in SFS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060236

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.237TABLE LOOK-UP PROGRAM

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program may be used to perform one way or two way table look-ups. If used two-way as in processing of the Lorge-Thorndike IQ test, it picks out one score for two. An IQ score is picked out for a given raw score and a given chronological age. If used one-way as when converting Stanford Achievements Tests raw scores to grade equivalents, a converted score is given for each raw score. Output is either on the typewriter or on cards. Dimensions are up to 25 across and up to 200 down. This means that if it is used two way as with the Lorge-Thorndike, there may be 25 columns of first scores (chronological ages) and up to 200 possible conversion scores (IQ scores) for each if there are that many raw scores. If used one way there may be up to 200 possible conversion scores for each raw score. Program requires a 20K card system with TNS, TNF, MF. Programmed in SFS.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060237

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-06.0.238SPS UNPACKING

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program is designed to unpack the special code put out by the IBM 1230 Optical Mark Scoring Reader when the 3 punch is used on the 534 Key Punch drum card. It splits each column of input into 2 columns of output and one card of input becomes 2 cards of output if data is punched beyond column 42. Column 43 is split between 2 cards of output. Columns 1 to 5 are used for the identification number. Only the digits 0-9 may be used in this space and will be punched out in 1-5 of both output cards (if 2 cards output is used). Program requires a 20K card system. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060238

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-06.0.23940X40 MEAN STANDARD DEVIATION AND INTERCORRELATION PROGRAM

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program calculates means, standard deviations, and intercorrelations on up to 40 variables. It will do all at the same time or it may be used to give separately means and standard deviations or intercorrelations. Standard deviations are calculated on the basis of N rather than degrees of freedom. Data may be from one to five digits in length. Jobs may be stacked. Data may come from up to four cards at a time. Data may be zero or positive. Negative data may not be processed without the addition of a constant to make it positive. Input is completely flexible. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060239

Indicate "E N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-06.0.24019X19 MISSING DATA

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program calculates means, standard deviations, and intercorrelations on up to 19 variables. It will do all at the same time or it may be used to give separately means and standard deviations or intercorrelations. It checks the low order digit of each variable for blanks. Adjustments are made whenever one or both variables in a pair are blank. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. It can easily be expanded for a larger machine. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060240

Indicate "E N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR COLUMN

in columns 4-13 on the IBM Program Order Form.

1620-06.0.241WEIGHTS PROGRAM

AUTHOR: Charles Hatounian

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program allows the summing up of different values from -9 to plus 9 assigned to the punches 0 to 9 in a given column. Each possible punch in the column may have a different value. Each column may belong to any one of from one to ten factor groups. The data may be on from one to six cards. The identification number for each card can appear anywhere on the card and must be of length greater than one and smaller than six. Output can be on the typewriter and/or on cards. This program can be used for attitude, etc., tests and for split half test reliabilities. Program requires a 20K card system with TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060241

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-06.0.242T-TEST PROGRAM FOR 19X19 MISSING DATA AND 40X40 MEAN, SD AND INTERCORRELATION

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Hunter College
695 Park Ave.
New York, N. Y.

DESCRIPTION - This program types the two labels, each mean, standard deviation, standard error of the mean, T for homogeneous variance (same population variance), T for non-homogeneous variance (different population variance), and the ratio of the variances. The variance ratio is always set up to be one or greater - the smaller is always divided into the larger. To determine which T is to apply the variance ratio may be used with an F table. Input data for this program is the output data for either the 40X40 or the 19X19 programs when Sense Switch 1 is on. No header cards are required beyond those used in the original data. Program requires a 20K 1620 Model I card system with Auto Divide and TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060242

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-06.0.243MISSING DATA MEAN AND STANDARD DEVIATION SORT PROGRAM WITH FLEXIBLE INPUT

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave.
New York, N. Y. 10021

DESCRIPTION - This program breaks down input data into groups according to punches (blank and 0 to 9) in a specified (control) column. For each group means and standard deviations are then calculated on up to thirty variables. A variable with a blank may be from one to five digits in length. Data may come from up to four cards at a time. Data must be zero or positive. Negative data can not be processed without the addition of a constant to make it positive. Input is completely flexible. Standard deviations are calculated on the basis of N rather than degrees of freedom. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060243

CONTINUED FROM PRIOR PAGE

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.244SIMPLE ANALYSIS OF VARIANCE WITH T-TEST OPTION

AUTHOR: Mr. John F. Gugel

DIRECT TECHNICAL INQUIRIES TO:
Mr. John F. Gugel
Office of Institutional Research
Hunter College
695 Park Ave
New York, N.Y. 10021

DESCRIPTION - This program calculates means, standard deviations, sums of squares within and between, mean squares between and within, the F test and T-tests between each group. Blank data is skipped over completely. Any number with a blank in the low order (units) position is considered to be blank. Other digits of the number are not checked for blanks. Input is flexible, so data may be anywhere on the card. Jobs may be stacked. Output is either by typewriter or on cards. Data may be from one to five-digits in length. Upto 99,999 cases overall or up to that number in any group may be processed. Data must be zero or positive. Program requires a 20K card system with Auto Divide and TNS, TNF, MF. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060244

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.245FITTING POISSON BINOMIAL DISTRIBUTIONS

AUTHORS: E.R. Russell C.R. Weaver

DIRECT TECHNICAL INQUIRIES TO:
C.R. Weaver
Oardc
Wooster, Ohio 44691

DESCRIPTION - The method of maximum likelihood is used to determine the parameters of the Poisson Binomial Formula to fit the frequencies of an observed distribution. Probabilities, cumulative probabilities, expected frequencies, and chi-square are computed. The program provides an initial estimate of the parameter P based on the moments of the observed distribution. A stepwise search procedure for the root of the equation in P between P equals 0 and P equals 1 is available if the initial estimated P fails to provide acceptable values. Initial values of P may be entered as card input or through the typewriter in lieu of the programmed estimate if desired. The maximum number of cells in the distribution to be fitted is 100, including the zeroth cell. FORCOM subroutines are used to make the distribution data input formats more flexible; distribution data for input cannot have decimal points punched.

Storage used is 23,414. Equipment required is 1622 card system, Automatic Divide, Indirect Addressing, 1620 Model 1, 40K memory. The program cannot be run on a lesser machine without recompiling. It is programmed in PDQ FORTRAN as a complete mainline program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060245

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.246FITTING DISTRIBUTIONS WITH THE POISSON WITH ZEROS

AUTHORS: E.R. Russell C.R. Weaver

DIRECT TECHNICAL INQUIRIES TO:
C.R. Weaver
Oardc
Wooster, Ohio 44691

DESCRIPTION - Four types of calculations can be performed in fitting a known distribution of events- 1) Finding the expected frequencies and chi-square when the parameters are all known. Finding values of the parameters to fit the distribution starting with either 2) An arbitrary value for one of the parameters or 3) An initial value for this parameter determined by the program from the distribution data. In the latter case the program also computes the expected frequencies and chi-squares. 4) Finding the expected frequencies and chi-square on the assumption that the distribution is a Poisson rather than a Poisson Binomial Type. The method used is maximum likelihood. Maximum number of cells into which the events are grouped is 100.

CONTINUED FROM PRIOR COLUMN

Distribution data for input cannot have decimal points punched. Storage used by program is 17454 positions. Equipment required by program: card system 1622, Automatic Divide, Indirect Addressing, 40K memory. Program can be run on a lesser machine by redimensioning and recompiling. It is programmed in PDQ FORTRAN as a complete mainline program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060246

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.247FITTING DISTRIBUTIONS WITH THE NEYMAN A FORMULA

AUTHORS: B.R. Russell C.R. Weaver

DIRECT TECHNICAL INQUIRIES TO:
C.R. Weaver
Oardc
Wooster, Ohio 44691

DESCRIPTION - This program determines parameters in the Neyman A distribution formula to fit an observed distribution, finds the expected frequencies and computes Chi-Square. Several optional variations are available-

- Omitting the calculation of expected frequencies and Chi-Squares.
- Omitting the initial estimates of the parameters provided by the program and supplying initial values as input parameters.
- Omitting the iteration procedure to fit the parameters to the distribution, simply computing the expected frequencies and Chi-Square on the basis of the parameter values supplied.

The parameters to fit the distribution are determined by the method of maximum likelihood; The Newton-Raphson procedure is used to find the root of the final equation. The maximum number of cells in the distribution to be fitted is 150, including the zero cell. FORCOM subroutines are used to make the distribution data input formats more flexible; distribution data for input cannot have decimal points punched. Storage used is 24,146 positions. Equipment required is 1622 card system, Automatic Divide, Indirect Addressing, 1620 Model 1, 40K memory. The program cannot be run on a lesser machine without recompiling. It is programmed in PDQ FORTRAN as a complete mainline program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060247

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.248FITTING NEGATIVE BINOMIAL DISTRIBUTIONS

AUTHORS: B.R. Russell C.R. Weaver

DIRECT TECHNICAL INQUIRIES TO:
C.R. Weaver
Oardc
Wooster, Ohio 44691

DESCRIPTIONS - Observations of frequencies of occurrence are used to estimate parameters of the negative binomial distribution. Parameters K, P, and Q are estimated and expected frequencies calculated. The program is a modification of 06.0.117 an improved estimation routine and relaxed input format. Storage used is approximately 22,000 positions. Equipment required by program- 14K memory, 1622 card system, Automatic Divide, Indirect Addressing. Program can be run on lesser machine by rewriting input format and redimensioning. It is programmed as a mainline program in PDQ FORTRAN with DORCOM subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060248

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.249SEVERAL GROUP DISCRIMINANT ANALYSIS

AUTHOR: J.O. Church, III

DIRECT TECHNICAL INQUIRIES TO:
J.O. Church, III

CONTINUED FROM PRIOR PAGE

Lawrence University
Appleton, Wisc.

DESCRIPTION - The ordinary problem that arises in discriminant analysis most often involves more than 2 groups. The programs available for the 1620 handle only the 2 group problem. This program modelled after the Bimed Several Group Discriminant Analysis Program is capable of handling up to 15 groups as presently compiled. The program output consists of the variance-covariance matrix for each group, the dispersion matrix along with its inverse, the matrix of means, the discriminant functions, the evaluation of the functions, and finally the classification matrix. The program is written in FORTRAN and it is possible to modify the source program to fit any 1620 configuration. To use the object program provided, a 1620 40K system with Auto-divide, Floating Point, MF, TWF, TNS, and card input/output is required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060249

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.250TRANSFORMATIONS TO CHECK AND INCREASE LINEARITY IN DATA *M

AUTHOR: Mr. R.W. Meadows

DIRECT TECHNICAL INQUIRIES TO:
Mr. R.W. Meadows
Southwest Missouri State College
Springfield, Missouri, 65802

DESCRIPTION - Accepts data prepared for multiple correlation and regression analysis in an F10.4 format, dependent variable punched last. A least squares cubic polynomial is fitted to the relationship between the dependent and each of 1 to 22 independent variables. The cubic polynomial coefficients are punched and could be read into the transformation section of a multiple regression program. If the data are loaded again, the cubic polynomial plotbacks are computed for each independent variable. The transformed data can then be run in 1620-06.043--or in 06.0.057 if 14 variables or fewer. Improved linearity usually results. Restriction: some roundoff errors if data dichotomized, especially if, in both ind and dep variables.

All data should be checked for linearity and transformed if need be before being run in linear correlation and regression programs. Otherwise, no definite conclusion is possible. This program makes possible multiple curvilinear correlation and regression analysis by using transformed data in the highly developed linear methods. The program also serves to check on the linearity of data, for if little improvement in correlations result, then one can be confident that the (non-cyclic) data were sufficiently linear to begin with.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I card system, 1443 Printer. Floating Point Hardware, Programmed in FORTRAN with Format. Storage used- 19,700.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060250

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.251BATCH PROCESSING STEPWISE MULTIPLE LINEAR REGRESSION

AUTHOR: Mr. K.L. Daniels

DIRECT TECHNICAL INQUIRIES TO:
Mr. K.L. Daniels
North Dakota State University
Fargo, N.D. 58101

DESCRIPTION - A stepwise multiple linear regression program providing sums, means, sums of squares and cross products, standard deviation, deviation squares and cross products, correlations. In addition for each step it provides least squares regression equation, standard error, T-test, R to the 2 power, F and Improvement F. A maximum of fifteen variables may be entered (14 independent and 1 dependent). The independent variables are entered in the best order unless otherwise specified. Data is normally in free form, however, any input form consistent with FORTRAN R, T, E, F, N and X Format can be specified at run time. Data may be run in batches without reloading the program. Extensive transformations in an easy to remember form are available. Output is on cards. Program can be used strictly as a correlation program by suppressing the regression output.

PROGRAMMING SYSTEMS - Written in Kingston FORTRAN II.

CONTINUED FROM PRIOR COLUMN

MINIMUM SYSTEM REQUIREMENTS - 40K 1620 with Automatic Divide, Indirect Addressing, TNS, TWF, MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060251

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-06.0.252PORTA - A GRADING PROGRAM *M

AUTHOR: Mr. E. Northouse

DIRECT TECHNICAL INQUIRIES TO:
Mr. E.A. Northouse
University of Wisconsin
Milwaukee College of Applied Science
Electrical Engineering
Milwaukee, Wisc. 53201

DESCRIPTION - PORTA is a grading algorithm using "PORTA Punch" cards. Quizzes taken on these "PORTA Punch" cards are graded and a statistical evaluation made.

PROGRAMMING SYSTEMS - PORTA is written in FORTRAN IID with Format and is a mainline program.

MINIMUM SYSTEM REQUIREMENTS - 1620 Mod II, 60K decimal digits (30 questions, 195 students), (40K decimal digits) 30 questions, 100 students) card reader, 1443 Line Printer, 1-1311 Disk File.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620060253

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.005SQUARE ROOT SUBROUTINE

AUTHOR: Jon Petersen

DIRECT TECHNICAL INQUIRIES TO:
Jon Petersen
Computer Section
Washington State Highway Department
Transportation Building
Olympia, Washington

DESCRIPTION - Computes the square root of a number, say A, where A has an even number of decimals and is from two to twenty digits in length. Storage 369 positions of core. No special features are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.006ARCTANGENT SUBROUTINE

AUTHOR: Jon Petersen

DIRECT TECHNICAL INQUIRIES TO:
Jon Petersen
Computer Section
Washington State Highway Department
Transportation Building
Olympia, Washington

DESCRIPTION - Computes the arctangent of the quotient of two numbers, say A/B, where both A and B are from two to ten digits in length and have the same number of decimals. Storage 735 positions of core (711 if the MF special feature is used), no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.007POLYNOMIAL CURVE FITTING USING LENGENDRE POLYNOMIALS

AUTHOR: Dr. Allan Malvick

CONTINUED FROM PRIOR PAGE

DIRECT TECHNICAL INQUIRIES TO:

Dr. Allan Malvick
Department of Engineering Science
University of Notre Dame
Box 1413
Notre Dame, Indiana

DESCRIPTION - The method used in this program gives a fit which follows (bumpy) curves better than a least squares fit. Storage memory 25K, memory 40K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070007

Indicate "F N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.010DOUBLE PRECISION FLOATING POINT ARITHMETIC SUBROUTINES

AUTHOR: Waldo J. Richards

DIRECT TECHNICAL INQUIRIES TO:

Waldo J. Richards
Pettijohn Engineering Co., Inc.
4145 N. E. Cully Boulevard
Portland, Oregon

DESCRIPTION - Sine and cosine are Maclaurin S series. Square root is Newton S Method. Arc tangent is from (Mathematics of Computation, July, 1960). The routines will work on any 1620. Storage addition, Subtraction, Multiplication and Division-00401 to 02057. Sine, cosine, square root, and arc tangent - 02058 to 04099.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.012POLYNOMIAL REGRESSION PROGRAM

AUTHOR: Otto Dykstra, Jr.

DIRECT TECHNICAL INQUIRIES TO:

Otto Dykstra, Jr.
General Foods Research Center
555 South Broadway
Tarrytown, New York

DESCRIPTION - This program determines by least squares the coefficients of a polynomial. Data input format is very general. Output may include Residuals and Predictions. Memory 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070012

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.013POLYNOMIAL ROOT SOLVER

AUTHOR: Ronald Anderson

DIRECT TECHNICAL INQUIRIES TO:

Ronald Anderson
Allen-Bradley Company
Department 810
136 W. Greenfield Avenue
Milwaukee 4, Wisconsin

DESCRIPTION - Solve for all roots (real and/or complex) of a polynomial degree ten or less. The advantage of this program is - no guess is needed for any of the roots. Memory 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070013

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.014REAL AND COMPLEX ROOTS OF POLYNOMIAL

AUTHOR: Dr. J. A. N. Lee

CONTINUED FROM PRIOR COLUMN

DIRECT TECHNICAL INQUIRIES TO:

Dr. J. A. N. Lee
The Commonwealth of Massachusetts
University of Massachusetts
Amherst, Massachusetts

DESCRIPTION - To compute the real & complex roots of polynomials of order not greater than 25. Constant term cannot be zero. Memory 20K, Automatic Divide 1620 tape system.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.015FORTRAN SYSTEM RELOCATABLE SUBROUTINE FOR GENERATING (RANDOM NUMBERS)

AUTHORS: M. Burns G. Dubay

DIRECT TECHNICAL INQUIRIES TO:

M. Burns
Baylor University of Medicine
Biomatematics Laboratory
Houston, Texas

DESCRIPTION - To permit the calling forth of a floating point (Random) number in the interval (0, 1.) by the FORTRAN statement X equals RND (ARG) the (Random) number X to be used in Monte Carlo type solutions.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 142 digits. Memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.017CALCULATION OF THE REAL ROOTS OF A REAL POLYNOMIAL EQUATION

AUTHOR: Donald S. Miller

DIRECT TECHNICAL INQUIRIES TO:

Donald S. Miller
Eastman Kodak Company
Management Systems Development Dept.
Applied Mathematics Section
Rochester 4, New York

DESCRIPTION - Will calculate all, or any lesser specified number, of the real discrete roots of polynomials of degree 2 to 29. Polynomials of common degree may be grouped, with 1 to 999 polynomials per group - For each group a single control can specify constants and options common to all problems within the group. Memory 20K - no other special features required. Written in FORTRAN Language.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070017

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.018SINE/COSINE SUBROUTINE - FIXED POINT.

AUTHOR: J. Schaalenger

DIRECT TECHNICAL INQUIRIES TO:

J. Schaalenger
Pan American World Airways, Inc.
Meteorological Data Reduction
Building 800, Mail Unit 222
Patrick AFB, Florida

DESCRIPTION - Computes the natural sine or cosine of an angle. Either sine or cosine is computed depending on entry. Any 1620 system. No special features. This subroutine is written in 1620 SPS Language, Fixed point form, for assembly with the users program. It is completely relocatable.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620070018

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.019THREE-IN-ONE CURVE FITS HYPERBOLIC, EXPONENTIAL, POWER FUNCTIONS.

AUTHOR: W. A. Norton

DIRECT TECHNICAL INQUIRIES TO:

E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - This program, which is really three programs in one, computes the parameters for theoretical curve fits to empirical data. Plot back, interpolation, standard error and function evaluation are each optional under CS control. Standard error feature permits comparison with polynomial fits done by program 07.0.002 and fits by other subprograms of this one. For function evaluation, parameters are keyed-in at console typewriter. Card I/O, 20K 1620 without special features.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070018

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.023POLYNOMIAL CURVE FITTING - NEWTONS DIVIDED DIFFERENTIAL FORMULA

AUTHOR: I. D. Thompson

DIRECT TECHNICAL INQUIRIES TO:

I. D. Thompson
The Marquardt Corporation
P. O. Box 670
Ogden, Utah

DESCRIPTION - To provide a convenient method of solving for all points (X, Y coordinates) on a curve defined by the 3 to 15 original points without the necessity of solving for the equation and its coefficients. An additional option is included on a sense switch for the intergration of the curve. 2252 positions, memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070023

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.029CALCULATION OF ROOTS (REAL AND COMPLEX) OF COUPLES POLYNOMIALS EQUATION

AUTHOR: D. S. Miller

DIRECT TECHNICAL INQUIRIES TO:

D. S. Miller
Applied Mathematics Section
Management Systems Development Dept.
Eastman Kodak Company
Rochester 4, New York

DESCRIPTION - Will calculate all, or any lesser specified number of roots (real or complex) of complex polynomials of degree 2 to 19. Complex polynomials of common degree may be grouped, with 1 to 999 polynomials per group; for each group a single control card can specify constants and options common to all problems within the group. Memory 20K; no other special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070029

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.030LAGRANGE INTERPOLATION - 1620

AUTHOR: A. F. Hallam

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR COLUMN

A. F. Hallam
Firestone Tire & Rubber Company
Akron 17, Ohio

DESCRIPTION - Accepts ABCISSAE at equal or unequal spacing, and from 1 to 3 ordinates at each ABCISSA, calculates the La Grange co-efficients, and interpolates intermediate ordinate values. Has provision for dividing a range on the ABCISSA into intervals, and for a polynomial in each such interval of up to 20th power. Writeup explains how to change program to Hermit's, Gauss', or other polynomial forms. Very complete write-up explains the reasons for each step of the program. 20K card I/O, FORTRAN with SAY.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070030

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.032CALCULATION OF ROOTS (REAL AND COMPLEX) OF A REAL POLYNOMIAL EQUATION

AUTHOR: D. S. Miller

DIRECT TECHNICAL INQUIRIES TO:

D. S. Miller
Applied Mathematics Section
Mgmt. Systems Development Dept.
Eastman Kodak Co.
Rochester4, New York

DESCRIPTION - Will calculate all, or any lesser specified number of roots (real or complex) of real polynomials of degree 2 to 19. Real polynomials of common degree may be grouped, with 1 to 999 polynomials per group - for each group a single control card can specify constants and options common to all problems within the group. All calculations are subject to the laws of rounding error and the precision defined by the FORTRAN system. Very close roots of a real polynomial equation may not be handled. For complex roots the initial approximation used in Newtons Method should probably be more carefully selected than in the case of real roots. Also, in most of the cases studied, it seemed advisable to use an initial approximation with non-zero imaginary part. Memory 20K - no other special features required. Written in FORTRAN Language.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070032

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.033CALCULATION OF THE REAL ROOTS OF A REAL NON-LINEAR EQUATION IN ONE VARIABLE

AUTHOR: D. S. Miller

DIRECT TECHNICAL INQUIRIES TO:

D. S. Miller
Applied Mathematics Section
Mgmt. Systems Development
Eastman Kodak Co.
Rochester 4, New York

DESCRIPTION - Will calculate a specified number of real roots of each of N non-linear equations $F(X, A_{1J}, A_{2J}, \dots, A_{MJ})$ equals 0, (1 - J - N) in the single variable X, where the real coefficients A_{1J} , A_{2J}, \dots, A_{MJ} , the associated initial approximations and other options are defined in an ordered set of control cards. All calculations are subject to the laws of rounding error and the precisions of the FORTRAN System. Very close roots in all probability may not be approximated. Complex roots may not be handled. Inaccurate initial approximations may result in divergence or convergence to the wrng root. Memory 20K or 40K, no other special features required. Written in FORTRAN Language.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070033

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-07.0.034DIFFERENTIATION OF AN EMPIRICAL FUNCTION

AUTHOR: A. M. Pratt

DIRECT TECHNICAL INQUIRIES TO:

A. M. Pratt

CONTINUED FROM PRIOR PAGE

Computer Center
University of California
Davis, California

DESCRIPTION - This program differentiates an empirical function defined by equidistant observations and gives a good approximation for functions in which five consecutive points may be assumed to lie approximately on a parabola of second order. Memory 20K, Automatic Divide, Indirect Addressing, and card reader, card punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070034

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.036ROOTS OF POLYNOMIAL EQUATION

AUTHOR: R. H. Owens

DIRECT TECHNICAL INQUIRIES TO:
R. H. Owens
National Science Foundation
Washington 25, D. C.

DESCRIPTION - To calculate roots (real or complex) of a polynomial equation of degree N with real or complex coefficients. The program uses Mullers method of solution for algebr. equa. Memory 40K, cards, and no other special features required. Program written in FORTRAN without Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070036

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.037BESSEL FUNCTION SUBROUTINES FOR FORTRAN WITH FORMAT, FILE NO. 1620-FO-037

AUTHOR: W. E. Sundvall

DIRECT TECHNICAL INQUIRIES TO:
W. E. Sundvall
General Nuclear Engineering Corp.
Dunedin, Florida

DESCRIPTION - In the nuclear reactor field there is frequent necessity to make calculations involving the low order Bessel functions. To reduce the programming job to a minimum in this area, these eight low order Bessel function subroutines have been incorporated into the FORTRAN system at General Nuclear. These subroutines were written for a 20K Paper Tape System with Automatic Divide. No other special features are required. With minor modifications they can be easily adapted to a 40K or 60K machine.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070037

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.038RELOCATABLE COS, SIN AND EXP SUBROUTINES FORTRAN II

AUTHOR: E. Ackerman

DIRECT TECHNICAL INQUIRIES TO:
J. White
Mayo Clinic Computer Facility
Rochester, Minnesota

DESCRIPTION - Replacement for IBM library subroutines in FORTRAN II Automatic Floating Point deck. Computation time is reduced by about 40 percent for COS and SIN and 20 percent for EXP. Storage requirements - Constants use locations 10500 - 11254. COS/SIN subroutine uses 912 positions - EXP subroutines uses 1144 positions. Equipment specifications - Same as for FORTRAN II with Automatic Floating Point subroutines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070038

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.041CALCULATION OF THE REAL ROOTS OF A SYSTEM OF K REAL NON-LINEAR IN K VARIABLES LINEAR EQUATIONS

AUTHOR: D. S. Miller

DIRECT TECHNICAL INQUIRIES TO:
D. S. Miller
Applied Mathematics Section
Mgmt. Systems Development Dept.
Eastman Kodak Co.
Rochester 4, N. Y.

DESCRIPTION - Will calculate a specified number of real roots of each of N systems of K real non-linear equations in K real variables. The associated initial approximation vectors and other options are defined in an ordered set of control cards. No special features are required. This program was written in FORTRAN Language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070041

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.042CALCULATION OF THE CHARACTERISTIC POLYNOMIAL OF A REAL SQUARE MATRIX

AUTHOR: D. S. Miller

DIRECT TECHNICAL INQUIRIES TO:
D. S. Miller
Applied Mathematics Section
Mgmt. Systems Development Dept.
Eastman Kodak Co.
Rochester 4, New York

DESCRIPTION - Will calculate the characteristic polynomial of an N X N real matrix where (a) For a 20K 1620 installation, N can vary from 1 to 12 inclusive and (b) For a 40K-1620 installation, N can vary from 1 to at least 20. This program was written in FORTRAN Language.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070042

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.043NUMERICAL CALCULATIONS OF THE DEFINITE INTEGRAL OF A REAL FUNCTION USING SIMPSONS RULE

AUTHOR: Donald S. Miller

DIRECT TECHNICAL INQUIRIES TO:
Donald S. Miller
Applied Mathematics Section
Management Systems Development Department
Eastman Kodak Company
Rochester 4, New York

DESCRIPTION - This program will tabulate using Simpson's Rule, a preassigned number of definite integrals. Simpson's Rule is used for approximately all definite integrals. See Numerical Mathematical Analysis, third edition, by J. B. Scarborough, the Johns Hopkins Press, page 132, section 46 and page 174, section 57, (C). All calculations are subject to the laws of rounding error and the precision of the FORTRAN system. This program was written in FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070043

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.045EXTREME-POINT SOLUTIONS FOR RECTANGULAR GAMES

AUTHOR: Richard E. Hammer

DIRECT TECHNICAL INQUIRIES TO:
Richard E. Hammer
Case Institute of Technology
Cleveland 6, Ohio

DESCRIPTION - This program finds the value of a rectangular game and all extremum points in the set of solutions of the game. Method - Examination of all sub-matrices. See chapter 3 of McKinsey, Introduction to the Theory of Games, for full details. Restriction/Range - where the game matrix is M by N, Storage - 20,000 Positions. Equipment

CONTINUED FROM PRIOR PAGE

required - TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware. Requirements easily removed - TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point. Programming language is AFIT FORTRAN. The program was compiled using an AFIT Processor that had been modified to take advantage of the above optional features. If compiled in non-modified AFIT FORTRAN, this program occupies approximately 22,400 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070045

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.046APPROXIMATE RECTANGULAR GAME SOLUTION

AUTHOR: Richard E. Hammer

DIRECT TECHNICAL INQUIRIES TO:
Richard E. Hammer
Case Institute of TECHNOLOGY
Cleveland 6, Ohio

This program, through an iterative technique described fully in chapter 4 of McKinsey. (Introduction to the Theory of Games) finds bounds on the value of a rectangular game and approximations to a pair of optimal strategies for the game. Method - a two-player competitive situation is set up in the machine, and the game is played, with each player basing his moves on his opponent's past moves. Equipment required by program - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware and 19,500 positions of core. By the restricting of the range somewhat more and compiling in standard AFIT FORTRAN, the program can be easily changed to require only a 20K card system. Other programming language - AFIT FORTRAN. The program was compiled using an AFIT FORTRAN Processor modified to take advantage of the above checked optional features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070046

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.047CHEBYCHEV ECONOMIZATION OF POLYNOMIALS

AUTHOR: Robert A. Brown

DIRECT TECHNICAL INQUIRIES TO:
Robert A. Brown
Carleton College
Northfield, Minn.

DESCRIPTION - This program reads the coefficients of a polynomial and computes coefficients of a polynomial of such a degree that it approximates the first to a given precision on a given interval or it equals a given degree. The program will handle degree up to 175 and carries twelve digit mantissas on coefficients and range. It will also, on a switch option, develop an error table consisting of the values of $P(C)$, the original Polynomial, $G(X)$, the economized polynomial, and their difference for each X in a specified range in increments also specified by the user. Method - By a linear change of variable, the interval of approximation is transformed to $(-1,1)$ and the method of economization by use of Chebychev Polynomials is then used. Restriction/Range - The program will handle any polynomial of degree not over 175 over any finite range as long as N to the D power less than 10 to the 99th power where D is the degree of the input polynomial and N the length of the interval. Equipment required - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware and storage positions 00402-19773. Programming type - 1620/1710 SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070047

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.048FORTAN WITH FORMAT GAMMA FUNCTION SUBROUTINE-POSITIVE ARGUMENTS

AUTHOR: Herberto Pachon

DIRECT TECHNICAL INQUIRIES TO:
Herberto Pachon
Automatic Electric Laboratories, Inc.

CONTINUED FROM PRIOR COLUMN

400 North Wolf Road
Northlake, Illinois

DESCRIPTION - This subroutine finds the gamma function of X of any argument X in the range 0 less than X less than 70.27, and within a relative error of less than one times ten to the minus seven. Arguments X outside above range are not considered as valid, and an error message is printed according to whether C equal to or greater than 70.27 or X equal to or less than 0.0. Storage used by subroutine is 875 digit locations. Equipment specifications: Card system, Auto Divide, Indirect Addressing, memory 20K. The subroutine can be used in other machines, since the Auto Divide, Indirect Addressing and memory requirements are fairly easy to remove. Programming type: FORTRAN with Format subroutines or function subprogram (S or F). The program is a library (I.E., SPS) function to the FORTRAN system checked SPS - 1620/1710. Language used in the write-up is SPS-1620/1710. The subroutine has been tested thoroughly, and its accuracy has been determined by means of an SPS program-subroutine, written by the author, and which calculates gamma values to an accuracy of as many as 43 digits.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070048

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.049ALGEBRAIC SOLUTION FO GENERAL REAL QUARTIC POLYNOMIAL

AUTHOR: Randolph G. Smith

DIRECT TECHNICAL INQUIRIES TO:
Randolph G. Smith
Scientific Computing Ctr.
Box 8011
University of Miami
Coral Gables, Fla.

DESCRIPTION - The program obtains all solutions of a general real polynomial of degree one, two, three, or four by algebraic methods. The methods used are Cardans solution of the cubic equation and must all be real. At least one of the coefficients must be Ferraris solution of the quartic equation. The coefficients non-zero for solutions to be found. A 40K 1620 card system with Auto Divide and Indirect Addressing is required. The language used is FORTRAN II. Compiled in FORTRAN II with 28 digit precision maximum time for quartic solution is about 50 seconds. Program automatically reinitializes for next quartic after solution is obtained.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070049

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.050FLOATING COMPARE SUBROUTINE FOR SPS

AUTHOR: Richard L. Pratt

DIRECT TECHNICAL INQUIRIES TO:
Richard L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

This is a Macro-Op and subroutine for comparing two numbers in the standard floating point format. It is used just as an ordinary compare instruction is used with fixed point numbers. Method - The floating subtract routine is used, but the answer is not stored. Specifications - Storage is 20K or up. Equipment: Card system, no optional features required. Programmed in SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070050

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.051ARCSINE SUBROUTINE (RELOCATABLE)

AUTHOR: Miss K. Kornafel

DIRECT TECHNICAL INQUIRIES TO:
Miss K. Kornafel

CONTINUED FROM PRIOR PAGE

Bureau of Public Roads
Room 109, Building 40
Denver Federal Center
Denver 25, Colo.

DESCRIPTION - A relocatable subroutine for the arcsine of a ten digit number (one integer plus nine decimals), representing the sine of an angle. Mathematical method: A rational approximation given by the Rand Corporations (approximations in numerical analysis). Restrictions - The range of X handled by this approximation is 0 equals X equals 1 the results are accurate to 6 or - 1 in the ninth decimal. (The subroutine totally includes and makes use of a relocatable subroutine for square root) storage. Requirements - 1143 positions. Equipment specifications: Automatic Divide, Indirect Addressing, other special features required - MF. Programmed in Fixed Point 1620 SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070051

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.053

RELOCATABLE SUBROUTINES ABS, DEF, PLCT, WRIT

AUTHORS: Ralph Brandt Lawrence Brown

DIRECT TECHNICAL INQUIRIES TO:
F. R. Cannon
Registrar
Shippensburg State College
Shippensburg, Penna.

DESCRIPTION - The added subroutine must be retained in the order specified in the title. The ABS subroutine takes the absolute value of the variable by clearing the flag in FAC-3. DEF defines the character to be plotted with by placing the defined constant in 8000. The plot causes any number of variables to be plotted using the character places in 8000. If no plotting character is defined the plus sign(+) is used. Error messages are included in this subroutine. The WRIT subroutine prompts the use of an output device for the final plot, and places the variable on the left of the plot in a 14 format. If this is impossible the word, over, is printed. Storage used by program - 1322 positions. Equipment required by program: Card system, TNS, TNF, MF, Auto Divide. Programming type - FORTRAN with Format, subroutine; program is a library function to the FORTRAN system checked. Processed using the 1620/1710 SPS. The error messages include error FN (variable is negative), error FE (exponent to large to plot), and error FF (100 greater than variable greater than 73). The output devices are controlled by switches 2 and 3, and are used as follows - 2 off, 3 off (Punch and Typewriter) 2 on, 3 off (Punch), 2 off, 3 on (Typewriter).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070053

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.055

POLYNOMIAL GENERATION AND INTERPOLATION WITH DERIVATIVES BY NEWTONS F.I.M.

AUTHOR: Mr. A. C. Housman

DIRECT TECHNICAL INQUIRIES TO:
Mr. A. C. Housman
Royal McBee Corporation
1031 New Britain Avenue
West Hartford, Conn.

DESCRIPTION - Given a set of "N" data points the program uses a divided difference table to evaluate an N-1 order polynomial through the points at any specified interval over any range within the range of the data points and evaluates all derivatives desired at the points. Any derivative may be forced to any desired value at any point. The program also gives the coefficients at the interpolating polynomial, and thus may be used as a curve fitting routine. Storage used by program- 44,250.

MINIMUM SYSTEM REQUIREMENTS - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing.

PROGRAMMING SYSTEMS - FORTRAN II, mainline, complete.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070055

Indicate "B N 1" in columns 1-3 and the Program Number

CONTINUED FROM PRIOR COLUMN

in columns 4-13 on the IBM Program Order Form.

1620-07.0.056

FOURIER ANALYSIS - TWO OR THREE PASS SYSTEM

AUTHOR: John E. Rieber

DIRECT TECHNICAL INQUIRIES TO:
Stanley Wooten, Code 1-65
U. S. Naval Civil Engineering Laboratory
Port Hueneue, California

DESCRIPTION - This program computes a specified number of terms of the Fourier Series of a given function. Output consists of a set of Fourier sine and cosine coefficients, a corresponding list of pure sine amplitudes and phases, and a tabulation and graphical plot of the input function and its Fourier approximation. This is a modification of the program (Fourier Curve Fitting) by A. F. Zettlemoyer and C. W. Bowman (7.0.031) with the following improvements: An option for a special type of input designed for use in analyzing electrical power systems, a graphical plot of the output, a slightly more efficient and more readable source program.

Restrictions/range- Source program requires a plot subroutine (Users Group No. 6.0.119, as modified by NCEL), and a PDQ Compiler (No. 2.0.031), but these requirements can easily be eliminated. Up to 50 terms of the Fourier Series can be computed. Up to 104 points of the function can be input or output. Four program decks are required.

Storage Requirements- Each pass requires approximately 28K storage.

PROGRAMMING SYSTEMS - FORTRAN, Floating Point, Non-Relocatable.

MINIMUM SYSTEM REQUIREMENTS - Memory 28K, Automatic Divide, Indirect Addressing. Card R/P unit.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070056

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.058

CONIC EQUATIONS PROGRAM

AUTHOR: David L. Jensen

DIRECT TECHNICAL INQUIRIES TO:
David L. Jensen
Computer Center
Utah State University
Logan, Utah 84321

DESCRIPTION - Classifies an equation as a circle, ellipse, parabola, hyperbola, one straight line, two parallel lines, two intersecting lines, or a point on either the real or imaginary plane. Depending on a control digit particulars such as the coordinates of foci, vertices, centers, the eccentricity, latus rectum, area, circumference, radius, length of major and minor axes, length of conjugate and transverse axes, equations of directrices, slopes, X and Y intercepts, etc. may be computed. Batch processing of data for more than one equation is allowed. Axis rotation may occur to remove any XY coefficient. All data is assumed to be in relation to the S-Y coordinate system. Output is on punched cards. All output is clearly labeled. Subroutine GDRTC is included with the main program.

PROGRAMMING SYSTEMS - Written for the IBM FORTRAN II compiler but can be readily modified for other FORTRAN compilers which will adapt to a 40K CPU, such as PDQ and UTO FORTRAN systems. I/O must be under FORMAT control.

MINIMUM SYSTEM REQUIREMENTS - 40K 1620 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070058

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.060

BINOMIAL COEFFICIENTS

AUTHOR: Mr. D. L. Wright

DIRECT TECHNICAL INQUIRIES TO:
Mr. D. L. Wright
Georgetown University
Computation Center
Washington, D. C. 20007

CONTINUED FROM PRIOR PAGE

DESCRIPTION - The $N!1$ coefficients of the binomial expansion of $(P+Q)^{**N}$ are calculated where P and N are given as input, and Q is either given as input also, or is calculated as $1-P$. If Q is calculated as $1-P$, then P must be less than or equal to 1.

PROGRAMMING SYSTEMS - Programmed in FORTRAN II-D.

MINIMUM SYSTEM REQUIREMENTS - 01316 positions of storage and a card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070060

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.062GAMMA FUNCTION SUBROUTINE FOR PDQ FORTRAN

AUTHOR: V. F. Hartsock, Jr.

DIRECT TECHNICAL INQUIRIES TO:

V. F. Hartsock, Jr.
Operations Research Group
Edgewood Arsenal, Maryland 21010

DESCRIPTION - The subroutine is designed as an addition to the 1620 Card PDQ FORTRAN subroutines (Fixed and Free Format) with Automatic Divide. It computes the gamma function when called for by name in a PDQ FORTRAN source program. The subroutine computes the gamma function by a Hastings approximation and the error in accuracy should be no greater than two in the seventh digit of the mantissa.

PROGRAMMING SYSTEMS - Programmed in SPS code 1620-SP-020 deck No. 1. This subroutine is to be used in conjunction with PDQ FORTRAN and must be added as specified in the PDQ FORTRAN write-up (02.0.031).

MINIMUM SYSTEM REQUIREMENTS - Card system, Automatic Divide. It may be used on any machine using PDQ FORTRAN. 500 digit of core.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070062

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.063ERROR FUNCTION SUBROUTINE FOR PDQ FORTRAN (CARD)

AUTHOR: V. F. Hartsock, Jr.

DIRECT TECHNICAL INQUIRIES TO:

V. F. Hartsock, Jr.
Operations Research Group
Edgewood Arsenal, Maryland 21010

DESCRIPTION - The subroutine is designed as an addition to the 1620 card PDQ FORTRAN subroutines (Fixed and Free Format) with Automatic Divide. It computes the error function when called for by name in a PDQ FORTRAN source program. The subroutine computes the error function by a Hastings approximation and the error in accuracy should be no greater than three in the seventh digit of the mantissa.

Equipment required by program- Card system; Automatic Divide. It may be used on any machine using PDQ FORTRAN. 470 digits of core. Programmed in SPS Code 1620-SP-020 deck No. 1. This subroutine is to be used in conjunction with PDQ FORTRAN and must be added as specified in the PDQ FORTRAN write-up (02.0.031).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070063

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.064RANDCN NUMBER SUBROUTINE FOR 1620 FORTRAN II

AUTHOR: Nina Thomas

DIRECT TECHNICAL INQUIRIES TO:

Nina Thomas
General Electric Co.
600 Main Street
Johnson City, New York

DESCRIPTION - In order to generate random numbers with

CONTINUED FROM PRIOR COLUMN

a minimum of trouble this program was written to be included in the FORTRAN II subroutine deck. Random numbers are produced from either a rectangular or a standard normal distribution. A series of random numbers can be continued where each random number serves as the multiplicand for the next number. Repetition should not be expected for a series of 50 million numbers. All computations are done in fixed point. The results are translated into Floating Point notation, normalized, and placed in FAC (00476-85) for branching back to the calling program. Source program is in SPS II 618 core locations.

Minimum System Requirements - A 1620 Model II Card System with Floating Point hardware, and 40K storage. Can be modified for other than 40K. The program is a modification of 1620-07.0.021, "Random Number Subroutines for IBM 1620 FORTRAN w/Format".

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070064

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.065VECTOR COMPOSITION AND DECOMPOSITION

AUTHOR: J. J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. J. Relihan, Jr., Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Fla. 32925

DESCRIPTION - Program adds any number of vectors in two or three dimensions, expressing the resultant in magnitude and direction(s) or orthogonal components, X, Y, Z. Program resolves each vector into its orthogonal components adds respective components, and forms resultant vector and direction(s) from these. Storage used - 13,104 positions.

Equipment required - 1620 card system with Auto Divide. Program can be used on machine without Auto Divide.

Programming language is PDQ FORTRAN, 2.0.031 Format FORTRAN with free form input.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070065

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.067RANGE AND BEARING

AUTHOR: J. J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. J. Relihan, Jr.,
Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Fla. 32925

DESCRIPTION - Program computes the range and bearing between two given points on the surface of the earth. Each point is expressed in geodetic latitude and longitude. The first point must be west of the second point; the bearing is taken from the first point. Bearings are calculated from 0 to 180 degrees. Storage used - 17,196 positions.

Equipment required - Card system with Auto Divide. Program can be used on machine without Auto Divide.

Programming language is PDQ FORTRAN, 2.0.031 Format FORTRAN with free form input.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070067

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.068HELMERTS DIRECT GEODETIC PROBLEM

AUTHOR: J. J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. J. Relihan, Jr.,
Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Fla. 32925

CONTINUED FROM PRIOR PAGE

DESCRIPTION - Program computes the geodetic co-ordinates of a point on the surface of the earth, given the distance and bearing from another known point. Program uses Helmert's solution. The point calculated must be east of the given point. Bearing from true North, from 0 to 180 degrees. Storage used - 14,482 positions.

Equipment required - 1620 card system with Auto Divide. Program can be used on machine without Auto Divide.

Programming language is PDQ FORTRAN, 2.0.031 Format FORTRAN with free form input. This program may be used to verify the calculations of the range and bearing program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070068

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.069GEODESIC POINTS

AUTHOR: J. J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:
J. J. Relihan, Jr.
Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Fla. 32925

DESCRIPTION - Program computes the geodetic latitude and longitude of points along a geodesic at given intervals up to a maximum range from a given origin. Approximately, it computes points on a Great Circle. Program uses Helmer's solution. Bearing from true North, from 0 to 180 degrees. Storage used - 14,736 positions.

Equipment required - Card system with Auto Divide. Program can be used on machine without Auto Divide. Programming language is PDQ FORTRAN, 2.0.031 Format FORTRAN with free form input.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070069

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.071RANDF - A FUNCTIONAL SUBROUTINE TO GENERATE RANDOM NUMBERS FOR THE MONITOR I SYSTEM

AUTHOR: Robert M. Jackson

DIRECT TECHNICAL INQUIRIES TO:
Robert M. Jackson
Louisiana Tech. Computing Center
Louisiana Polytechnic Institute
Ruston, Louisiana 71271

DESCRIPTION - To generate a random number of a specified length (dictated by the argument). The mathematical method is an extension of Lehmers Rule. Storage requirements are 728 digits.

Equipment specifications - 1620 with card I/O and Indirect Addressing.

Source language - SPS II-D; relocatable. Assembled on 1620-Model I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070071

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.073PROGRAM TO DETERMINE AND REMOVE MULTIPLE ROOTS FROM PCYNOMIALS

AUTHORS: Wesley Blood Eugene Peck
J. P. Riley

DIRECT TECHNICAL INQUIRIES TO:
Wesley Blood
Utah Water Research Lab.
Utah State University
Logan, Utah

DESCRIPTION - This computer program tests whether multiple roots, real and imaginary, exist in a polynomial. When such roots exist the given polynomial is factored into a series of sub-polynomials each of which contains no

CONTINUED FROM PRIOR COLUMN

multiplicity. The roots of each of the sub-polynomials can then be determined by standard techniques. The method is based upon Euclid's algorithm for determining the greatest common factor between two polynomials. The program is restricted to polynomials with real coefficients and degree 19 or less. Storage used - 30850 locations.

Equipment required - Card system with Floating Point hardware.

Written in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070073

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.075LEAST SQUARES FIT OF RESPONSE CURVES TO FIRST ORDER LAG WITH OR WITHOUT DEAD TIME

AUTHORS: Cecil L. Smith Paul W. Murrill

DIRECT TECHNICAL INQUIRIES TO:
Cecil L. Smith
Chemical Engineering Dept.
Louisiana State University
Baton Rouge, La.

DESCRIPTION - This program approximates the response curves commonly encountered in control work by either (1) a pure first order lag with a variable or specified initial point, or (2) a first order lag plus pure time delay. However, the program is not restricted to response curves. The best fit is determined in the least squares sense.

Equipment specifications - Memory of 40K, Automatic Divide, and Indirect Addressing.

The program is written in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070075

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.076FORTRAN II-D SUBROUTINE FOR MATRIX INVERSION AND/OR RELATED OPERATIONS *H

AUTHOR: C. L. R. Barker

DIRECT TECHNICAL INQUIRIES TO:
C. L. R. Barker
M. E. Dept.
Arlington State College
Arlington, Texas 76010

DESCRIPTION - May be used for inversion of a matrix, solving simultaneous linear equations, evaluating a determinant, finding the rank of a matrix, or any meaningful combination of these operations. Gauss-Jordan reduction with columnar pivoting. Number of rows in the matrix must not exceed 62. Storage used by program is 3946 digits.

PROGRAMMING SYSTEMS - Written in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - The equipment required by program is a 1620 card system with disk file, 1 drive, TNS, TWF, MF, Auto Divide, Indirect Addressing and Floating Point hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070076

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.077A VARIABLE PRECISION SERIES APPROXIMATION TO THE ERROR FUNCTION SUBROUTINE

AUTHOR: Mark Wilson

DIRECT TECHNICAL INQUIRIES TO:
E. Arthur Fiser
Director, Computing Center
Miami University
Oxford, Ohio

DESCRIPTION - A power series, with coefficients derived from Hermite polynomials, is used to compute the error function of any argument with any precision desired, from

CONTINUED FROM PRIOR PAGE

02 to 28 places. Error does not exceed 60-1 in the low-order digit. This is a library subroutine for 1620 FORTRAN II-D and must be added to the library as specified in C26-5739. It uses all the working areas of the FORTRAN subroutines. Equipment required by program - 1620 Model 1 Card I/O; 1 Disk File; MF Auto Divide; Indirect Addressing; Floating Point hardware; requirement which can be easily removed is MF instruction. Programmed in SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070077

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

short distances, i.e., less than about 10 NM, each point is expressed in Geodetic Latitude and Longitude. Program uses the Gauss Mid Latitude Formula. Storage used by program paper tape system, Auto Divide. Program can be used on lesser machine. Auto Divide requirements can be removed. FORTRAN with Format. This program and those named below form a trilogy for geodetic distance and bearing computations (1) same author, the Reverse Geodetic Problem (2) same author, Direct Geodetic Problems.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620081003

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.078DSAVE

AUTHOR: P. P. Emin

DIRECT TECHNICAL INQUIRIES TO:

P. P. Emin
University of New Brunswick Computing Center
Fredericton, New Brunswick, Canada

DESCRIPTION - DSAVE is an operating system which provides an Interrupt-and-Store facility for the 1620 Monitor System. The main program DSAVE resides in 1311 Disk Storage. The user program which is to be interrupted and stored on disk is stopped in manual and IR-1 and IR-2 are recorded. DSAVE is then called into memory. The operator via console typewriter, enters IR-1 and IR-2, the user program is stored on disk, and DSAVE executes CALL EXIT. To restore the program to memory, DSAVE is executed as a Monitor job. Execution begins at part 2 which permits continuation of any program previously stored on disk. No attempt should be made to interrupt the Monitor I/O routine, system time, or execution of DUP or Loader. DSAVE is a package system consisting of (a) DSAVE - the main program. (b) LIBDIG - a mainline SPS Program to force loading of subroutine LSAVE.

Program requires a 20K 1620 with one disk file and Indirect Addressing. Programmed in SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070078

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.1.004DIRECT GEODETIC PROBLEM

AUTHOR: James J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. J. Relihan, Jr.
Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Florida 32925

DESCRIPTION - Program computes geodetic co-ordinates of a point on the surface of the earth, given the distance and bearing from another known point. Program uses Helmer's Solution. The point calculated must be east of the given point. Bearings good from 0 to 180 deg. storage used by program 15,962. Paper tape system, Auto Divide. Auto Divide requirements can be easily removed. FORTRAN with Format. This program and those named below form a trilogy for geodetic distance and bearing computations (1) same author, The Reverse Geodetic Problem. (2) same author, The Reverse Geodetic Problem for Short Lines.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620081004

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.1.005GENERAL RAY TRACE PROGRAM

*M

AUTHOR: D. H. Oherren

DIRECT TECHNICAL INQUIRIES TO:

D. H. Oherren
G. A. C.
Litchfield Park, Ariz.

DESCRIPTION - Program will trace rays through Optical Lens Systems which include cylindrical and/or conical surfaces. Surfaces must be describable by a second degree equation. Surfaces are described in a local coordinate system and positioned by the program in the optical system through translation and rotation of the local system. A sample Ray Trace problem is included. Output includes X, Y, and Z coordinates and direction cosines on specified surfaces. Also calculates optical axis intersection of rays if any. Single ray input or ray fan input. Execution time depends upon machine available.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program - 40K. Equipment required by program - Card system, TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, assumes off-line 407 or equivalent. Program can be used on lesser machine. By recompiling, it can run on 40K machine without added features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620081005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-07.0.079RATIONAL APPROXIMATION PROGRAM

AUTHOR: G. Struble

DIRECT TECHNICAL INQUIRIES TO:

G. Struble
Statistical Laboratory and Computing Center
University of Oregon
Eugene, Oregon

DESCRIPTION - Generates rational function approximating a given function on an interval; both end-points are set by the user to finite or infinite values. Attempts to minimize maximum error (relative or absolute). User must supply subroutine which will provide value of function at any value in approximation interval. Convergence to good rational approximation cannot be guaranteed; convergence is enhanced by interactive control provided to the user by the program.

Program requires a 40K card system with Auto Divide and Indirect Addressing. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620070079

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.1.003REVERSE GEODETIC PROBLEM FOR SHORT LINES

AUTHOR: James J. Relihan, Jr.

DIRECT TECHNICAL INQUIRIES TO:

J. J. Relihan, Jr.
Mathematical Branch, ETORS-2
Air Force Systems Command
Patrick AFB, Florida 32925

DESCRIPTION - Program computes the distance and bearing between two given points on the surface of the earth for

1620-08.2.001WHY A ONE-DIMENSIONAL FEW-GROUP DIFFUSION CODE FOR THE IBM 1620

AUTHORS: C. H. Hunter R. A. Heffley

DIRECT TECHNICAL INQUIRIES TO:

Mrs. C. H. Hunter
Knolls Atomic Power Laboratory
Building E-6, Room 125
Schenectady, New York

DESCRIPTION - An approximate solution to the diffusion

CONTINUED FROM PRIOR PAGE

equation is obtained by applying a finite difference equation on a linear mesh for Slab, Cylindrical or Spherical Geometry. 00000-18620 are used in WHY, Version M. Memory 20K, Automatic Divide, Indirect Addressing, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620082001

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.2.003

MAIDS - A MACROSCOPIC INPUT DIFFUSION SYSTEM FOR THE IBM 1620

AUTHORS: D. L. Kavanagh E. K. Egawa
N. G. Gunther M. I. Temme

DIRECT TECHNICAL INQUIRIES TO:
Miss Elaine K. Egawa
Advanced Technology Laboratories
369 Whisman Road
Mountain View, California

DESCRIPTION - To carry out four-group diffusion calculations on light water moderated reactor systems. Includes many options for criticality searches, boundary conditions, output edits, etc. 40K, card input-output, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620082003

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.2.004

SPFK/SPEEDY KATE

AUTHOR: K. V. Cooper

DIRECT TECHNICAL INQUIRIES TO:
K. V. Cooper
Knolls Atomic Power Laboratory
ADA Advanced Experimental Physics
Room 13, Building F
Schenectady, New York

DESCRIPTION - This program generates group constants averaged over a Wigner-Wilkins Spectrum from 0 EV to .625 EV. 19,397 locations memory 20K, Automatic Divide, Indirect Addressing, and punched card input and output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620082004

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.2.010

MAIDS-II

AUTHORS: J. M. Christenson R. Trost

DIRECT TECHNICAL INQUIRIES TO:
R. Trost
University of Wisconsin
Nuclear Engineering Dept.
Madison, Wisconsin 53706

DESCRIPTION - Problems solved are few group Neutron Diffusion Equations in any one-dimensional geometry (including those with central voids). In addition to the basic diffusion calculation, the system will perform 5 different parameter searches for a specified Eigenvalue and calculate both the Neutron and adjoint fluxes. A variety of boundary conditions are provided for, both homogeneous and inhomogeneous, which permit the solution of certain simple shielding problems, cell problems and heat conduction problems. By use of an edit routine Neutron Balances may be calculated by region and group. Basic input is the Geometric Description, the Boundary Conditions, and the Macroscopic Reactor parameters.

RESTRICTIONS -
- Number of groups less than or equal to 4.
- Number of regions less than or equal to 10.
- Number of space points less than or equal to 100.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I or II, 60K memory, card I/O, 1443 Printer, 1 disk drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR COLUMN

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620082010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.3.004

CALCULATION OF MINERAL UNIT CELL CONTENTS

AUTHOR: R. J. Howarth

DIRECT TECHNICAL INQUIRIES TO:
R. J. Howarth
Geology Dept.
The University
Bristol 8, England

DESCRIPTION - Calculation of Unit Cell contents from chemical analysis data, recalculated on basis of 24 oxygen atoms into the form (SI,AL,FE3,TI)8. (AL,FE3,FE2,TI,MG,MN)X. (NA,K,CA)Y. (O,OH,F)24. Equipment Specifications - 1620 with 20K & card I/O. No special features required. Atomic Ratios in Unit Cell corrected to 0.01, Floating Point Arithmetic throughout. Written in FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620083004

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.3.005

A PROGRAM TO INDEX CRYSTALS

AUTHOR: Robert Greenblatt

DIRECT TECHNICAL INQUIRIES TO:
Robert Greenblatt
800 S Long Beach Avenue
Freeport, N.Y.

DESCRIPTION - This program was designed to aid a Crystallographer in indexing D-spaces obtained from a powder photograph. The input consists of the measured D-spaces, on cards, and the operator's choices for Crystal System and Lattice Constant(s) on the typewriter.

Using the operator's repeat distances, and an internally generated Miller Index, the computer calculates theoretical D-spaces. These are compared to the measured D-spaces until a match is found. The value of the actual D-space and the Miller Index is then printed.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Program occupies approximately 13,500 core positions. Equipment required - Card I/O with, TNS, TNF, MF; Indirect Addressing on 1620 Model I. Requirements which can be easily removed are TNS, TNF, MF, and Indirect Addressing.

Additional Remarks - The output is suppressed to eliminate superfluous indices. For example, in the Isometric System only the 001 value is indexed not 100 and 0100.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620083005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.002

INTENSITY CORRECTION PROGRAM FOR NORMAL - BEAM OR EQUI-INCLINATION SETTING

AUTHOR: DR. R. Shiono

DIRECT TECHNICAL INQUIRIES TO:
Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - The program applies the Lorentz-Polarization Factor to the observed intensities of X-ray diffraction by single crystal. Intensities of Normal-Beam or Equi-Inclination Settings and also of Single Crystal Orienter may be corrected by this program. Any Crystal Symmetry, and Axis, any number of reflexions. Up to 31st layer. Storage requirement-7470. Equipment-Card I/O, 20K core, Automatic Divide. Indirect Addressing, MOVE FLAG. The output cards are in the format of the input cards of structure factor program. Written in SPS, Fixed Point. Runs mostly in maximum punching speed.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR PAGE

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084002

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

ORDERING INFORMATION: PROGRAM NUMBER 1620084005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.003INTERPOLATION OF ATOMIC SCATTERING FACTOR TABLES

AUTHOR: Dr. R. Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - Given a table of atomic scattering factors for X-ray with equal or unequal intervals of $\sin \theta/\lambda$, the program interpolates the table and prepares a new table of equal intervals either in $\sin \theta$ or $\sin \theta/\lambda$. Aitkens process of four point iteration. Storage Requirement-4555. Equipment-Card I/O, 20K core, Automatic Divide, Indirect Addressing, MF, TNF instructions. Written in SPS, Fixed Point. When so specified, the program prepares and punches out the atomic F table cards to be used in structure factor program 1620-0 (8.4.004). Typewriter output (and use of TNF) is optional.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084003

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.006GENERAL THREE DIMENSIONAL FOURIER SYNTHESIS PROGRAM FOR X-RAY CRYSTALLOGRAPHY

AUTHORS: David Hall Ryonosuke Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - A general Three Dimensional Fourier Synthesis program for any symmetry. Fourier, Difference Fourier or Patterson Synthesis may be calculated. The output is either on cards or on typewriter. A built-in Trigonometric Table is used. $1/100$ th of the cell or its multiple, calculates between two desired positions, even beyond one Unit Cell. Maximum index H2 is 30. Maximum number of points in X1 direction in one pass is 26. Any number of reflexions in any order of indices. Storage requirements-19994. Equipment - Card I/O, 20K Core, Indirect Addressing, MF instruction. Written in SPS, Fixed Point. Uses the output of structure factor program (1620-0 8.4.004) as the input. Plotting program (8.4.007) is available to plot the output.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.004STRUCTURE FACTOR CALCULATION IN X-RAY CRYSTALLOGRAPHY

AUTHOR: Dr. R. Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - Given a set of atomic coordinates with the atomic scattering factors and associated individual isotropic temperature factors, the program calculates the structure factors for each reflexion in any symmetry class. Mathematical method - A separate expanded form is used for each of Monoclinic and Orthorhombic Class. Storage Requirement - 12913 plus locations for coordinates. Equipment-Card I/O, 20K core, Automatic Divide, Indirect Addressing, MF, TNF instructions. Written in SPS, Fixed Point. Uses the output of Intensity Correction Program (1620-0 8.4.002). The output of this program is in the form of the input to two or three Dimensional Fourier Synthesis programs (8.4.005 8.4.006).

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084004

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.007ALPHABETIC PLOTTING PROGRAM FOR THE OUTPUT OF FOURIER SYNTHESIS PROGRAM

AUTHOR: Dr. R. Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - The program reads in the output cards of Fourier programs (1620-0 8.4.005, 08.4.006) and types out the electron density maps in a suitable graded alphabetic characters representation for a direct contouring. The angle of the cell may be approximated within the mechanical and physical limitations. Storage requirements-2897. Equipment - Card I/O, 20K core, Indirect Addressing. Written in SPS.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084007

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.005GENERAL TWO DIMENSIONAL FOURIER SYNTHESIS PROGRAM FOR X-RAY CRYSTALLOGRAPHY

AUTHORS: David Hall Ryonosuke Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. R. Shiono
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pennsylvania

DESCRIPTION - A general Fourier projection program for any symmetry. The electron density of Patterson Function as well as the difference Fourier may be calculated. The output is either on cards or on typewriter. A built-in table of trigonometric function is used. $1/100$ th of the cell or its multiple. Any number of reflexions in any order. Maximum H2 index is 30. Maximum number of points in X1 direction in one calculation is 26. Calculates between any desired points. Within one Unit Cell or two adjacent Cells. Storage Requirement-18512. Equipment: Card I/O, 20K core, Indirect Addressing, M.F. Written in SPS, Fixed Point. Uses the output of structure factor program (8.4.004) as the input. A plotting program (1620-0 8.4.007) is available to plot the output.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084008

1620-08.4.008INTER AND INTRA-MOLECULAR ATOMIC DISTANCE CALCULATION IN X-RAY CRYSTALLOGRAPHY

AUTHORS: DR. S. S. C. Chu R. Shiono

DIRECT TECHNICAL INQUIRIES TO:

Dr. S. S. C. Chu
Crystallography Laboratory
University of Pittsburgh
Pittsburgh 13, Pa.

DESCRIPTION - Given a set of atomic coordinates for independent positions with a set of symmetry relations, the program calculates all possible interatomic distance from the independent atoms to any atom within the specified limit of length, in the 27 neighbouring cells. The analytical expression for distance is used. Any symmetry, maximum number of independent atoms 100, maximum number of symmetries 200, maximum length of distance 99.9 A. Storage requirement - 15547.

Equipment - Card I/O, 20K core, Automatic Divide, Indirect Addressing, MF TNF instructions. Written in SPS, Fixed Point. The output cards may be used as the input of all angle calculation programs.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.012MOLECULAR FORMULA II

AUTHORS: J. M. Vanderveen G. Denzer, Jr.

DIRECT TECHNICAL INQUIRIES TO:

Dr. J. M. Vanderveen
Stevens Institute of Technology
Dept. of Chemistry & Chemical Eng.
Hoboken, New Jersey

DESCRIPTION - The program generates all possible empirical formulae that fit the per cent composition analytical data. Input restrictions as to the number of atoms of any element are allowed. Also the allowable molecular weight range may be specified. The method consists of systematically permuting the number of atoms of each element and determining whether the resulting molecular weight is consistent with the input data. The program is restricted to 10 elements in a compound. Storage used by program is 31K. Equipment required by program is a 1620 Model 1 with card input/output. Programmed in - FORTRAN II.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084012

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.013MOLECULAR PEAK FINDER

AUTHORS: Dr. J. Vanderveen G. Denzer, Jr.

DIRECT TECHNICAL INQUIRIES TO:

Dr. J. Vanderveen
Dept. of Chemistry & Chemical engineering
Stevens Institute of Technology
Hoboken, New Jersey

DESCRIPTION - The program utilizes the output from MFP-II File No. 8.4.012, and a portion of a Compounds Mass Spectrum to select the correct composition of the parent ion and to suggest possible compositions for the high mass peaks in the mass spectrum. Verification of compositions is possible from the P61 and P62 intensities given in the output as well as from the exact mass of fragment also given. Method - Since MFP-II output data gives a list of all possible formulae corresponding to the analysis data, the composition of the parent is that of one of these formulae. Each one in turn is checked for the loss of various fragments (fragments to be used are built into program) to see if such a loss could explain any of the observed mass peaks. Output consists of those formulae which explain any of the masses observed along with the P61 and P62 intensities which would result from such a process. The actual parent will then be the formulae which give the best fit to the spectrum.

Equipment required by program - Card input/output 1620 Model 1X. Additional remarks - The card data for the program is generated by MFP-II Molecular Formulae program_II. File number 08.4.012.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084013

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.014ABSORPTION CORRECTION IN CRYSTAL STRUCTURE ANALYSIS

AUTHOR: H. Tompa

DIRECT TECHNICAL INQUIRIES TO:

H. Tompa
Union Carbide European Research Associates
95 Rue Gatti De Gamond
Brussels 18, Belgium

DESCRIPTION - The program computes the absorption correction in a crystal structure analysis, i.e.; the correction which has to be applied to the measured intensity of the diffracted beam due to absorption during its passage through the crystal. The output of the program "Elements of a Polyhedron (Crystal)" can be used directly as input as regards the crystal. The mathematical method used is based on an exact analytical expression and not on numerical integration. The crystal must have no reentrant angles, must not have more than 20 faces meeting in any vertex. The SPS II processor used has been modified to increase the symbol table area by removing the compressor and the subroutine facilities.

CONTINUED FROM PRIOR COLUMN

The program requires a 20K 1620 card system with Indirect Addressing. Programmed in 1620/1710 SPS.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.015ELEMENTS OF A POLYHEDRON (CRYSTAL)

AUTHOR: H. Tompa

DIRECT TECHNICAL INQUIRIES TO:

H. Tompa
Union Carbide European Research Associates
95 Rue Gatti De Gamond
Brussels 18, Belgium

DESCRIPTION - The program computes parameters characterizing the vertices and edges of a convex polyhedron (crystal) from parameters characterizing the faces. The output can be used directly as input to the program "Absorption Correction in Crystal Structure Analysis". The polyhedron must have no reentrant angles, must not have more than 20 faces or more than 25 vertices and there must not be more than four faces meeting in any vertex.

Program requires a 20K 1620. Programmed in FORTRAN with Format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.016TWO-DIMENSIONAL ABSORPTION CORRECTION IN CRYSTAL STRUCTURE ANALYSIS

AUTHOR: H. Tompa

DIRECT TECHNICAL INQUIRIES TO:

H. Tompa
Union Carbide Research Associates
95 Rue Gatti De Gamond
Brussels 18, Belgium

DESCRIPTION - The program computes the absorption correction in crystal structure analysis i.e.; the correction which has to be applied to the measured intensity of the diffracted beam due to absorption during its passage through the crystal. The crystal is assumed to be two-dimensional and to be a parallelogram. The mathematical method used is based on an exact analytical expression and not on numerical integration.

Program requires 20K 1620 card system. Programmed in FORTRAN with Format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620084016

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-08.4.017TWO-DIMENSIONAL ABSORPTION CORRECTION IN CRYSTAL STRUCTURE ANALYSIS FOR PARALLELOGRAMS

AUTHOR: H. Tompa

DIRECT TECHNICAL INQUIRIES TO:

H. Tompa
Union Carbide European Research Associates
95 Rue Gatti De Gamond
Brussels 18, Belgium

DESCRIPTION - The program computes the absorption correction in crystal structure analysis i.e.; the correction which has to be applied to the measured intensity of the diffracted beam due to absorption during its passage through the crystal. The crystal is assumed to be two-dimensional and to be a parallelogram. The mathematical method used is based on an exact analytical expression and not on numerical integration.

Program requires 20K 1620 card system. Programmed in FORTRAN with Format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620084017

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.001~~GRAPH 2 - A PRINTER PLOTTING SUBROUTINE PROGRAM *H

AUTHORS: J. Putnins R. Northouse

DIRECT TECHNICAL INQUIRIES TO:

J. Putnins
University of Wisconsin
Milwaukee, Wisconsin 53201

DESCRIPTION - GRAPH 2 provides the user a means of graphing numerical data without the use of a CALCOMP Digital Plotter. The routine is self-scaling and has variable length axes. Output is made on the on-line printer.

PROGRAMMING SYSTEMS - GRAPH 2 is a subroutine programmed in FORTRAN II D with Format.
MINIMUM SYSTEM REQUIREMENTS - 1620 Model I or II, 20K decimal digits, 1443 Printer, 1311 Disk Drive and card reader.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620090001

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.008~~WATER WAY COMPUTATIONS PROGRAM

AUTHORS: C. Carlson J. Feeney

DIRECT TECHNICAL INQUIRIES TO:

J. F. Gibbons
State Highway Commission
Bridge Section
State Office Building
Madison, Wisconsin

DESCRIPTION - Computes the velocity, area, and flow for an individual channel in a flow system and the average velocity, area, and flow for the entire network.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Tape system, memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.009~~SKewed BRIDGE ELEVATIONS

AUTHORS: C. E. Carlson J. F. Gibbons

DIRECT TECHNICAL INQUIRIES TO:

J. F. Gibbons
State Highway Commission
State Office Building
Madison, Wisconsin

DESCRIPTION - The program computes slab elevations and geometry for bridge superstructures with skewed substructure units on a vertical curve with straight horizontal alignment. Tape system, memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092009

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.010~~CURVE BRIDGE PROGRAM *H

AUTHORS: C. E. Carlson J. F. Gibbons

DIRECT TECHNICAL INQUIRIES TO:

J. F. Gibbons
State Highway Commission
Bridge Section State Office Building
Madison, Wisconsin

DESCRIPTION - Computes slab elevations and geometry for bridge superstructures with skewed substructure units on

CONTINUED FROM PRIOR COLUMN

a vertical curve and curved horizontal alignment. The program can lay out in four different ways. Restrictions Range-All points must be on the horizontal curve.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Tape system, memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.011~~COAL FILE VOLUME

AUTHORS: R. L. Patterson V. A. Lippo

DIRECT TECHNICAL INQUIRIES TO:

R. L. Patterson
West Penn Power Company
Cabin Hill
Greensburg, Pennsylvania

DESCRIPTION - Obtains the volume of coal storage piles using cross-section data obtained by field or aerial survey. Storage 6280 digits, SPS program. Memory 20K, tape system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092011

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.012~~RELOCATION OFFSETS

AUTHOR: P. O. Roberts

DIRECT TECHNICAL INQUIRIES TO:

P. O. Roberts
Assistant Professor
Civil Engineering Room 1-263
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

DESCRIPTION - This program computes the geometry of a highway centerline alignment and the offsets for an original survey line to the new centerline for cases where changes are desired. The program is accomplished in two parts. Part One computes the geometry of the base line and the new center line, given the state plane coordinates of the P.I.'s and one parameter defining each curve. Part Two works with the table of geometry prepared by Part One and computes the center line stations and offsets for each base line station. Memory 20K, cards.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092012

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

~~1620-09.2.014~~GENERAL VIRTUAL WORK ANALYSIS OF STRUCTURES

AUTHORS: W. A. Burrows J. E. Okeefe

DIRECT TECHNICAL INQUIRIES TO:

W. A. Burrows
Dravo Corporation
Neville Island
Pittsburgh 25, Pennsylvania

DESCRIPTION - The solution of indeterminate structures with members subject to bending and axial loads by the method of virtual work.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K. 1620 system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-09.2.015TRANSMISSION TOWER DESIGN

AUTHOR: R. L. Patterson
 DIRECT TECHNICAL INQUIRIES TO:
 R. L. Patterson
 West Penn Power Company
 Cabin Hill
 Greensburg, Pennsylvania

DESCRIPTION - Designs a double-circuit transmission tower with known dimensions to withstand loads determined by the conductor and static wire sizes specified in input. The tower must be composed of statically determinate trusses in the transverse and longitudinal faces. The tower is designed in one of three materials as selected by the user. The tower may have a rectangular or square base and be one of four types; suspension, anchor, angle, or dead-end. Tower with 140 members per face maximum. Fixed point. Machine language program. Memory 40K, Automatic Divide, paper tape machine.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.016DTM DESIGN SYSTEM 20K

*M

AUTHORS: P. O. Roberts A. Villaveces

DIRECT TECHNICAL INQUIRIES TO:
 P. O. Roberts
 Asst. Prof. of Civil Engineering
 Room 1-253
 Massachusetts Institute of Technology
 Cambridge 39, Massachusetts

DESCRIPTION - The DTM Design System is an integrated series of electronic computer programs for the final design and location of highways. The system can be divided logically into four separate phases; the Terrain Preparation phase, the Alignment Design phase, the Roadway Design phase, and the Material Classification phase.

Each phase is implemented with one or more computer programs, as follows: Terrain Preparation (Terrain Preparation/Edit); Alignment Design (Alignment Design/Geometry, Alignment Design/Offset, and Profile Plot); Roadway Design (Roadway Design/Preparation, Roadway Design/Template, Roadway Design/Volumes and Slope Stakes & Mass Haul Plot); Materials Classification (Materials Classification/Preparation, and Material Classification/Volumes).

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, cards.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092016

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.017CONTINUOUS BEAM ANALYSIS AND STEEL BEAM DESIGN

AUTHORS: J. F. Gibbons S. W. Woods

DIRECT TECHNICAL INQUIRIES TO:
 S. W. Woods
 State Highway Commission of Wisconsin
 Madison, Wisconsin

DESCRIPTION - The program computes beam characteristics, dead load moments and shears, influence lines, and live load moments, shears, and reactions for continuous beams with a maximum of five spans. A steel beam is designed non-compositely and compositely for up to three different allowable steel stresses giving plate sizes and shear lug spacing. The program will solve beams with intermediate expansion hinges. The steel beam design uses the criterion for alternating stresses as specified by AWS and ASSHO.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 1620, 20K tape I/O is required.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092017

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	none		none

1620-09.2.018SPS TRAVERSE AND CURVE DATA PROGRAM

AUTHOR: J. Jacobsen

DIRECT TECHNICAL INQUIRIES TO:
 J. Jacobsen
 Electronic Computer, Inc.
 5729 W. Vliet Street
 Milwaukee 8, Wisconsin

DESCRIPTION - For performing subdivision calculations, Solves open and closed traverses, saves computed unknowns for use in subsequent traverses, stores coordinates points, computes curve data and areas. Input is by tape or typewriter. Utilizes 17000 locations with remainder used for storage. Tape system, memory 20K, Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092018

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.019DTM DESIGN SYSTEM 40K

*M

AUTHORS: Paul O. Roberts John A. Currie

DIRECT TECHNICAL INQUIRIES TO:
 Paul O. Roberts
 Asst. Prof. of Civil Engineering
 Room 1-263
 Massachusetts Institute of Technology
 Cambridge 39, Massachusetts

The DTM Design System is an integrated series of electronic computer programs for the final design and location of highways. The system can be divided logically into four separate phases; the Terrain Preparation phase, the Alignment Design phase, the Roadway Design phase, and the Material Classification phase. Each phase is implemented with one or more computer programs, as follows: Terrain Preparation (Terrain Preparation/Edit), Alignment Design (Alignment Design/Program Profile Plot), Roadway Design (Roadway Design/Program, Slope Stakes and Mass Haul Plot); Materials Classification (Material Classification/Volumes).

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - No other special features required.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092019

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.020COMPUTER SOLUTIONS FOR SLOPE STABILITY ANALYSIS

*M

AUTHORS: L. C. Slack R. L. James

DIRECT TECHNICAL INQUIRIES TO:
 R. L. James
 U. S. Army Corps of Engineers
 517 Gold Avenue, S.W.
 Albuquerque, New Mexico

DESCRIPTION - Computes the factor of safety against sliding on a particular failure arc for an earth embankment. The package contains the following six programs; Program 1 - One-part program to completely analyze the end of construction condition; Program 1A - One-part-Drawdown Condition (no water pressure on sides of slices); Program 2 - Part one all two-part programs; Program 2A - Part Two-End of Construction; Program 2B - Part Two-Drawdown (no water pressure on sides of slices); Program 2C - Part Two-Drawdown (water pressure on sides of slices). The two-part programs are designed to provide additional capacity in order to analyze more complex embankments and to allow for the consideration of water pressure in the drawdown condition.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 19,980 each program (varies slightly from program to program), memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE

CONTINUED FROM PRIOR PAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092020

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.021INVERSE GEODETIC POSITION COMPUTATION

AUTHOR: John F. McMillan

DIRECT TECHNICAL INQUIRIES TO:
John F. McMillan
Los Angeles County
Department of County Engineer
108 West Second Street
Los Angeles 12, California

DESCRIPTION - A program for accurately determining the forward azimuth, back azimuth, delta alpha and geodetic distance (in meters and feet) between two survey control stations, knowing the latitude and longitude of each station. 20K storage IBM 1620 Data Processing System with 20K storage and the following special attachments (A) Automatic Divide (B) Transfer Numerical Strip (C) Transfer Numerical Fill (D) Move Flag.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092021

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.023WATER SURFACE PROFILE SAN2-X

AUTHOR: L. D. Convery

DIRECT TECHNICAL INQUIRIES TO:
Clyde L. Palmer
City Engineer
528 City - County Building
Detroit, Michigan

DESCRIPTION - Solves the head losses in a continuous sewer system. Memory 20K; FORTRAN Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092023

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.024BEAM CAMBER CALCULATIONS

AUTHOR: Eugene D. Lee

DIRECT TECHNICAL INQUIRIES TO:
Eugene D. Lee
Computer Section
Washington State Highway Department
Highway-License Building
Olympia, Washington

DESCRIPTION - This program will compute the deflections at the tenth points of a beam, and at the third points of a cantilever. The slopes at the beam ends and at the cantilever free end also are computed.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Indirect addressing and Automatic Divide. No other special features required. 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092024

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.025GENERAL SURVEY TRAVERSE PROGRAM

AUTHOR: Jess Martinez

DIRECT TECHNICAL INQUIRIES TO:
Jess Martinez
Board of Public Works
Special Services Division

CONTINUED FROM PRIOR COLUMN

City Hall
Los Angeles 12, California

DESCRIPTION - Program for solving and balancing survey traverses, area computations, and azimuth rotation adjustments. Memory 20K, Automatic Divide, 1622 Card Read Punch - additional instructions. This program was assembled using SPS. All subroutines are fixed point.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092025

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.026DTM LOCATION SYSTEM

AUTHORS: P. O. Roberts J. H. Suhrbier

DIRECT TECHNICAL INQUIRIES TO:
Mr. Paul O. Roberts
Asst. Prof. of Civil Engineering
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

DESCRIPTION - The Digital Terrain Model Location System and its resultant series of electronic digital computer programs are intended to be used in the preliminary or reconnaissance phase of the highway location and design process. The programs that compose the system have been integrated in such a way that they closely supplement each other and at the same time parallel the location and design procedure that is followed by an engineer.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 20K memory, cards, and no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092026

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.027HORIZONTAL ALIGNMENT DATA FROM COORDINATES (TAPE)

AUTHOR: H. Coucheron-Aamot

DIRECT TECHNICAL INQUIRIES TO:
H. Coucheron-Aamot
U. S. Army Eng. District, Albuquerque
Corps of Engineers
P. O. Box 1538
Albuquerque, New Mexico

DESCRIPTION - Computes traverse and curve data for horizontal alignments. The program is in three parts, the first of which computes the traverse data & punches a data tape that may be used with either the second or third part to compute simple curve data and stationing or spiraled curve data and stationing, respectively. Input data required are the stationing of back P.O.T., numeric designation of 1st P.I., number of sets of coordinates, grid factor, coordinates of P.I.'s and P.O.T.'s and radii of the curves corresponding to the P.I.'s. Equipment requirements include the IBM 1620 Data Processing System with 1621 Paper Tape Reader and 1624 Paper Tape Punch. The basic 20K memory is adequate and no special features or off-line equipment are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092027

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.028BACKWATER CURVE PROGRAM

AUTHOR: D. Hullinghorst

DIRECT TECHNICAL INQUIRIES TO:
D. Hullinghorst
New Hampshire Department of Public
Works and Highways
24 South Main Street
Concord, New Hampshire

DESCRIPTION - Calculation of water surface profiles along natural stream channels by use of observed cross-sections, with supplementary output concerning velocity, energy-head, etc. Special provisions minimize amount of input required,

CONTINUED FROM PRIOR PAGE

facilities evaluation of changes due to change in friction coefficients and permit use of composite cross-sections with segments of differing roughness.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1622 Card Read Punch and IBM 1620 digital computer with 20K memory and no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.029

*M

WATER HAMMER

AUTHOR: J. A. N. Lee

DIRECT TECHNICAL INQUIRIES TO:
J. A. N. Lee
Commonwealth of Massachusetts
University of Massachusetts
Amherst, Mass.

DESCRIPTION - The analysis of water hammer effects in long pipelines due to the sudden closure of a gate or valve at the downstream end. The valve is assumed to close in small steps in a prescribed form.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, and minimum of 11 in. typewriter paper.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092029

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.030

THE BUCKLING ANALYSIS OF OUTSTANDING COMPRESSION CHORDS

AUTHOR: J. A. N. Lee

DIRECT TECHNICAL INQUIRIES TO:
J. A. N. Lee
Commonwealth of Massachusetts
University of Massachusetts
Amherst, Mass.

DESCRIPTION - The computation of the critical load in outstanding compression chords in trusses.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092030

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.031

*M

VOLUMETRIC QUANTITIES PROGRAM

AUTHOR: J. A. Currie

DIRECT TECHNICAL INQUIRIES TO:
P. O. Roberts
Room 1-252
Massachusetts Institute of Technology
77 Massachusetts Ave.
Cambridge, Mass.

DESCRIPTION - The volumetric quantities program is designed to compute volume quantities for engineering purposes. For example, it can be used to compute borrow-pit, stockpile, roadwork, dredging, foundations ditchwork, or any of the other volume computations associated with a design or construction project. The average end area method is used to compute volumes. The end areas are defined by two sets of points referred to as template and terrain. The program can be requested to compute the intersection of template and terrain (i.e. slope stake) when given data on required slopes or this feature may be ignored and the intersection point given as input data (i.e. for foundation work, etc.). The program is designed to be engineer oriented. This allows flexibility and ready modification for special or general purpose.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 20K cards.

CONTINUED FROM PRIOR COLUMN

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092031

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-09.2.032

VEHICLE SIMULATION AND OPERATING COST SYSTEM

AUTHORS: A. S. Lang D. H. Robbins
P. O. Roberts

DIRECT TECHNICAL INQUIRIES TO:
P. O. Roberts
Assistant Professor Civil Engineering
Massachusetts Institute of Technology
Cambridge 39, Mass.

DESCRIPTION - The Vehicle Simulation and Operating Cost System models or simulates the operation of a vehicle over a specific highway alignment and determines the costs associated with the movement. Vehicle operating costs are a direct function of vehicle road speeds, engine rpm, vehicle tractive effort, and per cent of full engine load. These four items are in turn directly related to certain highway design characteristics selected by the engineer. These characteristics include the vertical alignment, the pavement type, and the operational restrictions placed on speed. The programs within the system take the above design characteristics and description of the vehicle and evaluate the consequences of these characteristics on engine performance. These consequences are then converted into associated costs. The system consists of three programs. The first, a data preparation program, initializes and consolidates the vehicle, control (wind speed, pavement type, fuel cost, time cost, traffic volumes, etc.), speed profile, and alignment data. The second, the vehicle simulation program, takes the initialized data and computes the resulting motion or speed profile. The third program, the fuel computation program, reads in a fuel performance table and the speed profile and calculates fuel consumption and various summary cost information.

PROGRAMMING SYSTEMS - Written in the FORTRAN Language.

MINIMUM SYSTEM REQUIREMENTS - A 1620, 20K memory, cards, no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092032

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.033

INDETERMINATE FRAME ANALYSIS

AUTHORS: J. J. Miller H. H. Sharp, III

DIRECT TECHNICAL INQUIRIES TO:
J. J. Miller
U. S. Army Engineer District,
P. O. Box 1538
Albuquerque, New Mexico

DESCRIPTION - To provide a rapid analysis of reinforced concrete structures, including concrete conduits or culverts under high fills and a variety of other structures with fixed or pinned ends. Program computes fixed-end moments, distribution factors, carryover factors, distributed moments, shear and unit shear, distances, etc. Structures subject to analysis are 1, 2, or 3-cell conduits/culverts- 1, 2, or 3-bay bents- 1, 2, or 3-story frames- 1 to 7-span beams- and single or double TS, or LS. The program is divided into three parts. Part one requires 19,935 units of memory, part two occupies about 19,260 positions, and part three utilizes 16,107 positions. Complete trace instructions can be assembled with parts two and three only. Modification for card input-output can be accomplished with little difficulty.

PROGRAMMING SYSTEMS - Source programs for all three parts are written in the 9/30/61 (Format) version of FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Data Processing System with 1621 Paper Tape Reader and 1620 Paper Tape Punch. The program is currently coded for the basic 20K memory, and no special features or off-line equipment are necessary.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR PAGE

ORDERING INFORMATION: PROGRAM NUMBER 1620092033

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.034SUBDIVISION PROGRAM

*M

AUTHOR: E. S. Dobbs

DIRECT TECHNICAL INQUIRIES TO:

E. S. Dobbs
Waldemar S. Nelson & Co., Inc.
1200 St. Charles Ave.
New Orleans 13, La.

DESCRIPTION - Computes necessary data for the subdivision of land into smaller parcels. The program starts with a closed boundary traverse and proceeds to compute all necessary curves and tangents. The design engineer then submits data for lot computations and receives complete information for staking and plotting the subdivision. Lot characteristics are checked against zoning requirements. Output includes coordinates of points-length and bearing of lines-length and radius of arcs-and area, depth, and width of lots.

MINIMUM SYSTEM REQUIREMENTS - Minimum 1620 with card input-output 20K. This is a modified version of the paper tape program by the same name.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092034

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.036DEAD LOAD BEAM DEFLECTIONS

*M

AUTHOR: J. F. Gibbons

DIRECT TECHNICAL INQUIRIES TO:

J. F. Gibbons
Room 580
State Office Bldg.
Madison, Wisc.

DESCRIPTION - Computes beam deflection, due to a uniform dead load. Moment of inertia may be constant or variable. Section dimensions or moments of inertia may be input. Beam may be simple or continuous.

PROGRAMMING SYSTEMS - This program is written in FORTRAN and may be FORTRANed for a card system with no changes in the program.

MINIMUM SYSTEM REQUIREMENTS - Tape I/O and a memory of 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092036

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.037RECTANGULAR REINFORCED CONCRETE COLUMN ANALYSIS - BI-AXIAL BENDING

AUTHOR: R. L. Cook

DIRECT TECHNICAL INQUIRIES TO:

J. F. Gibbons
State Highway Commission of Wisconsin
Bridge Section
Madison, Wisc.

DESCRIPTION - Computes the maximum concrete and steel stresses in a reinforced concrete column with an eccentric axial load.

PROGRAMMING SYSTEMS - The program uses IBM 1620 FORTRAN without format.

MINIMUM SYSTEM REQUIREMENTS - Tape, and a memory of 20K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092037

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.038HORIZONTAL ALIGNMENT AND OFFSETS (HALO)

AUTHOR: J. Peterson

DIRECT TECHNICAL INQUIRIES TO:

L. H. Morgan
Washington State Highway Dept.
Highway-Licenses Bldg.
Olympia, Wash.

DESCRIPTION - This program computes the geometry of a highway centerline alignment given the coordinates of the pi, the length line alignment given the coordinates of the pi, the length of Talbot spirals, and the circular curve parameters at each pi. When offsets are desired, one of the alignments is to be specified as the base line and the other the offset line. The offset distance normal to the base line, the stationing along the offset line and the skew angle of intersection will be computed at each station specified.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 1620 under 40K memory. Card I/O, Indirect Addressing, Multiply-Divide, 3 additional commands (MF, TNF, TNS).

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092038

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.039PIPE FRICTION HEAD LOSS CALCULATIONS IN WATER SUPPLY ENGINEERING USING THE DARCY METHOD

*M

AUTHOR: K. M. Yao

DIRECT TECHNICAL INQUIRIES TO:

B. A. M. Moon
Mobil Computer Laboratory,
University of Canterbury,
Christchurch, New Zealand

DESCRIPTION - Calculates the friction head loss for a given pipe flow based on the Darcy equation for use mainly in water supply engineering. Mathematical method- successive approximations. Applicable to all pipe flow situations including laminar and turbulent flow.

PROGRAMMING SYSTEMS - Language is SPS.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, Floating Point Arithmetic. Storage requirements- 4150.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092039

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.040GEOMETRIC COMPUTATION

AUTHOR: J. Peterson

DIRECT TECHNICAL INQUIRIES TO:

L. H. Morgan
Computer Engineer
Washington State Highway Department
Highways-Licenses Building
Olympia, Washington

DESCRIPTION - Given distances and bearings of courses, this program computes latitudes and departures, coordinates and enclosed area. Traverse may be adjusted by compass and/or transit rule. Given distances and bearings of courses - with distances of two courses unknown, or with two bearings unknown, or with one distance and one bearing unknown, solves for unknowns. Solves for distances and bearings between successively listed coordinates. Given circular curve data and stationing, computes the radial bearing, or given radial bearing computes the stationing. Distances, bearings, and coordinates may be stored in one problem and recalled into another.

PROGRAMMING SYSTEMS - The source language is SPS.

MINIMUM SYSTEM REQUIREMENTS - Plane analytic geometry, 33 courses and 31 memory numbers, memory 20K. Card I/O, Indirect Addressing, Multiply-Divide, 3 additional commands (MF, TNF, TNS).

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092040

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.041GEOMETRIC COMPUTATION

AUTHOR: J. Peterson

DIRECT TECHNICAL INQUIRIES TO:

L. H. Morgan
Computer Engineer
Washington State Highway Department
Highways-Licenses Building
Olympia, Washington

DESCRIPTION - Given distances and bearings of courses, this program computes latitudes and departures, coordinates and enclosed area. Traverse may be adjusted by compass and/or transit rule. Given distances and bearings of courses - with distances of two courses unknown, or with two bearings unknown, or with one distance and one bearing unknown, solves for unknowns. Solves for distances and bearings between successively listed coordinates. Given circular curve data and stationing, computes the radial bearings, or given radial bearing computes the stationing. Given Talbot spiral data and - (A). Bearing and coordinates of point on line, computes its intersection with spiral or offset spiral. (B). Coordinates of center of curve and radius, computes its intersection with spiral or offset spiral. (C). Arc length along centerline, computes point on spiral or offset spiral. Given common point data and scale factor, converts from one coordinate system to another. Distances, bearings, and coordinates may be stored in one problem and recalled into another. Plane analytic geometry. 88 courses and 100 memory numbers. This program is identical with the 60K version except the maximum number of courses in the 60K version is 98.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card I/O, Indirect Addressing, Multiply-Divide, 3 additional commands (MF, TNP, TNS).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092041

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.042GEOMETRIC COMPUTATION

AUTHOR: J. Peterson

DIRECT TECHNICAL INQUIRIES TO:

L. H. Morgan
Computer Engineer
Washington State Highway Department
Highways-Licenses Building
Olympia, Washington

DESCRIPTION - Given distances and bearings of courses, this program computes latitudes and departures, coordinates and enclosed area. Traverse may be adjusted by compass and/or transit rule. Given distances and bearings of courses - with distances of two courses unknown, or with two bearings unknown, or with one distance and one bearing unknown, solves for unknowns. Solves for distances and bearings between successively listed coordinates. Given circular curve data and stationing, computes the radial bearing, or given radial bearing computes the stationing. Given Talbot spiral data and - (A). Bearing and coordinates of point on line, computes its intersection with spiral or offset spiral. (B). Coordinates of center of curve and radius, computes its intersection with spiral or offset spiral. (C). Arc length along centerline, computes point on spiral or offset spiral. Given common point data and scale factor, converts from one coordinate system to another. Distances, bearings, and coordinates may be stored in one problem and recalled into another. Plane analytic geometry. 98 courses and 100 memory numbers. This program is identical with the 40K version except the maximum number of courses in the 40K version is 88.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Memory 60K. Card I/O, Indirect Addressing, Multiply-Divide, 3 additional commands (MF, TNP, TNS).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092042

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.043MASS DIAGRAM MODEL WITH CROSS SECTION

AUTHOR: R. A. Raub

DIRECT TECHNICAL INQUIRIES TO:

R. A. Raub
5614 Jordan Road
Bethesda 14, Maryland

DESCRIPTION - The Mass Diagram Model with Cross Section is designed to take basic cross section, and alignment-profile data, and create vertical curves, toe points, ditches, crown and grades, and mass diagram plot data. The first part, input from the profile, creates vertical curves, lengths, PVC, VCT, and height at each station along the curve. In addition, its output is inserted into the mass diagram (part two) input deck, to utilize vertical curves in grade field notes, maps, and alignment and profile sheets. There is one other similar program on file, however it is more scientific and does not include ditching, variable side slopes, or ledge cuts. Further the mass diagram model produces output which can readily be used by the contractor.

PROGRAMMING SYSTEMS - Written in FORTRAN (with FORMAT).

MINIMUM SYSTEM REQUIREMENTS - 20K for vertical curves, and 60K for Mass Diagram. Also, Automatic Divide and Indirect Address. Source deck can be compiled without the use of Automatic Divide or Indirect Addressing. 1620 with additional 40K card input/output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092043

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.045SURVEY TRAVERSE ANALYSIS PROGRAM (1620 - 40K)

AUTHOR: G. F. Volzer

DIRECT TECHNICAL INQUIRIES TO:

G. F. Volzer
Eastman Kodak Co.
Kodak Park Works
Engineering Division
Rochester 4, New York

DESCRIPTION - Solves and balances a survey traverse if within specified limits, or solves for the distance and azimuth of the unknown closing course. This program will balance the traverse by either Crandall's method (least square) or the compass method. The program is limited to the traverses with up to and including 75 courses.

PROGRAMMING SYSTEMS - Written in FORTRAN 90, (change in headings would permit use of FORTRAN I).

MINIMUM SYSTEM REQUIREMENTS - Memory 40K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092045

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.046LEAST SQUARES ADJUSTMENT OF PRECISE SURVEY OBSERVATIONS

AUTHOR: J. W. Hunter

DIRECT TECHNICAL INQUIRIES TO:

J. W. Hunter
Department of County Engineer
Advanced Planning Division
108 W. Second St.
Los Angeles 12, California

DESCRIPTION - The Least Squares Adjustment program is designed to compute the most probable corrections to a system of precise survey observations by the method of least squares. Input data is formed from either condition or observation equations. The program will form, store, and solve normal equations, and compute and type out the solutions of all unknowns. Its major application will be adjustment of 1st and 2nd order horizontal and vertical survey control systems. Restrictions - maximum of 60 conditions equations with no limit on number of unknown corrections, or maximum of 60 unknowns with no limit on number of observation equations.

PROGRAMMING SYSTEMS - The source program was coded in IBM 1620/1710 SPS Language.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 - 20K card I/O system with MF, TNP, TNS, Auto-Divide, and Indirect Addressing hardware.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092046

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.047TRIGNET - 6409, 6420, 6421, 6423, 6424, 6425

AUTHOR: C. W. King

DIRECT TECHNICAL INQUIRIES TO:

C. W. King
Iranian Oil Operating Companies
P. O. Box 1065
Tehran, Iran

DESCRIPTION - Computes and adjusts a triangulation network. Input may be either bearings or angles, and in grads or degrees. Computed either on plane or Lambert projection. Output is adjusted coordinates of all points and bearings and lengths of all sides. This program is designed to be used with companion programs, aerial triangulation strip formation, File No. 1620 09.2.048 uncorrelated and correlated polynomial adjustment of aerial triangulation strip, File No. 1620- 09.2.049. Restrictions, Range-limited to 27 separate stations of which not more than 15 may be unknowns to be adjusted. Also limited to 18 directions at any one station. Provision is made to compute larger figures in stages. Statement 93 in source program needs changing for projections other than Lambert, or for different false origin. Programmed for card input.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 60K, Automatic Divide, card I/O and Indirect Addressing. Computation in floating point with 10 digit mantissa. Provision made to check and eliminate data errors.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092047

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.048AERIAL TRIANGULATION STRIP FORMATION - 6431

AUTHOR: C. W. B. King

DIRECT TECHNICAL INQUIRIES TO:

C. W. B. King
Oil Operating Companies
P. O. Box 1065
Tehran, Iran

DESCRIPTION - Combines successive individual photogrammetric models into a strip with a coordinate system having origin at the first principal point, and x axis parallel to the machine base of the first model. Suitable for transforming aerial triangulation data from instruments without Zeiss parallelogram, and for improving and checking the strip coordinates obtained from universal plotters. In this specification, the term (pass points) refers to the customary 6 points per model which are basic in aerial triangulation. Of these, the two middle points are referred to as centre points and the other four as (wing points).

The program makes a thorough check for errors in all input data (see section below). In addition, it is designed to deal with the special circumstances, of steps in (by) and (bz) base components, of missing wing points (as can occur along sea coasts), and of right to left triangulation. In this last event, the terms r.h. (right hand) and l.h. (left hand), should be interchanged throughout this specialization. All common points to each pair of models are compared, meaned and the differences may be printed out. As an optional facility, each model can be given a small Omega tilt about the base line and a small z correction, to make a best fit in altitude of the three common pass points. All heights will be corrected accordingly, and these corrections will continue until a wing point is encountered with excessive height difference. In this event the last successful tilt is applied to the remainder of the strip. Further, facilities are the options to correct heights for earth curvature, either for the strip as a whole, or in the Y direction only. A count is made of the number of strip coordinates formed. The computation is carried out correct to 2 places of decimals. Data checks - pass points are checked for numbering error, incorrect position, and incorrect coordinates. Other common points are checked for incorrect coordinates.

PROGRAMMING SYSTEMS - Uses FORTRAN II Library Floating Point subroutines.

MINIMUM SYSTEM REQUIREMENTS - Card I/O - 60K - Auto-Divide
and Indirect Addressing.

CONTINUED FROM PRIOR COLUMN

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092048

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.049UNCORRELATED AND CORRELATED POLYNOMIAL ADJUSTMENT OF AERIAL TRIANGULATION STRIP 6432 + 6433

AUTHOR: C. W. B. King

DIRECT TECHNICAL INQUIRIES TO:

C. W. B. King
Iranian Oil Operating Companies
P. O. Box 1065
Tehran, Iran

DESCRIPTION - Given the machine coordinates of an aerial triangulation strip and the ground coordinates of any number of control points, the program will compute coefficients of formulae to adjust the strip to a best possible fit to the control points, by the method of least squares, and then compute ground coordinates of as many measured points in the strip as desired. No special disposition of control points is necessary, nor is it necessary that the initial model of the strip shall have been absolutely orientated or scaled. Control points do not necessarily have to have had all 3 coordinates provided. A facility of checking data for faulty control points is incorporated - and also a facility to modify or eliminate such points. Output may be printed, or punched, or both. The coefficients of the formulae may be printed out if desired.

PROGRAMMING SYSTEMS - FORTRAN II Library Floating Point, and SQRTF.

MINIMUM SYSTEM REQUIREMENTS - Card I/O - 60K - Auto-Divide
and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092049

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.050PRESTRESSED GIRDER ANALYSIS AND DESIGN PROGRAM FOR THE IBM 1620 DATA PROCESSING SYSTEM

AUTHOR: S. W. Woods

DIRECT TECHNICAL INQUIRIES TO:

S. W. Woods
State Highway Commission Of Wisc.
Bridge Section
Madison, Wisc.

DESCRIPTION - This program is used to analyze and design single span prestressed bridges using a standard 36 inch pretensioned girder. The number of strands, shear reinforcement, tension reinforcement, and critical stresses are given. The program is restricted to 36 inch girders, simple spans, standard Aasho loadings, and pretensioned girders.

PROGRAMMING SYSTEMS - The program uses FORTRAN without Format so all headings have been written in machine language.

MINIMUM SYSTEM REQUIREMENTS - 20K paper tape system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092050

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.2.051TWIN BOX CULVERT DESIGN

AUTHOR: James F. Woods

DIRECT TECHNICAL INQUIRIES TO:

Stanley W. Woods
Bridge Section
State Highway Commission Of Wisc.
Madison, Wisc.

DESCRIPTION - Designs a twin box culvert according to the Aasho 61 specifications. Top, side and bottom thicknesses are designed separately and a haunch will be placed over the center wall when necessary. Output are the dimensions and bar table. Fixed end moments and final maximum moments

CONTINUED FROM PRIOR PAGE

and shears are optional items of output controlled by sense switch. Moments are found by matrix algebra solution of slope deflection equations, sidesway being ignored. The approximate maximum span length is 20 feet. Storage used by program all-5 programs chained together.

PROGRAMMING SYSTEMS - UTC FORTRAN No. 1620-02.0.017.

MINIMUM SYSTEM REQUIREMENTS - Paper tape system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092051

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.0521620 MODEL 4 GEODIMETER FIELD NOTE REDUCTION

AUTHOR: Rocco D. Larizza

DIRECT TECHNICAL INQUIRIES TO:
R. L. Kennigott, Supr. Computer Ctr.
Chas. H. Sells, Inc.
409 Manville Rd.
Pleasantville, N.Y.

DESCRIPTION - To compute slope distance in feet and meters from total sums of readings by AGA Model 4 Geodimeter, purposely streamlined for minimum input and output (no reduction to horizontal, grid scale, or sea-level). Specific Geodimeter calibration tables easily read in at execution time. Standard for AGA Model 4 Geodimeter, all corrections added directly along slope. Atmospheric correction by temp./press. equation. Storage requirements are 6660 positions of core.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K SPS, Processor 1620-SP-020, Program Number Extension OPT1.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092052

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.053CONTINUOUS BEAM SERIES - PROGRAMS I THRU IX AND XCIX *M

AUTHORS: W. J. Verrill R. L. Mallar
D. R. Fields

DIRECT TECHNICAL INQUIRIES TO:
Walter J. Verrill
Maine Highway Dept.
Augusta, Maine

DESCRIPTION - Programs as referenced by number I equals section properties and stresses - allows design from console of built-up sections, being either any welded beam or any of 63 stored standard WF shapes with plates and composite action as desired. II equals section properties - a preparatory program for later series use, calculates inertias, weights from plate or shape descriptions. III equals span characteristics and fixed end moments - fixed end moments calculated for both unit conc and unit uniform loads. IV equals produced moments and influence lines - influence lines generated for moments at regular intervals, for shears and reactions only at supports. V equals design moments and shears part 1 * a preparatory program for VI which rearranges and supplements IV output and defines necessary influence point load vectors. VI equals design moments and shears - part 2 - calculates at all influence line points, dead load moments and shears and live load moments due to lane loading only. VII equals live load deflections - calculates deflection at estimated position of maximum deflection and at check points 20 feet each side of est. mas. point. VIII equals dead load deflections - continuous placement of concrete - calculates both blocking (for construction) and camber (for fabrication) for all designated regular spaced points plus up to 3 special points per span assuming concrete placed continuously. IX equals dead load deflections - panel placement of concrete - same as VIII except assumes planned sequence of concrete placement in panels. XCIX equals dead load deflections - retained as simple alternative to VIII and IX from original series submission. It should be noted that programs I, VII, VIII and IX may be also most useful in simple span design. The general scope and limitations of the series are as follows - *** 13 spans with any number of evenly spaced influence points per span so that total does not exceed 161. Maximum of 25 different elements of length having different moment of inertia per span. Maximum of 25 evenly spaced deflection points in any span but these need not be the same as influence points. Programs specifically written for steel-concrete construction of the following types, (1) non-composite, (2) normal composite, (3) composite but with full support of steel and liquid concrete by falsework and (4) composite but with support of liquid concrete only by false work.

CONTINUED FROM PRIOR COLUMN

The series works equally well with rolled beams or welded girders and with constant or variable depth. Articulation capabilities are not present. Adaption to other structural types may be possible by the user with varying difficulty in the separate programs.

PROGRAMMING SYSTEMS - Source language is 102 AFIT FORTRAN. Note- The continuous beam XCIX loses accuracy with large changes in I/(ML) for different beam elements in a span. For this case, or if short elements occur near contraflexure points, the use of continuous beam VIII is strongly recommended.

MINIMUM SYSTEM REQUIREMENTS - A card sorter and listing device are essential for use of the system. Card I/O, Auto-Divide & Indirect Addressing. Program III uses the most core (20K). Program VII uses the least core (16984 positions).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092053

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.057COMPOSITE BEAM SERIES - PROGRAMS I AND II

AUTHOR: R. E. Peary, Jr.

DIRECT TECHNICAL INQUIRIES TO:
Walter J. Verrill, PE, Chief Programmer
Maine Highway Dept.
Augusta, Maine 04330

DESCRIPTION - Selects a potentially competitive list of welded I sections and/or rolled WF beams and completes their design, or analyzes a given WF beam design. In analysis, the input section remains fixed, but for either design or analysis the design details are completed. Fifty common WF beams from 18 to 36 inches as well as 10 welded sections from 39 to 51 inches are stored in replaceable memory. Output gives complete designs including: cover plate, wt per foot, moments of inertia, stresses, reactions shear connector spacings, weld sizes, moments and deflections. Program accepts any AASO loading or fraction thereof as well as no live load. Opportunity exists for coding special distribution factors and additional loads. Some limitations on distribution and span exist but generally the program functions properly from spans of 38 to 120 feet and any number of traffic lanes for stringer spacings up to 10 feet. Program contains provision for handling special cases involving altered modular ratios, cover plate width, maximum cover plate thickness, etc. with ease. Average total time per beam solution is slightly under one minute thru both programs not including program load times. Output is fully identified. (1) Revision of cover plate length determination to conform to AWS specification 2.0-63. (2) Extension of the logic to handle A441 steel. (3) Recompilation of the series in PDQ. (4) More complete output and elimination of minor inconsistencies in the combination of certain output data.

PROGRAMMING SYSTEMS - PDQ FORTRAN, General Library Program 1620-02.0.013.

MINIMUM SYSTEM REQUIREMENTS - Card system with Auto-Divide. Storage used by program - I equals 19,985 positions. II equals 19,809 positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092057

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.058DETERMINATE TRUSS ANALYSIS

AUTHOR: David S. Heindel

DIRECT TECHNICAL INQUIRIES TO:
David S. Heindel
Dravo Corp.
Neville Island
Pittsburgh, Pa. 15225

DESCRIPTION - Program solves a simple, statically determinate, pin-connected truss for the support reactions and axial stress in each member. Truss is defined by giving the coordinates of each joint and listing members connecting these joints. The structure may be statically loaded at any of the joints. Program is limited to trusses that can be analyzed by the method of joints. A maximum of 245 members can be used. Any number of loading conditions can be treated without rereading the truss configuration. Output may be either punched or typed.

PROGRAMMING SYSTEMS - Written in PDQ FORTRAN. Object deck includes PDQ free form subroutines.

CONTINUED FROM PRIOR PAGE

MINIMUM SYSTEM REQUIREMENTS - Storage used by program - 40K. Card system, Auto-Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092058

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.059

NON-PRISMATIC NON SYMMETRICAL RIGID FRAME ANALYSIS

AUTHORS: R. J. Prowse L. DiBernardo

DIRECT TECHNICAL INQUIRIES TO:
R. J. Prowse
Eridge Division
Computer Section
N. H. Dept. P. W. & Hwys.
85 Loudon Rd.
Concord, N.H.

DESCRIPTION - This program permits the designer to quickly obtain an analysis by virtual work of a 2 hinged non-prismatic nonsymmetrical rigid frame with or without an earth loading over the deck. For the analysis, the structure is divided into 31 DS divisions. Fifteen of these are in the deck and eight are in each leg. In the first pass, the geometry of the structure and various functions such as elastic area, distance to elastic centroids, and dead loads are computed for each DS division. Pass 2 computes the simple moment table, the moment distribution, the influence line table, the moments due to earth pressure on each leg, and determines the trust at each hinge. The input to this program consists of the frame dimensions, the height of fill over each end, and the elevation of both hinges. Significant labels are shown on the longitudinal section sketch of a typical frame.

PROGRAMMING SYSTEMS - Used in the writeup: A.F.I.T. FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Basic card, 20K, IBM 1620 system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092059

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.060

EX-1.01 - TRAVERSE AXIS

AUTHOR: M.S. Anderson

DIRECT TECHNICAL INQUIRIES TO:
C. L. Palmer
City Engineer
City of Detroit
528 City-County Building
Detroit 26, Michigan

DESCRIPTION - Modification to the Traverse Analysis Program by D.T. Mitchell, 9.02.05/Tape. This program will not balance a traverse. It computes all traverse data including the three (3) types of intersections. Directional input may be in azimuths, bearings, deflection angles, interior or exterior angles. Output in bearings or azimuths. Selective output is optional. Curve data is computed and stored. 96 courses may be computed and stored for interdependent traverses. Distances and angles may be divided. Angles may be added or subtracted. Radial points may be set. Go normal to computed lines. Stored information may be referenced. Output on typewriter or in paper tape for offline listing. Entire 20K core equipment is required by program--Paper tape system. Programming type-SPS. Program may be modified for a card system with only minor changes with a savings of approximately 292 locations. The changes consist of reading and writing cards instead of paper tape. A list of modifications for cards is included.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092060

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.061

TRANSMISSION POWER DESIGN

AUTHOR: R. L. Patterson

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR COLUMN

V. A. Lippo
West Pennsylvania Power Co.
Cabin Hill
Greensburg, Pennsylvania 15602

DESCRIPTION - Designs a double-circuit transmission tower with known dimensions to withstand loads determined by the conductor and static wire sizes specified in input. The tower must be composed of statically determinate trusses in the transverse and longitudinal faces. The tower is designed in one of three materials as selected by the user. The tower may have a rectangular or square base and be one of four types- suspension, anchor, angle, or dead-end. Stress analysis by (Method of Joints). Design by standard design criteria and formula. Tower with 140 members per face maximum. Fixed point. Storage used by program- 40K. Equipment required - Card I/O and Auto-Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092061

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.062

HORIZONTAL CURVE DATA

AUTHOR: J. M. Waldner

DIRECT TECHNICAL INQUIRIES TO:
G. Woodruff
N. J. State Highway Department
1035 Parkway Avenue
Trenton, New Jersey

DESCRIPTION - Given the radius of a curve and the bearings from the center to the beginning point and ending point of the curve, the program computes the central angle, length of arc, length of tangent, external distance, and deflection per foot of arc for the curve. Given the beginning station of the curve in addition to the above information, the program computes the deflection angles to each even 25 foot station around the curve, and to any odd station for which a deflection is desired. Method-plane geometry and trigonometry. Restrictions- Stations up to 999899.999 may be given as input, but program computes stations above 1000700.000 if necessary. Storage used by program- approximately 8000 positions. Equipment required by program- card system, TMS, TNE, NF, Auto Divide, Indirect Addressing. Programming type- SPS - 1620/1710, Mainline, complete. Output is edited so it can be listed on standard eight and one half inches by eleven inches paper on a 407 using an 80/80 List Board.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092062

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.063

DEFLECTIONS IN HINGED SPANS BY THE CONJUGATE BEAM METHOD

AUTHOR: S. W. Woods

DIRECT TECHNICAL INQUIRIES TO:
S. W. Woods
State Highway Commission of Wisconsin
Madison, Wisconsin

DESCRIPTION - This program computes deflections in hinged spans by the conjugate beam method. The load may be uniform load with end moments known, or a variable load and the complete moment envelope known. The moment of inertia may be constant or variable. Storage used by program- 20K. Equipment required- paper tape I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092063

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.067

CONTINUOUS BEAM LIVE LOAD DEFLECTIONS

AUTHOR: S. W. Woods

DIRECT TECHNICAL INQUIRIES TO:
S. W. Woods
State Highway Commission of Wisconsin
Bridge Section
Madison, Wisconsin

DESCRIPTION - This program computes the live load

CONTINUED FROM PRIOR PAGE

deflections in each span of a continuous beam and prints the maximum value, its location, and the location of the wheel causing maximum deflection for AASHO loadings.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 paper tape system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092067

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - A plug deck for use with COGO I to provide for computing coordinates along a given spiral, to intersect a straight line with a spiral and to intersect a circular curve with a spiral. Storage used by program is the normal space occupied by COGO plugs.

Equipment required by program - Card 1620 Model I. Programmed in COGO FORTRAN with COGO Compiler.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092071

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.069GENERALIZED SAG AND TENSION CALCULATIONS

AUTHORS: D. D. Williams J. A. Rodgers

DIRECT TECHNICAL INQUIRIES TO:
D. D. Williams
Baltimore Gas & Electric Company
Engineering Computer Applications Group
Electric Engineers Department
Baltimore, Maryland 21203

DESCRIPTION - Determines the values of sags and tensions for various span lengths, wire types and sizes, loading conditions and relative temperatures. The volume of punched-card output is directly proportional to the ranges of the variables of the input data. A table of values is printed from the card output, from which the user can choose the sag values for the known tensions - or vice versa - at various relative temperatures. A single-pass execution of a batch of problems is the method. Approximately 18,000 positions of storage are used by the program.

Equipment required by program is: Card 1620 with Auto-Divide, Indirect Addressing, 1620 Model I.

Programmed in PDQ FORTRAN.

This program also monitors the limiting values of SAG, can be used to examine behavior with temperature changes of installed wire and can examine behavior of installed wire with two levels of additional weight on wire.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092069

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.072GRAVITY LOAD ANALYSIS PROGRAM

AUTHOR: Dr. B. S. Ismail

DIRECT TECHNICAL INQUIRIES TO:
L. L. Bathurst
Rush Engineering Company
Birmingham, Alabama

DESCRIPTION - These programs are an addition to the Rust Automated Building Design System. They provide capability for framework interaction analysis under vertical dead and live load. Provision is made for missing beams, columns, through girders. All operations are dependent on and consistent with the other operations (geometry description, load allocation, member selection, output) of the Automated Building Design System. Gravity load analysis is relatively fast, compared to the original portal analysis option; but it cannot handle lateral loading. Six cases of vertical dead and live load may be considered and combined at will.

PROGRAMMING SYSTEMS - Written in FORTRAN II-D, 1 Main, 1 Link, 4 subroutines. The sample problem can only be executed if the Automated Building Design System is available.

MINIMUM SYSTEM REQUIREMENTS - A 60K card system with two disk packs, TNS, TNF, MF, Auto Divide, Indirect Addressing, and a 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092072

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.070ROADWAY ELEVATIONS

AUTHOR: P. R. Schopfer

DIRECT TECHNICAL INQUIRIES TO:
R. L. Kenngott
C. H. Sells, Inc.
409 Manville Road
Pleasantville, New York

DESCRIPTION - Computes the elevation of a point on a roadway defined by its station and offset from a theoretical grade line. It will also compute the elevation of the theoretical grade line at the given station. It is capable of handling up to four lanes of pavement for a single roadway or four lanes of pavement in each direction for a dual roadway. The program can store and utilize up to nine vertical curves and seven horizontal curves transitioning can be set at any lane edge.

PROGRAMMING SYSTEMS - Written in FORTRAN with FORMAT.

MINIMUM SYSTEM REQUIREMENTS - 20K memory 1620 Model I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092070

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.073TRAVERSE ANALYSIS PROGRAM

AUTHORS: Mr. Robert Leabow Mr. John J. Stump

DIRECT TECHNICAL INQUIRIES TO:
Mr. Robert Leabow
Los Angeles County
Department of County Engineer
Advanced Planning Division
108 West Second Street
Los Angeles 12, California

DESCRIPTION - This program will solve the majority of the problems which arise in traverse computations. These include- error of closure, area, unknown bearings and lengths, traverse adjustment, interdependency between two or more traverses, and curve data including segment areas, interior angles, arc length, and semi-tangent length. 96 courses maximum can be handled for any one traverse.

PROGRAMMING SYSTEMS - 1620/1443 SPS III.

MINIMUM SYSTEM REQUIREMENTS - 20K IBM 1620 with Automatic Divide, Indirect Addressing, TNF, TNS, MF, 1622 Card Read Punch, 1443 Printer (optional).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092073

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.071SPIRAL PLUG DECK TO COGO I

AUTHOR: P. R. Schopfer

DIRECT TECHNICAL INQUIRIES TO:
R. L. Kenngott
C. H. Sells, Inc.
409 Manville Road
Pleasantville, New York

1620-09.2.074EARTHWORK PLOT

AUTHORS: Mike Vandeman H. C. Williamson

DIRECT TECHNICAL INQUIRIES TO:
Lloyd H. Morgan
Washington State Highway Dept.

CONTINUED FROM PRIOR PAGE

Highway-License Bldg.
Olympia, Washington

DESCRIPTION - The program takes cross-section and template readings and plots the points according to a previously specified scale. Cross-sections may be plotted without templates. Station number and the elevation at the cross-section centerline are printed with each station. Each job prints a heading with data taken from a transmittal card. Storage used- 40K.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system with TNS, TNF, MF, Auto Divide, Indirect Addressing and a Calcomp Plotter 1627.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092074

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.075

SPIRAL CURVE LAYOUT

AUTHORS: Francis J. Perry Robert Wilkinson

DIRECT TECHNICAL INQUIRIES TO:

Francis J. Perry
Computer Section
Dept. of Public Works
244 State Office Bldg.
Providence, R. I. 02903

DESCRIPTION - This program accepts the definition of a spiral highway curve, and calculates the necessary data (deflection angles and chords) for the layout of the spiral and two parallel lines in the field. The parallel lines may be any distance from the spiral, and on either side. Storage used- 20,000 positions.

PROGRAMMING SYSTEMS - Programmed in AFIT Improved FORTRAN (General Library No. 1.1.010).

MINIMUM SYSTEM REQUIREMENTS - Card system with Auto-Divide and a Model I. Auto-Divide can be easily removed.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092075

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.077

COGO PLOT CC ADDITIONAL COGO SUBROUTINES

AUTHORS: Charles L. Miller John G. Skedon
Edward E. Newman

DIRECT TECHNICAL INQUIRIES TO:

Edward E. Newman
Room 1-147, MIT
77 Massachusetts Avenue
Cambridge, Mass.

DESCRIPTION - Plot COGO is an extension of COGO providing the capability of displaying graphically on an IBM 1627 or a Calcomp Plotter the coordinate points computed with the COGO system. The points may be displayed with or without annotation and with or without connecting straight or circular lines. The commands to perform these operations, like the COGO commands, are problem-oriented. Storage used by program- 10800-17280 positions.

PROGRAMMING SYSTEMS - Programmed in SPS II-D.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I, 20K, card I/O, 1627 Plotter.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092077

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.078

PRESSURE AND FLOW RATES IN GAS AND WATER NETWORKS

AUTHORS: W. H. Everling V. Igney

DIRECT TECHNICAL INQUIRIES TO:

W. H. Everling
IBM Deutschland
7032 Sindelfingen, Germany

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - Evaluates pressure and flow of incompressible media in pipe networks. Automatic set-up of tree and loops. Subroutine techniques for easy modification of applicable law of resistance. Hardy cross iterative scheme.

PROGRAMMING SYSTEMS - Written in 1620 FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS -

- IBM 1620 with 60,000 core storage positions for networks with up to 400 pipe sections.
- IBM 1620 with 40,000 core storage positions for networks with up to 100 pipe sections. Limits can be extended by multiphase execution.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092078

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-09.2.079

WELDED STEEL COMPOSITE BEAM DESIGN

AUTHOR: Mr. R. Wright

DIRECT TECHNICAL INQUIRIES TO:

Mr. G. Latourneux
Oregon State Highway Dept.
Data Processing Section
Salem, Oregon

DESCRIPTION - Picks the most economical set of flanges for a simply supported welded steel beam composite with a concrete deck. Other detailing information is also furnished; AASHTO specifications used. Flanges taken from tables which can easily be modified. The structural steel used may consist of either A36 steel or Low Alloy, A441.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model I, 40K, card I/O, TNS, TNF, MF, Auto Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092079

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.081

VERTICAL ALIGNMENT AND STAKEOUT

AUTHOR: Mr. Max Noach

DIRECT TECHNICAL INQUIRIES TO:

Max Noach
Chas. H. Sells, Inc.
409 Hanville Road
Pleasantville, New York 10570

DESCRIPTION - Computation of vertical alignment data; high point, low point, PC, PT, Stopping or Head Light Sight Distance, from given PVI's and elevations or grades. Computation of elevations at random points along the alignment, together with differences in elevations in case stake elevations are given at those points; cut and fill computed in decimal feet and in feet, inches and 8th of inches. Standard Parabolic Vertical Alignment Curves; Sight Distances according to New York State Department of Public Works specifications. Range- Starting station, 13(thirteen) PVI's and an ending Station in one alignment.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 Model I card system and a printing device.

PROGRAMMING SYSTEMS - Programmed in FORTRAN with FORMAT.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092081

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.082

SYNCHRONIZING TRAFFIC SIGNALS FOR AXIAL AND WITH

AUTHORS: J. D. C. Little J. T. Morgan
B. U. Martin

*H

*H

CONTINUED FROM PRIOR PAGE

DIRECT TECHNICAL INQUIRIES TO:

Mr. J. D. C. Little
Massachusetts Institute of Technology
Sloan School of Management
Cambridge, Mass. 02139

DESCRIPTION - Synchronize signals for maximum equal bandwidths in each direction, given number of signals on a street, common cycle length, green and red times and specified vehicle speeds. Adjust synchronization to increase one bandwidth to some specified feasible value and maintain others as large as possible. Plots bandwidth of 10 signals on an 11 inch plotter. Method: Mixed integer-continuous variable algorithm. Restriction: 50 signals.

PROGRAMMING SYSTEMS - Written in FORTRAN without FORMAT.

MINIMUM SYSTEM REQUIREMENTS - 20K, card reader, plotter.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092002

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.083THE SELECTION OF A CYCLE LENGTH FOR FIXED TIME TRAFFIC SIGNALS

**

AUTHORS: A. J. Bone T. N. Harvey
B. V. Martin

DIRECT TECHNICAL INQUIRIES TO:

T. N. Harvey
MIT
Room 1-223
Cambridge, Mass.

DESCRIPTION - Calculates delay by Webster method, parameters for probability of arriving vehicle clearing intersection on first green phase and parameters for determining maximum expected queue also compute average queue. Restrictions: Analyses intersections in isolation; limited to two phase operations (may be modified); cannot deal with saturation conditions.

PROGRAMMING SYSTEMS - Programmed in FORTRAN with Format and FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - Load and Go FORTRAN 13K; FORTRAN II 40K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092003

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.2.084GENERALIZED STACK - VIBRATION CALCULATIONS BASED ON RAYLEIGH-RITZ FORMULAE

**

AUTHORS: Mr. D. D. Williams Mr. J. A. Rodgers

DIRECT TECHNICAL INQUIRIES TO:

Mr. D. D. Williams
Baltimore Gas & Electric Co.
Analysis & Systems Engr.
Electric System Planning Dept.
Baltimore, Maryland 21203

DESCRIPTION - Program Calculates the Fundamental Frequency and frequency of the First Harmonic, in cycles per second for the vibration of a cylindrical and/or conical shaped stack comprised of a metal-plate shell with or without 2 lining. The thickness of plates and lining may vary, from tier to tier, except for any conical-bank which is of constant thickness. Examples given are for steel and gunze stacks. Use proper Moduli and unit weight for other material. Range: The program calculates the root-values between .00000X ft. to XXXXXX. ft.

PROGRAMMING SYSTEMS - Written in FORTRAN PDQ.

MINIMUM SYSTEM REQUIREMENTS - 20K 1620 card system with Auto divide and Indirect Addressing.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620092004

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.006ASTM-TO-TBP AND TBP-TO-ASTM DISTILLATION CONVERSIONS

AUTHOR: O. K. Miniato

DIRECT TECHNICAL INQUIRIES TO:

O. K. Miniato
Shellburn Refinery
201 Kensington Street
Burnaby 2, B. C., Canada

DESCRIPTION - To Convert the I.B.P., 10%, 30%, 50%, 70%, 90% distilled and E.P. of an ASTM distillation curve to the corresponding points on a T.B.P. curve, and vice versa. Uses correlations published by S. C. Edmister and K. K. Okamoto in August, 1959, issue of Petroleum Refiner. Tape system, memory 20K are required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093006

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.011ADIABATIC FLAME TEMPERATURE, NO DISSOCIATION

AUTHOR: H. B. Kerr

DIRECT TECHNICAL INQUIRIES TO:

H. B. Kerr
Box 21
Tennessee Polytechnic Institute
Cookeville, Tennessee

DESCRIPTION - This program was designed to compute the adiabatic flame temperature for the combustion process using a large amount of excess air (such as in the combustion turbine) where the flame temperatures are low enough (below 3000 F) so as to have a negligible amount of dissociation in the products of combustion. The program is designed so that any hydrocarbon having a known enthalpy of formation may be run, with any amount of excess air. The flame temperature is assumed independent of pressure. Memory 20K (card 1620), no special features required. Program written in FORTRAN with Format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093011

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.012THIELE-GEDES METHOD FOR MULTICOMPONENT DISTILLATION

**

AUTHOR: Anthony J. Capato

DIRECT TECHNICAL INQUIRIES TO:

Anthony J. Capato
Department of Chemical Engineering
Columbia University
New York 27, New York

DESCRIPTION - This program uses the Thiele-Geddes method to perform plate to plate material balances in a distillation column with a specified number of plates. The method makes the following simplifying assumptions: 1. Constant molar overflow from plate to plate. 2. Equilibrium is established on each plate. Approximately 36,000 digits.

PROGRAMMING SYSTEMS - Written in FORTRAN I with Format.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, 40K core memory, 1622 Card Reader and Punch.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.013LOW AND MEDIUM PRESSURE GAS NETWORK ANALYSIS PROGRAM

AUTHOR: Mr. J. F. Aldrich

DIRECT TECHNICAL INQUIRIES TO:

Mr. J. F. Aldrich
Niagara Mohawk Power Corp.
300 Erie Blvd. West
Syracuse 2, New York

DESCRIPTION - The need for a method of studying a gas

CONTINUED FROM PRIOR PAGE

distribution network has long been recognized, and several programs have already been written to handle this type of problem. All of these programs are quite similar, most of them employing the Modified Hardy-Cross Method solution. However, in almost every case the task of data preparation is overwhelming for all but the simplest networks. The purpose of this program is not only to provide a means for solving as large a network as possible, but also to overcome as many of the data collection problems as possible. This program has been written in eight parts for the IBM 1620 card system with 40,000 digit core storage. Any low or medium pressure system of up to 3000 mains can be solved. Any number of closed loops may be used to describe the system.

MINIMUM SYSTEM REQUIREMENTS - An IBM 1620 card system with 40,000 digit core storage.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.014

EQUIVALENT PIPE LENGTHS

AUTHOR: J. F. Aldrich

DIRECT TECHNICAL INQUIRIES TO:
J. F. Aldrich
Niagara Mohawk Power Corp.
300 Erie Blvd., West
Syracuse 2, New York

DESCRIPTION - This program is intended as a preliminary to the "Low and Medium Pressure Gas Network Analysis" (1620-09.3.013). It performs the necessary calculations to reduce complex mains composed of several lengths of various sized pipe to an equivalent length and diameter as required by the load flow program. Output is the "permanent main data" required by the load flow program. Machine requirements - 40K card system with Indirect Addressing. Program language - SPS I (excess 50 Floating Point).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093014

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.015

CALCULATION OF VAN LAAR CONSTANTS AND VAPOR LIQUID EQUILIBRIUM FROM AZEOTROPE DATA

AUTHOR: G. L. Cunningham

DIRECT TECHNICAL INQUIRIES TO:
G. L. Cunningham
Eastern Illinois University
Charleston, Illinois

DESCRIPTION - This program calculates the equilibrium vapor pressures, vapor composition, and liquid-phase activity coefficients for a binary system which forms an azeotrope, at intervals of 0.05 mole fraction, from one measurement of the azeotrope composition, temperature, and pressure. The boiling point: composition diagram is also calculated at 760 mm. or any selected pressure. The Van Laar constants for the system are determined at the azeotrope and then used to calculate the activity coefficients and vapor pressures at each concentration. The liquid phase must be homogeneous- two immiscible liquid phases invalidate the calculation. Accuracy is limited to the extent to which the assumptions of the Van Laar equation apply. Storage used - 20K. Equipment required - card I/O. Written in FORTRAN with Format. This program was written for AFIT FORTRAN, but may be compiled on FORTRAN with Format with minor format changes. The ABS Subroutine is used, but may be bypassed by a simple modification.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093015

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.016

LEAST SQUARES FIT OF VAPOR PRESSURE DATA BY THE ANTOINE EQUATION

AUTHOR: G. L. Cunningham

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR COLUMN

G. L. Cunningham
Eastern Illinois University
Charleston, Illinois 61920

DESCRIPTION - This program calculates the three coefficients for the Antoine vapor pressure equation by the method of D. G. Miller, using a least-squares fit to the linearized equation, with iteration on C. Up to 120 pairs of pressure-temperature measurements may be employed. The calculated values of P and log (P) may be typed or punched for comparison with the input data. By a hunting process, a value of the non-linear constant, C, is found for which the sum of squares of deviations from the linearized equation is a minimum. Storage used by the program - 19,750. Equipment - card system, 20K core, no special features. Written for AFIT FORTRAN. The program employs the free-form input of AFIT FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093016

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.3.018

COMPUTATION OF EQUILIBRIUM COMPOSITION AND TEMPERATURE OF CHEMICAL REACTIONS

AUTHORS: H. E. Meads G. E. McGowan

DIRECT TECHNICAL INQUIRIES TO:
H. E. Meads
Baltimore Gas and Electric Co.
Baltimore, Md. 21203

DESCRIPTION - Computes the equilibrium conditions for the combustion of any hydrocarbon in air or in any oxygen-nitrogen mixture of a given ratio. Uses method devised by Huff, Gordon and Morrell (1) involving solution of equations simultaneously by successive iterations. Restricted to adiabatic combustion processes in which the total number of elements and compounds does not exceed 7 and 13, respectively. Thermodynamic Functions Program is restricted to use with the Table of Coefficients included with the writeup. Equipment required: 20K card system. Written in PDQ FORTRAN with Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620093018

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.004

SELECTION OF ECONOMIC CONDUCTOR SIZE (SPECIFIC CASE NEW ENGLAND SYSTEM PROGRAM #18)

AUTHOR: R. H. Snow

DIRECT TECHNICAL INQUIRIES TO:
R. H. Snow
New England Electric System
245 South Main Street
Hopedale, Massachusetts

DESCRIPTION - Given installed costs, resistances, a load forecast, unit loss costs, and other pertinent data, this program calculates cumulative present worth of total annual costs for any four conductor sizes, and prints these costs for each year for a period not exceeding 20 years, on a 1000 wire-foot basis. Results are presented in tabular form and may easily be transferred to a graph, if desired. About 3000 memory locations are required, exclusive of tables and subroutines.

MINIMUM SYSTEM REQUIREMENTS - A 1620, 20K, 1622 Card Read Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094004

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.006

SHORT CIRCUIT ANALYSIS

AUTHOR: G. S. Haralampu

DIRECT TECHNICAL INQUIRIES TO:
G. S. Haralampu
New England Electric System
441 Stuart Street
Boston 16, Massachusetts

CONTINUED FROM PRIOR PAGE

DESCRIPTION - This program is to be used for the determination of current distribution constants, bus voltages, and X/R ratios under faulted conditions. This program is a one pass program, and complex network impedances are used.

MINIMUM SYSTEM REQUIREMENTS - A 1620, 20K, 1622 Card Read Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094006

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.007SHORT CIRCUIT CALCULATIONS

AUTHOR: G. S. Haralampu

DIRECT TECHNICAL INQUIRIES TO:
G. S. Haralampu
New England Electric System
441 Stuart Street
Boston 16, Massachusetts

DESCRIPTION - This program is to be used for the determination of current distribution constants, bus voltages, X/R ratios, and impedances to the point of fault, under faulted conditions. The program accommodates a system of 80 buses and 119 lines and is done in three passes. Complex impedance networks are used.

MINIMUM SYSTEM REQUIREMENTS - A 1620, 20K, 1622 Card Read Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094007

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.008TRANSMISSION LOSSES AND PENALTY FACTORS

AUTHOR: D. Hayward

DIRECT TECHNICAL INQUIRIES TO:
D. Hayward
New England Electric System
441 Stuart Street
Boston 16, Massachusetts

DESCRIPTION - This program will figure generated power, losses and received power and the penalty factor at each entry point of the system represented by the B-constant matrix. It does not figure the B-constants. They must be available to use the program. The program is limited to a 28 by 28 B-constant matrix.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K and card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094008

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.009CURVE FITTING - SIMULATED PLANT RECORDED METHOD (REVISED VERSION)

AUTHOR: W. D. Garland

DIRECT TECHNICAL INQUIRIES TO:
W. D. Garland
New England Electric System
441 Stuart Street
Boston, Massachusetts

DESCRIPTION - Finds the best fitting average life within each curve type tried per plant account. Also, calculates retirement experience and conformance indices by which (goodness of fit) may be assessed. (cf. Methods of Estimating Utility Plant Life, Edison Electric Institute, 1952). 11,246 core positions, including Fixed Point Divide subroutine.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with a 1622 Card Read Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

CONTINUED FROM PRIOR COLUMN

ORDERING INFORMATION: PROGRAM NUMBER 1620094009

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.011POWER PRODUCTION COST

AUTHOR: R. L. Patterson

DIRECT TECHNICAL INQUIRIES TO:
R. L. Patterson
West Penn Power Company
Cabin Hill
Greensburg, Pennsylvania

DESCRIPTION - The purpose of this program is to sort given station power blocks in ascending incremental cost order, to integrate a load duration curve using the sorted power blocks to determine base megawatt-hours, variable megawatt-hours, and cost of the variable megawatt-hours. Base fuel and output maintenance costs can be applied to determine the base fuel and variable fuel cost.

PROGRAMMING SYSTEMS - Written in machine language.

MINIMUM SYSTEM REQUIREMENTS - A 1620 tape system with Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094011

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.012TRANSFORMER RATING FOR NORMAL AND EMERGENCY OPERATION

AUTHOR: E. M. Gulachenski

DIRECT TECHNICAL INQUIRIES TO:
E. M. Gulachenski
New England Electric System
441 Stuart Street
Boston, Massachusetts

DESCRIPTION - This program calculates the overload rating of a transformer for either normal or emergency operation based on the same information regarding the load curve and ambient temperature as is required to use ASA C57.92. A single rating is given for each loading condition desired, thus eliminating the need for interpolation as is required when using the loading tables in ASA C57.92. The ratings given are based on the factory test values for the transformer in question not on average values as in C57.92. Answers are printed out in report form with all input data clearly defined and labeled. Storage used is approximately 19,500 positions.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K and card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.013TRANSIENT STABILITY FOR TEN MACHINES

AUTHOR: R. O. Bigelow

DIRECT TECHNICAL INQUIRIES TO:
R. O. Bigelow
New England Electric System
441 Stuart Street
Boston, Massachusetts

DESCRIPTION - Calculates Swing Curves for a transient stability problem on an AC electric power network. The package includes calculation of transfer impedances on the network for input data to the main step-by-step solution. A plot program is also provided to plot Swing Curves directly on the 1620 Typewriter.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094013

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-09.4.015SIMULTANEOUS EQUATION SOLUTION AND MATRIX INVERSION WITH COMPLEX VALUES

AUTHOR: G. S. Haralampu

DIRECT TECHNICAL INQUIRIES TO:

G. S. Haralampu
New England Electric System
441 Stuart Street
Boston 16, Massachusetts

DESCRIPTION - The program has been written for the solution of a maximum of seventeen equations with seventeen unknowns with the coefficients, unknowns, and constants being complex numbers. The matrix inversion method is used for the solution of the simultaneous equations, and with sense switch settings, the inverted matrix may be part of the output. Storage 19,500 digits and memory 20K.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K, 1622 Card Read Punch, or 80K 7010 computer.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.016NETWORK REDUCTION PROGRAM

AUTHORS: R. H. Jordan R. S. Moody

DIRECT TECHNICAL INQUIRIES TO:

R. H. Jordan
Indianapolis Power and Light Company
25 Monument Circle
Indianapolis 6, Indiana

DESCRIPTION - The purpose of the program is to reduce a larger network to a smaller equivalent network. A 25 bus network can be reduced to any smaller size.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K, 1620 paper tape.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094016

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.018RADIAL THREE PHASE LINE DROP CALCULATIONS

AUTHORS: E. J. Orth, Jr. J. L. Redmond

DIRECT TECHNICAL INQUIRIES TO:

E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - Computes and/or reads out at each load and branch point: Total percent R and X, fault MVA, adjusted P and Q loads, voltage, percent drop from bus voltage, line current, low side capacitors, high side capacitors adjusted to load voltage, and if regulator installed, percent buck or boost and regulator terminal voltage. Accepts three types of voltage regulators on main feeder only: standard regulator, holding voltage at its terminals; regulator holding voltage at next load point; fixed buck or boost. Any number of non-forked branches are allowed. Any number of branches may occur at one point. Output may be punched or printed. Punched output designed for 402-407 listing.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 40K and card I/O.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094018

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.020RADIAL THREE PHASE LINE DROP CALCULATION IN 2 PASSES

AUTHORS: E. J. Orth, Jr. J. L. Redmond

DIRECT TECHNICAL INQUIRIES TO:

E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - Computes and/or reads out at each load and branch point: Total percent R and X, fault MVA, adjusted P and Q loads, voltage, percent drop from bus voltage, line current, low side capacitors, high side capacitors adjusted to load voltage, and if regulator installed, percent buck or boost and regulator terminal voltage. Accepts two types of voltage regulators on main feeder only: standard regulator, holding voltage at its terminals, and fixed buck or boost. Any number of non-forked branches are allowed. Any number of branches may occur at one point. Punched output designed for 402-407 listing.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K, Auto Divide and card I/O.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094020

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.023SHORT CIRCUIT ANALYSIS BY MATRIC METHOD

AUTHOR: James L. Cooke

DIRECT TECHNICAL INQUIRIES TO:

James L. Cooke
Gulf States Utilities Company
Lock Drawer No. 2951
Beaumont, Texas

DESCRIPTION - Programs Compute Short-Circuit Data for an Electric Power System. Zero-sequence voltages and currents are computed for line to ground faults. Currents and impedances (as seen by impedance relays) are computed for three phase faults- Complex impedances are used. Memory 20K, Automatic Divide, Indirect Addressing, and card input/output. No other special features required. SPS, Fixed Point, non-relocatable.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094023

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.026CAUER EXPANSIONS OF PASSIVE ONE-PORT NETWORKS

AUTHOR: Eric G. Manning

DIRECT TECHNICAL INQUIRIES TO:

Eric G. Manning
University of Waterloo
Department of Mathematics
Waterloo, Ontario
Canada

DESCRIPTION - The program accepts the coefficients of a positive real rational reactance function as input, and produces the terms of the corresponding Cauer expansion as output. The network elements values follow directly from the computed output. The user may choose either of the two Cauer forms, by setting a console switch. RC and RL functions may be handled by first converting them to reactance functions.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, Indirect Addressing and no other special features required.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094026

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.027SHORT CIRCUIT ANALYSIS OF RADIAL SYSTEMSAUTHORS: W. Mylius, Jr. K. Campbell
L. Teague

DIRECT TECHNICAL INQUIRIES TO:

W. Mylius, Jr.
The Rust Engineering Co.
2316 4th Avenue No.
Birmingham 3, Alabama1620-09.4.020 *#RADIAL THREE PHASE LINE DROP CALCULATION IN 2 PASSES

AUTHORS: E. J. Orth, Jr. J. L. Redmond

CONTINUED FROM PRIOR PAGE

DESCRIPTION - This program may be used by a design engineer to calculate circuit breaker requirements in asymmetrical amperes and interruptive KVA under conditions of both load and line side faults. Output includes ratings of reactors used.

Card I/O, 407 with 80-80 panel for listing, memory 40K and Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094027

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.028TRANSFORMER RATING FOR NORMAL AND EMERGENCY OPERATION WITH COMPLEX LOAD CYCLES

AUTHOR: E. M. Gulachenski

DIRECT TECHNICAL INQUIRIES TO:
E. M. Gulachenski
New England Electric System
441 Stuart Street
Boston, Massachusetts

DESCRIPTION - This program has been written to rate transformers for both normal and emergency operations based on the actual load curve shape for the transformer in question. It is not necessary to convert the actual load curve to a simplified equivalent curve as required to use the ASA loading guide C57.92. The rating as calculated is printed out and so labelled together with the calculated top oil rise and hottest spot copper temperature for each of the twenty-four hours in the load cycle. An alternate use of the same program permits entering a maximum peak load expected on a particular transformer together with the shape of the load curve and have calculated the top oil rise and hottest spot copper temperature attained for each of the twenty-four hours in the given load cycle. Equipment specifications - 1620 with 20K memory and a 1622 Card Punch, no special hardware. Storage requirements - no limit on number of transformers to be calculated at any one time. Equations used -

- a.) C equals $0.06 (WCC) + 0.04 (WTANK) + 1.33 (GALSO)$
- b.) TR equals $C (TPI/PFL)$
- c.) TGFL equals $TAVCU - TPL + 10$ where -
C equals constant used in calculating TR,
TR equals time constant for the transformer,
TGFL equals hottest spot copper temperature rise over, top-oil temperature at full load
WCC equals weight of transformer coil and coils - lbs.,
WTANK equals weight of transformer tank - lbs.,
GALSO equals gallons of oil in transformer,
PFL equals total transformer losses at full load - watts,
TAVCU equals average copper temperature rise over ambient-0 sub C,
TPL equals full load top oil rise over ambient-0 sub C.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094028

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.029NETWORK REDUCTION PLUS DISTRIBUTION FACTOR CALCULATION AND APPLICATION

AUTHOR: E. J. Orth, Jr.

DIRECT TECHNICAL INQUIRIES TO:
E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - A group of 5 programs -

- 1- Convert original network impedances to admittances, and compute driving point admittances-
- 2- Reduce network and determine complex distribution factors from buses eliminated to buses held-
- 3- Convert admittances of equivalent network to impedances-
- 4- Compute magnitude and angle of distribution factors and check components to assure that their sum is $1+J0$ - and
- 5- Prorate load/generation from eliminated buses to held buses according to distribution factors.

The first two programs are modifications of 1620 program 9.4.016, as written by Jordan and Moody of Indianapolis Power and Light Company.

MINIMUM SYSTEM REQUIREMENTS - For 40K, will accept up to

CONTINUED FROM PRIOR COLUMN

53 buses. For 20K, maximum is 29 buses. Larger systems may be handled by segmentizing. Core limitation occurs in Program 2. All computations are complex. Card I/O.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094029

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.030MULTI ANCHOR PIPE STRESS ANALYSIS

AUTHORS: J. F. Asuncion Lloyd W. Coombe

DIRECT TECHNICAL INQUIRIES TO:
Lloyd W. Coombe
The Detroit Edison Company
2000 Second Avenue
Detroit 26, Michigan

DESCRIPTION - This program will perform flexibility calculations of a piping system by determining the magnitude and direction of the movements and forces acting on any specified point due to thermal expansion in a system of up to 5 anchors.

PROGRAMMING SYSTEMS - Written in FORTRAN II

MINIMUM SYSTEM REQUIREMENTS - Card I/O, memory 40K, Automatic Divide, and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620094030

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-09.4.031NORMAL AND EMERGENCY CABLE RATINGS

AUTHOR: K. E. Scott

DIRECT TECHNICAL INQUIRIES TO:
K. E. Scott
New England Electric System
441 Stuart Street
Boston 16, Massachusetts

DESCRIPTION - Program 16-1 will calculate the thermal constants of cable from cable rating handbook data or from the physical construction data of the cable. Its output is the cable data card used in programs 16-2 and 16-3.

Program 16-2 will calculate the rating of one or more cables of similar or unlike characteristics in a multiple occupancy duct bank and the corresponding duct bank and the corresponding duct temperature. If no cable ampacity values are assigned, the program will calculate the maximum current allowed for each cable without exceeding its normal operating temperature. If one or more current ratings are assigned, the program will calculate maximum values for the remaining cables. If all cables are assigned values, the program calculates the corresponding duct temperature. If any current value assigned causes a cable to exceed normal operating temperature, the cable identification will be printed together with the duct temperature required to permit normal operation and duct temperature resulting from the current value used. The output of the program is a printed listing of the data and, if desired, a punched deck usable as the input data for program 16-3.

Program 16-3 will calculate the short-time rating of cables using the output deck of 16-2 as the source of most of its input data. Ratings (by insertion of desired times and/or cable time constants) can be calculated for any time or time constant. If neither time nor time constant is inserted, the program calculates ratings for one-half, one, two, four, twenty-four, and over twenty-four hour periods. The output is punched to be listed in report form as amperes and MVA for the programmed times. Cards, memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094031

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-09.4.032TRANSFORMER RATINGS BASED ON LOSS OF LIFE AND ACTUAL 24-HOUR LOAD CYCLE

AUTHOR: E. M. Gulachenski

DIRECT TECHNICAL INQUIRIES TO:

E. M. Gulachenski
New England Electric System
441 Stuart Street
Boston 6, Massachusetts

DESCRIPTION - This program will calculate the normal and/or emergency rating of a transformer given the transformer nameplate data, manufacturers test results, and the shape of the loading cycle. Ratings are based on the actual 24-hour load curve for the transformer. It is not necessary to draw out this curve and thus determine the peak load duration and equivalent 12-hour previous load such as is required to use the ASA loading guide C57.92 or programs nos. 2 and 35. The calculated ratings are based on a permitted loss of life which is specified in the input. For a no loss of life rating, zero (0) percent loss of life would be entered on the input cards. Equipment specifications - 1620 with 20K memory and 1622 Card Punch, no special hardware. Written in FORTRAN with no special format.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094032

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.033GENERATION PLANNING

AUTHORS: T. McDonough W. J. Pfeifer, Jr.

DIRECT TECHNICAL INQUIRIES TO:

L. W. Coombe
The Detroit Edison Company
2000 Second Avenue
Detroit 26, Michigan

DESCRIPTION - This program was written to assist in the economic evaluation of Generation System Expansion Plans. The program considers such variables as load projection, unit capability, heat rate and the resultant effect at partial loading, transmission penalty factor, and fuel costs and their escalation. Memory 20K, Automatic Divide, Indirect Addressing, transfer numerical fill, transfer numerical strip, move flag. SPS, Fixed Point.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094033

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.036PLANT GENERATION FOR GIVEN INCREMENTAL COST

AUTHOR: E. J. Orth, Jr.

DIRECT TECHNICAL INQUIRIES TO:

E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - Given the matrix of B coefficients, plant limits, fuel cost data, hydro generation, fixed loads, tie line values, and LAMBDA, plant generation is computed. If computed plant generation is less than minimum or greater than maximum, the respective limit is inserted as fixed generation, and the solution repeated. When all computed values are within range, percent power delivered and LAMBDA (incremental cost) are computed for each source. The general form of the transmission loss equation is used. Card I/O, FORTRAN II 40K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094036

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.037ELECTRIC POWER FLOW I

AUTHOR: Y. J. Fujimura

DIRECT TECHNICAL INQUIRIES TO:

Y. J. Fujimura

Department of Water and Power
Box 3669 Terminal Annex
Los Angeles 54, California

DESCRIPTION - The program will determine the Electric Power Flow conditions for various system configurations and requirements. The preparation of data for the base case and for system changes from case to case is done on standard forms. There are two simple basic forms so as to minimize errors. Iterative calculation with use of Gauss-Seidel equations, accelerating factors, extrapolation, and undercorrection. Storage requirements - 40K core, 1 pass. Equipment specifications - card system. Memory-40K. Automatic Divide- Indirect Addressing- Special Features.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094037

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.038COMPUTATION OF ROOT LOC I

AUTHORS: C. W. Richard, Jr. Harvey M. Paskin

DIRECT TECHNICAL INQUIRIES TO:

C. W. Richard, Jr.
Mathematics Department
AF Institute of Technology
Wright-Patterson AFB, Ohio

DESCRIPTION - Given the poles and zeros of a rational transfer function $G(S)$, this FORTRAN Program calculates the roots of the characteristic equation for a feedback system $1 + K G(S)$ equals 0. The locus of one root is calculated at equal increments in the complex S-plane for monotone variations of the parameter K. The number of poles plus the number of zeros of $G(S)$ must not exceed 25. Points on the locus are calculated only for non-negative values of the parameter K. IBM 1620 with 20,000 digits of memory. 1622 Card Reader-Punch.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094038

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.039SOLUTIONS FOR DETERMINATION OF LOOP CURRENTS IN ELECTRIC CIRCUITS

AUTHOR: Neale F. Koenig

DIRECT TECHNICAL INQUIRIES TO:

Neale F. Koenig
8963 Mayfield Ct.
Jenning 21, Missouri

DESCRIPTION - By simply inputting the circuit (linear) configuration and parameters, a partial solution in terms of the Laplace Transformed Equations is obtained. It remains to invert the resulting output matrix and perform a matrix multiplication to obtain loop currents. 1620 with 60K (program can be modified for smaller machines by reducing the size of problem that can be handled). Automatic Divide, Indirect Addressing, Floating Point hardware. This program is written in FORTRAN II.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094039

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.040MULTI-ANCHOR PIPE STRESS ANALYSIS

AUTHORS: R. R. Gould E. I. Motte

DIRECT TECHNICAL INQUIRIES TO:

R. R. Gould
Process Engineering Lab.
Union Oil Co. of California
Rodeo, California

DESCRIPTION - Given the individual member length, planes, etc., the coordinates and shape coefficients of each member are calculated. A matrix of coefficients is then assembled and solved to determine moments and forces at the end of each branch due to thermal expansion. These moments and forces are then transferred to each member and the stress of that member is calculated. The general analytical method of flexibility analysis, as described in Design

*M

CONTINUED FROM PRIOR PAGE

of Piping Systems by M. W. Kellogg Co., has been somewhat modified by eliminating consideration of skewed members in space, skewed bends in a plane, and restricting bends to 90 degrees per member. This program is limited to 4 branches and 5 anchors without extraneous restraints. Shape coefficients for skewed members in space, skewed bends in a plane, and bends other than 90 degrees per member are not calculated and must be approximated.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, 20K, card I/O, Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object decks.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source Code.

ORDERING INFORMATION: PROGRAM NUMBER 1620094040

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-09.4.041

LOW-PASS FILTER DESIGN

AUTHOR: Coleman Burton

DIRECT TECHNICAL INQUIRIES TO:
Coleman Burton
General Electric
4000 NW 39th Street
Oklahoma City 12, Okla.

DESCRIPTION - This program computes the actual component values of a Low-Pass Filter from its transfer function polynomial and point(s) of zero transmission (infinite attenuation). Will handle a transfer function of degree 15 or less and up to 6 pairs of zeros. Storage requirements - 20K-memory. Equipment specifications- Card system, memory 20K Automatic Divide. An absolute value subroutine is used. Language-1620 FORTRAN with Format.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094041

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.043

DIGITAL TOOL FOR PLANNING RADIAL DISTRIBUTION SYSTEMS

AUTHORS: E. J. Orth, Jr. J. L. Redmond
J. W. Crawford

DIRECT TECHNICAL INQUIRIES TO:
E. J. Orth, Jr.
Southern Services, Inc.
P. O. Box 2641
Birmingham, Alabama

DESCRIPTION - Computes percent voltage drop, percent voltage rise due to capacitors, net percent voltage drop, line flow without capacitor effect, line flow with capacitor effect, and KVAR applied to each point without capacitor effect. Gives voltage drop or voltage level under switch control. If an area on the system has lower than average loading (such as rural lines), will accept individual transformer known demand factor. Will accept distances between points in feet, or distance can be entered in inches making use of a scale factor. Accepts any combination of single-phase, open WYE, and three-phase lines. Load forecasting is available. Accepts capacitors at any three-phase point on the system. Accepts voltage regulators. A coincidence factor may be entered to adjust for diversity among systems. Any number of forked branches are allowed up to a nest of 25. Any number of branches may occur at one point. Equipment specifications - Card I/O, 40K, Auto Divide, FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094043

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.044

B CONSTANT PROGRAM

AUTHOR: James L. Cooke

CONTINUED FROM PRIOR COLUMN

DIRECT TECHNICAL INQUIRIES TO:

James L. Cooke
Gulf States Utilities Co.
Lockdrawer 2951
Beaumont, Texas

DESCRIPTION - To compute B constants (loss formula coefficients) of a power system with which incremental and total power losses may be computed. Mathematical method-bus impedance matrix and KRON'S network reduction restrictions, range-up to 40 bus power system, of which up to and including 15 of the busses may be source busses. Off-nominal transformer turns ratios are not recognized by the program. Storage requirement-40K equipment Specifications - Memory 40K other special features required-Card I/O the program was compiled in Format FORTRAN on a 40K IBM 1620 with AD, IA and SF, and the compiled program required virtually all of the 40K memory. Running time on a 31 bus system, 12 of which were sources, without iterating for 5 values, was 30 minutes.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094044

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.045

ELECTRIC SHORT CIRCUIT CURRENT CALCULATION

AUTHOR: Jose Marina-Martinez

DIRECT TECHNICAL INQUIRIES TO:
Jose Marina-Martinez
Puerto Rico Water Resources Authority
Electrical Planning and Research Div.
San Juan, Puerto Rico

DESCRIPTION - This program calculates short circuit currents and X/R ratio to the point of fault in complex impedance networks. Bus voltages can also be obtained. The program can also be used to determine transfer and driving point impedance as needed for transient stability programs. Restrictions/range-system as large as 150 busses and 250 lines can be solved. No limitation on number of generators. Negative impedance should be avoided. Storage requirements-about 17,000 core positions are used. Equipment Specifications - Card system, 20K, Automatic Divide, no other special feature. Additional remarks- SPS Programming System was chosen instead of FORTRAN because a larger system can be solved and most important, computing time is greatly reduced (about 10 times). For example, a system of 85 busses and 160 lines takes about 15 seconds per iteration with this program. Fixed Point Arithmetic is used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094045

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.046

ROOT LOCUS PLOTTING

AUTHORS: T. F. Gardner E. C. Thompson

DIRECT TECHNICAL INQUIRIES TO:
Prof. William Reuter
Electrical Engineering Dept.
South Dakota School of Mines & Tech.
Rapid City, South Dakota

DESCRIPTION - This program allows the engineer to plot root loci and compute the gains for the points on the locus in a fraction of the time required by manual methods. An option is provided to allow any portion of the plot to be expanded to obtain greater accuracy. Mathematical method - This program makes root locus plots by scanning the complex frequency plane in search of points where the imaginary part of the transfer function being considered is equal to zero and the real part is negative. Transfer function having a maximum of a fourth degree numerator and a maximum of a fifth degree denominator. The degree of accuracy obtained and the time consumed in obtaining the desired results are restricted by the care exercised by the operator in selecting the portion of the complex plane to be scanned.

Storage requirements - This program requires 19,127 storage positions including all loading routines, the symbol and multiple-add tables and all subroutines. Equipment specifications...1620 computer with 20K storage, Automatic Divide, Indirect Addressing, and 1622 Card Read-Punch. The program is written in 1620 Floating Point FORTRAN language. In addition, a special subroutine was written that modified the standard FORTRAN language to allow plotting. This subroutine was written in machine language and replaced the ATAN subroutine in the standard deck.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094046

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.4.048ELECTRIC POWER FLOW III

AUTHOR: H. Y. Lee

DIRECT TECHNICAL INQUIRIES TO:

H. Y. Lee
Dept. of Water & Power
Box 3669 Terminal Annex
Los Angeles, Calif. 90054

DESCRIPTION - The SPS 2 program as furnished is setup to solve electric network problems up to 150 buses and 220 lines. In addition to the features found in most Power Flow Programs, this program allows one special line per bus where the impedance of the line is unrestricted. It may be a negative value, zero for tying two buses together, or less than 0.011 percent on 100-MVA base. In many problems the slow convergence and errors around a bus having very high and low impedance line terminations can be avoided. Storage used by program - 60K core. Equipment required by program- Card System, TNS, TNF, MF, Auto Divide, Indirect Addressing. Programming type - SPS. Language used in the writeup- SPS. Two data forms, one for the bus and one for the line/transformer are used for all the runs.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094048

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.4.049ELECTRIC LOAD FLOW SINGLE LINE DIAGRAM OUTPUT

AUTHOR: R. I. Marino

DIRECT TECHNICAL INQUIRIES TO:

R. I. Marino
Planning and Research Department
Long Island Lighting Company
175 East Old Country Road
Hicksville, New York

DESCRIPTION - This program prepares an output for the Electric Load Flow Program No. 1620 SU-04X-07X in single-line diagram form, with names of buses, lines and transformers indicated, and voltages, loads, generation, and flows in their corresponding place on the diagram. This program does not modify the generalized core map of the load flow, so a sequence of cases can be run. Modification of common data storage (as described on pages 24 and 25 of the load flow manual) apply to this program. The use of 100 MVA base in the load flow data will lead directly to answers in megawatts and megavars on the diagram. Partial diagrams can be obtained at any time during solution of load flow. Indication of outage of lines and buses is provided. Losses in lines are calculated separately from losses in transformers. Total generation and load are calculated. The range and restrictions for the load flow program apply for this program as well. Storage required- 20K memory. Equipment - Card system., TNS, TNF, MF., Autodivide., Indirect Addressing. The use of a bigger storage machine or the sacrifice of some features of the program will allow removal of some of these requirements. Fixed Point Arithmetic is used. Programming type - SPS - 1620/1710.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094049

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.4.050THREE PHASE SHORT CIRCUIT STUDY PROGRAM

AUTHOR: John S. Krystoff

DIRECT TECHNICAL INQUIRIES TO:

John S. Krystoff
Department of Water and Power
Box 3669 Terminal Annex
Los Angeles 54, California

DESCRIPTION - This program was written to assist power system planning engineers in evaluation of electrical networks. The program will calculate three phase short

CONTINUED FROM PRIOR COLUMN

circuit duties at all nodes in a network as well as the line contributions to the faulted node. Also, for specified nodes, total three phase duties and line contributions are given after the removal of a tie line. Network changes are permitted allowing systems to be studied through a growth period, a feature which reduces the execution time per network studied. The solution consists of building a driving point transfer impedance matrix (inverted driving point and transfer admittance matrix) as each node is introduced to the network, the solution is direct not iterative. Language used in the writeup - FORTRAN II. The program as submitted here has a max. range of 69 nodes and 200 ties. However, for use on other computers this range can be expanded or contracted to conform with other computer limitations.

PROGRAMMING SYSTEMS - WRITTEN IN FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program- 60K core with card and disk file systems. Equipment required by program- Card System, disk file system. Program can be used on lesser machine. Requirements which can be easily removed- disk file system (with reduced program range).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094050

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.4.051EVALUATION OF POWER TRANSFORMER LOSSES

AUTHOR: E. M. Gulachenski

DIRECT TECHNICAL INQUIRIES TO:

E. M. Gulachenski
New England Electric System
441 Stuart St.
Boston, Mass.

DESCRIPTION - This program calculates the capitalized cost of losses for a transformer based on the estimated yearly peak loads throughout the life of the transformer. The answers are in the following form - No load loss value - (dollars per kw of transformer core loss) Load loss value - (dollars per kw of transformer load loss) These two figures are included in the specifications for a new transformer and play an important part in its design. When multiplied by the design values of core loss and load loss, the resulting dollar figure can be added directly to the cost of the transformer thus providing a means of evaluating several designs on a comparable basis. Card system with 20K memory and no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094051

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.4.052SCALAR SHORT-CIRCUIT

AUTHOR: Dr. D. Carroll

DIRECT TECHNICAL INQUIRIES TO:

Dr. D. Carroll
Electricity Supply Board
58 Upr. Mount St.
Dublin 2, Ireland

DESCRIPTION - Program (in SPS3 for high capacity and speed) calculates the short-circuit current distribution and total MVA for symmetrical 3-phase faults at any specified bus of a power system. Branch resistance and reactance data are converted to admittance magnitudes and all calculation is scalar. Current and voltage at buses other than the faulted bus can be obtained. Program also allows specified branch outages to be effected between fault calculations, thus permitting a complete schedule of successive faultings and switchings to be run without intervention. Solution by Gauss-Seidel Iteration and Extrapolation is 4-6 times faster than an A.C. program, and accuracy is within 1-3 percent thereof. Restriction & range - up to 150 buses, 250 branches/infeeds, one pass. A 20K 1620 card system with TNS, TNF, MF., Auto Divide and Indirect Addressing is required by the program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094052

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

*M

1620-09.4.053SCALAR ELECTRIC LOAD FLOW

AUTHOR: Dr. D. Carroll

DIRECT TECHNICAL INQUIRIES TO:
Dr. D. Carroll
Electricity Supply Board
58 Upr. Mount St.
Dublin 2, Ireland

DESCRIPTION - Program (in SPS3 for high capacity and speed) calculates the current in each branch of a power system, given the HV load and generation at each bus and resistance and reactance of each branch. Branch data are converted to admittance magnitude and all calculation is in scalar arithmetic. Current is proportional (to within 3-5 percent) to real power flow in the network. Solution by Gauss-Seidel Iteration and Extrapolation is four-six times faster than an A.C. study. Restriction & range - up to 150 buses, 220 branches, one pass. 1 20K 1620 card system with TNS, TWF, MF., Auto Divide & Indirect Addressing is required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094053

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.056VOLTAGE PROFILE AND FAULT CURRENT CALCULATIONS FOR RADIAL DISTRIBUTION LINES

AUTHOR: J. Y. Louis

DIRECT TECHNICAL INQUIRIES TO:
J. Y. Louis
Long Island Lighting Company
Hicksville, N.Y.

DESCRIPTION - This program accepts data generally available from grid map of primary distribution circuits to compute the voltage profile along a primary feeder circuit. The same data are used for fault current calculation along the circuit as an optional feature. This program will handle as many feeder circuits as desired with any number of junctions, branches and sub-branches. The equipment that can be included in the study are voltage regulators, boosters, stepdown transformers with or without tap, switched and fixed capacitors. Any number of stepdown transformers can be included on the main but limited to one along each branch. The program is written in PDQ FORTRAN for a 20K IBM 1620 digital computer with card system and Auto divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094056

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.057CALCULATION OF POLES AND ZEROS OF AMPLIFIERS TRANSFER FUNCTIONS

AUTHOR: E. M. Rips

DIRECT TECHNICAL INQUIRIES TO:
E. M. Rips
Electrical Engineering Dept.
Newark College of Engineering
Newark, N.J.

DESCRIPTION - This program utilizes topological data for an electronic network, together with parameter values to calculate the poles and zeros of an active network transfer function. Networks having a maximum of 30 branches can be dealt with. Of these branches a maximum of 10 may be either purely capacitive or purely inductive. The technique utilized cannot treat cases where the number of zeros equals or exceeds the number of poles. Multiple poles can be found but zeros cannot be correctly determined in such cases. In practice, however, such a condition rarely arises. A 60K core card system with Auto Divide is required by program - providing user is willing to subdivide program and punch out intermediate results to serve as data for succeeding sections. The program can be used on a lesser machine. Programming Language - AFIT, improved FORTRAN 1.1.010.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094057

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.058ELECTRICAL NETWORK REDUCTION

AUTHOR: Mr. Edmond Odwyer

DIRECT TECHNICAL INQUIRIES TO:
Mr. Edmond Odwyer
Electricity Supply Board
58 Upper Mount St.
Dublin 2, Ireland

DESCRIPTION - Program will reduce an electrical impedance network to any desired size. Eliminate or retainable buses may be specified. Program accepts as input branches- 1/ series elements - R, X P.U., 2/ load/generation and shunt elements MW, MVAR and P.U. voltage magnitude, and converts each type to an equivalent P.U. admittance. 3/ O/P options, 1 reloadable to 1620-09.4.052. Main applications- reductions to bring networks within the capacity of short circuit and transient stability programs, to cut short circuit program solution times, and for unsymmetrical fault calculations. Reduction is by successive star-mesh conversion and parallel combination The elimination sequence is automatically optimized. All computations are in complex arithmetic, using the SPS Floating Point subroutines. 270 independent (i.e. non-parallel) input branches, for Mantissa length equals 12, and 20K storage. Equipment required- Card system TNS, TWF, MF Auto Divide, Indirect Addressing and TFL. Requirements which can be easily removed are TFL, Auto Divide. Written in SPS III.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094058

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.059ELECTRIC TROUBLE ANALYSIS

AUTHOR: Mae E. Heads

DIRECT TECHNICAL INQUIRIES TO:
Mae E. Heads
Baltimore Gas & Electric Co.
Engineering Computer Applications Group
Baltimore, Maryland 21203

DESCRIPTION - The program is part of a system for collecting, coding, analyzing and reporting information relative to trouble, and interruptions experienced in our electric transmission and distribution system. Its purpose is to provide statistical information in a readable format pertaining to the causes of faults and their effects on the electric system. Information obtained is useful in planning, overhauling and improving electrical equipment and customer service. The program is a revision of a 650 program that was previously used by the company.

PROGRAMMING SYSTEMS - The program is written in four phases in 1620/1710 SPS.

MINIMUM SYSTEM REQUIREMENTS - Card I/O with Auto Divide and Indirect Addressing. Storage 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094059

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.060OVERLOAD RATINGS OF 65 DEGREE CENTIGRADE RISE TRANSFORMERS BASED ON LOSS OF LIFE AND 24-HOUR LOAD CYCLE

AUTHOR: E. M. Gulachenski

DIRECT TECHNICAL INQUIRIES TO:
E. M. Gulachenski
New England Electric System
441 Stuart Street
Boston, Mass.

DESCRIPTION - This program will calculate the normal and/or emergency rating of 650 Centigrade Rise Transformers given the transformer nameplate data, manufacturers test results, and the shape of the loading cycle. Ratings are based on the actual 24-hour load curve for the transformer. It is not necessary to draw out this curve and thus determine the peak load duration and equivalent 12-hour previous load such as is required to use the ASA loading guide Centi. 57.929.

PROGRAMMING SYSTEMS - Compiled with UTO FORTRAN processor.

MINIMUM SYSTEM REQUIREMENTS - Card system with 20K memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR PAGE

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094060

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.061ELECTRICAL FIELD INTENSITY PATTERNS-DRIVEN ANTENNA ARRAY

AUTHORS: Mr. A. C. Harvey Mr. G. L. Gearhart

DIRECT TECHNICAL INQUIRIES TO:

Mr. A. C. Harvey
Systems Analyst
Tri-state College
Angola, Indiana

DESCRIPTION - This program calculates the electrical field intensity pattern of any given broadcast band antenna array. The program accepts the distance, bearing, antenna height, electrical phasing and field ratio of each antenna and the RMS of the entire pattern. Both the angle of elevation and azimuth are swept in varying increments for the output of the electrical field intensity in each direction. Maximum of 14 antennas per pattern.

PROGRAMMING SYSTEMS - Written in FORTRAN without format, Program No. 1.1.010

MINIMUM SYSTEM REQUIREMENTS - 1620 Mod I 20K memory, Indirect Addressing, Card I/O, Auto Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094061

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.062COMBINATIONAL SWITCHING FUNCTION SUBROUTINE SET

AUTHORS: Mr. D. Dietmeyer Mr. P. Schneider

DIRECT TECHNICAL INQUIRIES TO:

Prof. C. H. Davidson, Director
Engineering Computing Lab.
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - The subroutines in this set implement many operations necessary to manipulate combinational logic functions. They allow the user to easily write FORTRAN programs which implement algorithms for performing classical minimization, analysis synthesis, symmetry detection, redundancy detection, etc. The FORTRAN program need only provide storage allocation, bookkeeping, and the proper sequence of call statements.

PROGRAMMING SYSTEMS - SPS. Subroutines are compatible with FORTRAN II (F equals 10, K equals 5).

MINIMUM SYSTEM REQUIREMENTS - Storage- varies with number of subroutines being used. Card system, Indirect Addressing, TNS, TNF, MF and 1443 Printer optional.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094062

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.063SCATTERING-MATRIX PARAMETERS COMPUTED FROM SHORT-CIRCUIT ADMITTANCE PARAMETERS

AUTHOR: Mr. A. L. Pike

DIRECT TECHNICAL INQUIRIES TO:

Mr. A. L. Pike
Tufts University
E. E. Dept.
Medford, Mass. 02155

DESCRIPTION - This program converts a 2X2 matrix (as many as 10 matrices in a set) of twoport complex-number short-circuit admittance parameters into the corresponding complex matrix of normalized scattering parameters. For output punching, input control transmits appropriate labels for (1) Common-emitter transistor data, or (2) General twoport data. While input data are in rectangular form, output data are computed in both rectangular and polar forms. Optional punching provides a second set of rectangular-form output data in simple format suitable for further processing.

PROGRAMMING SYSTEMS - Source Language - Written in 1620

CONTINUED FROM PRIOR COLUMN

FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - Source program may be executed directly with 1620 FORGO; Then 60K memory is mandatory. Object program may be executed with 40K memory. Equipment - 60K 1620 with 1622 Card Read Punch, and Off-Line listing on 407.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094063

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.064LOCUS - A ROOT LOCUS ALGORITHM

AUTHOR: Mr. R. A. Northouse

DIRECT TECHNICAL INQUIRIES TO:

Mr. R. A. Northouse
University of Wisconsin-Milwaukee
Electrical Engr. College of Applied Science & Engr
Milwaukee, Wisconsin 53202

DESCRIPTION - LOCUS is a digital computer program designed to calculate the values used for the root loci of most transfer functions up to the 14th order. LOCUS has the capability to output in three forms, print, plot, or both. The plotting is performed on the line printer thus an incremental plotter is not required. The input form to locus can be either in a coefficient form or in a factored form. A control card is necessary to state the starting, terminating, and increment of a constant gain, K, which multiplies the entire numerator polynomial. This control card also specifies the form of the polynomial inputs, whether factor or coefficient, and one of the three forms of output.

PROGRAMMING SYSTEMS - Written in FORTRAN IID with Format.

MINIMUM SYSTEM REQUIREMENTS - 1620 Mode II, 60K decimal digits without local card, 40K decimal digits with local card. 1443 On-Line Printer, card reader, and one 1311 Disk Drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094064

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.4.065BODE - A FREQUENCY RESPONSE ALGORITHM

AUTHOR: Mr. R. A. Northouse

DIRECT TECHNICAL INQUIRIES TO:

Mr. R. A. Northouse
University of Wisconsin-Milwaukee
Electrical Engr.
College of Applied Science & Engr.
Milwaukee, Wisconsin 53201

DESCRIPTION - BODE is a digital computer program designed to calculate the values used for determining frequency response of most transfer functions up to the 15th order. It provides sufficient material for the user to perform Bode Plot, Nichols Chart, Nyquist Plot and/or Inverse Nyquist Plots. BODE has the capability to output in three forms, print, plot, or both. The plotting is performed on the line printer thus an incremental plotter is not required. The input form to BODE can be either in a coefficient form or in a factored form. A control card is necessary to state the starting, terminating, and increment of the radian per second frequency. This control card also specifies the form of the polynomial inputs, whether factor or coefficient, and one of the three forms of output.

PROGRAMMING SYSTEMS - BODE is a main line program written in FORTRAN IID with Format.

MINIMUM SYSTEM REQUIREMENTS - 1620 Model II, 60K decimal digits without local card, 40K decimal digits with local card. 1443 on line Printer, card reader, and one 1311 Disk Drive.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094065

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-09.4.066
ANALOG

*M

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

AUTHOR: Mr. R. Northouse

ORDERING INFORMATION: PROGRAM NUMBER 1620095002

DIRECT TECHNICAL INQUIRIES TO:
Mr. R. A. Northouse
University of Wisconsin-Milwaukee
College of Applied Science and Engineering
Electrical Engineering
Milwaukee, Wisconsin 53201

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

DESCRIPTION - ANALOG is a digital computer program which
when fed the coefficients of a third order or smaller
differential equation of a single degree, will calculate
and plot the ANALOG computer circuitry complete with all
element values.

PROGRAMMING SYSTEMS - Programmed in FORTRAN IID with Format
ANALOG is a mainline program calling several subroutines.
IBM or CALCOMP plotting subroutines Plot and Char required.

MINIMUM SYSTEM REQUIREMENTS - 1620 II with 60K of decimal
digits, card reader, punch, CALCOMP 500 Incremental PLOTTER,
1311 Disk File.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620094066

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.5.001HELICAL GEAR SELECTION

AUTHOR: H. B. Kerr

DIRECT TECHNICAL INQUIRIES TO:
H. B. Kerr
Box 21
Tennessee Polytechnic Institute
Cookeville, Tennessee

DESCRIPTION - In many mechanical designs, it is necessary
to transmit power or a specific motion from one shaft to
another, where the shafts are non-intersecting and with
various angles between shaft centerlines. Helical gears
are frequently used to supply this need. Design
considerations are usually such as to dictate such factors
as- normal diametral pitch, angle between shaft centerlines,
and the number of teeth needed. The problem of determining
the pitch diameters of the two gears and their corresponding
helix angles is one that calls for trial and error solution.
To satisfy the requirements listed above, there are two
possible designs that may be determined, i.e., two pitch
diameters and two helix angles for each solution.
This program will give the two possible solutions to the
design.

PROGRAMMING SYSTEMS - Program written in FORTRAN with
Format.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K (card 1620), no
special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095001

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.5.002COMPRESSION SPRING DESIGN, DYNAMIC LOAD

AUTHOR: H. B. Kerr

DIRECT TECHNICAL INQUIRIES TO:
H. B. Kerr
Box 21
Tennessee Polytechnic Institute
Cookeville, Tennessee

DESCRIPTION - Helical Compression Springs are very widely
used to support and withstand various dynamic loads. A
properly designed helical spring should be carefully
designed so that the average load and the range load are
such as to develop a stress in the spring material which
falls within the endurance limit of the material in order
that the fatigue life of the spring is sufficiently long.
This design problem usually involves a trial and error
solution and this program is designed to perform this
function.

PROGRAMMING SYSTEMS - Program written in FORTRAN with
Format.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K (card 1620) no
special features required.

BASIC PROGRAM PACKAGE

1620-09.5.004H-104, TWO-DIMENSIONAL, TRANSIENT OR STEADY HEAT CONDUCTION

*M

AUTHOR: W. Burley

DIRECT TECHNICAL INQUIRIES TO:
W. Burley
ACF Industries
336 Woodward Rd.
Albuquerque, New Mexico.

DESCRIPTION - Solves the heat equation in finite differences
Cartesian coordinates. Transient or steady solutions may
be obtained. The system may contain heat generation and
be composed of different materials. Diagonal boundaries
are allowed. Boundary conditions may be fixed temperature
or connection. Peaceman-Racford, or Alternational-Direction
Implicit method is used. The system may contain up to
480 nodes consisting of up to 24 different materials.
Thermal properties may be anisotropic, but are not
temperature dependent. The program is in six parts stored
on magnetic tape, each part nearly filling memory.
Iteration occurs with three program parts.

PROGRAMMING SYSTEMS - Written in FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Memory 60K, Automatic Divide,
two magnetic tapes.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095004

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.5.005FAMILY OF COMPUTER PROGRAMS FOR DISK CAM COMPUTATIONS

*M

AUTHOR: Heinz C. Altmann

DIRECT TECHNICAL INQUIRIES TO:
Heinz C. Altmann
Eastman Kodak Company
Kodak Park, Building 23
Rochester 4, New York

DESCRIPTION - Computes cam manufacturing tables, approximate
pressure angles, and radii of curvature for disk cams,
with roller followers, of three types - radial translating
follower (cutter diameter may be different from follower
diameter), offset translating follower, pivoting-arm
follower. Cycloidal motion is used for rises and returns.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 1620 with 20K memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095005

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1620-09.5.006NATURAL FREQUENCIES AND RELATIVE DEFLECTIONS AND FORCES OF A VIBRATING BEAM

*M

AUTHOR: J. J. Lee

DIRECT TECHNICAL INQUIRIES TO:
J. J. Lee
Director General Ships
Department of National Defence
Ottawa, Canada

DESCRIPTION - The program is aimed at finding the natural
frequencies of a beam-like structure & subsequently the
relative deflections & forces along the beam. The beam
can have any cross section and can be either a straight
beam or beam with bends. Eccentricities & moments of
inertia of attached weights are taken into consideration.
The frequency can therefore be either pure flexural or
coupled with torsional vibration. The method used is
transfer matrices, i.e. the forces & deflection are
transferred from one segment to the next segment of the
beam, and the natural frequency is obtained by trial similar
to Holzer's method. The beam must be divided into straight
sections, each consisting of a number of segments. The
program can handle problems with 1 to 4 sections and a

CONTINUED FROM PRIOR PAGE

total of not more than 28 segments. Section I of the program is for cantilever beam with rigid or flexible support. Section II is for free-free beam, and Section III for simply-supported beam.

PROGRAMMING SYSTEMS - FORTRAN II, Mainline, complete.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program-40K core memory. Card system, Auto Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095006

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.5.007ANALYSIS OF HELICOIDAL GIRDERS

AUTHOR: R. Reddy

DIRECT TECHNICAL INQUIRIES TO:
R. Reddy
Computer Science Department
Stanford University
Stanford, California

DESCRIPTION - This is a general purpose program for the solution of fixed ended helicoidal girders. The loading may be uniform or variable. The sectional properties may be uniform or variable. Matrix method of analysis is used for the solution of the problem. Floating Point numbers carry a six digit mantissa. Uses all the 40,000 positions of the 1620 storage. If the loading or sectional properties are variable the helicoid can only be divided into 30 segments or less. Otherwise, the program will handle any number of points. If the program is to be used on computers with an online printer all the punch statements may be changed to print statements.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 40K card 1620 with Auto-Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095007

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.5.009TURBINE CYCLE HEAT BALANCE

AUTHORS: Y. J. Fujimura Robert R. White

DIRECT TECHNICAL INQUIRIES TO:
Robert R. White
Los Angeles Department of Water & Power
Box 3669 Terminal Annex
Los Angeles, California 90054

DESCRIPTION - Calculates steam extractions and heat rate for a steam generating plant. Method- building block with Fixed Point arithmetic. Restrictions- 30 equipment blocks and 4 turbines.

PROGRAMMING SYSTEMS-SPS-1620/1710

MINIMUM SYSTEM REQUIREMENTS - Storage used by program-54K. Card system, disk file system with one pack, TNS, TNP, NP, Auto Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095009

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.5.010GAS NETWORK ANALYSIS PROGRAM FOR LOW, MEDIUM AND HIGH PRESSURE SYSTEM

AUTHOR: Raymond R. Gollie

DIRECT TECHNICAL INQUIRIES TO:
Raymond R. Gollie
The East Ohio Gas Company
1717 East 9th Street
Cleveland 14, Ohio

DESCRIPTION - The program is developed to use the modified Hardy Cross method of solving gas distribution analysis problems for low, medium and high pressure systems. The program is written to conserve memory area so as to accept

CONTINUED FROM PRIOR COLUMN

as large a system as practical for the machine configuration, 1770 mains and an unlimited number of loops. Length and flow data can be varied by powers of 10, and the program handles loops between regulators of different pressures. Separate programs are used for the phases of loading data, solution and punching out results. Loop data cards are manually reloaded after each iteration. Load gathering, error checking and junction pressure programs have been written separately.

PROGRAMMING SYSTEMS - Language used in the writeup-SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system, Auto Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.5.011HEATING-LOAD DETERMINATION FOR BUILDINGS

AUTHORS: J. C. Irvin P. H. Armbrust, Jr.

DIRECT TECHNICAL INQUIRIES TO:
P. H. Armbrust, Jr.
U. S. Army Engineer District
Corps of Engineers
P.O. Box 1538
Albuquerque, New Mexico 87103

DESCRIPTION - Determines heating-load requirements for a building, either new or existing, and whether or not air-conditioned or evaporative-cooled. Cooling-load determination for buildings. Input data is obtained from the cooling-load output sheets and/or from current Ashre guide and data books. Heat losses are calculated for individual rooms, with results of the various equations being printed three rooms to the page. For each room, user has the option of obtaining (depending on design requirements), the room-entering air temperature, the room air quantity, the water temperature difference, or the water quantity.

PROGRAMMING SYSTEMS - Written in UTO FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program - 13,067. Paper tape system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095011

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	none		none

1620-09.5.012GENERAL PIPE STRESS

AUTHORS: E. J. Orth, Jr. Mr. John Lewis

DIRECT TECHNICAL INQUIRIES TO:
E. J. Orth, Jr.
Southern Services, Inc.
600 North 18th Street
Birmingham, Alabama 35202

DESCRIPTION - A four part pipe stress program is presented- 1-Input edit, 2-flexibility matrix calculation, 3-Solution for branch point deflections, and 4-Computation of stresses. The input edit program performs a rigorous error check on the data file. A monitor is output giving coordinates of each point. Data file consists of system topological data and, for each branch, coordinates of first point reference global origin, expansion and movement data, coordinate differences between tangent intersections, and Bend radii. Data is keyed by 3 letter alphabetic codes. The flexibility matrix calculation applies the algorithm described in the supplement to Kellogg's book, "The Design of Piping Systems", second edition. The solution program allows for loops. It will handle 30 branches, 15 branch points, and any number of anchors. Rigid stops, spring stops, and external forces may be oriented parallel to coordinate axes. The algorithm of Chen -Isme Paper No. 59-APM-24- is used, with a novel approach to solution of the matrix to take advantage of sparsity. Result is deflections at branch points and reactions each branch, all reference global origin. These are left in common storage, and program 4 called thru a link subroutine at completion of solution. The stress and deflection program computes for each point of each branch- 1. Deflections reference the point, 2. Restraining reactions reference the point, and 3. Combined stressed. Sum of restraining reactions about each branch point is also given.

1620

1620

PAGE 109

CONTINUED FROM PRIOR PAGE

PROGRAMMING SYSTEMS - Written in FORTRAN II mainline, with subroutine and function subprograms.

MINIMUM SYSTEM REQUIREMENTS - A 60K card 1620 in FORTRAN II configuration. Conversion to 40K disk is possible, with major reprogramming. Peripheral equipment - Reproducer, sorter, 407 E-8, keypunch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095012

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-09.5.013

CALCULATION OF CENTER OF GRAVITY, POLAR MOMENTS OF INERTIA AND ALLIED DATA

AUTHORS: William T. White June V. Grenier

DIRECT TECHNICAL INQUIRIES TO:

William T. White
Royal McBee Corporation
1031 New Britain Avenue
West Hartford, Connecticut

DESCRIPTION - Calculates the center of gravity, polar moments of inertia about the center of gravity and axis of rotation, radius of gyration of both center of gravity and axis of rotation, and the center of percussion in a two-dimensional case. The center of percussion is not calculated in a three-dimensional case. Program is compiled and assembled with necessary subroutines.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program-38460 digits. Card system, TNS, TNF, MP, Auto Divide, Indirect Addressing. Program can be used on lesser machine.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620095013

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.7.005

S-109 STRESS ANALYSIS OF A FLANGED TAPERED HUB

AUTHOR: R. C. Wenrick

DIRECT TECHNICAL INQUIRIES TO:

R. C. Wenrick
ACR Industries, Inc.
P. O. Box 1666
Albuquerque, New Mexico

DESCRIPTION - This program can be used to size tapered sections used for damping the discontinuities produced at flange-shell junctures or can provide stress and discontinuity levels of existing designs. Storage 30,000 core locations. 40K, Automatic Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.7.006

HYDRAULIC ANALYSIS OF FLOW IN PIPE NETWORKS

AUTHOR: James W. Hunter

DIRECT TECHNICAL INQUIRIES TO:

James W. Hunter
108 W. Second Street
Los Angeles 12, California

DESCRIPTION - Given any configuration of constant or variable head flow inputs pipe characteristics for each line consisting of the length, diameter, Hazen-Williams (c) coefficient, change in elevation and booster pump head given or trial flow in each pipe this program corrects the trial flows in pipes forming closed loops, computes head losses for every pipe and the pressure at each pipe junction.

PROGRAMMING SYSTEMS - Written in FORTRAN.

CONTINUED FROM PRIOR COLUMN

MINIMUM SYSTEM REQUIREMENTS - Memory 20K IBM 1620, 1622 Card Read-Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097006

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.7.007

STEAM AND WATER PROPERTIES AND EFFICIENCY PROGRAM

AUTHOR: S. W. Lovejoy

DIRECT TECHNICAL INQUIRIES TO:

S. W. Lovejoy
Electric Production Department
Long Island Lighting Company
175 East Old Country Road
Hicksville, New York

DESCRIPTION - The purpose of this program is to determine the thermodynamic properties of steam and water as required for calculation of a heat balance for a reheat turbine using field test data as input. In addition, the program will calculate the efficiency between any two points within the superheat region. Nearly all of 20K memory.

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097007

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.7.008

WATER FLOW IN A PIPE NETWORK BY HARDY CROSS SOLUTION

*H

AUTHOR: D. R. Wood

DIRECT TECHNICAL INQUIRIES TO:

D. R. Wood
Calgary Power Limited
140 - 1st Avenue West
Calgary, Alberta

DESCRIPTION - The IBM 1620 program, (distribution of Water Flow in a Pipe Network), (1620-09.7.001), solves the basic water flow problem but is limited because it was restricted to a 20,000 digit storage computer. This program has been rewritten with many modifications for a 40,000 digit storage computer. Some advantages of this program are: 1. A different Hazen-Williams coefficient can be used for each pipe eliminating the necessity of calculating an equivalent length of pipe for the one Hazen-Williams coefficient used. 2. Output consists of the corrected flow in gallons per minute and, in addition, the resistance factor and resultant pressure drop for each pipe. 3. The accuracy control to stop calculations has been changed from (the sum of the absolute value of the correction currents for an iteration) to the maximum algebraic sum of the pressure drops (or error of closure) allowable around any one loop. 4. The larger storage allows the storing of the actual pipe numbers assigned and does not assume the sequential storing of the pipes thus allowing the same three digit number assigned to be used for the same pipe in all problems. The entire 40,000 digits are used with the exception of the area from approximately 14,200 to approximately 24,000.

PROGRAMMING SYSTEMS - It was written in FORTRAN with Format Control and Automatic Divide.

MINIMUM SYSTEM REQUIREMENTS - This program requires card input with a 40,000 digit storage computer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-09.7.012

COOLING-LOAD DETERMINATION FOR BUILDINGS

AUTHORS: J. W. Lafon R. M. Catanach

DIRECT TECHNICAL INQUIRIES TO:

J. W. Lafon
U. S. Army Engineer District
Albuquerque, New Mexico

DESCRIPTION - Program determines cooling-load requirements (total and by individual rooms) for a building in which

CONTINUED FROM PRIOR PAGE

it is planned to install either a central-station air-conditioning system, individual air-conditioning units, or an evaporative cooling system. Computes grand-total heat loads for five selected times of day and, using time which corresponds to maximum heat-load as design time-of-day, types individual calculations for each room. User has option of computing either the sensible heat-factor and air quantity for a duct system, or the GPM requirements for a chilled-water system. Generally, program follows the methods outlined in 1963 Ashrae Guide and Data Book. Solution factors based on 95 degrees DB, automatically corrected. Restrictions/Range - Provides for seven common types of wall, five roof types.

PROGRAMMING SYSTEMS - Written in UTO FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - Equipment required - Paper Tape I/O. 19,951 positions of core.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097012

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	none		none

1620-09.7.014
STRESS *M

AUTHORS: R. V. Goodman S. G. Mazzota
L. C. Teague

DIRECT TECHNICAL INQUIRIES TO:
R. V. Goodman
M. I. T.
Room, 1-075
Cambridge, Massachusetts

DESCRIPTION - 1620 STRESS is a subset of the 7094 STRESS, a problem-oriented language for the analysis of structures. Five types of structures may be analyzed for gross member end forces, joint displacements, and reactions. They are planar or space trusses, planar or space frames, and plane grids. The method used is a matrix formulation of the stiffness method. The restrictions on 1620 STRESS (as opposed to 7094 STRESS) are - no modifications, no non-prismatic members, only tabular form of all statements, and maximums of - 99 joints, 200 members, 20 joint release components and 100 start released members. STRESS requires an entire disk pack which does not contain monitor of an SPL, thus no programs other than STRESS may reside on the pack. STRESS was developed on a 60K, 2 drive, Floating Point hardware, Mod I 1620 with the earlier version of Monitor I. The machine also had TNS, TNF, MF, Auto Divide, and Indirect Addressing. Card I/O was used, with some messages on the typewriter.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620097014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.004

MXV PROGRAM FOR LINEAR PROGRAM MATRIX PREPARATION

AUTHOR: E.I. Motte

DIRECT TECHNICAL INQUIRIES TO:
E.I. Motte
Union Oil Co. of California
Oleum Refinery
Rodeo, Calif.

DESCRIPTION - This program performs a matrix by vector multiplication to prepare a linear program input vector. The range of multiplication, vector number assigned to output vector, and ID of output vector are all controlled by control cards which may be interspersed with matrix loading. Program stored in locations 00000 to 02690.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, 20K, Indirect Addressing card input/output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101004

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.005

TRANSPORTATION PROGRAM FOR THE IBM 1620 *M

AUTHOR: J.N. Boles

DIRECT TECHNICAL INQUIRIES TO:
J.N. Boles
University of California
207 Giannini Hall
Berkeley 4, Calif.

DESCRIPTION - This program is a simple adaptation of the Transportation Program for the IBM 1620 (tape) by Madden and Smith, (1620-10.1.003). It provides an optional solution to the linear programming transportation problem.

MINIMUM SYSTEM REQUIREMENTS - Memory 20k, 1622 Card-Read-Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.007

LINEAR PROGRAMMING I *M

AUTHOR: F.W. Wood

DIRECT TECHNICAL INQUIRIES TO:
F. W. Wood
Brown & Williamson Tobacco Corp.,
1600 W. Hill St.,
Louisville, Kentucky 40201

DESCRIPTION - This program maximizes or minimizes a linear functional subject to a set of linear restrictions, by finding a set of non-negative numbers for the variables in question.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with no special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101007

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.008

LINEAR PROGRAMMING *M

AUTHOR: F. W. Wood

DIRECT TECHNICAL INQUIRIES TO:
F. W. Wood
Brown & Williamson Tobacco Corp.,
1600 W. Hill St.,
Louisville, Kentucky 40201

DESCRIPTION - This program maximizes or minimizes a linear functional subject to a set of linear restrictions, by finding a set of non-negative numbers for the variables in question.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - FORTRAN with Format and no other special feature required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.011

ECONOMIC ORDER QUANTITIES FOR LINEAR DEMAND FUNCTIONS *M

AUTHOR: A. Diegel

DIRECT TECHNICAL INQUIRIES TO:
A. Diegel
Sr. Lecturer in Mgmt.
Univ. of Otago
Dunedin, New Zealand

DESCRIPTION - The program determines optimal order quantities, minimum inventories, and optimal delivery times for sequences of lots designed to meet linear demand functions of the general form Y equals A & BX . It replaces the traditional economic order quantity formula which

CONTINUED FROM PRIOR PAGE

applies only to the special case of constant demand (where the demand function would be of the general form Y equals A). Mathematical method- the program itself uses only algebra.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - Basic 1620 FORTRAN with Format Floating Point.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101011

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.012OUTPUT ANALYSIS FOR LINEAR PROGRAMMING

AUTHORS: J. H. Stafford R. W. Taylor
J. C. Snyder

DIRECT TECHNICAL INQUIRIES TO:
J. H. Stafford
Purdue Univ.
Lafayette, Ind.

DESCRIPTION - This routine is designed to edit the solution to a linear programming problem into a completely self explanatory table. Coded variable and problem identifications are decoded. Scaled variables are unscaled.

PROGRAMMING SYSTEMS- FORTRAN II, Mainline, complete. Other programming language- Machine language.

MINIMUM SYSTEM REQUIREMENTS - Storage used by programs- 55,038 digits.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.1.013LINEAR PROGRAMMING

AUTHOR: R. Gallup

DIRECT TECHNICAL INQUIRIES TO:
R. Gallup
KSTC Computer Center
Emporia, Kansas 66801

DESCRIPTION - This program solves Linear Programming problems using the simplex algorithm. All the identities, artificial variables and necessary changes to obtain a optimal feasible solution are added by the program. all that the user has to do is enter the coefficients of the variables a sub IJ, the cost coefficients C sub J, and the requirements B sub J. the optimal feasible solution is punched out along with the cost, basis vectors and the basic variables. The maximum size problem that can be solved is on a 20K Machine, 18 equations and 18 variables, On a 40K Machine, 31 equations and 31 variables, and On a 60K Machine, 40 equations and 40 variables.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system, Automatic Divide, Indirect Addressing, Floating Point hardware, TNF and TNS instructions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620101013

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.2.005BOSTON COLLEGE DECISION-MAKING EXERCISE

AUTHOR: John E. Van Tassel

DIRECT TECHNICAL INQUIRIES TO:
John E. Van Tassel
Boston College
Graduate School of Business Administration
Chestnut Hill 67, Massachusetts

DESCRIPTION - A general management interaction simulation, an outgrowth of the original IBM 650 Management game. This exercise is designed primarily for educational use in teaching participants to appreciate the interrelationships of production, distribution and financial

CONTINUED FROM PRIOR COLUMN

management in short-run decisions and long-range planning in a course of 25-35 class meetings over a semester or an academic year.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K with card I/O. Indirect Addressing, Automatic Divide, and optional instruction MF-71.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102005

	PROGRAM NUMBER	DISTRIBUTION MEDIUM	USER VOLUME
	EXTENSION	TYPE	CODE
	-----	-----	-----
BASIC	none	DTR*	00
OPTIONAL	none	none	none

1620-10.2.007EXPONENTIAL SMOOTHING PROGRAM

AUTHOR: W. N. Smith

DIRECT TECHNICAL INQUIRIES TO:
W. N. Smith
Dow Chemical Company
Freeport, Texas

DESCRIPTION - Exponential Smoothing is a basis for statistical forecasting. It is based on the assumption that the most recent result from a time series is the most important with regard to forecasting. The method effectively assigns geometrically decreasing weights to older data.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - 40K memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102007

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.2.008EXPONENTIAL SMOOTHING (FORECASTING)

AUTHOR: Jonas Rabin

DIRECT TECHNICAL INQUIRIES TO:
Jonas Rabin
Western Electric Company, Inc.
P.O. Box 900
Princeton, New Jersey

DESCRIPTION - This is a Forecasting Program based on the fundamental theorem of Exponential Smoothing, by Robert G. Brown and Richard F. Meyer of the Arthur E. Little Company, Cambridge, Massachusetts. Tape system memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102008

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.2.009PRODUCTION MANPOWER GAME

AUTHOR: J. J. Bachhuber

DIRECT TECHNICAL INQUIRIES TO:
J. J. Bachhuber
Supervisor of Machine Computation
Institute of Paper Chemistry
Appleton, Wisconsin 54910

DESCRIPTION - The purpose of the Production-Manpower Game is to demonstrate how a computer can aid in making complex decisions quickly and consistently. The game is played by two teams of executives, using decision rules of their own choice, and by the computer using a programmed decision rule developed from experience with this type of operation. The participants act as production executives of a paint company, who must decide each month how many thousand gallons of paint should be made to fill expected orders and what size work force must be maintained to meet this production. The decisions will be based upon the forecasted orders, the current manpower, and the current inventory. Method Linear decision rule for production and employment scheduling. Storage used by program- 19737 core locations.

CONTINUED FROM PRIOR PAGE

PROGRAMMING SYSTEMS - Written in FORTRAN

MINIMUM SYSTEM REQUIREMENTS - Card system, Auto Divide. Program can be used on lesser machine requirements that can be easily removed- Auto Divide - by recompiling using AFIT FORTRAN.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102009

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-10.2.013
SADSIM

AUTHOR: R. L. Claeson

DIRECT TECHNICAL INQUIRIES TO:
Prof. C. H. Davidson
Director
Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - SADSIM is a FORTRAN program which simulates a hypothetical single address decimal computer designed for instructional purposes. SAD has a 1000 word memory, with 5 decimal digits plus sign in each word. The complete instruction set contains 26 instructions. Subsets of 15 or so lend themselves easily to learning processes. Program requires 1620 Model I or Model II card system with 40K or more. Programmed in FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102013

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.2.010

FARM OPERATION SIMULATOR AND FARM MANAGEMENT DECISION EXERCISE

AUTHOR: L. M. Eisgruber

DIRECT TECHNICAL INQUIRIES TO:
L. M. Eisgruber
Purdue University
AES Annex
School of Agriculture
Lafayette, Indiana 47907

DESCRIPTION - The program may be used for simulation as well as for operational gaming. Gaming may be executed either in non-competitive or competitive mode although the latter can only be accomplished by some degree of manual interference during computer processing of team decisions. Simulation and gaming may be either deterministic or stochastic. The program does not limit simulation or gaming to a predetermined set of enterprises, farm size, price situations. To introduce entirely new enterprises, or new technology for already considered enterprises, only the respective coefficients and/or alphabetic descriptions need to be changed.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - Card system, TMS, TNF, MF Auto Divide, Floating Point hardware and an 80/80 listing device (e.g. IBM 402 or 407).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102010

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	none		none

1620-10.3.006

PERT - PROGRAM EVALUATION AND REVIEW TECHNIQUE

*M

AUTHORS: John C. Patton Frank H. White

DIRECT TECHNICAL INQUIRIES TO:
J. C. Patton
IBM Corporation
1220 19th Street, N.W.
Washington 6, D.C.

DESCRIPTION - To allow 1620 users to utilize project planning and scheduling concepts. The 1620 Pert Program combines least cost estimating and scheduling with the determination of the risk involved in attempting to complete a total project *or any part thereof* within assigned completion times. The program allows negative slack times to be produced for the determination of other existing critical paths. Projects may be planned, scheduled, monitored and changed with this program. No node may be numbered 000 or may be above 999. For a 20K machine, the sum of the number of the highest numbered node and the number of jobs must be 1672 or less. To work in conjunction with part II, the sum of twice the number of jobs plus the highest numbered node must be 3100 or less in addition to the previous requirement. Node numbering is completely random.

PROGRAMMING SYSTEMS - Written in SAS.
MINIMUM SYSTEM REQUIREMENTS - 20K for the above requirements. 40K for 3672 & 7100 respective. 60K for 5672 & 11000 respective.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103006

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-10.2.012

GENERAL SYSTEMS SIMULATOR

AUTHOR: R. P. Kartschoke

DIRECT TECHNICAL INQUIRIES TO:
Prof. C. H. Davidson
Director
Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - This General Systems Simulator Program is capable of simulating systems which manipulate units of traffic. Typical traffic might be people, telephone calls, or automobiles in a system such as a cafeteria line, a telephone exchange, or an automobile tunnel, respectively. Briefly, traffic enters the system, encounters various delays, and then leaves the system.

PROGRAMMING SYSTEMS - Written in SPS

MINIMUM SYSTEM REQUIREMENTS - 60K or more. Card input-output, Automatic Divide, Indirect Addressing, special instructions TMS, TNF, and MF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620102012

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.009

PERT

AUTHORS: Bob N. Manning Wes Folsom

DIRECT TECHNICAL INQUIRIES TO:
Bob N. Manning
Goodyear Aircraft Corporation
Arizona Division
Litchfield Park, Arizona

DESCRIPTION To calculate the critical path of any project, and the earliest and latest start and finish times for each activity and the total and free float times. The probability of meeting a predetermined scheduled date is also computed. Tape system, memory 20K

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103009

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.010ECONOMIC ANALYSIS OF PLANS - OUTPUT 1 AND OUTPUT 2

AUTHOR: A.B. Calsetta

DIRECT TECHNICAL INQUIRIES TO:
A. B. Calsetta
Long Island Lighting Company
175 Old Country Road
Hicksville, New York

DESCRIPTION - This program calculates the economics of long range plans. It consists of two subprograms which compute output data in the following forms Output 1-a tabular summary of capital additions, operating expenses, and present worth of cumulative annual charges for each long range plan. Output 2-present worth of cumulative annual charges of from two to eight separate categories *or types of capital additions* within each long range plan.

PROGRAMMING SYSTEMS - Written in FORTRAN Language With Format.

MINIMUM SYSTEMS REQUIREMENTS - Card system, memory 20K, and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.014PERT DATING ROUTINE

AUTHOR: Irving C. Zacher

DIRECT TECHNICAL INQUIRIES TO:
Irving C. Zacher
Motorola, Inc.
140 N. Cicero Avenue
Chicago 51, Illinois

DESCRIPTION - Written to operate in conjunction with a modified version of the 1620 Pert Program, 1620-10.3.009). The program provides calendar dates for the predicted, or early finish date (te) and the latest finish date (tl). The calculation of dates is based upon a zero date or current date entered by the programmer. Switch options provide for critical path runs, displaying only the activities on the critical path, and for updating runs. A header format is provided, as well as automatic spacing from page to page to provide a uniform format for all pages. Paper tape I/O, memory 20K and no other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103014

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.015AUTOSPOT POST - PROCESSOR FOR MILWAUKEE - MATIC 11 TUBE - TYPE

AUTHOR: R. L. Merriam

DIRECT TECHNICAL INQUIRIES TO:
R. L. Merriam
N/C Training Department
Kearney & Trecker Corp.
11000 Theodore Trecker Way
West Allis 14, Wisconsin

DESCRIPTION - The Post-Processor accepts general autospot record-type output and converts it to information meaningful to the Milwaukee-Matic 11 tube machine tool. The post-processor may be used with either the 8-position or infinite position table index configuration. The output is in card form. To produce a tape, the cards must be run through an off-line card to tape converter. The program may be used for estimating purposes since the time per line information as well as the total cycle time on the Milwaukee-Matic is computed. Memory 20K- Indirect Addressing and Divide hardware required. No other features required. Card input-output SPS language used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103015

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

*M 1620-10.3.016KNIC - KEYWORD IN CONTEXT

AUTHOR: E. I. Motte

DIRECT TECHNICAL INQUIRIES TO:
E. I. Motte
Union Oil Company of California
Oleum Refinery
Rodeo, California

DESCRIPTION - This program prepares a title card for the original title and for each key word in the title. Each key word is specified by a record mark. Storage requirements - 1,848 digits. Equipment specifications- Memory 20k, Indirect address, card input/output, card system. Programmed in SPS two pass.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103016

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.017STUDENT SCHEDULING TECHNIQUE USING DEFINED INCREMENTS OF TIME

AUTHORS: I. K. Lukey D.A. Hubbard

DIRECT TECHNICAL INQUIRIES TO:
I. K. Lukey
IBM Corp.
1602 West Third Avenue
Flint 4, Michigan

DESCRIPTION - The purpose of the program Student Scheduling Technique Using Defined Increments of Time is to schedule students to a previously established master schedule in educational institutions. The program involves logic which makes it very suitable for both secondary schools and colleges. The most significant feature in this particular code is a defined time module which allows complete flexibility in scheduling any period of time during any day for any or all days of the week.

PROGRAMMING SYSTEMS - Written in Symbolic language.

MINIMUM SYSTEM REQUIREMENTS - The program student requires a card 1620 with 20K memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103017

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-10.3.020CRITICAL PATH/SCHEDULE BAR GRAPH GENERATOR PROGRAM

AUTHOR: Donald C. Walker

DIRECT TECHNICAL INQUIRIES TO:
D. C. Walker
Dravo Corporation
Computer Services Department
Building N-2
Pittsburgh 25, Pennsylvania

DESCRIPTION - To represent a large volume of numerical output data from the (less), critical path program in bar graph form. Latest finish may not be greater than day 430. 39,304 digits of memory. Transfer numerical strip (TNS-72) instruction. This program may easily be adapted and recompiled for graphing activities with a latest finish beyond day 430. The procedure is described in detail within the contents of the program write-up

PROGRAMMING SYSTEMS - Written in SPS

MINIMUM SYSTEM REQUIREMENTS - 40K, 39,304 digits of memory.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103020

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-10.3.021INVESTMENT COST

AUTHOR: L. W. Coombe

DIRECT TECHNICAL INQUIRIES TO:

L. W. Coombe
Computer Application Engineer
The Detroit Edison Company
2000 Second Avenue
Detroit 26, Michigan

DESCRIPTION - The purpose of this program is to calculate an equivalent uniform annual cost for a series of investments. The program allows for variable fixed-charge rates, variable escalation rates, negative escalation, removal of investment charges and modification of investments fixed charge rates. The present worth method of economic comparison is used. A maximum of 200 investments and 100 fixed charge rates is allowed. 00000-12414 20K memory, Automatic Divide, Indirect Addressing. Machine language- SPS, Fixed Point.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103021

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.024SEASONAL ADJUSTMENT PROGRAM

AUTHOR: S. Groman

DIRECT TECHNICAL INQUIRIES TO:

S. Groman
Budget Department
U. S. Borax and Chemical Co.
3075 Wilshire Blvd.
Los Angeles, California

DESCRIPTION - Adjust economic data for seasonal variations. User is better able to utilize his resources to compensate for Seasonal Variations aids in interpreting economic data having a seasonal pattern parameter control and twelve month moving average. Restriction, range- up to 11 sequential years of data-input in form of monthly data bi-monthly data or quarterly data-variances between 1 and 99 mills first half year and last half year of data lost for output purposes. Output via punched cards.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 60K, Automatic Divide and card I/O.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103024

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.030CRITICAL PATH NODE AND DUMMY ASSIGNMENT TECHNIQUE PROGRAM

AUTHOR: R. J. Srodawa

DIRECT TECHNICAL INQUIRIES TO:

R. J. Srodawa
Computer Center
University of Detroit
Detroit, Michigan

DESCRIPTION - A list of the jobs which must be performed before the job in question, time duration and costs for each job. It then assigns node numbers, generates any needed dummies, and punches out an output deck which can be used as input for 1620-10.3.011. The restrictions are that 3A84B84C8ID must be less than 3022, where A is the number of jobs, B is the number of prerequisites, C is the number of jobs with no prerequisites, and D is the number of jobs not used as a prerequisite. Add 5000 to the upper limit for every additional 20K of memory. Equipment required - Card system, can be used on lesser machine. I/O devices can be changed to fit machine configuration. Additional Remarks - This program generates input to program 1620-10.3.011 (Miss Less) by Ray N. Sauer. The sample II job is processed by CPNAT in about 35 seconds.

PROGRAMMING SYSTEMS - Written in SPS 1620/1710. Mainline, complete. SPS listing with machine code.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K-100K.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103030

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.031PERT-LESS

AUTHOR: L. Standlee Steenrod

DIRECT TECHNICAL INQUIRIES TO:

L. Standlee Steenrod
Computer Research Center
University of Missouri
Columbia, Missouri

DESCRIPTION - This is a Critical Path Program devised to compute schedules of paths and their associated least cost through a network of activities of a large project. The schedules are generated between the projects normal time and crash time and each contains start and finish times, costs and floats for each activity. These schedules enable a time and its associated least cost to be chosen. This program is a modification of SHARE program 1188 PA GMCP program consists of two (2) decks. Deck I gives intermediate output, deck II gives final output for listing.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - A 160 with 60K, Auto Divide, Indirect Addressing and Floating Point hardware. Program can be used on lesser machine if dimensions are reduced or part of labeling in program deck 2 is removed.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103031

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.032ZIP - KEYWORD IN CONTEXT ANALYSIS ON A MULTIPLE LINEABSTRACT

AUTHOR: Thomas J. Scott

DIRECT TECHNICAL INQUIRIES TO:

Sun Oil Company
1608 Walnut Street
Philadelphia, Pa.

DESCRIPTION - The program will: 1) Accept a multi-card abstract (paragraph, etc.) according to a format designated by the user. 2) Rearrange this abstract according to a second, or output format (also designated by the user). 3) Then cross reference the abstract by keywords (single or multiword) that appear either in the abstract itself or immediately following the abstract on a special keyword card. 4) Produce the following output:

- Header or keyword title card.
- The rearranged abstract.
- A referenced card, giving the abstract source, location, etc.
- A blank card.

One set of output described will be punched for each key word, provision is made for sorting all cards. Processing time is a function of the length of abstract and the number of keywords selected. For example, a 10-card abstract (input) with 5 key words requires approx. 8 seconds of processing (incl. read time) and 45 seconds of card punch time. Both input and output formats can be changed by varying some 4 constants, located at the beginning of the SPS deck, and reassembling.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Those required for card system Indirect Addressing SPS-1620/1710.

BASIC PROGRAM PACKAGE

DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103032

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.033KWIC INDEX WITH FORMAT

AUTHOR: Richard L. Storrer

DIRECT TECHNICAL INQUIRIES TO:

Richard L. Storrer
The Norwich Pharmacal Company
Norwich, New York

DESCRIPTION - This program prepares KWIC-type permutations of input cards, especially titles and keywords comprising a document reference file. Program control allows any

CONTINUED FROM PRIOR PAGE

arbitrary input format. Off-line sorting and listing of output is required. Keyword is punched in center of card, and remainder of input is wrapped around with document reference, if specified, right justified to column 80. Provides for deletion of trivial words specified in list which may be easily altered by user.

MINIMUM SYSTEM REQUIREMENTS - 20K card machine with no special features. Storage used by program 5500. Equipment required by program card system SPS 1620/1710 Mainline, complete.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103033

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.035 *#
PORTFOLIO SELECTIONS - DIAGONAL MODEL (40K)

AUTHORS: Pao L. Cheng Hugh R. Gardner

DIRECT TECHNICAL INQUIRIES TO:
Prof. Pao Lun Cheng
School of Business Administration
University of Massachusetts
Amherst, Mass.

DESCRIPTION - The use of a simplified model to trace a critical line of efficient portfolio diversification. Mathematical method-diagonal model. Restrictions, range-80 securities may be processed.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 40K, Automatic Divide, Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103035

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.037 *#
CAPITAL INVESTMENTS

AUTHOR: John D. Raithel

DIRECT TECHNICAL INQUIRIES TO:
Dr. A. A. J. Hoffman
Director Computer Center
Texas Christian University
Fort Worth, Texas

DESCRIPTION - This program is able to determine earnings, depreciation, interest, cash flow (the additional amount of cash money which the investment makes available), salvage value, the rate of return, and the probability factor of the proposed investment each year through its maximum service life. There are several ways in which management computes each of the above. The capital investment program offers a choice of the more common methods involved in each computation.

PROGRAMMING SYSTEMS - AFIT-FORTRAN. Language used in the writeup - FORTRAN I-APII. This program was written so that the Capital Investment Program 1620-CS-01Y could be run on a 20K 1620 instead of the 40K required by the IBM program.

MINIMUM SYSTEM REQUIREMENTS - Storage used by program-20K, card system, Auto Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Source program punch. Source program, print. Sample data. Sample data punch-out.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object program, punch. Object program print.

ORDERING INFORMATION: PROGRAM NUMBER 1620103037

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-10.3.038
ALPHABETIC INDEXER AND LISTER FOR CONCORDANCES, GLOSSARIES,
AND DICTIONARIES

CONTINUED FROM PRIOR COLUMN

AUTHOR: Warren Brisley

DIRECT TECHNICAL INQUIRIES TO:
Warren Brisley
Newcastle University College
Tighes Hill, N.S.W.
Australia

DESCRIPTION - The program was originally written for language and literature studies, to produce an alphabetically ordered list of words in a given text, together with the line or page numbers of occurrence for each word. It will produce word lists for large texts using minimal 20K with tape reader, dealing with an alphabet of up to 35 letters on single character coding. It is easily modified to deal with a text already on card or disc file, and, or to take any advantage of 40K or 60K or disk if available. Storage used -02615.

PROGRAMMING SYSTEMS - Language used - SPS. Small modification to take advantage of non-tape system and, or non-tape text.

MINIMUM SYSTEM REQUIREMENTS - Minimal paper tape system with Indirect Addressing. The requirement of paper tape easily removed. SPS or SPS - 1620/1710. Mainline - complete program.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103038

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.039 *#
STUDENT SCHEDULING SUPPLEMENTARY PROGRAM

AUTHOR: Robert A. Murphy

DIRECT TECHNICAL INQUIRIES TO:
R. M. Meyers
IBM Corporation
1933 Fifth Avenue
Seattle, Washington 98101

DESCRIPTION - A series of programs designed for use with 11 "scheduling techniques using defined increments of time." Program Number 1620-10.3.017. Program 1 - Tallies student's request by sex, grade level, and total requesting each course. Determines number sections required, based on a standard section size, for each course. Card output 80-80 list. Program 2 - Potential conflict matrix for up to 99 courses. Analyzes students requests for combinations of selected courses. Builds a matrix showing number of students requesting each combination. One pass, card output 80-80 list. Program 3 - Schedule priority rearranges student requests into a pre-established priority sequence and punches new student request card. Reduces throughput time and false conflicts. Program 4 - Punch seats remaining after scheduling. Cards are punched in master schedule format for use by school personnel or for scheduling in increments.

MINIMUM SYSTEM REQUIREMENTS - All programs require IBM 1620, 20K with no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object decks. Sample problem.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source.

ORDERING INFORMATION: PROGRAM NUMBER 1620103039

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-10.3.040 *#
WEEK - WEEKLY SCHEDULE USING MASTER SCHEDULE

AUTHOR: M. C. Trivedi

DIRECT TECHNICAL INQUIRIES TO:
M. C. Trivedi
Agricultural & Technical Institute
State University of New York
Alfred, New York 14802

DESCRIPTION - The main purpose of the program WEEK is to prepare a weekly schedule for a student using a pre-prepared master schedule and for student requests specifying each section of the course. Besides the principal use, the program WEEK may be used to check conflicts. It may be used for a maximum of any six days of a week. The day left must be uniform (same) for the institution. A class day may be started at any time of the day and may be continued for as many as nine consecutive hours with an

CONTINUED FROM PRIOR PAGE

increment of one hour. e.g. start at 8 a.m. and end at 5 p.m., i.e. the last class is from 4 p.m. to 5 p.m. The program week accepts student's requests as punched on a student request card (one card per student), forms the weekly schedule, indicating various types of errors, if any, and then works as directed by the sense switches settings. There is no limit to the number of students involved, but the serious limitation is to the number of sections. This limit depends upon the number of days a course is taught during a week period. For example a course taught 3 days a week will occupy less space than

PROGRAMMING SYSTEMS - Symbolic language.

MINIMUM SYSTEM REQUIREMENTS - Requires a 1620-22 System with a 20K memory. Extra features required are TNF, TNS and Indirect Addressing. IBM 407 or a similar machine having at least 72 alphanumeric type wheels/bars.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103040

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.041KNIC - KEYWORD IN CONTEXT

AUTHOR: M. M. Gold

DIRECT TECHNICAL INQUIRIES TO:

M. M. Gold
Massachusetts Institute of Technology
Alfred Sloan School of Management
50 Memorial Drive
Cambridge, Massachusetts 02139

DESCRIPTION - This program reads in title cards with an ID code either beginning in column 1 or ending in column 80. If necessary, it moves the ID code to end in column 80 and then rotates the title image until a word begins in column 40. It compares this word with stored "non-key" words and punches a card with each "key-word" as the leading word in the title. Included on the right-hand side will be the ID code of any length specified. The output format is such that the user may specify the "key-words" begin either in column 1 or column 41 (with columns 39 and 40 blank). No lateration of the input cards is necessary. The user can use the key words supplied with the program or may use his own.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, Indirect Addressing, card I/O, 8207 digits.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103041

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.043WEEKLY SCHEDULING USING MASTER SCHEDULE

AUTHOR: M. C. Trivedi

DIRECT TECHNICAL INQUIRIES TO:

M. C. Trivedi
Assistant Professor
Director of Computer Center
State University of New York
Agricultural & Technical Institute
Alfred, New York

DESCRIPTION - The main purpose of the program week is to prepare a weekly schedule for a student using a pre-prepared master schedule and for student requests specifying each section of the course. Besides the principle use, the program week may be used to check conflicts. It may be used for a maximum of any six days of a week. The day left must be uniform (same) for the institution. A class day may be started at any time of the day and may be continued for as many as nine consecutive hours with an increment of one hour. E.g. start at 8 a.m. and end at 5 p.m., i.e. the last class is from 4 p.m. to 5 p.m.

The program WEEK accepts student's requests as punched on a student request card, forms the weekly schedule, indicates various types of errors, if any, and then works as directed by the sense switches settings. There is no limit to the number of students involved, but the serious limitation is to the number of sections. This limit depends upon the number of days a course is taught during a week period. For example, a course taught 3 days a week will occupy less space than a course taught 4 days a week. (To know about what number of sections should be loaded, please refer to the types of errors.)

PROGRAMMING SYSTEMS - Written in Symbolic language.

CONTINUED FROM PRIOR COLUMN

MINIMUM SYSTEM REQUIREMENTS - This program requires a 1620-22 System with a 20K memory. Extra features required are TNF, TNS and Indirect Addressing. IBM 407 or a similar machine having at least 72 alphanumeric type wheels/bars.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103043

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.044FINAL EXAMINATION SCHEDULING SYSTEM 20K

AUTHOR: J. Lincoln Barr

DIRECT TECHNICAL INQUIRIES TO:

S. Broder
Manager of Computer Center
State University of New York
Stony Brook, New York

DESCRIPTION - This system will produce final examination schedules with minimized conflicts. The number of courses which can be scheduled is 119. The system will process up to 7 courses per student, ignoring all courses which follow the seventh. There is also a maximum limit of 30 examination periods. However, there is no limit to the number of students, nor are there restrictions to division of the 30 examination periods into periods per week or per day.

PROGRAMMING SYSTEMS - The condenser program and the conflict matrix generator program are written in 1620 Symbolic Programming System the scheduling program and the checking program are written in PDQ FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Data Processing System with 20K memory with Automatic Division and Indirect Addressing features. The IBM 1622 Card Reader and Punch, a line Printer (IBM 407) and a sorter are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - 4 Decks containing sample problem data. 1 SPS object code (condenser). 1 SPS object code (Conflict Matrix Program). 1 PDQ FORTRAN source code (Scheduling Program). 1 PDQ FORTRAN source code (Checking Program). 1 PDQ FORTRAN Processor C(2). 1 PDQ FORTRAN Subroutines Fixed Format.

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
MACHINE READABLE - Deck 1 - 20K Condenser Program (SPS source code). Deck 2 - 20K Conflict Matrix Program (SPS source code).

ORDERING INFORMATION: PROGRAM NUMBER 1620103044

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-10.3.045FINAL EXAMINATION SCHEDULING SYSTEM 40K

AUTHOR: J. L. Barr

DIRECT TECHNICAL INQUIRIES TO:

S. Broder
Manager of Computer Center
State University of New York
Stony Brook, New York

DESCRIPTION - This system will produce final examination schedules with minimized conflicts.

The number of courses which can be scheduled is 182.

The system will process up to 7 courses per student, ignoring all courses which follow the seventh. There is also a maximum limit of 30 examination periods. However, there is no limit to the number of students, nor are there restrictions to division of the 30 examination periods into periods per week or per day.

PROGRAMMING SYSTEMS - The condenser program and the conflict matrix generator program are written in 1620 Symbolic Programming System the scheduling program and the checking program are written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Data Processing System with 40K, memory with Automatic Division and Indirect Addressing features. The IBM 1622 Card Reader and Punch, a line Printer (IBM 407), and a sorter are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - 4 programs containing sample problem data. 1-40-60K Condenser Program (SPS object code).

CONTINUED FROM PRIOR PAGE

1-40K Conflict Matrix Program (SPS object code).
 1-40-60K Scheduling Program (FORTRAN II source code).
 1-40-60K Checking Program (FORTRAN II source code).

OPTIONAL PROGRAM PACKAGE

DOCUMENTATION - None.
 MACHINE READABLE - 40K Condenser Program (SPS source code).
 40-60K Conflict Matrix Program (SPS source code).

ORDERING INFORMATION: PROGRAM NUMBER 1620103045

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	CARDS	15	none
OPTIONAL	none	CARDS	15	none

1620-10.3.046FINAL EXAMINATION SCHEDULING SYSTEM 60K

AUTHOR: J. L. Barr

DIRECT TECHNICAL INQUIRIES TO:

S. Broder
 Manager of Computer Center
 State University of New York
 Stony Brook, New York

DESCRIPTION - This system will produce final examination schedules with minimized conflicts.

The number of courses which can be scheduled is 228. The system will process up to 7 courses per student, ignoring all courses which follow the seventh. There is also a maximum limit of 30 examination periods. However, there is no limit to the number of students, nor are there restrictions to division of the 30 examination periods into periods per week or per day.

PROGRAMMING SYSTEMS - The condenser program and the conflict matrix generator program are written in 1620 Symbolic Programming system the scheduling program and the checking program are written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Data Processing System with 60K memory with Automatic Division and Indirect Addressing features. The IBM 1622 Card Reader and Punch, a line Printer (IBM 407) and a sorter are required.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103046

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.047LOOP LOCATOR FOR CRITICAL PATH SYSTEM NETWORK

AUTHOR: D. C. Walker

DIRECT TECHNICAL INQUIRIES TO:

D. C. Walker
 Computer Services Dept.
 Dravo Corporation
 Pittsburgh, Pennsylvania

DESCRIPTION - The purpose of the program is to diagnose "loops" and all unconnected points within a critical path network. Properties of a precedence matrix are utilized. The I node numbers represent rows and the J numbers represent columns. If any matrix row is all zeroes, the corresponding column of the matrix can be eliminated, and vice-versa. This procedure is used until the "residual matrix" is remaining with all looped numbers. This program can handle a maximum of 2500 I-J cards and a maximum I or J number of 2500.

PROGRAMMING SYSTEM - Written for use with the "MISS LESS", Critical Path program.

MINIMUM SYSTEM REQUIREMENTS - Card with Indirect Addressing and 40K.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103047

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.049PROGRAM CATALOG FOR DIGITAL COMPUTERS - PROCOM

AUTHOR: R. E. Nelson

DIRECT TECHNICAL INQUIRIES TO:

R. E. Nelson

CONTINUED FROM PRIOR COLUMN

Engineering Computer Applications Group
 Baltimore Gas and Electric Company
 Lexington Building
 Baltimore 3, Maryland

DESCRIPTION - PRODCOM provides a systematic method of describing and classifying programs available in the user company library. PRODCOM generates a card deck for use in preparing and Edison Electric Institute (EEI) task force on computer applications program manual and a user program library manual, which is updated when new programs become productive. The program permits updating the user program library manual without regenerating the entire manual but only the affected pages. The input is composed of a minimum of 3 cards per program (2 data cards, 1 description card). Since PRODCOM limits the number of description cards to 5, 7 cards per program is the maximum permissible. A message stating that the 5th description card did not have an asterisk in column 80 will otherwise result, but the program will continue to run until a card order error is detected. At this point the program will stop to permit ordering and limiting of input cards. PRODCOM A produces user number prefix interpretations. PROCOM E produces page title code interpretations. Output from both programs supplements the user program library manual. PRODCOM is submitted as a suggestion to companies interested in constructing a systematic library for themselves. Storage used 15285 positions.

PROGRAMMING SYSTEMS - Written in 1620/1710 SPS.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with Auto Divide and Indirect Addressing.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103049

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.050LUNCH STUDY EXPLODER AND STUDENT SCHEDULING HANDBOOK

*M

AUTHORS: H. R. Tuck C. Freehafer

DIRECT TECHNICAL INQUIRIES TO:

H. R. Tuck
 IBM Corporation
 370 W. First Street
 Dayton, Ohio 45402

DESCRIPTION - This program is utilized in conjunction with 1620-10.3.017 "Student" to do complete school scheduling on a basic 20K card 1620. On an optional basis the program will schedule lunch and, or study halls. Two different semesters can be scheduled on one run. Exploded output for each student includes complete course description, room number, meeting times. Output can be listed without sorting on 402, 407, etc. to produce students schedule. In 20K card 1620 the master schedule can be up to 200 courses with 400 sections. Running time is approximately 500 - 1000 students per hour depending on number of courses in master schedule and number of lines per students schedule. Included is a school administrators handbook concerning all phases of 1620 student scheduling using 1620-10.3.017 "Student" and 1620-10.3.039 "Supplementary Programs".

MINIMUM SYSTEM REQUIREMENTS - A 1620 Card System.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Condensed Object Code Phase 1, condensed object code phase 2, sample problem input, output exploded cards.

OPTIONAL PROGRAM PACKAGE
 DOCUMENTATION - None.
 MACHINE READABLE - SPS source code phase 1, SPS source code phase 2.

ORDERING INFORMATION: PROGRAM NUMBER 1620103050

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-10.3.051DISKWIC - A KWIC INDEXER FOR DISK AND PRINTER

AUTHOR: R. E. Thomas

DIRECT TECHNICAL INQUIRIES TO:

R. E. Thomas
 Planning Department
 Federal Reserve Bank of Minneapolis
 Minneapolis, Minnesota

DESCRIPTION - The program generates permuted index records, sorts the records on the disk file, and prints the sorted index list. Provision is made for a list and count of

CONTINUED FROM PRIOR PAGE

original (input) records, omitting certain words (up to 90), and a count of index entries. Current capacity of 1200 index entries may be increased according to disk space available.

PROGRAMMING SYSTEMS - Monitor - Operates under PR-033 1620/1311 Monitor Control and uses 1620/1311 Sort/Merge (1620-SM-047).

MINIMUM SYSTEM REQUIREMENTS - A 20K disk file system with TNS, TNF, MF, Indirect Addressing and a 1443 Printer. TNF and Indirect Addressing may be reprogrammed to allow use on a lesser machine.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103051

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - This program is a Post-Processor which is used to convert the output data generated by AUTOSPOT II (1620-CN-05X) into instructions for the Burgmaster Drill Press. Storage used by program- Less than 20K.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system, Auto Divide, Indirect Addressing, TNF, and MF executed by subroutine in the object deck.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620104011

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.3.052

ANALYSIS OF FACTORS AFFECTING OPTIMUM PLANT SIZE

*M

AUTHOR: E. M. Babb

DIRECT TECHNICAL INQUIRIES TO:
E. M. Babb
Purdue University
Department of Agricultural Economics
Lafayette, Indiana 47907

DESCRIPTION - This program is a general model used to analyze the effects of assembly and distribution factors and economics of scale in processing an optimum (least-cost) size of plant and on total cost and its components for plants of various sizes. The program can accommodate the analysis of a plant processing from one to three products, but can be modified to handle additional products. The program is analytical but is written so that solutions can be observed where variables affecting optimum size of plant take on a range of values. This allows the researcher to test the sensitivity of solutions and observe, for example, how costs are affected by changes in sales density.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 24K, 1620 Model I, Floating Point, Auto Divide, TNS, TNF, MF, and card read/punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620103052

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.4.010

AUTOSPOT II POST-PROCESSOR FOR CINTIMATIC TURRET DRILL WITH STEPPING SWITCH CONTROL

AUTHORS: R. Beller T. Hall

DIRECT TECHNICAL INQUIRIES TO:
R. Beller
Cincinnati Milling Machine Co.
Cintrol Division
Marburg Ave.
Cincinnati 9, Ohio

DESCRIPTION - The post-processor is a single pass card input/card output routine which accepts general autospot record-type output and converts it to information meaningful to the Cintimatic Turret Drill.

PROGRAMMING SYSTEMS - Written in SES language.

MINIMUM SYSTEM REQUIREMENTS - 1620 20K 1622 Card Read-Punch Unit, Indirect Addressing and Automatic Divide hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620104010

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-10.4.011

POST PROCESSOR CONCEPTS FOR THE BURGMASER DRILL PRESS WITH HUGES NC-211 MACHINE TOOL CONTROL

AUTHOR: M. M. Thompson

DIRECT TECHNICAL INQUIRIES TO:
M. M. Thompson
Goodyear Aerospace Corp.
1210 Massillon Rd.
Akron, Ohio

1620-10.4.013

POST PROCESSOR FOR LE BLOND TAPE-TURN LATHE WITH MARK CENTURY NUMERICAL CONTOURING WITH "E" FORMAT

AUTHOR: M. M. Thompson

DIRECT TECHNICAL INQUIRIES TO:
M. M. Thompson
Goodyear Aerospace Corp.
1210 Massillon Rd.
Akron, Ohio

DESCRIPTION - This program is a Post-Processor which is used to convert the output data generated by AUTOMAP I (1620-CN-01X) into instructions for the Leblond Tape-turn Lathe.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 20K 1620 card system with Auto Divide and Indirect Addressing. TNF and MF are executed by subroutine in the object deck.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620104013

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.004

THE EXECUTIVE GAME

AUTHORS: E. Jury J. Lee

DIRECT TECHNICAL INQUIRIES TO:
J. Lee
Commonwealth of Massachusetts
University of Massachusetts
Amherst, Mass.

DESCRIPTION - To familiarize business students with the processes of business decisions and the resulting effects on the market. This program is a translation of the U.C.L.A. game for the IBM 650.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object code appendix tape

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110004

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	PT	05	none
OPTIONAL	none	none		none

1620-11.0.005

BLACKJACK GAME

*M

AUTHOR: A. J. Lang

DIRECT TECHNICAL INQUIRIES TO:
A. J. Lang
Fairchild Camera & Instrument Corp.
Dumont Military Electronics Corp.
Defense Products Division
750 Eloomfield Avenue
Clifton, New Jersey

DESCRIPTION - The program to play the game of blackjack (commonly known as "21") was designed for demonstration purposes for the 1620 Data Processing System. Storage 6607 core positions.

MINIMUM SYSTEM REQUIREMENTS - 1620 with attached 1621.

CONTINUED FROM PRIOR PAGE

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110005

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.012

**

TIC-TAC-TOE DEMONSTRATION

AUTHOR: M. O. Holioien

DIRECT TECHNICAL INQUIRIES TO:
M. O. Holioien
Math Department
North Dakota State University
Fargo, North Dakota

DESCRIPTION - Since the version of FORTRAN used has the Format statement, that version of the subroutine deck must also be used. The object program uses locations 8300-16832. No relocatable subroutines are used.

PROGRAMMING SYSTEM - Written in FORTRAN

MINIMUM SYSTEM REQUIREMENTS - Card system, memory 20K

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Cards.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110012

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.013

**

TIC TAC TOE - A LEARNING PROGRAM

AUTHOR: W. D. Glauz

DIRECT TECHNICAL INQUIRIES TO:
W. D. Glauz
School of Aeronautical & Engineering Sciences
Purdue University
Lafayette, Indiana

DESCRIPTION - This is a demonstration program with which one may play Tic Tac Toe against the machine. However the machine, being quite stupid, can be beaten. It "learns" from its defeats and cannot be beaten twice in the same identical way.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, 1622 Card Reader and Punch (may be modified for paper tape), with Indirect Addressing.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Cards.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110013

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.018

**

MORTGAGE AMORTIZATION PROGRAM

AUTHOR: L. G. Sanders

DIRECT TECHNICAL INQUIRIES TO:
L. G. Sanders
Mathematics Department
Digital Computer Laboratory
AF Institute of Technology
Wright-Patterson AFB, Ohio

DESCRIPTION - This program is concerned with a debt which is to be repaid, with interest, by a number of equal monthly payments. As the debt is repaid, the proportion of each monthly payment devoted to interest decreases, while that devoted to debt reduction increases.

MINIMUM SYSTEM REQUIREMENTS - 16,721 digit spaces. IEM 1620, with 20K and card input and output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Source code, loader, object code,

CONTINUED FROM PRIOR COLUMN

subroutines.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110018

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.019

**

HIM AND HER

AUTHOR: A. Colijn

DIRECT TECHNICAL INQUIRIES TO:
A. Colijn
University of Alberta
Computing Centre
Calgary, Alberta, Canada

DESCRIPTION - The program is intended as demonstration of a simple form of learning by a computer. The computer plays a game, HEXAPAWN, knowing at first only the rules of the game, learning the best strategy through experience.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 computer with 20K core storage, Automatic Divide, and Indirect Addressing. No other special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110019

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.020

**

REACTION TIME PROGRAM

AUTHOR: R. L. Pratt

DIRECT TECHNICAL INQUIRIES TO:
R. L. Pratt
Senior Computer Programmer
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

DESCRIPTION - This is a demonstration program which measures the reaction time of a person.

PROGRAMMING SYSTEMS - Written in SPS language.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620, with 20,000 digits of memory, card input-output.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Reaction time source code, reaction time object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110020

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.021

**

QUEENS GAME (MODIFIED)

AUTHOR: E. A. M. Moon

DIRECT TECHNICAL INQUIRIES TO:
E. A. M. Moon
University of Canterbury
Box 1471
Christchurch, New Zealand

DESCRIPTION - This program permits the 1620 and another player (human) to play a simple game on a draughts board. It is a modified form of a game used as a 7070 demonstration. It is just difficult to provide a good game for the novice confronting the machine with awe.

PROGRAMMING SYSTEM - Written in SPS I.

MINIMUM SYSTEM REQUIREMENTS - Basic card 1620.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110021

CONTINUED FROM PRIOR PAGE

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.026
UNIVERSAL CALENDAR

AUTHOR: Ronald C. Read

DIRECT TECHNICAL INQUIRIES TO:
Ronald C. Read
Department of Mathematics
University of the West Indies
Kingston 7, Jamaica, West Indies

DESCRIPTION - This program gives the day of the week corresponding to any given date between the years 1 A.D. and 9999 A.D. Its purpose is to demonstrate the speed and ability of the IBM 1620 by means of a problem whose nature and complexity is apparent to the non-mathematician. Numbers depending on the days, month, year, century, number of leap years since the beginning of the century, and so on are calculated and added. Their sum is reduced Modulo 7, and the result is converted to a day of the week. The program should be compatible with any special features, and any size of memory.

PROGRAMMING SYSTEMS - Written in machine language

MINIMUM SYSTEM REQUIREMENTS - Basic tape 1620 - no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110026

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.022

PERPETUAL CALENDAR

AUTHOR: W. B. Earl

DIRECT TECHNICAL INQUIRIES TO:
W. B. Earl
University of Canterbury
P. O. Box 1471
Christchurch, New Zealand

DESCRIPTION - This program gives the day of the week for any date (A.D.) in the Gregorian calendar, entered numerically at the typewriter keyboard in logical sequence (viz- day, month, year). Appropriate messages are typed out for invalid entries (e.g. 31.11.1962). It is an excellent demonstration program for non-specialists, most of whom know what a calendar is.

PROGRAMMING SYSTEMS - Written in SPS I.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K card 1620 with Divide Hardware.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110022

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.024

ACCOUNTING DEMONSTRATION PROGRAM - ADP

AUTHOR: Arthur H. Pike

DIRECT TECHNICAL INQUIRIES TO:
Arthur H. Pike
Associate Professor
Dept. of Economics and
Business Administration
Norwich University
Northfield, Vermont

DESCRIPTION - This program may be used to simulate the accounting process usually taught in accounting theory classes. The portion of the accounting cycle including the preparation of five journals of original entry and a trial balance is demonstrated. Certain error detection and audit principles are also demonstrated. The data input code has been found usable at the college sophomore level.

PROGRAMMING SYSTEMS - 1620 Machine language.

MINIMUM SYSTEM REQUIREMENTS - 1620 with 20K storage, paper tape I/O. No special features required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110024

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.029

DEMOPAK - A FUNCTIONAL DEMONSTRATION OF THE IBM 1620

AUTHORS: Ray Peck Dave Montgomery
W. J. Olmo

DIRECT TECHNICAL INQUIRIES TO:
W. J. Olmo
IBM Corporation
340 Market Street
San Francisco, California

DESCRIPTION - DEMOPAK is designed to be used as an introductory demonstration of various 1620 functions and to provide a background for the demonstration of programming systems and production programs. The program is divided into sections, each of which is a complete program which will type a heading and, if program switch 3 is on, a set of operating instructions. The section then comes to a halt and is executed by depressing start. Upon completion the program returns to the initial halt and is ready to be executed again. Program switches 1 and 2 are used in some sections to stop the operations, alter logic, or provide optional input or output. When the demonstration of any section is complete the operator depresses reset, insert, release and start to proceed to the next demonstration section. By inserting the correct branch the operator can return to any section or change the sequence of section.

PROGRAMMING SYSTEMS - Is written in 1620/1710 SPS (1620-SP-020)

MINIMUM SYSTEM REQUIREMENTS - Basic 1620 card system, no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
DOCUMENTATION - None.
MACHINE READABLE - Source code.

ORDERING INFORMATION: PROGRAM NUMBER 1620110029

	PROGRAM NUMBER	DISTRIBUTION MEDIUM	USER VOLUME	
	EXTENSION	TYPE	CODE	
			REQUIREMENT	
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-11.0.025

GAME OF DICE

AUTHOR: Robert H. Fahnestock

DIRECT TECHNICAL INQUIRIES TO:
Robert H. Fahnestock
Centralia College
2615 Howard Street
Centralia, Washington

DESCRIPTION - This is an entertainment type program that simulates a crap game using two dice. 4303 positions of core including the add tables. Memory 20K.

PROGRAMMING SYSTEMS - SPS.

MINIMUM SYSTEM REQUIREMENTS - 20K card system

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110025

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.030

PERFECT NUMBER DEMONSTRATION PROGRAM

AUTHOR: J. W. Sawyer, Jr.

DIRECT TECHNICAL INQUIRIES TO:
J. W. Sawyer, Jr.
116 Belle Vista Court, N. W.
Winston-Salem, N. C. 27106

DESCRIPTION - Perfect numbers, by definition, are equal to the sum of their proper divisors. For example, 6 is a perfect number, since 6 equals 1+2+3. Until 1952, only 12 of these numbers were known. After this time computers were used to determine additional perfect numbers. This program types a brief history of perfect numbers, gives

CONTINUED FROM PRIOR PAGE

a summary of the method used to determine them, and computes rapidly the first five perfect numbers.

PROGRAMMING SYSTEMS - Is written in FORTRAN with Format, and the object deck is compiled with UTO FORTRAN.

MINIMUM SYSTEM REQUIREMENTS - 20K memory, 1622 Card Read-Punch.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110030

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.031

MUSIC PROGRAM

1620-11.0.033

MUSICAL OUTFUT PROGRAM

AUTHOR: Ron Davis

DIRECT TECHNICAL INQUIRIES TO:
Mr. A. Heyworth
Department of Computer Science
University of Alberta
Edmonton, Alberta, Canada

DESCRIPTION - This program causes the computer to output music through a nearby radio tuned to the clock frequency of 1 Megacycle or its harmonics.

PROGRAMMING SYSTEMS - Fast, an SPS type assembler.

MINIMUM SYSTEM REQUIREMENTS - Card system, Indirect Addressing, A. M. radio receiver. Program can be used on lesser machine. Decks for 20K, 40K, 55K, are included.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110033

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

DESCRIPTION - Demonstration program to play music on the 1620 using a radic speaker for output. Uses a tune subroutine plus constants specifying address of field for each note and duration of a note. Storage used by program-actual subroutine and constants located from 19500-19999. Each tune takes varying storage according to number of notes to be played.

PROGRAMMING SYSTEMS - Written in SPS 1620/1710.

MINIMUM SYSTEM REQUIREMENTS - Card system, (Model I), Indirect Addressing, can be used on any machine by changing the one instruction which uses Indirect Addressing. Could be compiled on tape as well as cards.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110031

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.032

EEC BASEBALL SIMULATION AND DEMONSTRATOR

AUTHOR: P. R. Burgeson

DIRECT TECHNICAL INQUIRIES TO:
P. R. Burgeson
4257 Oak Knoll Avenue
Youngstown 12, Ohio

DESCRIPTION - This program demonstrates the simulation ability of the 1620 by quote - playing - unquote - the game of baseball between two all star teams. The machine operator picks the visiting team from a master roster of 90 possible players, the 1620 selects (randomly) the home team from the 81 players left. A complete ball game is then simulated. Two separate random number generators which are initialized at the program start assure a different game each time. Simulation of the rules of baseball. Restrictions- the program recognizes only 90 particular player names and records, contained in a master table with the program. Other player names are not acceptable.

PROGRAMMING SYSTEMS - Coded in machine language.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K 1620 with 1622 Card Reader. No other features are used, although their presence does not inhibit program operation. Storage- all of 20K memory is used.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110032

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
--	-----------------------------	----------------------	----------------	----------------------------

CONTINUED FROM PRIOR COLUMN

	BASIC	OPTIONAL	DTR*	00	none
	none	none	none		none

1620-11.0.034

MUSICAL ASSEMBLY PROGRAM

AUTHOR: R. Davis

DIRECT TECHNICAL INQUIRIES TO:
A. Heyworth
Department of Computing Science
University of Alberta
Edmonton, Alberta, Canada

DESCRIPTION - This program translates cards punched in musical notation into cards of the correct format for the musical output program. Storage used by program - 00402 to 03235.

PROGRAMMING SYSTEMS - Language used - FAST, an SPS type assembler.

MINIMUM SYSTEM REQUIREMENTS - Card system, Indirect Addressing, TMS, TNP. Can be used on lesser machine. Can be assembled on a 20K, 40K, and 55K computer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110034

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.036

EXECUTIVE GAME

AUTHOR: J. A. N. Lee

DIRECT TECHNICAL INQUIRIES TO:
J. A. N. Lee
Commonwealth of Massachusetts
University of Massachusetts
Amherst, Massachusetts

DESCRIPTION - This game simulates market reactions as a function of player decisions over a quarter year in a single product, single area industry with a maximum of 8 separate firms (or teams). The purpose of this game is to install some notions of the endeavors of ("executive management") into the minds of business students and those aspiring to this type of work. Storage requirements - 20K.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, Automatic Divide, Indirect Addressing, other special features required - Codes 71, 72, 73. This program is the card version of 1620-11.0.004.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110036

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
--	-----------------------------	----------------------	----------------	----------------------------

CONTINUED FROM PRIOR PAGE

BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.037 *M
BASEBALL GAME PROGRAM

AUTHOR: D. R. Iverson
 DIRECT TECHNICAL INQUIRIES TO:
 D. R. Iverson
 21503 Craig Court
 Torrance, California 90502

DESCRIPTION - This SPS program permits the operator to play major league baseball on the IBM 1620 computer. It is primarily intended to be executed by two persons, since the operator calls the strategy he desires and a manager is needed for each team (conceivably, though, one person could manage both teams). The operator informs the computer of his desired strategy by throwing one or a combination of the four console switches. The program is based on actual major league statistics, and the operator has the option of what teams he wants to play based on a specified years performance. This characteristic is accomplished by reading in data cards for the desired players when the program is loaded into the computer. The operator must, therefore, prepare data cards for the players he wants to use. As an aid in the preparation of these data cards, two FORTRAN programs have also been written in conjunction with the main baseball program.

PROGRAMMING SYSTEMS - Written in SPS.
 MINIMUM SYSTEM REQUIREMENTS - The 1622 Card Reader and 1620 computer with no extra features and minimum storage are required for the program.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE
 DOCUMENTATION - None.
 MACHINE READABLE - Source Code.

ORDERING INFORMATION: PROGRAM NUMBER 1620110037

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	DTR*	00	none

1620-11.0.038 *M
ELEMENTARY NUMBER THEORY DEMONSTRATION

AUTHOR: R. B. Nelsen
 DIRECT TECHNICAL INQUIRIES TO:
 R. B. Nelsen
 Computer Center
 DePauw University
 Greencastle, Indiana 46135

DESCRIPTION - The program is designed to calculate any combination of the following three functions for fixed-point numbers P and Q. The Euclidean algorithm for the greatest common divisor of P and Q, the greatest common divisor as a linear function of P and Q, and the table of partial convergents for P/Q.

PROGRAMMING SYSTEMS - FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 card system, 20K memory.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110038

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.039 *M
MUSIC INTERPRETER

AUTHOR: R. F. Smiley
 DIRECT TECHNICAL INQUIRIES TO:
 R. F. Smiley
 Carleton College
 Northfield, Minnesota 55057

DESCRIPTION - This program reads cards punched from sheet

CONTINUED FROM PRIOR COLUMN

music and plays the music through a standard AM radio placed on the computer. The input notes are interpreted as loops of various lengths, to be performed a various number of times. The interpreter will handle any note from G-sharp-sub-zero to C-sub-six. However, the lowest octave and a half is of very poor tonal quality. Provision is made for any reasonable tempo. A rest is interpreted as a very low note. The interpreter will handle a maximum of 2277 notes and rests in any one song, on a 20K machine. Storage used by program - locations 000000-004000, 18622-19999, and 8 additional locations per note of song.

PROGRAMMING SYSTEMS - SPS - 1620/1710, Mainline, complete. Interpreter may be partially relocated by recompiling the SPS source deck. Since the actual physical characteristics of the machine influence the success of the program, it may not give satisfactory results on all machines.

MINIMUM SYSTEM REQUIREMENTS - Card I/O, TMS, TNF, MF, Auto Divide, Indirect Addressing, also, must be Model 1. Requirements which can be easily removed - card I/O, TMS, TNF, MF, Auto Divide, also, can be modified for Model 2.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110039

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.040 *M
DEMONSTRATION PROGRAM TO PRINT OUT PRIME NUMBERS

AUTHOR: R. T. Harling
 DIRECT TECHNICAL INQUIRIES TO:
 R. T. Harling
 Air Force Institute of Technology
 AFIT-SE-MATH
 Wright-Patterson AF Base, Ohio

DESCRIPTION - This program utilizes the method published in the IBM 1620 Newsletter, Volume II, No. 1, by Dr. Ronald C. Reed. The object deck is preceded by a two-card ("zero-core") routine which was published in the IBM 1620 Newsletter, Volume I, No. 1. Storage used by program - 40K.

PROGRAMMING SYSTEMS - SPS - 1620/1710. Mainline, complete.

MINIMUM SYSTEM REQUIREMENTS - Card system.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up on Microfiche only.
 MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 16200110040

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.041 *M
CARD PUNCH DEMONSTRATION PROGRAM TO PUNCH BLOCK LETTERING ON IBM CARDS

AUTHOR: J. Landau
 DIRECT TECHNICAL INQUIRIES TO:
 J. L. Alford
 Harvey Mudd College
 Engineering Dept.
 Claremont, California 91716

DESCRIPTION - This demonstration program accepts alphanumeric information from the console typewriter and reproduces it in the form of block lettering punched on the backs of standard IBM cards. Either of two sizes of lettering can be selected - (1) 1-inch letters which fit ten per line, two lines per card, or (2) 2-inch letters which fit ten per card, on one line only. Up to 75 different sets of lettering can be requested at one time from the typewriter, each of which can have large or small letters, centered or not, punched on any number of cards. All the cards can be punched at once in six passes through the card punch. Characters which can be punched include the alphabet, the digits, arithmetic operation symbols, and punctuation marks. Storage used by program - 20K.

PROGRAMMING SYSTEMS - SPS.

MINIMUM SYSTEM REQUIREMENTS - Card system. Machine language - No compiler used.

BASIC PROGRAM PACKAGE
 DOCUMENTATION - Write-up.
 MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110041

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
--	-----------------------------	----------------------	----------------	----------------------------

CONTINUED FROM PRIOR PAGE

CONTINUED FROM PRIOR COLUMN

EASIC	none	DTR*	00	none
OPTIONAL	none	none		none

data is re-typed with output. Sums number of days using Jan 1, 1583 as first day. The program makes special corrections for quandrennial and centesimal leap years. Converts sum of days to day of week by repeated subtraction of seven. Optimized program gives result in from two to seven seconds. For use with any 1620 with card I/O. Written in UTO FORTRAN (1620-02.0.024). Input dates of calendar limited to 1585 AD to 2599 AD. Dates earlier than 1585 AD are not meaningful since the Gregorian calendar was invented by Pope Gregory XIII in 1582 and did not come into general use until somewhat later. The Julian calendar was used prior to this time, but there were so many local options regulating its use that the general program for it is not suggested.

1620-11.0.042
NIM

*M

AUTHOR: J. Green

DIRECT TECHNICAL INQUIRIES TO:
J. Green
Data Processing Center
Harvard School of Public Health
1 Shattuck St.
Boston, Massachusetts

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.
MINIMUM SYSTEM REQUIREMENTS - Card System with 20K storage capacity.

DESCRIPTION - This demonstration program pits the computer against a human in a game far more interesting than Tic-Tac-Toe or Blackjack.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

PROGRAMMING SYSTEMS - Written in FORTRAN with FORMAT, Mainline, complete.

ORDERING INFORMATION: PROGRAM NUMBER 1620110044
Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

MINIMUM SYSTEM REQUIREMENTS - Card system (16K).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110042

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.045

DATE INTERPRETER AND PERPETUAL CALENDAR

AUTHOR: Mr. Jack Landau

DIRECT TECHNICAL INQUIRIES TO:
Mr. Jack Landau
Engineering Department
Harvey Mudd College
Claremont, Calif. 91716

DESCRIPTION - Here is an elegant perpetual calendar program which has a completely re-form input, whether from cards of the console typewriter, and provides the following sort of information about any date in any year greater than 1752--Thursday 4 July 1776, 27th week 186th day of the year. Input can range anywhere from lengthy questions in sentence form to the most abbreviated statements - the program accepts anything which will allow it to uniquely determine one date. Twenty different error checks with corresponding informative messages are made on the input data to guarantee essentially foolproof operation. When you need to demonstrate simultaneously the logical, arithmetic, and printing capacities of the 1620, as well as its speed, versatility and usefulness, this is the program to use. Storage used by program - 8890 positions. Equipment required by program - Card system, TNS-TNF-MF, Auto Divide, Indirect Addressing, 1620 Model 1. Requirements that can be easily removed are TNS-TNF-MF and Auto Divide. Programmed in - IBM SPS. There are several perpetual calendar programs already in the library. This program is greatly superior to each one for one or more of the following reasons - completely free-form input, input can be from typewriter or cards, twenty error checks on input statements, output statement gives complete information about the date in question, some of the mathematical techniques are explained in the write-up.

1620-11.0.043

EXPENSIVE DESK CALCULATOR

*M

AUTHOR: S. E. Madnick

DIRECT TECHNICAL INQUIRIES TO:
S. E. Madnick
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 03139

DESCRIPTION - The expensive desk calculator program provides the 1620 user with a convenient, valuable calculating tool that is both versatile and easy to use. It is no longer necessary to waste the time involved in writing and compiling a FORTRAN program in order to perform simple numerical calculations. This program combines the ease of a desk calculator with the power of a high speed computer. All output occurs via the console typewriter.

Input is accepted from either cards or typewriter in the form of single arithmetic expressions involving the normal operations of algebra, namely add, subtract, multiply and divide, and including the use of parentheses, and any of 11 predefined arithmetic functions. Expressions are evaluated immediately as they occur. Provisions also exist for defining symbols and reiterating a group of expressions. A number of simple input/output commands are provided in order to make input/output quite flexible. Internal accuracy is variable from 2 to 20 places, although, unless modified by command, it is standardized at 8 places.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 with 20K memory and Indirect Addressing feature.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110043

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110045
Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.046

VIRTUOSO - THE MUSIC PROGRAM TO END ALL MUSIC PROGRAMS

AUTHORS: P. J. Jutsum R. C. Read

DIRECT TECHNICAL INQUIRIES TO:
P. J. Jutsum
Computing Centre
Mathematics Department
University of the West Indies
Kingston 7, Jamaica

DESCRIPTION - This program is designed to perform music on the 1620 by means of a radio placed on the console, as with other music programs in the library. However it contains many features not possessed by other programs, such as provision for the repetition of passages (including repeats within repeats) variations in tempo, and changes of volume and tone quality. Provision is also made for percussion effects using the tape punch and the typewriter, and for repetition of passages in a slightly modified form. This latter feature, together with the fact that each note requires only one instruction, enables pieces of 5 minutes duration or more to be played on a 20K machine. Rests can be included to any extent, and are executed by reading appropriate lengths of feed-code on the tape reader. The tone colour produced by this program approximates to that of a small organ, and by careful use of the above features, aesthetically pleasing performances of serious musical works can be achieved. Several source tapes for

1620-11.0.044

GREGORIAN CALENDAR - 1585 to 2599 A.D.

AUTHOR: R. K. Simpson

DIRECT TECHNICAL INQUIRIES TO:
R. K. Simpson
13134 Deming Avenue
Downey, California 90242

DESCRIPTION - This program types the day of the week corresponding to a give date in the Gregorian calendar. Illegal dates and dates before 1585 AD are excluded. Console switch determines card or typewriter input. Input

CONTINUED FROM PRIOR PAGE

representative musical works are supplied with this program. The present repertoire is as follows. Prelude from Partita No. 6 for solo violin (J. S. Bach)... Solfeggietto (Ph. E. Bach) ... Moto Perpetuo (Paganini)... Flight Of The Bumble Bee (Rimsky-Korsakov). Equipment required - standard 20K tape 1620 Model I. Extra storage can be effectively used for long works. The program could easily be adapted and recompiled for use with a card machine, so as to handle pieces for which no tests are required.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110046

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.047 *M
BOILERMAKER SUPERMARKET MANAGEMENT GAME

AUTHOR: E. M. Babb

DIRECT TECHNICAL INQUIRIES TO:
E. M. Babb
Department of Agricultural Economics
Purdue University
Lafayette, Indiana

DESCRIPTION - This program simulates the market environment in which supermarkets compete for sales. From two to five teams (players) can compete directly in a market area (set). Each team makes 20 decisions which would normally be made or reviewed weekly. The game administrator can influence the market environment. The supermarket is departmentalized for produce, meat, groceries and dairy products. The game can be used to teach business planning techniques, economic and accounting principles or characteristics of the firm and the industry. Storage used by program - 48,592 positions.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware and 1620 Model I. Program can be recompiled on machine w/o specifications or program scaled down by reducing number or competing stores.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110047

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-11.0.048 *M
BOILERMAKER DAIRY MANAGEMENT GAME

AUTHOR: E. M. Babb

DIRECT TECHNICAL INQUIRIES TO:
E. M. Babb
Department of Agricultural Economics
Purdue University
Lafayette, Indiana

DESCRIPTION - This program simulates the market environment in which from two to four processors and distributors of fluid milk compete for sales on home delivery routes and to stores. Each team makes 14 decisions which normally would be made or reviewed monthly by dairies. The game administrator can influence the game environment. The game can be used to teach business planning techniques, economic principles or characteristics of the firm and the industry. Storage used by program 42,702 positions.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, and 1620 Model I. Program can be recompiled on machine w/o specifications or program scaled down by reducing the number of competing dairies.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110048

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none

CONTINUED FROM PRIOR COLUMN

OPTIONAL none none none

1620-11.0.049 *M
BOILERMAKER FARM SUPPLY BUSINESS MANAGEMENT GAME

AUTHOR: E. M. Babb

DIRECT TECHNICAL INQUIRIES TO:
E. M. Babb
Department of Agricultural Economics
Purdue University
Lafayette, Indiana

DESCRIPTION - The program simulates the market environment in which farm supply businesses selling feeds and fertilizers compete for sales. The game administrator can control the environment in which teams (players) compete. From one to four teams can compete directly in a market (set). An unlimited number of sets can be processed consecutively. Each team (business) makes 18 decisions which would be normally made quarterly by a typical business. The game can be used to teach business planning techniques, economic and accounting principles or characteristics of the firm and the industry. Storage used by program - 30,786 positions.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 1620 card system with TNS, TNF, MF, Auto Divide, Indirect Addressing, Floating Point hardware, and 1620 Model I. Program can be recompiled on machine w/o specifications or program scaled down by reducing number of competing stores.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110049

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-11.0.050 *M
PRIME NUMBER DEMONSTRATOR

AUTHORS: Miss H. Giroffi Mr. M. Sandberg
Dr. H. J. Highland

DIRECT TECHNICAL INQUIRIES TO:
Dr. H. J. Highland
The Brooklyn Center of Long Island University
Computer Laboratory
Brooklyn, N. Y. 11201

DESCRIPTION - Program to determine in input number is a prime, will accommodate any value under 1,000,000. Modification of the ("sieve of eratosthenes") the division equals remainder algorithm, is used to test for prime. Storage used by program - 18989 to 19999 for symbol table and 8300 to 12330 for program.

PROGRAMMING SYSTEMS - Written in FORTRAN I with Format.

MINIMUM SYSTEM REQUIREMENTS - Minimum 1620 20K with card I/O and no special features.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110050

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none	none	none

1620-11.0.051 *M
MOUSE IN THE MAZE DEMONSTRATION

AUTHOR: Asa C. Harvey

DIRECT TECHNICAL INQUIRIES TO:
Asa C. Harvey
Systems Analyst,
Tri-State College
Angola, Ind.

DESCRIPTION - The purpose of this program is to demonstrate the ability of the IBM 1620 to make logical decisions, and to retain the results of each decision for future use. The operator sets up a maze and a (computer-mouse) finds its way from the starting gate to the finish gate. The

CONTINUED FROM PRIOR PAGE

mouse may then rerun the maze using the knowledge it obtained on the first run, etc. Movement of the mouse is random, therefore the mouse may take several different paths for identical mazes.

MINIMUM SYSTEM REQUIREMENTS - 1620 Mod. I, 20K memory, Indirect Addressing, card I/C, Auto Divide.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110051

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-11.0.052

MONABUS - A BUSINESS SIMULATION EXERCISE/CARD/

*M

AUTHOR: W. L. Brown, Jr.

DIRECT TECHNICAL INQUIRIES TO:
W. L. Brown, Jr.
Bureau of Business and Economic Research
University of Montana
Missoula, Mont.

DESCRIPTION - This business game has been constructed for use in conjunction with college courses in business policy or management that stress total firm operations and the desirability of adopting the generalist point of view. Rather than being a vehicle for teaching specific management concepts, MONABUS is directed towards developing problem solving ability and an appreciation for balanced decision-making and short and long-range planning. MONABUS simulates a three-firm industry marketing a single unnamed product in a competitive environment. In addition to making decisions on price, production volume, marketing and S & D expenditures, and plant investment, participants determine their products quality and handle company financing and debt payment.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - 40K card system with Auto Divide, Indirect Addressing 1620 Model I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110052

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.053

ELEMENTARY GERMAN-TO-ENGLISH TRANSLATION

*M

AUTHOR: Dr. R. C. Read

DIRECT TECHNICAL INQUIRIES TO:
Dr. R. C. Read
University of the West Indies
Mathematics Dept.
Kingston 7, Jamaica

DESCRIPTION - This is a demonstration program the purpose of which is to illustrate the basic ideas of machine translation of languages by translating elementary German sentences into English. The vocabulary consists of about 150 different words (or about 330 words if inflected forms of the same word are counted separately). The built-in grammar is capable of handling many problems of word-order and multiple meaning, and will also cope to a reasonable extent with such difficulties as the use of der, die and das as relative pronouns, and the correct handling of separable prefixes. This program is not of any use for practical translation, and is not intended to be. It is for demonstration purposes only. It has, however, been found to be of great interest to German speakers and teachers, and serves to indicate the sort of way in which practical machine translation of languages could be effected on large computers. The data for the program (glossaries, grammar, etc.) follow the main program on the program deck.

PROGRAMMING SYSTEMS - SPS.

MINIMUM SYSTEM REQUIREMENTS - Basic 20K tape or card 1620. No special features. The program is known to be compatible with Indirect Addressing, and should be compatible with any special features. The whole of storage is used. The main program is in SPS, but is loaded in the form of a dump from 00300 in order to allow the multiplication table area to be used for additional storage (multiplication is not required).

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.

CONTINUED FROM PRIOR COLUMN

MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110053

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.054

ELEMENTARY GERMAN-TO-ENGLISH TRANSLATION

AUTHOR: Dr. R. C. Read

DIRECT TECHNICAL INQUIRIES TO:
Dr. R. C. Read
University of the West Indies
Mathematics Dept.
Kingston 7, Jamaica

DESCRIPTION - This is a demonstration program the purpose of which is to illustrate the basic ideas of machine translation of languages by translating elementary German sentences into English. The vocabulary consists of about 150 different words (or about 330 words if inflected forms of the same word are counted separately). The built-in grammar is capable of handling many problems of word-order and multiple meaning, and will also cope to a reasonable extent with such difficulties as the use of der, die and das as relative pronouns, and the correct handling of separable prefixes. This program is not of any use for practical translation, and is not intended to be. It is for demonstration purposes only. It has, however, been found to be of great interest to German speakers and teachers, and serves to indicate the sort of way in which practical machine translation of languages could be effected on large computers. Specification - Basic 20K tape or card 1620. No special features. The program is known to be compatible with Indirect Addressing, and should be compatible with any special features. The whole of storage is used. The main program is in SPS, but is loaded in the form of a dump from 00300 in order to allow the multiplication table area to be used for additional storage (multiplication is not required). The data for the program (glossaries, grammar, etc.) follow the main program on the program tape.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110054

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.055

NOPE/NIM ONE FILE EDUCATOR

*M

AUTHOR: T. Kroncke

DIRECT TECHNICAL INQUIRIES TO:
Prof. C. H. Davidson
Engineering Computing Laboratory
University of Wisconsin
Madison, Wisconsin 53706

DESCRIPTION - NOPE is a program written in FORTRAN II to demonstrate computer learning by the elimination of wrong answers. The computer plays a version of the game called NIM against the operator, making random choices from a set of possible moves. When it loses it backtracks and eliminates the most recent wrong choice from the set. This process continues until only the best choices for each situation remain in the set. Output is produced at the end of each game to show the new collection of moves still contained in the set as well as a record of the game just played. NOPE must be run on a 1620 with 40K or more of memory. It must have a random number generator, such as the NRRAN function subprogram supplied in deck 2.

PROGRAMMING SYSTEMS - Written in FORTRAN II.

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model I with 40K or Model II card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620110055

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-11.0.056

GUESS

AUTHOR: D.D. Boon

DIRECT TECHNICAL INQUIRIES TO:
D.D. Boon
102 Columbia Ave.
Crisfield, Maryland 21817

DESCRIPTION - Guess is a demonstration program of card

CONTINUED FROM PRIOR PAGE

game of bluffing as described in Martin Gardner's "Mathematical Games" section of the December, 1967 Scientific American.

PROGRAMMING SYSTEMS - The program requires the use of the subroutine RANDF by Robert H. Jackson. The subroutine is program number 1620-07.0.071 in this catalog and is in SPS.

MINIMUM SYSTEM REQUIREMENTS - Storage used is about 7K, and the equipment required is a card system. Programming Type is FORTRAN II.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Object code.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 16200110056

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-12.3.021UNIVERSAL OUTPUT SUBROUTINE

AUTHOR: R. Davis

DIRECT TECHNICAL INQUIRIES TO:
R. Davis
University of Alberta
Computing Center
Edmonton, Alberta

DESCRIPTION - This program converts internally stored data in any standard form into any of five external formats and outputs them on typewriter, paper tape, or cards. It also simulates all the typewriter control functions. Card system, Indirect Addressing, move flag and transfer numeric fill.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620123001

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.003NORTHEASTERN UNIVERSITY TEST SCORING PROGRAM

AUTHOR: R. M. O'Brien

DIRECT TECHNICAL INQUIRIES TO:
R. M. O'Brien
Computation Center
Northeastern University
360 Huntington Ave.
Boston 15, Mass.

DESCRIPTION - To grade multiple choice objective exams taken on mark sense cards and publish, in addition to the grade for each student, a grade distribution (with mean and standard deviation) and an analysis of the exam indicating how many chose each choice for each question and the percent of correct answers for each question. Maximum of 150 5-choice questions per exam. Storage Requirements- 19563 locations.

PROGRAMMING SYSTEMS - Written in SPS. Fixed point. Not relocatable.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 28K, 1622, no special features required.

*** This program has been certified by COMMON.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up.
MACHINE READABLE - Appropriate material delivered.

OPTIONAL PROGRAM PACKAGE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130003

	PROGRAM NUMBER EXTENSION	DISTRIBUTION TYPE	MEDIUM CODE	USER VOLUME REQUIREMENT
BASIC	none	DTR*	00	none
OPTIONAL	none	none		none

1620-13.0.005CAL-COMP 565 PLOTTER SUBROUTINE PEN FOR FORTRAN (FORMAT)

AUTHOR: T. Michel

DIRECT TECHNICAL INQUIRIES TO:

CONTINUED FROM PRIOR COLUMN

T. Michel
Argonne National Laboratory
Argonne, Illinois

DESCRIPTION - Permits control of CAL-COMP 565 on-line plotter from FORTRAN/ format source program. 184 Positions. Memory 28K. Indirect Addressing- other special features required- CAL-COMP 565 Plotter attached on-line. Relocatable. Written in 1620/1710 SPS card system. Program description- Subroutine PEN is designed to give the FORTRAN user direct control of the CAL COMP Plotter/s pen and drum movements normally available only at the machine language programming level. Pen also allows repetition of a movement up to 9999 times through the transmission of one argument. Or, a string of 8 successive movements may be executed. The accompanying SPS assembly has been made as subroutine no. 9 for the FORTRAN/Format computer. For another numbered subroutine, re-assemble with arg changed to the appropriate address. Pen requires 184 positions and IDA.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130005

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.008A DEMONSTRATION PROGRAM IN LOGIC TO DETERMINE THE VALIDITY OF A CATEGORICAL SYLLOGISM

AUTHOR: W. B. Saunders

DIRECT TECHNICAL INQUIRIES TO:
W. B. Saunders
Box 744
Ashland, Va. 23005

DESCRIPTION - The categorical syllogism consists of two premisses from which a conclusion is drawn. Its validity is dependent only on the arrangement of the terms and the types of statements asserted. This program, under sense switch control, will accept just the mood and figure of a syllogism, or accept the actual statements of the premisses and conclusion. The program then checks the types of statements and arrangement of terms against six rules which determine the validity of the argument. Equipment specifications - The program is written in SPS 1620-1710 for a card system with Indirect Addressing and uses 5,549 core positions.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130008

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.010VARIABLE ALPHANUMERIC FORMAT PLOT RELOCATABLE SUBROUTINE

AUTHOR: R. F. Gates, Jr.

DIRECT TECHNICAL INQUIRIES TO:
R. F. Gates, Jr.
Computing Center
University of Delaware
Newark, Delaware 19711

DESCRIPTION - The purpose of the subroutine is to punch on a card any symbol in any of its 80 columns, or to punch a symbol in up to all of the columns, each with its own symbol. The program can accept arguments for a blank card. The argument given is validity checked. Thus the program can be used to plot data points, plot and label simultaneous curves, produce patterns and to give FORTRAN an alphanumeric format statement which can be program controlled. Specifications- storage- less than 600. Equipment- Card, Indirect Addressing, disk if used with FORTRAN II-D. Programming type- Written in SPS as a double entry relocatable subroutine for FORTRAN II. A modification of compiler deck I is required. Written in SPS II-D as a double entry relocatable subroutine for FORTRAN II-E for use under Monitor - I.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130010

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.011SCRAMBLE - COMPUTER PREPARATION OF MULTIPLE FORMS OF AN EXAMINATION

AUTHOR: Dr. H. J. Highland

*M

CONTINUED FROM PRIOR PAGE

DIRECT TECHNICAL INQUIRIES TO:
Dr. H. J. Highland
Computer Laboratory
Long Island University
Brooklyn 1, New York

DESCRIPTION - Program designed to meet needs of schools wherein large classes dictate need for multiple copies of the same examination. Program will produce these multiple copies by rearranging the sequence of the examination questions. Punched card output is used to produce (a) teacher's copy with answer key printed next to each question and (b) offset master stencil used for printing, both of these can be produced on a 407 or similar model printer. Program will handle up to 50 questions, each of which can be up to 99 cards long. Storage used by program 19059 to 20000.

PROGRAMMING SYSTEMS - Written in FORTRAN with Format.

MINIMUM SYSTEM REQUIREMENTS - A 1620 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130011

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.012

EXAMINATION ASSEMBLY PROGRAM

*M

AUTHOR: H. B. Kerr

DIRECT TECHNICAL INQUIRIES TO:
H. B. Kerr
Computer Center
Tennessee Polytechnic Institute
Box 21A Tenn. Tech.
Cookeville, Tennessee

DESCRIPTION - This program package causes an examination to be made up by pulling examination questions from a pool of questions punched into cards. A new sequence number is given to the questions "pulled", and the examination may then be listed on ditto master on the 407 Accounting Machine. A maximum of 999 questions may be contained in the "pool" of questions. The questions may be of variable length with no limitation placed upon the maximum number of cards allowed.

PROGRAMMING SYSTEMS - Written in SPS.

MINIMUM SYSTEM REQUIREMENTS - A 1620 with 20K, Indirect Addressing, TNS, TNF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130012

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.013

FORTRAN TEACH

*M

AUTHOR: Prof. W. L. Pope

DIRECT TECHNICAL INQUIRIES TO:
Prof. W. L. Pope
Computer Center
Utah State University
Logan, Utah 84321

DESCRIPTION - FORTRAN TEACH is a set of programs and student problems designed for use during the early part of a course teaching FORTRAN programming. They enable the student to get something on the machine before he can write a complete program, and they assist the instructor in checking the problems.

PROGRAMMING SYSTEMS - FORGO.

MINIMUM SYSTEM REQUIREMENTS - Card system, 40K core minimum. These programs are written in FORTRAN for the FORGO processor. Programming type: Mainline, complete.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130013

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.014

CHAR ANNOTATION SUBPROGRAM

AUTHOR: W. S. Sekscienski

CONTINUED FROM PRIOR COLUMN

DIRECT TECHNICAL INQUIRIES TO:
W. S. Sekscienski
University of Maryland
Wind Tunnel Operations Dept.
College Park, Maryland

DESCRIPTION - The Char Subprogram is a completely relocatable subprogram used in conjunction with the FORTRAN II, Version 2 Programming System for the IBM 1620-1627 Card Data Processing System. This routine will annotate on the 1627 Plotter, the FORTRAN character set, and three non-standard symbols for use in point spotting of plotted data. The three non-standard characters for point spotting can be programmed in such a manner as to give a total of twelve separate plotting symbols. The annotation routine will write out the characters in various heights and in any one of four different directions. The character heights and direction of write out are variables which are in the call statement to this sub-program. The routine will annotate the 1620 character set with the exception of the @ and record mark characters. Maximum character size is 10.01 inches hx5.72 inches w and minimum size is .07 inches hx.04 inches w. Machine Specifications - 1620 capable of using the FORTRAN II L Storage - 2758 digits. Language - 1620/1710 SPS.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130014

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.015

141 DATA PROCESSING SYSTEM - AN EDUCATIONAL COMPUTER FOR INSTRUCTION IN BASIC PROGRAMMING

AUTHORS: K. P. Swallow R. E. Gentry

DIRECT TECHNICAL INQUIRIES TO:
W. T. Price
Merritt College
5714 Grove Street
Oakland, California 94609

DESCRIPTION - The 141 Data Processing System is an educational tool for teaching basic computer concepts through a 1401 type machine language and 1401 SPS. The 141 simulator set of basic 1401 instructions includes- SW, CW, R, P, W, MCW, LCA, CS, B, C, A, S, H, and NOP. This set is sufficient to illustrate such concepts as- (1) reading, punching, and printing, (2) looping for iterative processes, (3) sequence checking, (4) counted loops, (5) program switches, (6) load routines, (7) address modification, (8) subroutines and subroutine linkages, etc. Basic utility routines are incorporated in the 141 simulator for easy debugging of 141 programs. 141 written subroutines are provided for multiplication, division, zero suppression, and editing. The 141 SPS Assembler processes the 141 set of instructions and all 1401 pseudo operations including- DCW, DC, DS, DSA, ORG, EX, and END. Storage used by program - 20,000 positions of storage.

Equipment required by program- Basic 1620 card system. Programming type- SPS - 1620/1710.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130015

Indicate "E N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.016

141 DATA PROCESSING SYSTEM - AN EDUCATIONAL COMPUTER FOR INSTRUCTION IN BASIC PROGRAMMING

AUTHORS: K. P. Swallow R. E. Gentry

DIRECT TECHNICAL INQUIRIES TO:
W. T. Price
Merritt College
5714 Grove Street
Oakland, California 94609

DESCRIPTION - The 141 Data Processing System is an educational tool for teaching basic computer concepts through a 1401 type machine language and 1401 SPS. The 141 simulator set of basic 1401 instructions includes- SW, CW, R, P, W, MCW, LCA, CS, B, C, A, S, H, and NOP. This set is sufficient to illustrate such concepts as- (1) reading, punching, and printing, (2) looping for iterative processes, (3) sequence checking, (4) counted loops, (5) program switches, (6) load routines, (7) address modification, (8) subroutines and subroutine linkages, etc. Basic utility routines are incorporated in the 141 simulator for easy debugging of 141 programs. 141 written subroutines are provided for multiplication, division, zero suppression, and editing. The 141 SPS Assembler processes the 141 set of instructions and all 1401 pseudo operations including- DCS, DC, DS, DSA, ORG, EX, and END. Storage used by program - 20,000 positions of storage.

CONTINUED FROM PRIOR PAGE

Equipment required by program- 1628, 1622, and 1443.
Programming type- SPS - 1628/1718.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138816

Indicate "E N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1628-13.8.017141 DATA PROCESSING SYSTEM - AN EDUCATIONAL COMPUTER FOR INSTRUCTION IN BASIC PROGRAMMING

AUTHORS: K. P. Swallon R. E. Gentry

DIRECT TECHNICAL INQUIRIES TO:

W. T. Price
Merritt College
5714 Grove Street
Oakland, California 94609

DESCRIPTION - The 141 Data Processing System is an educational tool for teaching basic computer concepts through a 1401 type machine language and 1401 SPS. The 141 simulator set of basic 1401 instructions includes- SW, CW, R, P, W, MCV, LCA, CS, B, C, A, S, H, and NOP. This set is sufficient to illustrate such concepts as- (1) reading, punching, and printing, (2) looping for iterative processes, (3) sequence checking, (4) counted loops, (5) program switches, (6) load routines, (7) address modification, (8) subroutines and subroutine linkages, etc. Basic utility routines are incorporated in the 141 simulator for easy debugging of 141 programs. 141 written subroutines are provided for multiplication, division, zero suppression, and editing. The 141 SPS Assembler processes the 141 set of instructions and all 1401 pseudo operations including- DCW, DC, DS, DSA, ORG, EX, and END. Storage used by program - 28,000 positions of storage. Equipment required by program- 1628, 1622, 1311, and Indirect Addressing. Programming type - SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138817

Indicate "E N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1628-13.8.018141 DATA PROCESSOR SYSTEM - AN EDUCATIONAL COMPUTER FOR INSTRUCTION IN BASIC PROGRAMMING

AUTHORS: K. P. Swallon R. E. Gentry

DIRECT TECHNICAL INQUIRIES TO:

W. T. Price
Merritt College
5714 Grove Street
Oakland, California 94609

DESCRIPTION - The 141 Data Processing System is an educational tool for teaching basic computer concepts through a 1401 type machine language and 1401 SPS. The 141 simulator set of basic 1401 instructions includes- SW, CW, R, P, W, MCV, LCA, CS, B, C, A, S, H, and NOP. This set is sufficient to illustrate such concepts as- (1) reading, punching, and printing, (2) looping for iterative processes, (3) sequence checking, (4) counted loops, (5) program switches, (6) load routines, (7) address modification, (8) subroutines and subroutine linkages, etc. Basic utility routines are incorporated in the 141 simulator for easy debugging of 141 programs. 141 written subroutines are provided for multiplication, division, zero suppression, and editing. The 141 SPS Assembler processes the 141 set of instructions and all 1401 pseudo operations including- DCW, DC, DS, DSA, ORG, EX, and END. Storage used by program - 28,000 positions of storage. Equipment required by program- 1628, 1622, 1443, 1311, and Indirect Addressing. Programming type - SPS II-D.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138818

Indicate "E N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1628-13.8.026A COMPUTER PROGRAM TO POWER-MATCH TEAMS IN A DEBATE TOURNAMENT

AUTHOR: Mr. Peter Wells

DIRECT TECHNICAL INQUIRIES TO:

Mr. Peter Wells
5415 S.W. 19th Dr.
Fortland, Oregon 97201

CONTINUED FROM PRIOR COLUMN

DESCRIPTION - This program processes the results of a debate tournament and assigns opponents, judges, and rooms for each round. Matches are made so that- (1) As far as possible, teams debate teams of equal ability; (2) A team does not debate the same side of the issue in successive rounds; (3) Teams never debate each other more than once; and (4) Teams from the same district never debate each other. In addition, a list of teams in order by win-loss ratings is produced and input cards to the next rounds processing are produced.

PROGRAMMING SYSTEMS - Written in SPS - 1628/1718.

MINIMUM SYSTEM REQUIREMENTS - A 28K 1628 card system.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138826

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1628-13.8.027STUFF OUTPUT EDITOR

AUTHOR: E. Satterthwaite

DIRECT TECHNICAL INQUIRIES TO:

E. Satterthwaite
University of Delaware
Computing Center
Newark, Del. 19711

DESCRIPTION - Program accepts as input an entire output deck of the STUFF program and edits all numeric data into FORTRAN-like E- or F-fields. All heading cards are also reproduced in the output. Field specifications for the numeric data are supplied by FORTRAN-like Format cards. Separate formats are allowed for phase 1-7 and for phase 9 stuff output. Storage used- 6328 core positions.

PROGRAMMING SYSTEMS - Written in SPS-1628/1718, mainline, complete.

MINIMUM SYSTEM REQUIREMENTS - A 1628 card system, TMS/TNF/HF, Indirect Addressing. These are minimum requirements and cannot easily be removed.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138827

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

1628-13.8.028UNIVERSITY OF MISSISSIPPI TEST SCORING PROGRAM - UMTS

*M

AUTHOR: Richard D. Ross

DIRECT TECHNICAL INQUIRIES TO:

Richard D. Ross
Director
Computer Center, Carrier 103
University of Mississippi
University, Mississippi

DESCRIPTION - UMTS is a flexible means of scoring objective exams taken on mark sense cards. A numerical grade for each student is published along with a grade distribution (with mean and standard deviation) and an exam analysis- indicating how many choices per question. UMTS has a maximum range of 500 5-choice questions (10 cards) per exam with multiplicity of correct answers permitted. In addition, each question may be weighted with a weight value from 1 to 5. UMTS also permits batch processing. To grade 150 questions takes approximately 1 1/2 seconds. No special instructions are required, although TNF and/or Direct Divide can be used on computers that have these capabilities. The maximum number of questions that may be graded is 150 questions for 28K computers and 500 questions for 48K computers.

PROGRAMMING SYSTEMS - SPS Language Processed by AFIT SPS (Program Number 1628-01.1.023).

MINIMUM SYSTEM REQUIREMENTS - Memory 28K, 1622. No special instructions are required but Indirect Addressing is required. Memory 48K can be used if available.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1628138828

Indicate "B N 1" in columns 1-3 and the Program Number
in columns 4-13 on the IBM Program Order Form.

CONTINUED FROM PRIOR COLUMN

1620-13.0.031UNIVERSITY OF MISSISSIPPI TEST SCORING PROGRAM

AUTHOR: Richard D. Ross

DIRECT TECHNICAL INQUIRIES TO:
Mr. Richard D. Ross, Director
Computer Center, Carrier 103
University of Mississippi
University, Mississippi

DESCRIPTION - This is a flexible means of scoring objective exams taken on mark sense cards. It features a card input and card output patterned after program number 13.0.028 by the same author. A numerical grade for each student is published along with a grade distribution (with mean and standard deviation) and an exam analysis--indicating how many choices per question. UMS has the following additional features -

- 1- Allows multiplicity of correct answers.
 - 2- Allows each answer to be weighted with a weight value from 1 to 5.
 - *3- Allows omitted question numbers to be punched following the students grad card.
 - *4- Allows weight factor to be punched beside each question number on exam analysis output.
 - 5- Allows identification to be punched in columns 76-80 of students grade card.
 - 6- Allows additional identification to be punched in columns 01-30 of first header card.
 - *7- Allows blank cards to be read at any time.
 - 8- Allows all key cards, alternate key cards, and weight cards to be read in random order.
 - 9- Allows student answer cards to be read in random order.
 - 10- Allows batch processing.
- *- Indicates additions to program number 13.0.028.

Because of the additions to program number 13.0.028 a maximum of 130 questions can be graded on 20K computers, 485 questions on 40K and 500 questions for 60K computers. No special instructions are required although TNF and/or Direct Divide can be used on computers that have these capabilities. The maximum number of questions that may be graded is 130 questions for 20K computers, 485 for 40K computers, and 500 questions for 60K computers.

PROGRAMMING SYSTEMS - Written in SPS Language processed by APIT SPS (Program Number 01.1.023). Fixed Point and non-relocatable.

MINIMUM SYSTEM REQUIREMENTS - Memory 20K, 1622. No special instructions are required but Indirect Addressing is required. Memory 40K and 60K can be used if available. Running time is 1 1/2 seconds for 150 questions and 4 seconds for 500 questions. This program is written to handle 25 mark sense columns and split them in half putting questions 1-25 in the 9 to 5 positions and questions 26-50 in the 4 to 0 positions. Each answer must be punched in a separate column for the computer so that a half-after-four time pick up was added to the mark sense punch to pick up cselectors and punch each question in a separate column.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130031

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.032LPI INFORMATION RETRIEVAL

AUTHOR: C.E. Bean

DIRECT TECHNICAL INQUIRIES TO:
C.E. Bean
Louisiana Polytechnic Inst.
Computing Ctr.
Ruston, La. 71270

DESCRIPTION - This is a series of programs to store up to 32 keywords concerning a specific reference in such a manner that the reference is associated with each word. Later use of these words in a search request then causes retrieval of this reference. The entire system is operable on a 20K machine. The size of the library to about 500 documents on a 20K machine, the search program may use all available core. This restricts 2000 on 40K, and 4000 on a 60K machine.

PROGRAMMING SYSTEMS - SPS-IID was used for convenience. Object decks were obtained using 1710 SPS. The SPS-IID B7 and B2 commands were converted to their 1710 SPS equivalents by a FORTRAN program included in the listings.

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model 1, 18K, with Card I/O and 1 disk file; TNS, TNF, MF X and Indirect Addressing. Requirements which can be easily removed are TNS-TNF.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

*M

ORDERING INFORMATION: PROGRAM NUMBER 1620130032

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.033PLOTTER (110x110)

AUTHOR: A.F. Brisken

DIRECT TECHNICAL INQUIRIES TO:
A.F. Brisken
Dept. of Physics
Saint Louis University
221 N. Grand Blvd.
Saint Louis, Mo. 63103

DESCRIPTION - The card output of this program is listed to make a plot of the entered data with respect to time (marked off in hours, minutes, and seconds). There are 10 vertical and horizontal increments (or intervals) every 10th and 20th increment, respectively, being labeled. All the data points, positive values only, are tested with respect to time to determine the proper time interval, and once all the points for a time interval have been accumulated, the average value and the probable error of the average are calculated. Then, the computer scans the vertical increments horizontally and substitutes the average and probable error symbols where appropriate. After the plot has been punched, a statistics of the plot can also be punched. Due to the very nature of this program, namely the averaging techniques, only single valued functions can be plotted. Also, to get a true representation of the data, the cards must be in an order such that time increases monotonically. This program contains three options. If a different symbol (other than a period) is needed for the plot, then it must be entered in the appropriate place and Sense Switch 1 must be on. If error bars are required (to indicate the precision of the average point), Sense Switch 2 must be on. If a statistics of the plot is desired, Sense Switch 3 must be on. (Any combination of Sense Switch settings is allowed).

MINIMUM SYSTEM REQUIREMENTS - A 1620 Model I card system with 56160 positions of storage, Indirect Addressing, Auto Divide, 1622, 1623 and any printer which lists with keys 81-120.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620140033

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.034TABULATE NUMERIC DATA DECKS ON 1443 PRINTER

AUTHOR: A.R. Eckert

DIRECT TECHNICAL INQUIRIES TO:
A.R. Eckert
Dept. of Agricultural Economics
University of Nebraska
Lincoln, Nebr. 68503

DESCRIPTION - Field and sign flags are cleared to avoid letters in lieu of numbers. On the page a sign column precedes and separates data fields that are designated to be printed. Signflags may be read either from the rightmost or leftmost columns of the card fields. Plus signs and high position zeros become blanks. A zero in the unit positions of empty data cells is optional. Printing is omitted for card columns that are designated to become blanks. Limitations- The sequence of printed fields is determined by the order of the card columns. It is not possible to place higher columns before lower columns. On a 120 space/line printer the maximum of separated fields is 60. Storage used- 2135 positions.

PROGRAMMING SYSTEMS - Machine Language, Relocatable 12-module, self-restoring.

MINIMUM SYSTEM REQUIREMENTS - IBM 1620 Model 1, Indirect Addressing; TNF, MF, cards, 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on Microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130034

Indicate "B N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0.035MINIIZATION AND STATE IDENTIFICATION OF AUTOMATA

AUTHOR: Hota S. Sarma

DIRECT TECHNICAL INQUIRIES TO:
Hota S. Sarma, Instructor

CONTINUED FROM PRIOR PAGE

School of Engineering
Tuskegee Institute
Tuskegee, Ala.

DESCRIPTION - The purpose of this project is to design a computer program, (A) To produce the minimal form of a given machine and (B) To find the present diagnosing and homing input sequences for identifying the initial and final states of the minimal form of the given machine. The number of states in the automation to be analyzed is limited to 20 and the number of input symbols is limited to 5.

PROGRAMMING SYSTEMS - Written in FORTRAN Language.

MINIMUM SYSTEM REQUIREMENTS - A 60K IBM 1620 using the For-To-Go Compiler with the input and the output at the typewriter. The program also requires Auto Divide, Indirect Addressing and a 1443 Printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130035

Indicate "P N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.

1620-13.0-036

*M

CAST - COMPUTER ASSISTED TEST SCORING

AUTHOR: D. Eschbach, Jr.

DIRECT TECHNICAL INQUIRIES TO:
D. Eschbach, Jr.
University of Toledo,
Toledo, Ohio

DESCRIPTION - This is a test scoring program which gives a reference for the student to read for each incorrect answer. Item analysis and frequency distributions are also generated for the instructors use. The program was developed to show some methods of computer assistance in teaching.

PROGRAMMING SYSTEMS - FORTRAN II-D.

MINIMUM SYSTEM REQUIREMENTS - 40K 1620 card-disk file system. The program can easily be expanded to take advantage of a printer.

BASIC PROGRAM PACKAGE
DOCUMENTATION - Write-up on microfiche only.
MACHINE READABLE - None.

ORDERING INFORMATION: PROGRAM NUMBER 1620130036

Indicate "P N 1" in columns 1-3 and the Program Number in columns 4-13 on the IBM Program Order Form.



International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, New York 10601
(USA only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)

READER'S COMMENT FORM

Catalog of Programs for IBM 1620
and 1710 Data Processing Systems

GC20-1603-10

January 1971

Please comment on the usefulness and readability of this publication, suggest additions and deletions, and list specific errors and omissions (give page numbers). All comments and suggestions become the property of IBM. If you wish a reply, be sure to include your name and address.

COMMENTS

—
fold

—
fold

—
fold

—
fold

YOUR COMMENTS PLEASE...

Your comments on the other side of this form will help us improve future editions of this publication. Each reply will be carefully reviewed by the persons responsible for writing and publishing this material.

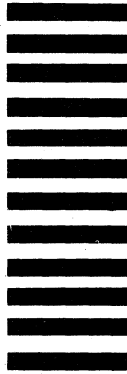
Please note that requests for copies of publications and for assistance in utilizing your IBM system should be directed to your IBM representative or the IBM branch office serving your locality.

fold

fold

FIRST CLASS
PERMIT NO. 62
HAWTHORNE, N. Y.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES



POSTAGE WILL BE PAID BY...

IBM Corporation
40 Saw Mill River Road
Hawthorne, New York 10532

Attention: Program Information Department, Catalog of Programs

fold

fold



International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, N.Y. 10601
[USA Only]

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
[International]

Catalog of Programs for IBM 1620 & 1710 DPS Printed in U.S.A. GC20-1603-10