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00016	000000	PTEMP	OCT 0	
00017	000000	TLVLS	OCT 0	
00018	000000	WTAB	OCT 0	
00019	000000	TEMPA	OCT 0	
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 TEMPORARIES FOR MAIN LINE

HP 2100 PROGRAM CATALOG

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Margaret Hunter/Atlanta
Rudolph Schneider/Boeblingen
Wim Roelandts/Brussels
Rolf Kobcke/Frankfurt
Priscilla Hartline/Fullerton
Bill Caelli/Melbourne
Virginia Herrera/Mexico City
Alfredo Scarfone/Milan
Didier Guerin/Orsay
Bob Chaffin/Paramus
Al Walthers/Skokie
Roger Llewellyn/Slough
Stuart MacKenzie/So. Queensferry
Bjoern Rosengren/Stockholm
Rick Roughgarden/AMD, Bldg. 70
Pierre Loisel/Taiwan
Tom Strasser/Tel Aviv
Y. Mikuni/Shibuya, Tokyo
Y. Manome/Hachioji, Tokyo
Gary Graham/Toronto
Ted Slater/Vancouver
Fritz Joern/Geneva
Pat Kelly/Wellington
Antonio Coco/Sao Paulo
George Radu/Cupertino
Dick Rands/3L
Frank Sloomweg/Amsterdam
Don Riley/Vienna
Al Sperry/Loveland
Bent Andersen/Copenhagen

HP 2100 Program Catalog

HEWLETT  PACKARD

August 1973

HP SOFTWARE CENTER
11000 WOLFE ROAD
CUPERTINO, CALIFORNIA
95014

HP 5950-9226
Printed in U.S.A.
August 1973

contents

INTRODUCTION

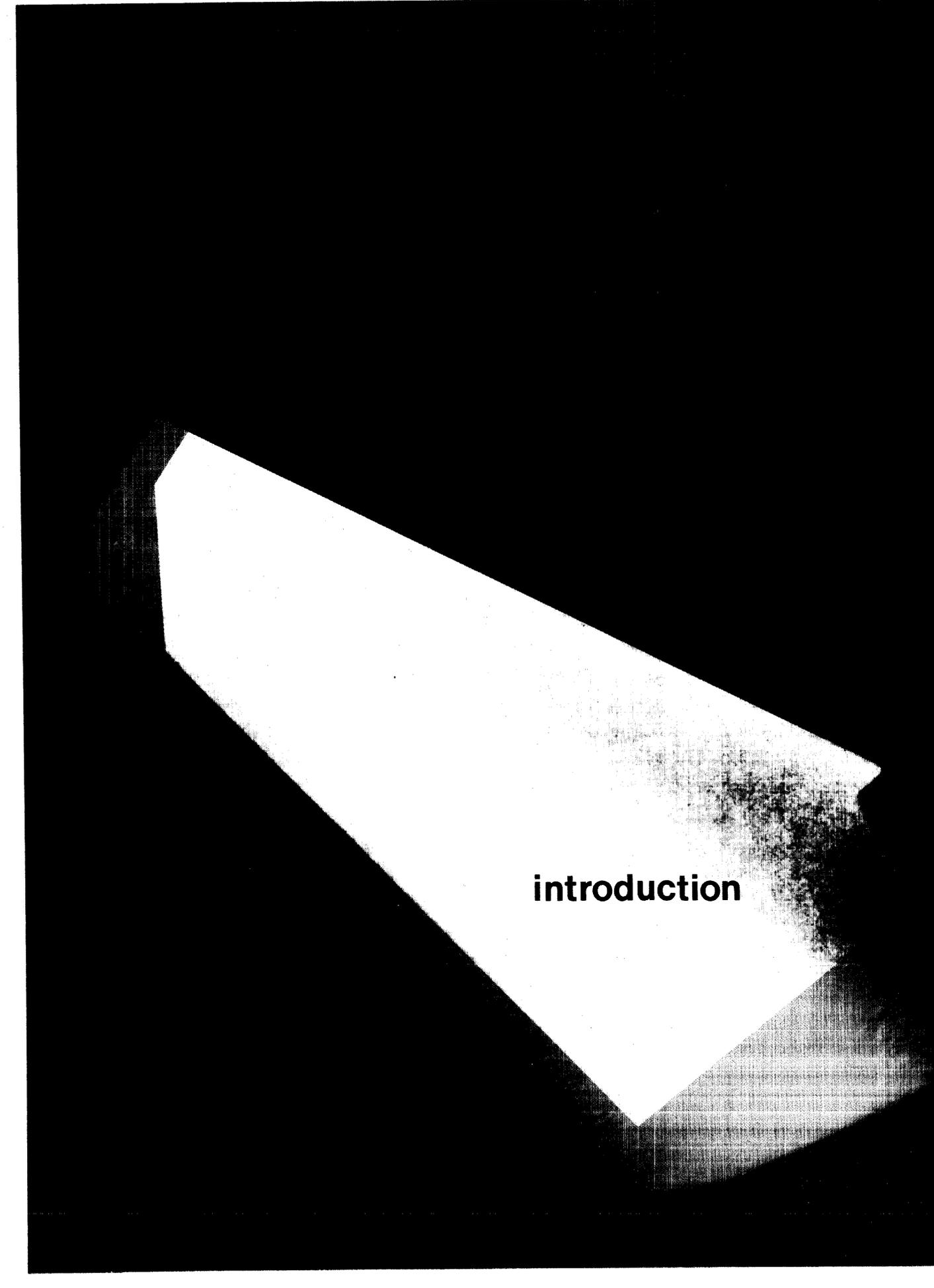
SECTION I SOFTWARE ABSTRACTS

SECTION II CROSS-REFERENCE INDEX

SECTION III SUMMARY

SECTION IV ORDERING INFORMATION

SECTION V HP 2100 CONTRIBUTORS GUIDE



introduction

The HP 2100 Program Catalog is designed as a handy reference to all Assembly, Microprocessor Assembly, FORTRAN, and ALGOL programs currently available from the Hewlett-Packard Software Center.

System designers and programmers will find it a convenient aid in selecting HP software. Potential users will find the technical descriptions useful in evaluating HP supporting software, contributed applications software, and other HP software products.

HP 2100 programs apply to a wide range of systems based on HP 2100-Series Computers. These systems range from a CPU and teleprinter up to a large disc-based configuration with a variety of computer peripherals and digital input/output instrumentation.

SOFTWARE CATEGORIES

The programs described in this catalog are classified as either HP supported or user contributed.

Supported software consists of all programs developed by Hewlett-Packard for the operation and support of HP computers and HP computer systems. These programs are fully backed by HP, and the originating division assumes responsibility for program testing and maintenance.

In the case of contributed software, HP does not perform testing or maintenance. However, the HP Software Center does collect "bug" reports on contributed software and forward them to the HP contributor. Program maintenance is the responsibility of the contributor because he is the most knowledgeable authority.

USING THE CATALOG

The catalog is divided into six parts; introduction, software abstracts, cross-reference index, summary, ordering information, and contributor's guide.

The introduction contains information on software ordering, new program contributions, HP's total support and the company's history in the computer field.

The software abstracts provide a brief description of each program, the source language used and any special hardware requirements beyond the minimum system.

How to Find Programs

The software abstracts are organized according to ten classification codes, and several subdivisions. Within each code, the programs are ordered numerically. To locate a specific software abstract quickly, first determine the

classification code and order number of the program. This can be done by using one of the following procedures:

1. If the category of a program is known, check the table of classification codes immediately preceding the abstracts section. Note the code of the application desired and turn to that section of abstracts. (The summary section of the catalog lists all programs by name and order number within each classification code).
2. If only the name of a program is known, check the cross-reference index. It contains an alphabetic list of words and phrases related to computer software. Each program in the catalog is listed under the key words or phrases that apply to it. For each program listed, the index gives the classification code and order number.
3. If only the order number of a program is known, check the price index of the catalog. It lists all programs numerically and gives the classification code for each program.

Programs for several specific types of HP Computer Systems are not covered in this catalog. These programs are of two types: those written in BASIC programming language and those intended for dedicated computer systems. The BASIC language programs are listed in the Index to HP BASIC Program Library, (HP order no. 5952-4639) and are described fully in the HP BASIC Program Library Handbook (HP order no. 36000-90001). Among the dedicated computer systems available are the following:

- HP 9500 Automatic Test Systems
- HP 8540 Series Automatic Network Analyzers
- HP 8580 Series Automatic Spectrum Analyzers
- HP 5451 Series Fourier Analyzer Systems
- HP 5406 Series Nuclear Analyzer System

Further information on the above dedicated computer systems, and programs available for them, may be obtained from any Hewlett-Packard sales and service office.

How to Order Programs

To order software from HP, simply write the field-office or distributor for your area, using the guidelines in the ordering information section. Or call your local HP representative. He will be happy to answer questions and advise you regarding special hardware requirements. A complete list of HP sales and service offices is given at the end of this catalog.

To insure prompt delivery, it is important that your order specify product numbers, option codes and prices. For further details refer to Section IV, Ordering Information.

How to Submit Programs

The contributor's guide (Section V of this catalog) is designed especially to facilitate the submittal of programs to the HP Software Center. It gives a detailed explanation of submittal procedures and policies. Additional information and forms may be obtained from any sales office or by writing HP directly.

The Software Center encourages HP computer users not only to submit their programs but also to report errors in HP programs or documentation. A special software report is available for this purpose. (One is included at the end of this catalog.)

HP's WORLD-WIDE SUPPORT

Hewlett-Packard provides total customer support throughout the world. Your HP computer investment is backed up by data center services, training courses, the assistance of systems analysts, complete software documentation and maintenance services.

Data Centers

To bring data products support closer to you, HP data centers are strategically located throughout the United States, Canada, Europe and Australia. Each location is staffed with experienced systems analysts and provided with a complement of HP computer systems. This equipment is utilized for demonstration purposes to train customers, and to prepare application software for new equipment. It also serves as a back up to your system whenever necessary.

Training

HP provides a full range of hardware and software courses to meet the training needs of its customers. Most of these courses are offered periodically at HP data centers.

Data products are designed to provide key personnel with intensive training in the operation and maintenance of HP computer equipment. This experience will prepare them to plan effectively for staffing, further training, equipment utilization, maintenance and development of special-purpose software. For the latest information on HP data products courses, contact your local HP representative.

Systems Analysts

If further assistance is required to solve a particular hardware or software problem, HP systems analysts are available. They can provide problem definition, system configuration and special-purpose software support.

Even before your HP system is delivered, you can count on an HP systems analyst to help with site preparation and training needs. And he'll make sure your system gets on-line fast.

In addition to systems analysts, specialists in such areas as communications, instrumentation, medical electronics, data acquisition, time-sharing and educational systems can be called on to assist you. Many of these specialists are among the most experienced professionals in the data products field. They constitute a support force that is virtually unmatched in the industry.

Software Documentation

To make your HP computer or computer system as useful and easy to operate as possible, the standard software is fully supported by publications and periodicals.

Software publications include programmer's reference manuals, operator's manuals, small program manuals and diagnostic manuals. Several tutorial handbooks and pocket reference guides supplement the information in other publications.

Maintenance

Help in maintaining your HP equipment in first-rate operating condition is as close as your telephone.

Service and parts assistance are available from over 170 HP field offices throughout the free world. Local service facilities are backed up by regional service centers and by major parts warehouses located in Mountain View, California and Rockaway, New Jersey. These facilities provide board exchanges services which get systems back on-line with minimal downtime.

To assure on-site preventive maintenance and repair, HP provides comprehensive customer service agreements. Assistance can range from 5-day service during normal working hours to 7-day all-hours backup. A maintenance arrangement to fit your needs can bring many important benefits. Contact your nearby HP field office for details.

THE HP STORY—GROWTH THROUGH EXCELLENCE

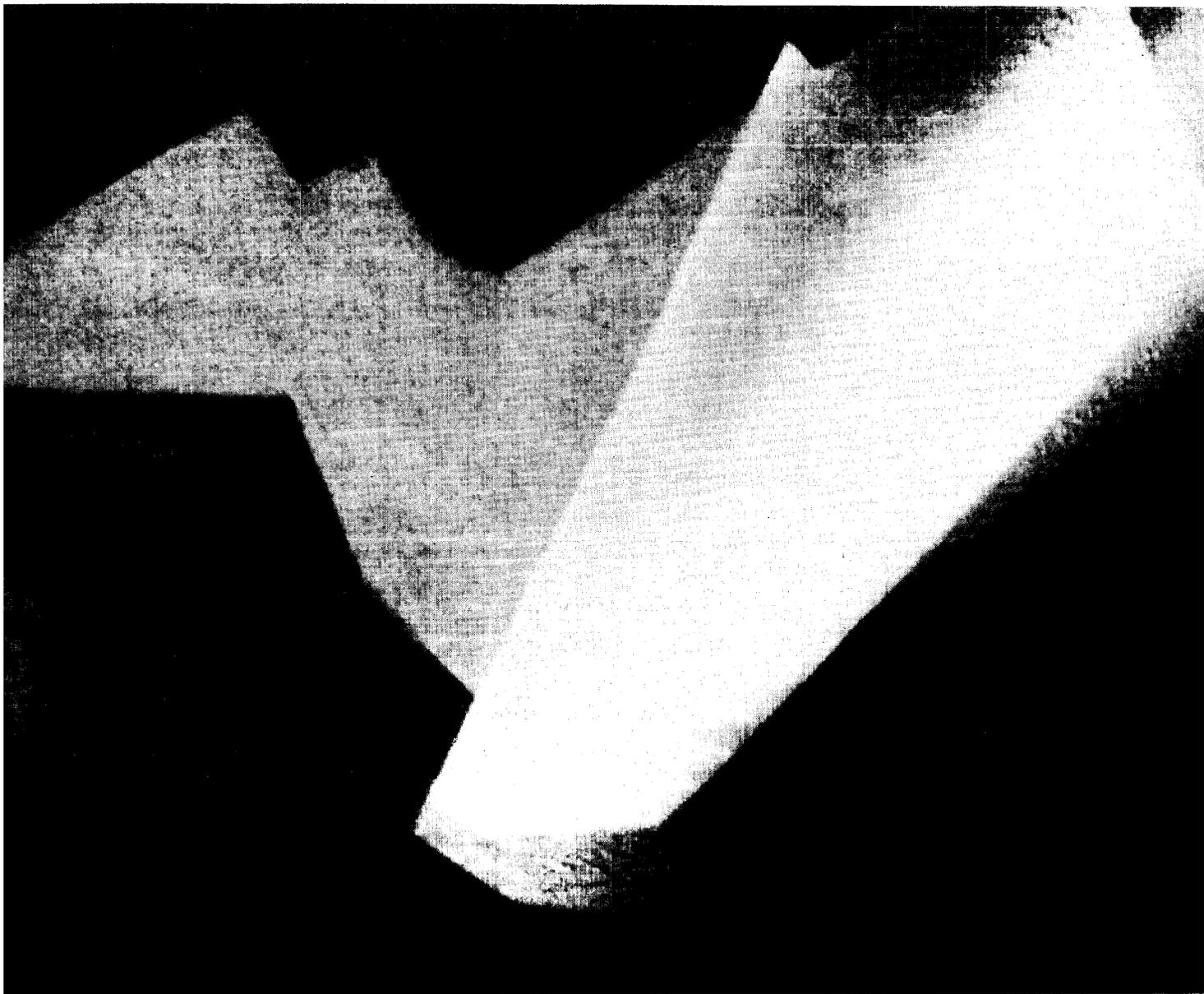
Hewlett-Packard is known throughout the world as a leader in the manufacture of instruments and systems of the highest quality. These products are designed to satisfy measurement needs of all kinds in science, industry, business and education. Today, HP provides over 2000 different electronic products for measurement, analysis and computation.

Since its founding in Palo Alto, California, almost thirty-five years ago, HP has grown from a two-man operation into a world-wide organization of more than 26,000 people, with an annual sales volume exceeding \$479 million. The company and its affiliates now have more than a dozen manufacturing plants, including three in Western Europe and one in Japan. Sales and service offices are located in nearly every major city in the free world.

HP's initial contribution to the data products field was the 2116A computer, introduced in 1966. This general-purpose digital computer was designed from the ground up to interface with a broad variety of measuring instruments as well as traditional computer peripherals.

By 1970, the 2116A had been replaced by the 2116C which permitted four times the internal memory capacity of the 2116A. Two smaller, lower-cost computers, the HP 2114 and the HP 2115, were also introduced during this period.

These three computers have been replaced by the HP 2100A, introduced in the spring of 1971. The 2100A provides significantly greater performance at less cost than the 2116C. From 4K to 32K of memory, with 14 input/output channels are packaged in a compact 12-inch package. Complete software compatibility has been maintained between the 2100A and all earlier models.



The following text is extremely faint and illegible due to the high contrast and low resolution of the scan. It appears to be a list or a series of entries, possibly a table of contents or a list of items, but the specific details cannot be discerned.

CLASSIFICATION CODE CATEGORIES

(Not all categories have programs. Please refer to Section III for available programs.)

000 OPERATING AND PROGRAMMING SYSTEMS	300 MATH AND NUMERICAL ANALYSIS	517 Aeronautical Engineering
001 Time-Shared Operating Systems	301 Mathematics, General	518 Structural Engineering
002 I/O, Telecommunications	302 Extended-Precision Arithmetic	519 System Theory
003 I/O, Special Device	303 Complex Arithmetic	600 MANAGEMENT SCIENCES AND OPERATIONS RESEARCH
004 I/O, Status Processing	304 BCD/ASCII Arithmetic	602 Pert
005 Report Generators	305 Boolean Algebra	603 Critical Path Analysis
006 I/O, Instrument	306 Functions, Computation of	604 Optimization Programs
007 Disc Operating Systems	307 Interpolation/Extrapolation	605 Linear Programming
008 Preparation of Systems	309 Curve Fitting	606 Discrete Systems Simulation
009 I/O, Paper Tape	310 Numerical Integration	607 Continuous Systems Simulation
010 I/O, Punch Card	311 Polynomials and Polynomial Equations	608 Forecasting Techniques
011 I/O, Printer	312 Matrix Operations	610 Dynamic Programming
012 Data Acquisition Systems	313 Eigenvalues and Eigenvectors	700 BUSINESS AND MANUFACTURING APPLICATIONS
013 I/O, A/D - D/A	314 Systems of Linear Equations	701 Job Reporting
014 I/O, Graphic	315 Systems of Non-Linear Equations	702 Quality Assurance Performance Analysis
015 I/O, Disc/Drum	316 Integral Transforms	703 Quality Assurance Testing
016 I/O, Magnetic Tape	317 Numerical Differentiation	704 Numerical Control
017 Loaders	318 Ordinary Differential Equations	705 Bill of Materials
018 Translators, Language	319 Partial Differential Equations	706 Payroll Accounting
019 External Interrupt Processing	400 PROBABILITY AND STATISTICS	707 Work-in-process Control
020 Real Time Systems	401 Univariate and Multivariate Parametric Statistics	708 Inventory Analysis
021 System Libraries	402 Time Series Analysis	709 Accounts Payable
022 System Utilities	403 Discriminant Analysis	710 Sales Forecasting
100 DATA HANDLING	404 Regression Analysis	711 Accounts Receivable
101 Editing	405 Random Number Generators	712 Financial Analysis
102 Information Storage and Retrieval	406 Probability Distribution Sampling	713 Investment Analysis
103 Table Handling	407 Non-Parametric Statistic	714 Economic Analysis
104 Character/Symbol Manipulation	408 Statistics, General	716 Budgeting Programs
105 Code/Radix Conversion	409 Correlation Analysis	717 Business Information Systems
106 Duplication	410 Analysis of Variance and Covariance	718 Business Services
107 Sorting and Merging	411 Factor Analysis	720 Educational Administration
108 Data Handling Utilities	412 Scaling	800 EDUCATION
109 Media Conversion	413 General Probability	801 Mathematics
110 File Management	500 SCIENTIFIC AND ENGINEERING APPLICATIONS	810 Programming and Computer Science
112 Special Format Data Transfer	501 Social and Behavioral Sciences	820 Engineering
200 TESTING, DEBUGGING AND PROGRAMMING AIDS	502 Geophysics	830 Economics
201 Tracing	503 Geology	833 Science
202 Instrument Test	504 Oceanography	850 Fine Arts
203 Disc/Drum Equipment Test	505 Physics	860 Social Science
204 Magnetic Tape Equipment Test	506 Medical Sciences	863 History
205 Graphic Equipment Test	507 Chemistry	870 English
206 Memory Search and Display	508 Biology	871 Foreign Languages
207 Dumping	509 Astronomy and Celestial Navigation	872 Reading
208 Core Storage Test	510 Petroleum Engineering	880 Business
209 Central Processing Unit Test	511 Hydraulic Engineering	890 Vocational
210 Break Points	512 Nuclear Engineering	900 UNCLASSIFIED
211 Debugging Aids	513 Electrical Engineering	901 Demonstrations
212 Programming Aids	514 Mechanical Engineering	903 Games
213 Paper Tape Equipment Test	515 Civil Engineering	904 Plotting Routines
214 Punch Card Equipment Test	516 Chemical Engineering	905 Microcode
215 Printer Equipment Test		
216 A/D - D/A Equipment Test		
217 Telecommunications Equipment Test		
218 Special Device Equipment Test		
219 Data Acquisition Systems Test		

section I

abstracts

INTRODUCTION

In this section is a brief description of the computer programs (and routines) offered for use with the HP 2100 series computers. Abstracts of HP supported and contributed programs are included.

The abstracts are organized by classification code. A list of the ten major classification codes and the subdivisions precedes the abstracts. Not all categories listed have programs.

TO FIND AN ABSTRACT

To find a particular abstract when the classification code is known, check the classification code number at the top of each page, the code numbers are in numerical sequence. The programs themselves are arranged numerically, by program number, within each classification group.

To find an abstract when only the program number is known, refer to Section IV of the catalog, where all programs are listed in sequence by program number. Section IV gives the classification code for each program, permitting the abstract to be found.

When seeking a program to perform a particular function, make reference to Section II, where programs are listed under key words and phrases applicable to the program.

STAT-PACK ROUTINES

Some of the routines listed in this catalog are identified as part of the Stat-Pack group. This is a collection of mathematical routines based on routines initially prepared by the Goddard Computer Science Institute, a division of the Wadley Institute of Molecular Medicine, Dallas, Texas.

PROGRAM REVISIONS

Each 5-digit program number is followed by a letter of the alphabet. A new program is assigned the suffix letter "A". If, for debugging or other purposes, the program is later revised in a manner which changes none of its intended functions, the letter is changed to "B". Subsequent revisions are identified as "C", "D", "E", etc. Thus, if a program has a suffix letter other than the one given in this catalog, the functions of the program remain the same as described in the abstract.

If a program is revised in such a manner that its functions change, a new number is assigned, together with the letter "A".

EQUIPMENT REQUIRED

Unless otherwise stated, the software listed in this catalog can be used with any computer in the HP 2114, 2115, 2116, or 2100 series, provided the computer system includes the accessories listed in the abstract. A teleprinter is included in every HP computer system and is not considered an accessory.

Equipment requirements are not stated for HP operating systems. When a computer system is intended for use with one of these operating systems, at least the minimum amount of equipment required by the operating system is supplied at the time of site installation. In the case of user programs intended for an operating system, only equipment which is beyond the minimum requirements of the operating system is listed.

When the amount of core storage required by a program is not stated in an abstract, 4K (4,096 16-bit words) is sufficient. This is the minimum amount of core storage available in HP computers.

Included in this catalog are numerous drivers for Hewlett-Packard instrumentation devices. Information on these devices is provided in the HP Instrument Catalog.

000, OPERATING AND PROGRAMMING SYSTEMS

001, TIME-SHARED OPERATING SYSTEMS

20596F, HP 2000A TIME-SHARED BASIC SYSTEM

This software product is a program system which permits up to 16 persons to use the computer and its associated I/O devices. Each user employs a teleprinter to communicate with the central processor and to receive pre-programmed messages. Because of program interleaving, each user receives immediate response from the central processor, and is unaware of the presence of other users. Additionally, each user not only has access to programs which are available to other users, he also has his own program library and data storage area. The teleprinters can be situated up to one mile (1.5 kilometers) from the central processor when simple wire connections are employed. Alternatively, by using suitable coupling equipment in conjunction with voice-grade telephone circuits, the teleprinters can be situated in any part of the world.

Some typical business uses of the program system are the following:

- a. Engineering and research: all types of technical computation.
- b. Manufacturing: master scheduling, line scheduling, decisions on new processes, cost analysis.
- c. Finance: Monthly and yearly budgets, financial statements, modeling and planning, investment decision making.
- d. Quality assurance: Test control and statistical analysis.
- e. Marketing: Forecasting, profit analysis, product status reports, product planning, market analysis.
- f. Inventory: Inventory control, reordering, usage analysis.
- g. Field Service: Service contract generation, parts information, frequency-of-failure analysis.

Further information on the program system is provided in the publications *2000A: A Guide to Time-Shared BASIC* (HP order no. 0200-90002) and *2000A: Time-Shared BASIC System Operator's Guide* (HP order no. 02000-90001).

The 20596 program system must be used in the 2000A Time-Shared System, which consists of the program system,

an HP 2116 computer, and additional components as specified in the aforementioned Operator's Guide.

Assembly language, absolute.

HP supported:
Data Systems Division

24230B, HP 2000C TIME-SHARED BASIC SYSTEM

The HP 2000C system uses two computers—one for actual computation and the other for controlling access to the main computer. The system supports up to 32 terminals; programs can be entered through the terminal keyboard or through the paper tape reader.

Each user has access to three libraries—a public library, his own private library that cannot be accessed by anyone else, and the intermediate library available to a group of users.

Compared to the HP 2000A and 2000B time-sharing systems, the 2000C offers the following advancements in system features and further extensions to the BASIC language:

- a. Moving-head discs are a key feature of the system. Up to eight discs are allowed and provide greatly increased storage capacity for programs and files.
- b. Special system commands permit the operator to store selected user programs and files on the fixed-head drum for rapid access.
- c. The language processor now features formatted output, providing more precise control of printing and extending line length beyond the usual limit of 72 characters per line through use of PRINT USING and IMAGE statements.
- d. A magnetic tape transport allows the system operator to load and dump the entire system or selected user programs and files. With the mag. tape transport feature, the computer and peripheral equipment can be used easily for other applications such as batch processing.

(continued)

001, TIME-SHARED OPERATING SYSTEMS (continued)

- e. Length of a single program has been extended to over 10,000 (16-bit) words—about 1000 BASIC statements per program.
- f. For larger programs, the CHAIN and COMMON statements allow virtually unlimited program lengths, with variables common to all programs.
- g. File size has been increased to 16 million characters—over 8 million 16-bit words.
- h. A program may reference many files, limited only by available disc storage space.

Further information on the system is provided in the publications *2000C: A Guide to Time-Shared BASIC* (HP order no. 02000-90016) and *2000C: Time-Shared BASIC Operator's Guide* (HP order no. 02000-90017).

Assembly language, absolute.

HP supported:
Data Systems Division

24231A, HP 2000B/C TIME-SHARED BASIC COMMUNICATIONS PROCESSOR

The HP 2000B Time-Shared BASIC System has been separated into modules to facilitate future updates and sharing of modules between the HP 2000B System and other similar systems. This is the terminal multiplexing module for the 2000B and 2000C Systems. This and other 2000B TSB modules obsolete the HP 2000B System, HP Order Number 20877.

Assembly language, absolute.

HP supported:
Data Systems Division

24232B, HP 2000C/F TIME-SHARED BASIC LOADER (HP 2883 DISC)

This program is used with an HP 2000C Time-Shared BASIC system that contains HP 2883 and HP 2884 disc files. The loader provides system loading and dumping (backup) on HP 3030 or HP 2970 magnetic tape drives.

Assembly language, absolute.

HP supported:
Data Systems Division

24233B, HP 2000C TIME-SHARED BASIC LOADER (HP 2870 DISC)

This program is used with an HP 2000C Time-Shared BASIC system with an HP 2870 disc. The loader provides system loading and dumping (backup) on HP 3030 or HP 7970 magnetic tape drives.

Assembly language, absolute.

HP supported:
Data Systems Division

24234B, HP 2000B TO HP 2000C CONVERSION (HP 2883 DISC)

This program is used when a HP 2000B TSB system is being upgraded to a 2000C TSB with HP 2883 disc and it is desired to retain user programs and/or files on the new system. HP 2000A systems which are being updated to 2000C TSB systems must be converted to 2000B systems as an intermediate step, requiring complete 2000B software.

Assembly language, absolute.

HP supported:
Data Systems Division

24235B, HP 2000B TO HP 2000C CONVERSION (HP 2870 DISC)

This program is used when a 2000B TSB system is being upgraded to an HP 2000C TSB with HP 2870 disc and it is desired to retain user programs and/or files on the new system. HP 2000A systems which are being updated to 2000C TSB systems must be converted to 2000B TSB systems as an intermediate step, requiring 2000B software.

Assembly language, absolute.

HP supported:
Data Systems Division

24238B, HP 2000B TIME-SHARED BASIC LOADER

The HP 2000B Time-Shared BASIC System has been separated into modules to facilitate future updates and sharing of modules between the HP 2000B System and other similar systems. This is the loader module, and it has been corrected to verify file marks correctly on the HP

(continued)

001, TIME-SHARED OPERATING SYSTEMS (continued)

7970 magnetic tape. This and other HP 2000B TSB modules obsolete the HP 2000B System, HP Order Number 20877.

Assembly language, absolute.

HP supported:
Data Systems Division

24239B, HP 2000B TIME-SHARED BASIC SYSTEM

The HP 2000B Time-Shared BASIC System has been separated into modules to facilitate future updates and sharing of modules between the HP 2000B Systems and other similar systems. This is the system module, and it includes the following corrections:

- a. Blanks are now stripped from commands.
- b. ENTER accepts plus (+) and minus (-) when inputting a number.
- c. ENTER does *not* strip off leading blanks.
- d. DELETE does *not* allow parameters 9999.
- e. KILLID removes directory entries properly when the last track contains only the ending pseudo entry.
- f. An attempt to print a string greater than 72 characters is flagged as an error.
- g. A simple variable appearing in COMMON more than once is flagged as an error.
- h. All lower case characters are converted to upper case, except in quoted strings and string inputs to INPUT and ENTER statements.
- i. Appending a program after scratching another program which had at least one variable in common will not cause an error.
- j. Possible loss of a program previously stored by a CSAVE has been eliminated.
- k. Aborting a program which has just filled the output buffer will not cause a buffer wrap-around.
- l. SLEEP is no longer aborted if a key on the teleprinter is pressed while SLEEP is logging off the users.
- m. The problem that erroneously caused the message NAM-XXX-ONLY 6 CHARS ACCEPTED has been eliminated.

This and other HP 2000B TSB modules obsolete the HP 2000B System, HP order number 20877.

Assembly language, absolute.

HP supported:
Data Systems Division

24253C HP 2000C/F TIME-SHARED BASIC LOADER (HP 7900 DISC)

This program is used with an HP 2000C Time-shared BASIC system with an HP 7900 disc. The loader provides system loading and dumping (backup) on HP 3030 or HP 7970 magnetic tape drives.

Assembly language, absolute.

HP supported:
Data Systems Division

24254B, HP 2000B TO HP 2000C CONVERSION (HP 7900 DISC)

This program is used when a 2000B TSB system is being upgraded to a 2000C TSB with 7900 disc and it is desired to retain user programs and/or files on the new system. 2000A systems which are being updated to 2000C TSB systems must be converted to 2000B TSB systems as an intermediate step, requiring 2000B software.

Assembly language, absolute.

HP supported:
Data Systems Division

24261C, HP 2000C HIGH SPEED TIME-SHARED BASIC SYSTEM

The most recent addition to the family of HP time-sharing systems, the HP 2000C high speed system uses two computers, one for actual computation and the other for controlling access to the main computer. The system supports up to 32 terminals; programs can be entered through the terminal keyboard or through the paper tape reader.

Each user has access to three libraries—a public library, his own private library that cannot be accessed by anyone else, and the intermediate library available to a group of users.

(continued)

001, TIME SHARED OPERATING SYSTEMS (continued)

In addition to the advancements offered in the HP 2000C system, the HP 2000C high speed offers the following system features:

- a. Terminal speeds ranging from 10 to 240 characters per second are offered through use of the HP 2100A asynchronous multiplexer.
- b. Eight terminal modules are supported: HP 2749A Teleprinter, HP 2600A Key-Board Display, HP 2605A Console Printer, GE Terminet 300, Memorex 1240, Execuport 300, ASR-37, and IBM 2741.
- c. A line printer can be designated as the users output device by means of a user command. Four line printer models are supported: HP 2767A, HP 2778A, HP 2610A, and HP 2614A.

Assembly language, absolute.

HP supported:
Data Systems Division

24262C, HP 2000C HIGH SPEED/F TIME-SHARED BASIC COMMUNICATIONS

The HP 2000C high speed time-shared BASIC system has been separated into modules to facilitate future updates and sharing of modules between the HP 2000C high speed and other similar systems. This is the terminal multiplexing module for the HP 2000C high speed and HP 2000F system. This module is also responsible for line printer control.

Assembly language, absolute.

HP supported:
Data Systems Division

24276B, HP 2000F TIME SHARED BASIC SYSTEM

The HP 2000F TSB system provides BASIC language features for as many as 32 simultaneous users and on-line file and program storage on disc files. Eight terminal types can be connected with speeds ranging from 110 to 2400 baud. Optionally a line printer (HP 2767A, HP 2778, HP 2610, or HP 2614) can be connected.

The system requires the use of an HP 2000C Loader appropriate to the disc file being used and the HP 2000C (high speed) TSB communications processor.

NOTE: The HP 2000F TSB system is currently being revised. The updated version will be listed in a later issue of the SIB.

Assembly language, absolute.

HP supported:
Data Systems Division

24280B, HP 2000E TIME-SHARED BASIC SYSTEM

The HP 2000E Time-Shared BASIC (TSB) system consists of an executive program, multiplexor control program, accounting system and library system to provide effective user/system communication. The HP 2000E TSB provides up to 16 users great flexibility and power in terminal programming applications.

Note: The following terminals are not supported in this version: GE Terminet, ASR-37, Memorex 1240.

Assembly language, absolute.

HP supported:
Data Systems Division

24285B, HP 2000E TIME-SHARED BASIC LOADER/UTILITY

This program is a utility to load the HP 2000E Time-Shared BASIC System.

Assembly language, absolute.

HP supported:
Data Systems Division

24286A, HP 2000E TIME-SHARED BASIC BOOTSTRAP LOADER

This program is a bootstrap loader for the HP 2000E Time-Shared BASIC system.

Assembly language, absolute.

HP supported:
Data Systems Division

002, I/O TELECOMMUNICATIONS

20017C, BCS TELEPRINTER DRIVER D.00

This BCS driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20322A, 4K SIO BUFFERED TELEPRINTER DRIVER

Used by 4K computers, this SIO driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20323A, 8K SIO BUFFERED TELEPRINTER DRIVER

Used by 8K computers, this SIO driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20329A, 12K SIO BUFFERED TELEPRINTER DRIVER

Used by 12K computers, this SIO driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20330B, 16K SIO BUFFERED TELEPRINTER DRIVER

Used by 16K computers, this SIO driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20741D, RTE TELEPRINTER DRIVER (DVR00)

This RTE driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20985D, DOS TELEPRINTER DRIVER (DVR00)

This DOS and DOS-M driver controls teleprinter I/O operations.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

22237C, TELEPRINTER/LINEPRINTER OUTPUT SELECTOR FOR HP BASIC

This routine, which operates under the 20392A BASIC Operating System, allows an operator to transfer teleprinter I/O operations to either of two teleprinters. One or both of the teleprinters can be at a remote site, connected to the computer by a telephone data-link system. Transfer from one teleprinter to the other is accomplished in any of the following ways:

- a. The word "BYE" is typed (or read from punched tape) on the teleprinter currently recognized by the program.

(continued)

002, I/O TELECOMMUNICATIONS (continued)

b. When the computer is halted, a number is entered into the switch register. The transfer takes place when the computer is started.

c. The program calls a transfer routine.

When the transfer takes place, the teleprinter which will be recognized by the program types "READY."

Assembly language, absolute.

Contributed:
Roy Jacobus
Westinghouse Electric Co.

22244B, 16K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM

This program provides data communications capability between two Hewlett-Packard 2100 series computers. This utility is designed to be used in conjunction with D.50, 22328, a BCS Telecommunications Driver. Interactive commands and messages allow the operator to specify the transmission code, ASCII, EBCDIC, or 6-bit TRANSCODE through a system console teleprinter. The user may also specify the direction of transmission, the source or destination peripheral device, the mode of transmission, and various other functions. All data transmitted is compressed before transmission and expanded upon reception in blocked or unblocked mode.

Equipment required includes 16K core, an HP 2752 or 2754 teleprinter, a BELL 202C Modem, and an HP 12539 Time Base Generator.

Assembly language, relocatable.

Contributed:
Bill Alexander
HP, Midwest Sales Region

22245A, USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER D.50

Identified as BSCIN, this routine serves as a user's interface with program 22328C, BCS Telecommunications Driver (D.50). BSCIN relieves the programmer of such housekeeping tasks as handshaking with a remote terminal, auto-answering, initializing the time base generator, adding control characters to messages, etc. As a result, telecommunications I/O operations are performed in a fashion similar to I/O operations with peripheral units at the local computer. More specifically, for a telecommunications operation the programmer simply codes a subroutine call to BSCIN, and furnishes a parameter list. The call can be made either from Assembly Language, FORTRAN, or ALGOL.

Equipment required is one HP 12539A Time Base Generator Interface Kit, and one HP 12587A Asynchronous Data Set Interface Kit.

Assembly language, relocatable.

Contributed:
Bill Alexander
HP, Midwest Sales Region

22246B, DOS-M REMOTE TAPE READER DRIVER

It is possible to remote a DOS-M system console by connecting a 103-A data phone directly to the teletype interface board using cable number 2116-6156. The user communicates with DOS-M using a remote teleprinter (HP 2749 or equivalent) and an acoustic coupler. Only one teleprinter at a time can be used in this manner, operating on a first-come, first-served basis.

No software changes are required for this operation as long as only keyboard/page printer operations are required.

"Remote batch" operations using the remote system console teleprinter tape reader are possible but require the use of special software. Two drivers are available for this purpose. One driver in this package with entry point DVR07 controls operations with the tape reader on the remote console teleprinter. The second driver DVR00, controls the remaining console teleprinter functions (keyboard input, type output, and punch output). A lockout between the two drivers prevents their being used simultaneously.

Note that this package does not allow for a remote automatic bootstrap of the system in case of a crash.

A 12K DOS-M system is required. The drivers are in relocatable language.

Assembly language, relocatable.
Contributed:
Denis Winn
HP, Data Systems Division

22311A, BCS POWER FAIL TELEPRINTER DRIVER WITH AUTORESTART OPTION

This BCS teleprinter driver incorporates a power fail routine for any HP 21XX computer with power fail. It saves and restores all the registers including the switch register. If the autorestart option is available, this driver will restart the program at the interrupted point and restore the teleprinter to its previous status.

(continued)

002, I/O, TELECOMMUNICATIONS (continued)

If the full capability of this routine is used to drive a complete paper tape system including photoreader and high-speed punch, then this driver alone will revive the complete paper tape system after autorestart.

Equipment required is any 4K HP computer with power fail, an HP 2752A or 2754 teleprinter, and optionally, autorestart.

Assembly language relocatable.

Contributed:
Enrico P. Mariani
HP, Italy/Milan

22328C, BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS AND ASYNCHRONOUS DEVICES

D.50 is designed to interface telecommunication synchronous or asynchronous devices using IBM's Binary Synchronous Control line discipline. The driver may be used for data communications between two 2100 series computers, a 2100 series computer and an IBM computer with a telecommunications adapter, or a 2100 series and any terminal (or other computer) operating under BSC line discipline (as an IBM 2780). The synchronous mode of the driver is required with most IBM equipment.

All requests to D.50 must be a standard formatted request to .IOC, buffered or unbuffered. The function processors in D. 50 services requests to CLEAR, READ, WRITE, HANDSHAKE, AUTO-ANSWER, RECEIVE TO SEND, SEND END OF FILE, and EXTENDED STATUS.

D.50 will support three different character codes—ASCII, EBCDIC, and 6-bit TRANSCODE. In addition, transparent mode is provided where data link control characters may be transmitted as data without taking on control meaning as would be required in the transmission of binary data. Conversational mode is also provided where both terminals alternately send and then receive data.

Coupled with HP's 12621A and 12622A synchronous interface boards or 12587A Asynchronous Data Set Interface Kit, 12539A Time Base Generator, and an appropriate modem, this driver will allow an HP 2100 series computer to communicate directly with an IBM or BSC terminal. The calling program initiates the appropriate function calls to carry out data transmissions. Included with this driver is a calling program which makes a 2100 computer simulate an IBM 2780 terminal. Also, this driver will interface directly with contributed programs 22244 and 22245 for 2100 to 2100 series computer communication. HP 22453, HP 2100 Remote Job Entry may also be of interest to users of this package.

Assembly language, relocatable.

Contributed:
Rich Nielsen
HP, Palo Alto

22367A, 8K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM

This program provides data communications capability between two Hewlett-Packard 2100 series computers. This utility is designed to be used in conjunction with D.50, 22328, a BCS Telecommunications Driver. Interactive commands and messages allow the operator to specify the transmission code, ASCII or EBCDIC, through a system console teleprinter. The user may also specify the direction of transmission, the source or destination peripheral device, the mode of transmission, and various other functions. All data transmitted is compressed before transmission and expanded upon reception in blocked or unblocked mode.

Equipment required included 8K core, an HP 2752 or 2754 teleprinter, a BELL 202C modem, and an HP 12539 Time Base Generator.

Assembly language, relocatable.

Contributed:
Bill Alexander
HP, Midwest Sales Region

22372A, HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1108

This program allows an HP 2100 series computer to operate as a remote batch terminal to a Univac 1108. The HP 2100 series computer simulates the operation of a Univac 1004 as a remote batch terminal to a Univac 1108 via standard telecommunications techniques. The program conforms to Univac specifications for the 1108 operating systems, EXEC 11 and EXEC 8.

Basically this program operates by sending and receiving control information and data buffers. This program handles only the communications logic; it relies on external subroutines for assembly of data buffers, compression, and code conversion. Data buffers sent and received consist of 320 or 330 characters of compressed or uncompressed data. All data sent and received is in excess-three code, XS-3 (Univac's 1004 standard). The supporting documentation details Univac's communication techniques, compression techniques, and XS-3 code.

(continued)

002, I/O, TELECOMMUNICATIONS (continued)

This program operates under BCS in an 8K 2100 series computer using a 12618A Synchronous Data Set Interface and a 201A3 Bell Data Set (200 Baud Synchronous).

Assembly language, relocatable.

Contributed:
Jerry Reaugh
HP Data Systems Division

22374A, A BCS ASYNCHRONOUS DATA SET INTERFACE DRIVER

This driver establishes data communications between HP 2100 series computers and the TC-380 Olivetti buffered terminal. It allows the HP computer to input or output control signals with the following features; half-duplex transmission, 1200 bits/sec., even parity, 8-bit characters, 1 start bit, and 1 stop bit. The driver also initiates, continues, and completes all data transmission or reception commands via an HP 12587 Interface Board.

On read requests, the driver receives character per character one Olivetti formatted buffer with a maximum of 230 ISO coded characters. It translates these characters into an ASCII packed buffer or an XS-3 buffer properly formatted for communication with a Univac 1108 computer. On write requests, the driver translates into ISO code and sends one ASCII packed buffer or one formatted XS-3 buffer character per character to the Olivetti terminal.

The communication procedures are selecting and polling. One useful application of this driver is in the environment where an HP minicomputer handles I/O for a Univac 1108 computer.

Assembly language, relocatable.

Contributed:
Elizabeth Caloyannis
HP, France/Orsay

22387A, D.70 REVERSE CHANNEL TELECOMMUNICATIONS DRIVER

D.70 is an input/output driver, written in the form of a subroutine, designed to operate in an interrupt controlled BCS environment. It interfaces HP 2100 series computers to telecommunication devices under an ARQ (Automatic Request for Resend) line discipline. Reverse channel is used as the request for resend medium. The driver supports HP's asynchronous I/O boards coupled to any appropriate modem with reverse channel feature (as a BELL 202C).

The ARQ method used by this driver can considerably increase throughput rates, especially for short data blocks. In effect, it simulates a pseudo full-duplex line on a half-duplex circuit.

Equipment required includes 8K core, an HP 12539 Time Base Generator, an HP 12587A Asynchronous Data Set Interface Kit, and an appropriate modem with the reverse channel feature, BELL 202C.

Assembly language, relocatable.

Contributed:
Rich Nielsen
HP, Corporate

22394A, CORE-SAVING TELEPRINTER I/O DRIVER AND CODE CONVERSION ROUTINE

This driver allows a FORTRAN compiled program to bypass the formatter, .IOC., and standard BCS drivers for conversational ASCII text and real data input/output on a single teleprinter. It is a completely self-contained relocatable I/O system with ASCII and real code conversion routines using only 600₁₀ words. Thus core amounting to 800₍₁₀₎ + .IOC. + drivers are saved over the usual formatted read/write. In a 4K machine, this results in the user having an extra 1K available for raw FORTRAN code.

All relocatable binary code including this driver and the library must be loaded and punched onto an absolute tape without .IOC., the formatter, or the BCS drivers by using the contributed Offline Relocating Loader, HP 22297.

Assembly language, relocatable.

Contributed:
Don Mactaggart
Canadian Marconi Company

22453B, HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU

HPRJE is a program designed to allow medium- to high-speed remote job entry functions to be carried out between an IBM "host" computer and an HP 2100 series computer. The program simulates the function of an IBM 2780 terminal which is one of IBM's popular medium-speed RJE terminals.

In particular, the functions available with HPRJE are as follows:

1. *JOB ENTRY*. A file of data, as a COBOL source compile, is transmitted to the IBM "host" CPU for processing.

(continued)

002, I/O, TELECOMMUNICATIONS (continued)

2. *JOB RETRIEVAL*. Output files from entered jobs are received from the IBM "host" CPU and spooled to tape in print line format.
3. *JOB STATUS & CONTROL*. Statistics on entered jobs, as processing queues, and job control functions, as job cancellation, are available upon request from the HP 2100 system's console.
4. *CARD TO TAPE*. HPRJE will read cards and write to magnetic tape, thus generating an input file for transmission to the "host" CPU.
5. *FILE PRINT*. HPRJE will print job files received from the "host" CPU.

Assembly language, relocatable.

Contributed:
Rich Nielsen
HP, Palo Alto

22489A, CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER (LINE PRINTER COMPATIBLE)

This one HP 2752/54 Teletypewriter SIO driver can replace all the different core size versions of such SIO drivers. It has the ability to automatically determine the memory size of any HP 2100 series computer during the normal SIO configuration process. This is achieved by a self-contained modification to the configuration section of the standard HP SIO driver. The entire process is transparent to the user and acts as if he had loaded and configured the specific driver for his size memory.

Assembly language, absolute.

Contributed:
Michael W. Lesko
HP, Midwest Sales Region

22496A, CDC USER 200 TERMINAL SIMULATOR

Operating in a BCS, MTS, or DOS-M environment this package of assembly language routines and drivers simulates the CDC User 200 Terminal; thus, it provides a connection between an HP computer and a CDC 6600 computer. All operation is Half Duplex over telephone lines. The HP 12618A Synchronous Communications Cards enable speeds of up to 9.6K bauds, and the HP 2600A Visual Display Unit allows functions to be effected from the keyboard rather than the switch register. An on-line configurator was added so that automatic switching of peripherals could be provided.

This package will operate with the CDC Telescope, Import/Export, or Telecom operating systems. Equipment required includes 8K of core, an HP 2778A, HP 2767A, or DP 2410 Line Printer, a DP SR300 or MDS 6002 Card Reader, an HP 2600A or HP 2752A Console, HP 12618A Communications Cards, and optionally an HP 2753A or HP 8100 Tape Punch.

Assembly language, relocatable.

Contributed:
Dave Mackie
HP, Data Systems Division

24123A, 4K SIO TELEPRINTER DRIVER, LINE PRINTER COMPATIBLE

Used by 4K computers, this SIO driver controls teleprinter I/O operations. If a line printer is also used, the line printer driver overlays the print and punch portions of the teleprinter driver; as a result, all print outputs are forwarded to the line printer. If tape punching is required when the teleprinter driver is overlaid, a separate tape punch is used, with its own driver. If no line printer is configured, teleprinter print outputs are forwarded to the teleprinter.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit. An optional I/O device is an HP 2767 or 2778 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24125A, 8K SIO TELEPRINTER DRIVER, LP-COMPAT

Used by 8K computers, this SIO driver controls teleprinter I/O operations. If a line printer is also used, the line printer driver overlays the print and punch portions of the teleprinter driver; as a result, all print outputs are forwarded to the line printer. If tape punching is required when the teleprinter driver is overlaid, a separate tape punch is used, with its own driver. If no line printer is configured, teleprinter print outputs are forwarded to the teleprinter.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit. An optional I/O device using this routine is an HP 2767 or 2778 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

002, I/O, TELECOMMUNICATIONS (continued)

24127A, 16K SIO TELEPRINTER DRIVER, LP-COMPAT

Used by 16K or larger computers, this SIO driver controls teleprinter I/O operations. If a line printer is also used, the line printer driver overlays the print and punch portions of the teleprinter driver; as a result, all print outputs are forwarded to the line printer. If tape punching is required when the teleprinter driver is overlaid, a separate tape punch is used, with its own driver. If no line printer is configured, teleprinter print outputs are forwarded to the teleprinter.

Equipment required is one HP 2752 or 2754 Teleprinter, with interface kit. An optional I/O device is an HP 2767 or 2778 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24157B, DOS-M SYSTEM TELEPRINTER DRIVER (DVR05)

This DOS-M driver controls keyboard input and typewriter output operations for the teleprinter. The driver is core resident, and to conserve storage space the means for reading or punching tape at the teleprinter is not provided. If teleprinter tape reading and tape punching are required, program 20985 is used.

Assembly language, relocatable.

HP supported:
Data Systems Division

24256A, 4K SIO HP 2605A CONSOLE PRINTER DRIVER

Used by 4K computers, this SIO driver controls I/O operations with an HP 2605A Console Printer.

Assembly language, relocatable.

HP supported:
Data Systems Division

24257A, 8K SIO HP 2605A CONSOLE PRINTER DRIVER

Used by 8K computers, this SIO driver controls I/O operations with an HP 2605A Console Printer.

Assembly language, relocatable.

HP supported:
Data Systems Division

24258A, 16K SIO HP 2605A CONSOLE PRINTER DRIVER

Used by 16K computers, this SIO driver controls I/O operations with an HP 2605A Console Printer.

Assembly language, relocatable.

HP supported:
Data Systems Division

24259A, BCS HP 2605A CONSOLE PRINTER DRIVER (D-25)

This BCS driver is used to drive the HP 2605A Console Printer for keyboard input (ASCII) and for line printer output.

Assembly language, relocatable.

HP supported:
Data Systems Division

24260A, DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)

This driver operates as a system console for DOS-M or as an ordinary I/O device. This driver will input and list ASCII code.

Assembly language, relocatable.

HP supported:
Data Systems Division

24299A, 12K SIO TELEPRINTER DRIVER

This SIO driver controls teleprinter I/O operations in 12K systems. Equipment required is one HP 2752 or 2754 Teleprinter, and an HP 2767 or 2778 Line Printer.

Assembly language, absolute.

HP supported:
Data Systems Division

24300A, 12K SIO HP 2605 CONSOLE PRINTER DRIVER

This SIO driver operates an HP 2605A Console Printer in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

002, I/O, TELECOMMUNICATIONS (continued)

29029A, RTE MULTIPLE-DEVICE SYSTEM CONTROL DRIVER (DVR00)

The Real-Time Executive Multiple-Device System Control Driver controls data transmission on input/output devices such as the ASR-33, ASR-35 Teletype, HP 2600A Keyboard Display Terminal, HP 2605 High Speed Console, paper-tape readers, and paper tape punches. The DVR00 Driver operates in the interrupt mode through the I/O Control EXEC calls in RTE.

The DVR00 Driver may be used in place of the standard DVR00, DVR01, and DVR02 drivers. This driver does not have Direct Memory Access capability, but it can be used with programs that schedule interrupts.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

003, I/O, SPECIAL DEVICE

20098C, BCS 40 BIT OUTPUT REGISTER DRIVER D.54

This driver forwards up to 40 bits in a single output operation to an HP 562AR or 5050A/B Digital Recorder. The driver can also be used with two 40-bit output register interface kits to permit employment of all 18 columns of an HP 5050A/B Digital Recorder. As a further use, this driver can furnish 40 bits to an HP 2759A Frequency Synthesizer Programmer or other suitable I/O device.

Equipment required is one or two HP 40-bit output register interface kit, and a suitable output device.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20502B, TIME BASE GENERATOR DRIVER (D.43)

This routine serves as a time-of-day clock for the Data Acquisition and Control Executive (DACE) Operating System.

Equipment required is one HP time base generator interface kit.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

22002A, TIME-OF-DAY CLOCK

After initially being set to the correct time, this routine furnishes the time of day on demand. Units are hours,

minutes and seconds. As an additional feature, elapsed time can be measured without interfering with the time-of-day function. The clock stops when the computer halts.

One HP 12539 Time Base Generator is required.

Assembly language, relocatable.

Contributed.

22071A, HP 12539A TIME BASE GENERATOR DRIVER — FORTRAN CALLABLE

This routine provides a means for measuring the time of day. Elapsed time can also be measured. The time-of-day and elapsed time functions may be used simultaneously without restrictions.

When time-of-day is read out, the units are hours, minutes, and seconds, each expressed as a floating point number. Elapsed time is indicated in hundredths of seconds, expressed as a single floating point number.

For time-of-day use, the routine must be initiated with the current time. In either use, the routine causes a program interrupt every 10 milliseconds; the time-of-day and elapsed time counts are then incremented if necessary. When the program halts, the time-of-day and elapsed time counts stop.

Equipment required is one HP 12539A Time Base Generator Interface Kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

003, I/O, SPECIAL DEVICE (continued)

22112A, HP 12539A TIME BASE GENERATOR DRIVER — BASIC CALLABLE

This routine provides a means for measuring the time of day. Elapsed time can also be measured. The time-of-day and elapsed time functions can be used simultaneously without restrictions.

When time-of-day is read out, the units are hours, minutes, and seconds, each expressed as a floating point number. Elapsed time is indicated in hundredths of a second, expressed as a single floating point number.

For time-of-day, the routine must be initialized with the current time. In either use, the routine causes a program interrupt every 10 milliseconds; the time-of-day and elapsed time counts are then incremented if necessary. When the program halts, the time-of-day and elapsed time counts stop. The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 12539A Time Base Generator Interface Kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22170A, SYNCHRONOUS HIGH SPEED DATA ACQUISITION PROGRAM

Intended for use with any high speed data source furnishing 16-bit words at a regular rate, this program transfers data to an HP 2770A Disc Memory. For a disc memory operating from a 50-Hertz power source, data transfer rates as high as 137,000 words per second can be achieved. For a 60-Hertz power source, throughput rates up to 164,000 words per second are possible.

Equipment required is one HP 2770A Disc Memory with interface kit, and the Direct Memory Access option for the computer.

Assembly language, absolute.

Contributed:
Vittorio Baldini
HP, Italy/Milan

22195B, PROGRAM EXECUTION TIMER

The purpose of this routine is to accurately measure program execution time. Correction is made for the time

taken to service interrupts. The execution time is printed out in seconds, correct to four decimal places. The maximum time which can be measured is 32,768 seconds (9 hours, 6 minutes, and 8 seconds).

Equipment required is one HP 12539 Time Base Generator.

Assembly language, relocatable.

Contributed:
Warren Nelson
HP, Canada/Ottawa

22229B, HP 12551A/B RELAY REGISTER INTERFACE DRIVER — FORTRAN CALLABLE

Used with the HP 12551A or 12551B Relay Output Register, this routine opens or closes any specified relay contact. In addition, all relay contacts can be opened simultaneously. After contact opening or closure, the routine remains in a waiting loop for approximately 300 milliseconds to allow time for relay contacts to settle.

Equipment required is one HP 12551A or a 12551B Relay Output Register, with interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22313A, HP 12551B RELAY REGISTER INTERFACE DRIVER — BASIC CALLABLE

The absolute modification to the HP 20392A BASIC System opens or closes relay contacts on the HP 12551B Relay Register. It checks the range and processes the contact number. The driver waits in a loop to allow the contacts to settle before returning to the calling program.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

24277A, HP 12908A WCS BCS DRIVER (D.33)

This driver reads microcode from, and writes microcode to, the HP 12908A Writable Control Store interface.

Assembly language, relocatable.

HP supported:
Data Systems Division

003, I/O, SPECIAL DEVICE (continued)

24278A, HP 12908A WCS DOS DRIVER (DVR33)

This driver reads microcode from, and writes microcode to, the HP 12908A Writable Control Store interface.

Assembly language, relocatable.

HP supported:
Data Systems Division

24287A, HP 2100 PROM WRITER CONTROL PROGRAM

This program uses mask tapes prepared by the Micro Debug Editor to burn prom chips.

Assembly language, absolute.

HP supported:
Data Systems Division

29001A, COMPUTER SERIAL INTERFACE RTE DRIVER DVR65

DVR65 is a relocatable assembly language driver that interfaces the HP 12665 Computer Serial Interface Card to the HP 2005 RTE system. The HP 12665 card provides a means of communication between two computers. DVR65 is capable of communicating with any number of HP 12665 cards in the RTE system. DVR65 can communicate with either another RTE DVR65 driver or a BCS D.65 driver.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29002A, COMPUTER SERIAL INTERFACE BCS DRIVER D.65

D.65 is a relocatable assembly language driver for the HP 12665 Computer Serial Interface Card. The HP.12665 Interface provides a means of communications between two computers, each computer having its own HP 12665 Interface and driver.

D.65 can communicate with either another BCS D.65 Driver or a RTE DVR.65 Driver. FORTRAN/ALGOL READ or WRITE Statements are not allowed with D.65.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29003A, COUPLER SERIAL INTERFACE RTE DRIVER DVR66

DVR66 is a relocatable assembly language driver that transfers data between the HP 2570A/2575A Coupler/Controller (interfaced with a HP 12813) card and the HP 2005 RTE systems (operating in a HP 2100 family computer interfaced with a HP 12665 card. Any number of HP 2570A/2575A Coupler/Controllers can be controlled by DVR66.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

004, I/O, STATUS PROCESSING

22236A, FORTRAN I/O STATUS FUNCTION

This routine uses a variable calling sequence to provide status information on selected unit reference numbers. Use of the routine obviates waiting in the .DTA loop in the formatter. Additionally, a variable length calling sequence permits requests for transmission log and hardware status.

Assembly language, relocatable.

Contributed:
Stroud Custer
HP, Eastern Sales Region

006, I/O, INSTRUMENT

14900B, HP 6936A/6937A BCS DRIVER (D.61)

This BCS driver transfers control data from the calling program to a device controlled by an HP 6936A Multiprogrammer Data Distribution System. The 6936A is an equipment item which provides the means for controlling up to 240 devices. These devices can vary widely in nature, but typically they are such things as programmable power supplies, attenuators, filters, modulators, function generators, CRT display units, X-Y or strip-chart recorders, servos, stepping motors, valves, solenoids, alarm systems, or memory testing systems. The routine performs the output operations by the non-interrupt method, and it checks legality and provides formatting for the 6936A Multiprogrammer.

Equipment required is one HP 6936A Multiprogrammer Data Distribution System with interface kit, and controlled devices.

Assembly language, relocatable.

HP supported:
New Jersey Division

14904B, HP 6940A/6941A BCS DRIVER (D.61)

This driver controls HP 6940A/6941A Multiprogrammer systems under the basic control system (BCS). The driver performs most general purpose software functions required for efficient HP 6940A/6941A operation.

The functions are: (1) Normal read (with initial write). (2) Read direct with no input gate. (3) Read direct with input gate. (4) Read operator data. (5) Poll to first interrupter. (6) Poll all. (7) Normal write. (8) Write with handshake. (9) Clear.

These functions are classified as reads, writes, or clear. The driver is not callable from high-level languages.

Assembly language, relocatable.

HP supported:
New Jersey Division

14907A, HP 6940A/6941A RTE DRIVER, DVR61

DVR61 interfaces one or more HP 6940A/6941A Bidirectional Multiprogrammer chains to an HP 2005 Real Time Executive system (RTE). DVR61 provides all the most frequently used techniques for efficient Multiprogrammer operation. The driver supports both READ and WRITE functions divided into eight separate types of I/O transfer. Three of these complete in the driver's

continuator/completor section: Normal Read, Normal Write, & Read Operator Data; five complete in the driver's initiator section (immediate completion): Write with Handshake, Poll to First Input, Poll All Inputs, Read Direct (No Gate), Read Direct (With Gate). Immediate completion functions are much faster than equivalent functions using continuation. DVR61 may be called from higher level languages, but assembler language is recommended. FORTRAN (II or IV) and ALGOL users should use calls to routines in the HP 6940A RTE/DOS Library, HP 14912A.

Note: DVR61 can direct Normal Write, Write with Handshake, and Read Operator Data functions to HP 6936A/6937A Unidirectional Multiprogrammer chains also. HP 6936 based and HP 6940 based chains may be mixed on the same RTE system.

Hardware required: one HP 6940A and one HP 14543A Interface kit per Bidirectional Multiprogrammer chain, plus from zero to 15 6941A extender units per chain and/or one HP 6936A and one HP 14542A Interface kit per Unidirectional Multiprogrammer chain, plus from zero to 15 HP 6937A extender units per chain. Each extender unit requires one 14541A chaining cable. (Plus, of course, the minimum hardware to support RTE.)

Assembly language, relocatable.

HP supported:
New Jersey Division

14909A, HP 6940A DRIVER FOR 20392A BASIC

This program establishes a 20392A BASIC subroutine which controls an HP 6940A bi-directional multiprogrammer system. The subroutine overlays the BASIC matrix routines.

The calling sequence is

NNNN CALL (1,M,A,S,D,F)

where NNNN = the statement number, 1 identifies the driver subroutine, M = mode of I/O transfer, A = decimal select code, S = slot address, D = data value, and F = flag returned by the driver (giving varying information depending upon the CALL and the HP 6940A response).

Assembly language, absolute.

HP supported:
New Jersey Division

006, I/O, INSTRUMENT (continued)

14911A, HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY

These two subroutines provide the higher level language (FORTRAN or ALGOL) Programmer with an interface to the HP6940A/6941A Basic Control System Driver, D.61 (14904B). Each subroutine requires seven arguments. I6940 allows the user to execute .IOC. calls to initiate I/O requests using D.61. J6940 allows the user to check the status of these requests and optionally wait for their completion. I6940 and J6940 give higher level language compatibility between BCS and DOS/DOS-M or RTE. Both I6940 and J6940 may be used as integer functions in FORTRAN or as integer function procedures in ALGOL. The user must be thoroughly familiar with the operation of D.61 in order to use I6940 correctly.

Assembly language, relocatable.

HP supported:
New Jersey Division

14913A, HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)

DVR61 interfaces one or more HP 6940A/6941A Bidirectional Multiprogrammer chains to a Disc Operating System (DOS/DOS-M). DVR61 provides all the most frequently used techniques for efficient Multiprogrammer operation. The driver supports both READ and WRITE functions divided into eight separate types of I/O transfer. Three of these complete in the driver's continuator/completer section: Normal Read, Normal Write, and Read Operator Data; five complete in the driver's initiator section (immediate completion): Write with Handshake, Poll to First Input, Poll All Inputs, Read Direct (No Gate), Read Direct (With Gate). Immediate completion functions are much faster than equivalent functions using continuation. DVR61 may be called from higher level languages, but assembler language is recommended. FORTRAN (II or IV) and ALGOL users should use calls to routines in the HP 6940A RTE/DOS Library, HP 14912A.

Note: DVR61 can direct Normal Write, Write with Handshake, and Read Operator Data functions to HP 6936A/6937A Unidirectional Multiprogrammer chains also. (HP 6936 based and HP 6940 based chains may be mixed on the same DOS/DOS-M system).

Hardware required: One HP 6940 and one HP 14543A Interface kit per Bidirectional Multiprogrammer chain, plus from zero to fifteen HP 6941A extender units per chain and/or one HP 6936A and one HP 14542A Interface kit per Unidirectional Multiprogrammer chain, plus from zero to

fifteen HP 6937A extender units per chain. Each extender unit requires one HP 14541A chaining cable (plus, of course, the minimum hardware to support DOS/DOS-M).

Assembly language, relocatable.

HP supported:
New Jersey Division

14915A, HP 6940A/6941A DRIVER FOR 20392A BASIC

This program establishes two basic subroutines which control one or more HP 6940/6941A Multiprogrammer systems (one at a time). These subroutines overlay the BASIC Matrix routines. 14915A is about 200 (decimal) words longer than 14909A but offers many new features. 14915A somewhat resembles the 14904B, 14907B, and 14913A HP 6940/6941A drivers to the user.

The calling sequences for HP 14915A are:

NNNN CALL (10,A) to establish the current CPU I/O Slot
and
MMMM CALL (11,M,U,S,D,T,F) to transfer data

where NNNN and MMMM are statement numbers, 10 and 11 identify the calls, A is a decimal select code, M is the mode of transfer (0 to 7), U is the unit number, S is the slot number, D is the data value, T is the time allowed, and F is a flag returned by the driver.

Assembly language, absolute.

HP supported:
New Jersey Division

20008B, BCS 8-4-2-1 DATA SOURCE INTERFACE DRIVER (D.40)

This BCS driver acquires measurements from any of the following:

- a. HP 2401C Integrating Digital Voltmeter
- b. HP 2402A Integrating Digital Voltmeter
- c. HP 3440A Digital Voltmeter
- d. HP 3450A Multi-Function Meter
- e. HP 3460A or 3460B Digital Voltmeter
- f. Most HP counters with 8-4-2-1 or 4-2-2-1 BCD output

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006, I/O, INSTRUMENT (continued)

Meter function (type of measurement), meter range, and other measurement conditions must be established prior to execution of the routine. This can be done either manually or by programming means. Automatic range selection can be employed if the meter is equipped with this feature. The measurement acquired is furnished to the calling program either in the BCD form in which it is acquired from the measuring instrument (8-4-2-1 or 4-2-2-1), or the reading can be converted to ASCII digits if it is in 8-4-2-1 form. As well as supplying the measured value to the calling program, the routine furnishes an additional word to indicate the type of measurement, and measurement range, for which the meter is set.

This driver is identical with routine 20011, except that it does not offer conversion of 4-2-2-1 BCD data to ASCII form.

Equipment required is one of the meters listed above, with data source interface kit and interconnecting cable. The meter can supply either 8-4-2-1 or 4-2-2-1 BCD data.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20009B, BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41)

This BCS driver establishes measurement conditions in any of the following devices:

- a. HP 2401C Integrating Digital Voltmeter
- b. HP 2402A Integrating Digital Voltmeter
- c. HP 3450A Multi-Function Meter

The measurement conditions, established by means of control words, consist of those of the following parameters applicable to the device used:

- a. Meter function (type of measurement)
- b. Sample time
- c. Mode (measurement or calibration check)
- d. Meter range
- e. Delay (HP 3450A Multi-Function Meter only)

The routine does not acquire the measurement itself. This function is reserved for routine 20008B or 20011B. Alternatively, a visual reading can be made, or the data can be recorded on an external instrument.

Equipment required is one of the measuring devices listed above, with interface kit.

Assembly language, relocatable.
HP supported:
Automatic Measurement Division

20010C, BCS 8-4-2-1 SCANNER CONTROL DRIVER (D.42)

This BCS driver controls an HP 2911 Guarded Crossbar Scanner. Control words, furnished by the calling program, establish the data channel to be sampled, delay before the measurement is taken, and type of measurement (voltage, resistance, or frequency).

The driver does not acquire the measurement itself. This function is reserved for routine 20008B or 20011B. Alternatively, a visual reading can be made, or the data can be recorded on an external instrument.

Equipment required is one HP 2911 Guarded Crossbar Scanner, with interface kit and measuring instrument.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20011B, BCS 8-4-2-1/4-2-2-1 DATA SOURCE INTERFACE DRIVER (D.40A)

This BCS driver acquires measurements from any of the following:

- a. HP 2401C Integrating Digital Voltmeter
- b. HP 2402A Integrating Digital Voltmeter
- c. HP 3440A Digital Voltmeter
- d. HP 3450A Multi-Function Meter
- e. HP 3460A or 3460B Digital Voltmeter

Meter function (type of measurement), meter range, and other measurement conditions must be established prior to execution of the routine. This can be done either manually or by programming means. Automatic range selection can be employed if the meter is equipped with this feature. The

(continued)

006, I/O, INSTRUMENT (continued)

measurement acquired is furnished to the calling program either in the BCD form in which it is acquired from the measuring instrument (8-4-2-1 or 4-2-2-1), or the reading can be converted to ASCII digits. As well as supplying the measured value to the calling program, the routine furnishes an additional word to indicate the type of measurement, for which the meter is set, if this information is available as a BCD meter output.

This driver is identical with routine 20008B except that it also offers 4-2-2-1 BCD capability, though at the cost of a greater core storage requirement for the routine.

Equipment required is one of the meters listed above, with data source interface kit and interconnecting cable. The meter can supply either 8-4-2-1 or 4-2-2-1 BCD data.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20012C, BCS 8-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER (D.42A)

This BCS driver controls an HP 2911 Guarded Crossbar Scanner. Control words, furnished by the calling program, establish the data channel to be sampled, delay, and type of measurement (dc volts, ac volts, resistance, or frequency).

The driver does not acquire the measurement itself. This function is reserved for routine 20008B or 20011B. Alternatively, a visual reading can be taken, or the data can be recorded on an external instrument.

This routine is identical with routine 20010C except that it offers 4-2-2-1 digit capability, though at the cost of a greater core storage requirement for the routine.

Equipment required is one HP 2911 Guarded Crossbar Scanner, with interface kit and measuring instrument.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20024A, BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41B)

This BCS driver establishes measurement conditions in an HP 2402A Integrating Digital Voltmeter. To accomplish this, a control word from the calling program specifies the type of measurement, meter range (automatic range selec-

tion can be programmed if desired), and mode (measurement or calibration check).

The driver does not acquire the measurement itself. This function is reserved for routine 20008B or 20011B. Alternatively, a visual reading can be taken, or the data can be recorded on an external instrument.

Equipment required is one HP 2402A Integrating Digital Voltmeter including option 011 (computer control capability), and a programmer interface card.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20025A, BCS HP 2912 SCANNER CONTROL DRIVER (D.42B)

This BCS driver controls an HP 2912A-001 Reed Scanner. A control word, furnished by the calling program, establishes the data channel to be sampled and the delay. To provide time for channel selection, the routine remains in a waiting loop until the specified delay has elapsed.

The driver does not acquire the measurement itself. This function is reserved for routine 20008B or 20011B. Alternatively, a visual reading can be taken, or the data can be logged on an external recording device.

Equipment required is one HP 2912A-001 Reed Scanner with scanner program interface card, and one measuring instrument with interface card or cards.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20028B, BCS 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN-12 (D.77)

This BCS driver acquires 8-4-2-1 BCD measurements from an HP 2323A Low-Speed Data Acquisition Subsystem. Control words from the calling program establish the data channel to be sampled, delay, meter function (type of measurement), meter range, and mode (measurement or calibration check). Upon acquiring a measurement in the 8-4-2-1 BCD form, routine 20210 can be used to convert the BCD data to floating point binary form.

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006, I/O, INSTRUMENT (continued)

Equipment required is one HP 2323A Low-Speed Data Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20295A, RTE HP 12604B DATA SOURCE INTERFACE DRIVER (DVR40)

This RTE driver acquires 8-4-2-1 BCD measurements from an HP 2401C or 2402A Integrating Digital Voltmeter, or from other measuring devices that use the HP 12604B Data Source Interface Kit. Meter function (type of measurement), meter range, and other measurement conditions must be established prior to execution of this routine. This can be done either manually or by programming means. Automatic range selection can be employed if the meter is equipped with this optional feature. As well as supplying the measured value to the calling program in 8-4-2-1 BCD form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. Program 20288A can be used to convert the BCD measurement to floating point form.

Equipment required is one HP 2401C or 2402A Integrating Digital Voltmeter or other measuring instrument with 8-4-2-1 BCD output, with HP 12604B Data Source Interface Kit and interconnecting cable.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20430B, HP 2402A PROGRAMMER/DATE INTERFERENCE DIAGNOSTIC

This routine tests the HP 2402A Integrating Digital Voltmeter and the associated interface kit.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

22004A, COUNTER DATA SOURCE INTERFACE DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 5-to-8 digit counter. The BCD measurements is converted

to floating point form and forwarded to the calling program.

Equipment required is an 8-4-2-1 digital counter of a type suited to one of the following data source interface kits: HP 12604B, 12544A, 12545A, 12546A, or 12547A.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22005B, HP 2401C DIGITAL VOLTMETER DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2401C Integrating Digital Voltmeter. A control word from the calling program specifies the meter function (type of measurement), sampling time, and meter range. If an HP 2411A Guarded Data Amplifier is used in conjunction with the meter, either X1 or X10 voltage amplification can be specified by the control word. The measurement acquired is converted to floating point binary form and forwarded to the calling program.

Equipment required is one HP 2401C Integrating Digital Voltmeter (8-4-2-1 BCD output), with programming interface kit and data source interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22006A, HP 2401C DATA SOURCE INTERFACE DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2401C Integrating Digital Voltmeter. Meter function (type of measurement), sampling time, and meter range are selected manually at the meter. Automatic range selection can be employed if the meter is equipped with this optional feature. As well as supplying the measured value to the calling program in floating point binary form, the routine furnishes an additional word to indicate the type of measurement for which the meter is set.

Equipment required is one HP 2401C Integrating Digital Voltmeter (8-4-2-1 BCD output), with data source interface kit.

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006, I/O, INSTRUMENT (continued)

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22008A, HP 3460A DIGITAL VOLTMETER DRIVER —
FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 3460A Digital Voltmeter. A control word from the calling program specifies the meter function (type of measurement), sampling time, and meter range. Automatic range selection, a standard feature of the meter, can be employed if desired. The measurement acquired is converted to floating point binary form and forwarded to the calling program.

Equipment required is one HP 3460A Digital Voltmeter (8-4-2-1 BCD output), with programming interface kit and data source interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22055A, HP 3460A/B DATA SOURCE INTERFACE
DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 3460A or 3460B Digital Voltmeter. Meter function (type of measurement) and meter range are selected manually at the meter. Automatic range selection, a standard feature of the meter, can be employed if desired. As well as supplying the measured value to the calling program in floating point form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set.

Equipment required is one HP 3460A or 3460B Digital Voltmeter (8-4-2-1 BCD output), with data source interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22061A, HP 2320 LOW SPEED A-TO-D SUBSYSTEM
DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2320A Low-Speed Data Acquisition Subsystem. Control words from the calling program specify the data channel to be sampled, meter function (type of measurement), meter mode (measurement or calibration check), delay, and meter range. Automatic range selection can be employed if the meter is equipped with this optional feature. The measurements acquired are converted to floating point form and forwarded to the calling program.

Equipment required is one HP 2320A Low-Speed Data Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22062A, HP 2322A LOW SPEED A-TO-D SUBSYSTEM
DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2322A Low-Speed Data Acquisition Subsystem. Control words from the calling program specify the data channel to be sampled, meter function (type of measurement), sampling period, delay, and meter range. Automatic range selection can be employed if the meter is equipped with this optional feature. The measurement acquired is converted to floating point form and forwarded to the calling program.

Equipment required is one HP 2322A Low-Speed Data Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22069A, HP 2323A LOW SPEED A-TO-D SUBSYSTEM
DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2323A Low Speed Data System. Calibration of the measuring instrument employed in the system can also be checked. Control words from the calling program specify the data channel to be sampled, meter function (type of measurement), meter mode (measurement or calibration check),

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006, I/O, INSTRUMENT (continued)

delay, and meter range. Automatic range selection can be employed if the meter is equipped with this optional feature. The measurement acquired is converted to floating point form and forwarded to the calling program.

Equipment required is one HP 2323A Low Speed Data System (8-4-2-1 BCD output), with data source interface kit, digital voltmeter program interface kit, and reed scanner program interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22075A, HP 5100B FREQUENCY SYNTHESIZER DRIVER — FORTRAN CALLABLE

This routine controls an HP 5100B Frequency Synthesizer. Two control words, furnished by the calling program, designate the frequency required. Any frequency from dc to 50 MHz can be specified with change increments as small as 0.01 hertz. Typically, the frequency changes 20 microseconds after the control words are supplied.

Equipment required is one HP 5100B Frequency Synthesizer, one HP 5110B Synthesizer Driver, one HP 2759B Synthesizer Programmer, and one 40-bit output interface card.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22101B, HP 2911A/B CROSSBAR SCANNER DRIVER — BASIC CALLABLE

This routine controls an HP 2911 Guarded Crossbar Scanner. The scanner samples the data channel designated, and forwards the sample to a meter or external recording device. Control words from the calling program specify the data channel, delay, and type of measurement (dc volts, ac volts, resistance, or frequency). The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 2911 Guarded Crossbar Scanner, with programming interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22102B, HP 3460A/B DATA SOURCE INTERFACE DRIVER — BASIC CALLABLE

This driver acquires 8-4-2-1 measurements from an HP 3460A or 3460B Digital Voltmeter. Meter function (type of measurement) and meter range are selected manually at the meter. Automatic range selection, a standard feature of the meter, can be employed if desired. As well as supplying the measured value to the calling program in floating point form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 3460A or 3460B Digital Voltmeter (8-4-2-1 BCD output), with data source interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22104B, HP 2402A DATA SOURCE INTERFACE DRIVER — BASIC CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 2402A Integrating Digital Voltmeter. Meter function (type of measurement), mode (measurement or calibration check), and meter range, are selected manually at the meter. Automatic range selection can be employed if the meter is equipped with this optional feature. As well as supplying the measured value to the calling program in floating point form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 2402A Integrating Digital Voltmeter (8-4-2-1 BCD output), with data source interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22106B, COUNTER DATA SOURCE INTERFACE DRIVER — BASIC CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 5-to-8 digit counter. The measurements are converted to floating point decimal form and furnished to the calling

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006,I/O, INSTRUMENT (continued)

program. The routine operates under the 20392A BASIC Operating System.

Equipment required is an 8-4-2-1 digital counter of a type suited to one of the following data source interface cards: HP 12544A, 12545A, 12546A, or 12547A.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22107B, HP 2912A REED SCANNER DRIVER — BASIC CALLABLE

This routine controls an HP 2912A Reed Scanner. The reed scanner samples a designated data channel, and forwards the sample to a meter or external recording device. Control words from the calling program specify the data channel required and designate the delay. This routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 2912A Reed Scanner, with programming interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22108C, HP 3450A DATA SOURCE INTERFACE DRIVER — BASIC CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 3450A Digital Multi-Function Meter. Meter function (type of measurement) and range are selected manually at the meter. Automatic range selection, a standard feature of the meter, can be employed if desired. As well as supplying the measured value to the calling program in floating point form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. The routine operates under the HP 20392A BASIC Operating System.

Equipment required is one HP 3450A Digital Multi-Function Meter (8-4-2-1 BCD output), with digital output option and data source interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22200A, WAVETEK BASIC DRIVER

This driver permits remote programming of all functions of the Wavetek Model 150 or Model 155 Signal Generator. Control words program one to five of these signal generators, each with its own operating conditions. The control words establish the frequency (0.01 Hz to 1 MHz), amplitude (10 millivolts to 10 volts), and waveform (sine, triangular, or square). The control words also specify either continuous or triggered operation. The routine operates under the 20392A BASIC Operating System.

Equipment required is one to five Wavetek Model 150 or 155 Signal Generators, each with an HP 12556B 40-Bit Output Register Interface Kit and interconnecting cable. Instructions for connecting the cable to the signal generator are furnished in the program documentation.

Assembly language, absolute.

Contributed:
M. H. Kendall III
Wyle Laboratories

22211A, HP 5100B FREQUENCY SYNTHESIZER DRIVER — BASIC CALLABLE

This routine controls an HP 5100B Frequency Synthesizer. Two control words, furnished by the calling program, designate the frequency required. Any frequency from dc to 50 MHz can be specified, with change increments as small as 0.01 hertz. Typically, the frequency changes 20 microseconds after the control words are supplied. The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 5100B Frequency Synthesizer, one HP 5110B Synthesizer Driver, one HP 2759B Synthesizer Programmer, and one 40-bit output interface card.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22215A, HP 3480A/B DIGITAL VOLTMETER DRIVER — BASIC CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 3480A or 3480B Digital Voltmeter. A control word from the calling program specifies the meter function (type of measurement), use of an ac-noise filter (if the meter is equipped with this optional feature), delay, and meter

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006, I/O, INSTRUMENT (continued)

range. Automatic range selection, a standard feature of the meter, can be employed if desired. The measurement acquired is converted to floating point form and forwarded to the calling program. The routine operates under the 20392 BASIC Operating System. Matrix operations are deleted.

Equipment required is one HP 3480A or 3480B Digital Voltmeter (8-4-2-1 BCD output), with interface kit.

Assembly language, absolute.

Contributed:

Steven A. Stark
HP, Eastern Sales Region

22226B, HP 3480A/B DIGITAL VOLTMETER DRIVER — FORTRAN CALLABLE

This driver acquires 8-4-2-1 BCD measurements from an HP 3480A or 3480B Digital Voltmeter. A control word from the calling program specifies the meter function (type of measurement), use of an ac-noise filter (if the meter is equipped with this optional feature), delay, and meter range. Automatic range selection, a standard feature of the meter, can be employed if desired. The measurement acquired is converted to floating point form and forwarded to the calling program.

Equipment required is one HP 3480A or 3480B Digital Voltmeter (8-4-2-1 BCD output), with interface kit.

Assembly language, relocatable.

Contributed:

Steven A. Stark
HP, Eastern Sales Region

22227A, HP 6131B DIGITAL VOLTAGE SOURCE DRIVER — FORTRAN CALLABLE

This routine establishes the output voltage and current-limiting point for an HP 6131B Digital Voltage Source. Up to eight of these voltage sources can be controlled, each with its own operating conditions. Voltages from +100 to -100 can be programmed, and any of six current-limiting points between 20 and 500 milliamps can be specified.

As an additional program feature, any time after operating conditions have been established the routine can check the current-limit status of the digital voltage source. If current limiting is taking place, an error indication is furnished to the calling program.

Equipment required is one to eight HP 6131B Digital Voltage Sources, with interface kit and interconnecting cables.

Assembly language, relocatable.

Contributed:

Steven A. Stark
HP, Eastern Sales Region

22276A, RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE CONVERSION

DVR42 operates under the I/O control module of the RTE to control the HP 2911 Crossbar Scanner. This driver is responsible for controlling output to any number of scanner cards simultaneously. It accepts binary write and clear requests. FORTRAN callable.

Assembly language, relocatable.

Contributed:

M.H. Kendall III
Wyle Laboratories

22294A, DOS/DOS-M/RTE 3480 DVM DRIVER AND BCD CONVERSION

This driver inputs BCD data from the HP 3480 DVM, and "BCD" converts it to floating point. The initiator will test for the correct calling sequence and then start the measurement. The continuator returns the raw data into a two-word array where the conversion routine converts it to floating point format. FORTRAN callable.

Assembly language, relocatable.

Contributed:

Dieter Schmidtke
HP, Germany/Frankfurt

22305A, HP 2402A DIGITAL VOLTMETER DRIVER — BASIC CALLABLE

This driver processes and outputs the program control word to the DVM, programming it for range, function and mode for HP 20392 BASIC. Then the driver accepts the BCD data measured by the DVM, converts it to floating point and returns to the calling program. Error returns are provided for overload or incompleting calls.

Equipment required includes 8K, HP 2402A Digital Voltmeter, HP 12567A DVM Programming Interface Kit, and an HP 12604B Data Source Interface Kit.

Assembly language, absolute.

Contributed:

Steven A. Stark
HP, Eastern Sales Region

006, I/O, INSTRUMENT (continued)

22317A, RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC STORAGE ROUTINE

This FORTRAN callable subroutine allows RTE to use most of memory as a buffer to input data from the HP 2310 analog to digital converter and output it to the disc at the full speed of the multiverter with no break in data. All samples are evenly spaced and the number of data points taken is limited only by the size of the disc. The maximum possible throughput rate is 80 kHz.

Equipment required is a minimum RTE system, an HP 2310 analog to digital converter, and an HP 2770 60 Hz or 50 Hz disc.

Assembly language, relocatable.

Contributed:
M.H. Kendall III
Wyle Laboratories

22336A, HP 1900 PROGRAMMABLE PULSE GENERATOR - FORTRAN CALLABLE

This BCS non-IOC driver for the HP 1900 Pulse Generator allows the user to program any number of units in the 1900 family - 1905, 1908, or 1917. Nine additional words of core are required for each unit.

Equipment required includes 4K and an HP 2752A Teleprinter, HP 14542A I/O Kit, and HP 1900/6936S Programmable Pulse Generator.

Assembly language, relocatable.

Contributed:
Gordon A. Greenley
HP, Colorado Springs Division

22337A, HP 1900 PROGRAMMABLE PULSE GENERATOR DRIVER - BASIC CALLABLE

This absolute modification to HP BASIC 20392A allows the user to program any number of HP 1900 Pulse Generators - 1905, 1908, 1917. Nine additional words are required for each generator.

Equipment required includes an HP 12566A Interface Kit, 8K, an HP 2752A teleprinter, and an HP 1900/6936S Programmable Pulse Generator.

Assembly language, relocatable.

Contributed:
Gordon Greenley
HP, Colorado Springs Division

22339A, DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER

This FORTRAN callable driver for the HP 2320A Low Speed Analog-to-Digital Subsystem is self-configuring and operates on a minimum DOS. Through calls to the EXEC, the driver processes the channel number, converts it from binary to BCD and outputs it to the Scanner. The driver then takes a DVM measurement and returns to the EXEC.

Equipment required is an HP 2402A DVM, HP 2911A/B Crossbar Scanner, HP 12604B DSI, HP 12576B-01 DVM Program Interface, and an HP 12535A Scanner Program Interface.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22407B, HP 3360A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC CALLABLE

These instrument system drivers modify HP BASIC 20392A to work with the HP 3360A Gas Chromatograph and add some special features. The compiler can be restarted with or without scratching the stored program, the switch register can be read from BASIC enabling the user to control the program, a driver controls up to 8 integrators, HP 3370/1/A/B and reads data from them through the HP 18980A Multiplexor, data acquisition is performed in interrupt mode, and an 8, 16, or 40 bit output register can be used to control any device or signal lamp.

Assembly language, absolute.

Contributed:
Hans Biesel
HP, Germany/Boeblingen

22410A, RTE MULTIPROGRAMMER DRIVER (DVR61)

DVR61 is an RTE driver to operate the HP 3936A multiprogrammer. The driver performs three separate functions. A reset will reset all cards in the 6936 system. Reading from the device will input a word from the switch register of the 6936 to the calling program. This allows remote control of the users system. Finally, the write routine will

(continued)

006, I/O, INSTRUMENT (continued)

output control and data words for control of devices connected to the HP 6936A. FORTRAN callable.

Assembly language, relocatable.

Contributed:

Michael Naughton
HP, Midwest Sales Region

22442A, BD.1 BASIC DRIVER FOR HP 8054A REAL TIME ANALYZER

This BASIC driver can be used to operate the HP 8054A Real Time Analyzer (with HP 8060A extension optionally) through the use of the HP 15163A, Option 01 Interface Kit. It is a modification of the HP 20392A BASIC compiler which allows the user to program the following options in conversational BASIC language:

- 1) Set one of eleven measuring ranges of the analyzer
- 2) Read one cycle of 24 (or 36) output levels from the analyzer

The driver includes a configuration routine that is released at run time.

Assembly language, absolute.

Contributed:

Hans Biesel
HP, Germany/Boeblingen

22447A, HP 5360 COMPUTING COUNTER DRIVER

This BCS driver allows the user to call the HP 5360 Computing Counter from a FORTRAN program. Programming steps can be passed to the counter by means of an integer array and data can be passed to and from the counter by means of two floating point arrays. Status is returned.

Equipment required includes the HP 5360 Computing Counter, 25000-60030 Interface Card and the 25000-60033 Interface Cable.

Assembly language, relocatable.

Contributed:

Richard Brandt
HP, Eastern Sales Region

22450A, PRIVILEGED RTE DRIVER FOR THE HP 8054 AUDIO ANALYSER (DVR75)

This privileged RTE Driver, DVR 75, controls the HP 8054A Audio Analyser on read/write requests. It requires the HP 15163A Data Source Interface Card with cable and the HP 12620A Breadboard Interface Card.

Assembly language, relocatable.

Contributed:

Richard Brandt
HP, Eastern Sales Region

007, DISC OPERATING SYSTEMS

20597C, DISC OPERATING SYSTEM (HP 2770 SERIES DISC/DRUM)

The Disc Operating System (DOS) has two processing modes: batch and keyboard. In batch mode users compose a batch-processing job deck consisting of system directives, data, and source programs. DOS processes each job step according to the directives included in the job deck, automatically transferring system modules and user programs from disc to core storage as required. Keyboard mode is similar to batch mode, except that system directives are entered at the teleprinter.

The DOS Operating System has a particularly effective and versatile file system. User files, containing source statements, relocatable and loader-generated object programs, and ASCII or binary data, are referenced by symbolic addresses rather than disc addresses. Therefore, the user need not know where files are located on the disc. Files can be edited, purged, searched, and listed by user directives, and the files can be referenced by user programs.

Unlike the Real Time Executive (RTE) Operating System, I/O drivers, except for disc and system teleprinter, need not be core-resident in DOS operations. Instead, these routines are stored on the disc, and are loaded into core storage as

(continued)

007, DISC OPERATING SYSTEMS (continued)

they are required. After use, the core locations are available for other purposes. Using the time base generator in the computer, the DOS system can keep an account of the time required for each job performed. As in other HP operating systems, an extensive library of mathematical and utility routines is available in DOS. Multiprogramming, however, cannot be performed.

By using suitable hardware options and memory sizes, and by selecting appropriate program modules and making them either core-resident or disc-resident, versions of DOS can readily be developed to meet almost any batch processing need. A drum recording unit can be substituted for the disc unit.

The DOS Operating System differs from DOS-M (program 24154) in that the disc unit used with DOS has a single fixed-head disc, while DOS-M requires a 2-disc unit with movable heads. Because of the fixed-head feature, disc access time for DOS is somewhat faster than for DOS-M.

Full information on DOS is provided in the publication *Disc Operating System* (HP order no. 02116-91748).

Assembly language, relocatable, except for system generator which is absolute.

HP supported:
Data Systems Division

24225 F, MOVING-HEAD DISC OPERATING SYSTEM

The Moving Head Disc Operating System (DOS-M) has two processing modes: batch and keyboard. In batch mode users compose a batch-processing job deck consisting of system directives, data, and source programs. DOS-M processes each job step according to the directives included in the job deck, automatically transferring system modules and user programs from disc to core storage as required. Keyboard mode is similar to batch mode, except that system directives are entered at the teleprinter.

The DOS-M Operating System has a particularly effective and versatile file system. User files, containing source statements, relocatable and loader-generated object programs,

and ASCII or binary data, are referenced by symbolic addresses rather than disc addresses. Therefore the user need not know where files are located on the disc. Files can be edited, purged, searched, and listed by user directives, and the files can be referenced by user programs.

Unlike the Real Time Executive (RTE) Operating System, I/O drivers, except for disc and system teleprinter, need not be core-resident in DOS-M operations. Instead, these routines are stored on the disc, and are loaded into core storage as they are required. After use, the core locations are available for other purposes. Using the time base generator in the computer, the DOS-M system can keep an account of the time required for each job performed. As in other HP operating systems, an extensive library of mathematical and utility routines is available in DOS-M. Multiprogramming, however, cannot be performed.

By using suitable hardware options and memory sizes, and by selecting appropriate program modules and making them either core-resident or disc-resident, versions of DOS-M can readily be developed to meet almost any batch processing need.

The DOS-M Operating System differs from DOS (program 20597) in that DOS-M uses a moving-head unit with two discs. One of the two discs is in a readily removable plug-in unit. A large store of data and user programs thus can be maintained, ready for use simply by plugging in the appropriate disc. If desired, data on the plug-in disc can be transferred to the fixed disc, allowing a second plug-in disc to be installed.

Because of the moving-head feature in the disc unit, disc access time for DOS-M is somewhat slower than for DOS.

Full information on DOS-M is provided in the publication *Moving-Head Disc Operating System* (HP order no. 02116-91779).

Assembly language, relocatable, except for system generator which is absolute.

HP supported:
Data Systems Division

008, PREPARATION OF SYSTEMS

20021C, PREPARE CONTROL SYSTEM

This program prepares the Basic Control System (BCS) from the BCS loader and IOC subroutine. The loader loads and links the relocatable programs, creates indirect addressing when necessary, and selects the loads library routines. The IOC subroutine processes I/O requests. The Prepare Control System also establishes the relationship among the I/O channel numbers, drivers, driver interrupt entry points, and unit reference numbers.

Assembly language, relocatable.

HP supported:
Data Systems Division

20301C, 4K SIO SYSTEM DUMP

Used by 4K computers, this routine adapts SIO drivers to the I/O select codes used by a particular computer system. The routine produces a punched object-tape (absolute address) which, optionally, may include a standard 4K software system (compilers, assemblers) or user's absolute programs.

Assembly language, absolute.

HP supported:
Data Systems Division

20313C, 8K SIO SYSTEM DUMP

Used by 8K computers, this routine adapts SIO drivers to the I/O select codes used by a particular computer system. The routine produces a punched object-tape (absolute address) which, optionally, may include a standard 8K software system (compilers, assemblers) or user's absolute programs.

Assembly language, absolute.

HP supported:
Data Systems Division

20335B, 16K SIO SYSTEM DUMP

Used by 16K or larger computers, this routine adapts SIO drivers to the I/O select codes used by a particular computer system. The routine produces a punched object-tape (absolute address) which, optionally, may include a standard 16K software system (compilers, assemblers) or user's absolute programs.

Assembly language, absolute.

HP supported:
Data Systems Division

20594B, 8K MAGNETIC TAPE SYSTEM

This program is one of the major operating systems used by the HP 2100 computer series. Magnetic tape is the principal mass storage medium; disc storage is not used. The program is designed for 8K computers.

The Magnetic Tape System (MTS) offers greater ease of use than does the Basic Control System (BCS). Specifically, MTS requires much less manual handling of punched tape. This results in part from the fact that assembler and compiler programs normally pre-exist on the magnetic tape, and are sought automatically at the appropriate points in a program. MTS also stores intermediate output information on magnetic tape, and again this data is sought automatically when required by the program. An additional advantage offered by MTS is that magnetic tape is written and read much faster than punched tape, resulting in faster program execution times.

The Magnetic Tape System, as compared with the Disc Operating System, has the disadvantage that magnetic tape I/O operations are considerably slower than disc I/O operations. MTS, furthermore, does not have the real-time capabilities of the Real Time Executive System.

Full information on MTS is provided in the handbook *Magnetic Tape System* (HP order no. 02116-91752).

Assembly language, relocatable.

HP supported:
Data Systems Division

20595B, 16K MAGNETIC TAPE SYSTEM

This program is one of the major operations systems used by the HP 2100 computer series. Magnetic tape is the principal mass storage medium; disc storage is not used. The program is designed for 16K computers.

The Magnetic Tape System (MTS) offers greater ease of use than does the Basic Control System (BCS). Specifically, MTS requires much less manual handling of punched tape. This results in part from the fact that assembler and compiler programs normally pre-exist on the magnetic tape, and are sought automatically at the appropriate points in a program. MTS also stores intermediate output information on magnetic tape, and again this data is sought automatically when required by the program. An additional advantage offered by MTS is that magnetic tape is written and read much faster than punched tape, resulting in faster program execution times.

The Magnetic Tape System, as compared with the Disc Operating System, has the disadvantage that magnetic tape

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008, PREPARATION OF SYSTEMS (continued)

I/O operations are considerably slower than disc I/O operations, MTS, furthermore, does not have the real-time capabilities of the Real Time Executive System.

Full information on MTS is provided in the handbook *Magnetic Tape System* (HP order no. 02116-91752).

Assembly language, relocatable.

HP supported:
Data Systems Division

20802C, SYSTEM DUMP

System Dump, SDUMP, is an independent utility program which copies disc program-systems onto magnetic tape or punched tape. The SDUMP program is also used to transfer these programs back to the disc. System Dump is intended for use with the DOS and RTE Operating Systems.

Assembly language, absolute.

HP supported:
Data Systems Division

20878B, HP 2000A TO HP 2000B CONVERSION

This program converts user 2000A Time Share BASIC programs for 2000B use. After conversion, the 20878 program is not used again unless additional 2000A programs require conversion.

Assembly language, absolute.

HP supported:
Data Systems Division

22042C, AN HP 2116-FAMILY SIMULATOR FOR THE IBM 360

This program is run on an IBM 360 computer, and it simulates the operation of instructions written for any HP computer in the 2114, 2115, 2116, or 2100 series. The simulator program furnishes a means for compiling, assembling, debugging, and executing HP programs without the use of an HP computer. The simulator program can be used for any of the following computer languages or operating systems: HP ALGOL, HP FORTRAN, HP Assembler, BCS, and MTS.

The program simulates the functions of the following HP I/O devices: teleprinter, 7- or 9-track magnetic tape unit, tape punch, and punched tape reader. Teleprinter outputs appear on an IBM line printer exactly as they would appear

if furnished by an HP teleprinter. The IBM line printer also prints out the information on all simulator control cards, lists all halts in the HP program, and (if desired) lists each HP instruction in the sequence in which it is executed. The simulated output of the HP tape punch is provided in the form of punched cards or as card images on magnetic tape.

The input medium for the IBM computer is punched cards, and the output is furnished on a line printer and magnetic tape. Simulation of a 4K HP computer requires an IBM 360-30 computer (or larger), using the IBM DOS program system, and with a minimum core storage capacity of 32K bytes. An OS version of the simulator program, requiring a core storage capacity of 131K bytes, simulates the operation of a 16K HP computer.

Equipment required is an IBM 360 computer, with punched card reader and line printer. If the HP program includes magnetic tape I/O operations, the IBM system must include a magnetic tape unit with the same number of tracks as the HP tape unit.

System 360 Bal Assembly Language

Contributed.

22338A, DISC BASIC EXECUTIVE

This absolute program operates in conjunction with HP BASIC 20392A to provide the added capability of user program storage and retrieval in a single terminal BASIC environment. This Disc Basic Executive is intended as a substitute for the standard Prepare Basic System. It is comprised of a system generator, I/O drivers, and a simple executive.

Equipment required includes 8K CPU, HP 2752A teleprinter, an HP 2870 moving head disc, and an HP 12578A or HP 12607A Direct Memory Access.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22441A, PSEUDO MULTIPROGRAMMING EXECUTIVE FOR BCS

The objective of MTE is to effect multi-programming in conjunction with the Basic Control System environment. It provides the operator with facilities to maintain the

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008, PREPARATION OF SYSTEMS (continued)

system time and date, execute programs, suspend and activate program execution, abort programs, and obtain the system's status. Programs may use MTE to access the system time and date, allocate and deallocate peripherals, relinquish the CPU until an I/O operation is completed, lock subroutines, and wait until a previously locked subroutine is free. There are two major limitations to MTE. It has no facilities to load programs into memory and it does not actively take the CPU from the currently executing program.

MTE requires a time base generator and a teletype. Optionally it can operate under a Magnetic Tape System.

Assembly language, relocatable.

Contributed:
Howard Morris

22452A, BCS - FORTRAN/ALGOL MEMORY ALLOCATION ROUTINE

This routine determines the address and length of the largest block of available memory and passes this information as parameters to a subprogram. It is a pseudo main program which operates in a minimum BCS programming system and requires only a teletype. It has two versions, which allows the user to code the subprograms in either FORTRAN or ALGOL.

Assembly language, relocatable.

Contributed:
Ted Slater
Simon Fraser University/Canada

22493A, CREATE DSGEN MAGNETIC TAPE

This program creates a magnetic tape in the form required by the Disc Generator (DSGEN). By allowing a user to store the system library on any user disc and then selectively dump to magnetic tape, this program simplifies system generation; it is not necessary to maintain a separate disc library (required if generation is done from disc), and it is not necessary to use paper tape to create the library on tape. The program operates under DOS-M, using an HP 7900 Disc Drive for input and an HP 7970 Magnetic Tape Unit for output.

FORTRAN

Contributed:
Stanley M. Segal
HP, Southern Sales Region

24016A, PREPARE TAPE SYSTEM

This SIO program can serve either of two purposes. First, it can produce the configured library required for the MTS Operating System. Secondly, it can store relocatable object programs for the generation of DOS, DOS-M, and RTE Operating Systems. The Prepare Tape System program requires any one of the following SIO drivers: HP 2020 or 3030 Magnetic Tape Unit, or the disc/drum driver.

Equipment required is one of the following:

- a. One HP 2020 or 3030 Magnetic Tape Unit, with interface kit. If the 3030 Magnetic Tape Unit is used, the DMA option is also required.
- b. One HP 2770 or 2771 Disc Memory with power supply and interface kit, and the Direct Memory Access option for the computer.
- c. One HP 2773, 2774, or 2775 Drum Memory with power supply and interface kit, and the Direct Memory Access option for the computer.

Assembly language, absolute.

HP supported:
Data Systems Division

24172A, BCS INPUT/OUTPUT CONTROL, BUFFERED

This BCS routine controls I/O drivers for which the program system is configured. The routine, referred to as IOC, interprets each I/O request, directs the request to the appropriate driver, and services drivers as I/O interrupts occur. The routine maintains control of simultaneous operations taking place at different I/O devices.

In addition, this routine queues I/O requests, and services them on a first in, first out, basis. However, priority requests are handled immediately.

The IOC routine replaces program 20015B, the former buffered IOC routine, and offers the following advantages over the superseded routine:

- a. An illegal-request reject from a driver (for other than control requests) is forwarded to entry point IOERR. Formerly, endless looping took place between the user program and IOC.

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008, PREPARATION OF SYSTEMS (continued)

- b. IOC now handles several EQT entries from the same driver and makes provisions for busy reject handling from drivers.
- c. IOERR is defined as 76B, and is followed by a jump to HALT to permit MTS operations to continue.
- d. If core storage space cannot be allocated for buffer use, a 75B halt takes place. Execution resumes on a suspended I/O basis when the RUN switch is pressed and the halt condition is cleared for future requests, the halt having served to warn the user.
- e. Priority read requests allow inputs to be received from an I/O device that has output requests waiting.
- f. A test is made for a SQT ordinal of zero; if true, the program proceeds to IOERR.

Assembly language, relocatable.

HP supported:
Data Systems Division

24173A, BCS INPUT/OUTPUT CONTROL

This BCS routine controls I/O drivers for which the program system is configured. The routine, referred to as IOC, interprets each I/O request, directs the request to the appropriate driver, and services drivers as I/O interrupts occur. The routine maintains control of simultaneous operations taking place at different I/O devices.

The IOC routine replaces program 20000A, the former IOC routine, and offers the following advantages over the superseded routine:

- a. An illegal-request reject from a driver (for other than control requests) is forwarded to entry point IOERR. Formerly, endless looping took place between the user program and IOC.
- b. Dynamic status requests are referenced to the driver even when the driver is busy. Previously, the request was rejected.
- c. The IOERR halt number is defined as 76B instead of zero.

- d. IOC returns to entry point HALT after an IOERR abort, to allow MTS to continue operations.

Assembly language, relocatable.

HP supported:
Data Systems Division

24298A, 12K SIO SYSTEM DUMP

This program is an SIO system dump to operate in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

29014B, RTE GENERATOR, MH-RTGEN

The Real-Time Generator (RTGEN) converts relocatable software modules and user programs into a configured real-time system in absolute binary format, and stores the binary code on the Moving Head System Disc.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29015B, RTE GENERATOR, FH-RTGEN

The Real-Time Generator (RTGEN) converts relocatable software modules and user programs into a configured real-time system in absolute binary format, and stores the binary code on the Fixed Head System Disc.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

009, I/O, PAPER TAPE

20005B, BCS TAPE READER DRIVER (D.01)

This BCS driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20006B, BCS TAPE PUNCH DRIVER (D.02)

This BCS driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20016A, BCS TAPE PUNCH DRIVER, IBM 8-LEVEL, (D.02A)

This BCS driver controls tape punch I/O operations. IBM 8-level code is used.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20303A, 4K SIO TAPE READER DRIVER

Used by 4K computers, this SIO driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20304A, 4K SIO TAPE PUNCH DRIVER

Used by 4K computers, this SIO driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20306A, 8K SIO TAPE READER DRIVER

Used by 8K computers, this SIO driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20307A, 8K SIO TAPE PUNCH DRIVER

Used by 8K computers, this SIO driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20316A, 8K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL

Used by 8K computers, this driver controls tape punch I/O operations. IBM 8-level code is used.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

009, I/O, PAPER TAPE (continued)

20317A, 4K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL

Used by 4K computers, this driver controls tape punch I/O operations. IBM 8-level code is used.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20319A, 16K SIO TAPE READER DRIVER

Used by 16K or larger computers, this SIO driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20320A, 16K SIO TAPE PUNCH DRIVER

Used by 16K or larger computers, this SIO driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language absolute.

HP supported:
Data Systems Division

20327A, 12K SIO TAPE READER DRIVER

Used by 12K computers, this SIO driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20328A, 12K SIO TAPE PUNCH DRIVER

Used by 12K computers, this SIO driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20743D, RTE TAPE READER DRIVER (DVR01)

This RTE driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20745B, RTE HIGH SPEED PUNCH DRIVER (DVR02)

This RTE driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20987C, DOS TAPE READER DRIVER (DVR01)

This DOS and DOS-M driver controls punch-tape reader I/O operations.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

009, I/O, PAPER TAPE (continued)

20989B, DOS HIGH SPEED PUNCH DRIVER (DVR02)

This DOS and DOS-M driver controls tape punch I/O operations.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

22044B, RUN-TIME DATA INPUT FOR BASIC

This routine, termed SCANR, allows a programmer to furnish free-field data to a running BASIC program through a photoreader or teleprinter, employing the normal BASIC I/O drivers. Any number of data items are transferred into an array specified by the user program.

The SCANR routine, an assembly language modification of the 20392A BASIC Operating System, changes the routine normally used to scan a data statement so that the values are read from the photoreader or teleprinter.

After the values are passed to the user program, SCANR restores the BASIC Operating System to its original state.

Assembly language, absolute.

Contributed:
David R. McClellan
HP, Southern Sales Region

22078B, HIGH SPEED PUNCH DRIVER — BASIC CALLABLE

Providing a means for logging data or storing intermediate results, this driver furnishes a punched tape output from a running BASIC program. The routine operates under the 20392A BASIC Operating System.

Equipment required is one HP 2753 Tape Punch, with interface kit.

Assembly language, absolute.

Contributed:
David R. McClellan
HP, Southern Sales Region

22082B, BASIC PHOTO READER DATA INPUT

This routine allows a programmer to furnish free-field data to a running BASIC program by means of a photoreader. The user requests input data by means of an INPUT statement. If the photoreader is ready when the statement is executed, data is furnished to the program from the punched tape in the photoreader. If the photoreader is not ready (i.e.; no tape installed or gate down), the teleprinter types a question mark and data is then entered in the normal manner from the keyboard. The routine is an absolute-address modification of the 20392A BASIC Operating System.

Equipment required is at least 8K core storage, and a photoreader with interface kit.

Assembly language, absolute.

Contributed:
Stephen M. Curry
Department of Physics
Stanford University

22176A, HP 2754A PUNCH/LIST IN KT MODE

This BCS routine allows users with an HP 2754 Teleprinter and no high-speed punch to select by programming means whether printing or punching will be performed.

Equipment required is one HP 2754 Teleprinter, with interface kit.

Assembly language, relocatable.

Contributed:
Steven M. Rosen
HP, Eastern Sales Region

22247B, FAST DOS/DOS-M PHOTOREADER DRIVER

This DOS and DOS-M driver controls tape reader I/O operations. The routine is similar to routine 20987C, except that it is three times as fast and includes a subroutine to ensure that interrupts from the time base generator are not missed. The driver operates by the non-interrupt method.

Equipment required is one HP 2737, 2748, or 2758 Punch Tape Reader, with interface kit. For DOS, revision B of the DOS minimum software configuration is required. For

(continued)

009, I/O, PAPER TAPE (continued)

DOS-M revision A of the DOS-M minimum software configuration is used.

Assembly language, relocatable.

Contributed:

Fritz Joern

HP, Germany/Frankfurt

22264B, TELEX TO ASCII PHOTOREADER DRIVER

This driver reads five-level TELEX tapes and converts the code to ASCII. It replaces BCS driver D.01, HP 20005A, and can only be used with a modified HP 2737A photoreader. The call to the driver is identical to other IOU calls for ASCII operation.

Assembly language, relocatable.

Contributed:

Bjoern Lindberg

HP, Sweden/Stockholm

22353A, DOS/DOS-M PHOTOREADER DRIVER TO READ ABSOLUTE BINARY TAPES

This special DOS-M photoreader driver can read absolute binary format tapes as well as normal relocatable and source formats. The read is accomplished in FORTRAN through a special CALL EXEC. The tape is read into a user buffer area. To store the absolute binary into a user file, use HP 22354, "DOS-M Store Absolutes." This driver is particularly useful for reproducing absolute tapes.

Assembly language, relocatable.

Contributed:

Thomas J. Winker

HP, Neely Sales Region

22490A, CORE SIZE INDEPENDENT PHOTO READER SIO DRIVER

This one HP 2737/48/58 High Speed Paper Tape Reader SIO driver can replace all the different core size versions of photo reader SIO drivers. It has the ability to automatically determine the memory size of any HP 2100 series computer during the normal SIO configuration process. This is achieved by a self-contained modification to the configuration section of the standard HP SIO driver. The entire process is transparent to the user and acts as if he had loaded and configured the specific driver for his size memory.

Assembly language, absolute.

Contributed:

Michael W. Lesko

HP, Midwest Sales Region

22491A, CORE SIZE INDEPENDENT PAPER TAPE PUNCH SIO DRIVER

This one HP 2753A/B or HP 2895A Paper Tape Punch SIO driver can replace all the different core size versions of punch SIO drivers. It has the ability to automatically determine the memory size of any HP 2100 series computer during the normal SIO configuration process. This is achieved by a self-contained modification to the configuration section of the standard HP SIO driver. The entire process is transparent to the user and acts as if he had loaded and configured the specific driver for his size memory.

Assembly language, absolute.

Contributed:

Michael W. Lesko

HP, Midwest Sales Region

010, I/O, PUNCH CARD

20019C, BCS CARD READER DRIVER (D.11)

This BCS driver controls HP 2779A Card Reader I/O operations. Hollerith-to-ASCII conversion is performed.

Equipment required is one HP 2779A Card Reader, with 12558A interface kit.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20324B, 8K SIO CARD READER DRIVER

Used by 8K computers, this SIO driver controls HP 2779A Card Reader I/O operations. The routine reads in sequence each column on the card, converts the data in the column from Hollerith Code to ASCII Code, and packs the characters into the user's buffer.

Equipment required is one HP 2779A Card Reader, with 12558A interface kit.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20332A, 16K SIO CARD READER DRIVER

Used by 16K computers, this SIO driver controls HP 2779A Card Reader I/O operations. The routine reads in sequence each column on the card, converts the data in the column from Hollerith Code to ASCII Code, and packs the characters into the user's buffer.

Equipment required is one HP 2779A Card Reader, with 12558A interface kit.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20520C, 4K SIO MARK SENSE CARD READER DRIVER

Used by 4K computers, this driver acquires data from an HP 2761A-007 Optical Mark Reader used with an HP

12602A interface kit. The driver overlays the core area normally occupied by the 4K SIO tape reader driver; therefore, a high-speed punch tape reader cannot be used while in the SIO mode.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20521C, 8K SIO MARK SENSE CARD READER DRIVER

Used by 8K computers, this driver acquires data from an HP 2761A-007 Optical Mark Reader used with an HP 12602A interface kit. The driver overlays the core area normally occupied by the 8K SIO tape reader driver; therefore, a high-speed punch tape reader cannot be used while in the SIO mode.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20522C, 16K SIO MARK SENSE CARD READER DRIVER

Used by 16K or larger computers, this driver acquires data from an HP 2761A-007 Optical Mark Reader used with an HP 12602A interface kit. The driver overlays the core area normally occupied by the 16K SIO tape reader driver; therefore, a high-speed punch tape reader cannot be used while in the SIO mode.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

010, I/O, PUNCH CARD (continued)

20817B, BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)

This BCS driver acquires data from an HP 2761A-007 Optical Mark Reader used with the HP 12602A interface kit. The routine performs any of three types of conversion on the data acquired. These conversion functions are Hollerith-to-ASCII, column-image binary, and packed binary. The packed binary conversion is used when reading assembler-produced or compiler-produced cards in relocatable binary format.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602A interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20819C, BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)

This BCS driver acquires data from an HP 2761A-007 Optical Mark Reader used with the HP 12602B interface kit. The routine performs any of three types of conversion on the data acquired. These conversion functions are Hollerith-to-ASCII, column-image binary, and packed binary. The packed binary conversion is used when reading assembler-produced or compiler-produced cards in relocatable binary format. The driver operates either with the Direct Memory Access option or without it.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602B interface kit. The Direct Memory access option can also be used, if desired.

Assembly language, relocatable.

HP supported:
Data Systems Division

20821B, RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)

This RTE driver acquires data from an HP 2761A-007 Optical Mark Reader used with the HP 12602B interface kit. The routine performs any of three types of conversion on the data acquired. These conversion functions are Hollerith to ASCII, column-image binary, and packed binary.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602B interface kit, and the Direct Memory Access option.

Assembly language, relocatable.

HP supported:
Data Systems Division

20823C, DOS MARK SENSE DRIVER, KIT HP 12602B, (DVR15)

This DOS driver acquires data from an HP 2761A-007 Optical Mark Reader used with the HP 12602B interface kit. The routine performs any of three types of conversion on the data acquired. These conversion functions are Hollerith to ASCII, column-image binary, and packed binary.

This driver can control only one optical mark reader at a time.

Equipment required is one HP 2761A-007 Optical Mark Reader, with HP 12602B interface kit, and the Direct Memory Access option.

Assembly language, relocatable.

HP supported:
Data Systems Division

24178A, 4K SIO HP 2891A CARD READER DRIVER

This driver processes requests for input from the HP 2891A Card Reader. The driver is unbuffered, non-interrupt, and is used on 2114-15-16 with 4K of memory. The 12882 Card Reader Interface is required.

Assembly Language

HP supported:
Data Systems Division

24179A, 8K SIO HP 2891A CARD READER DRIVER

This driver processes requests for input from the HP 2891A Card Reader (with 12882 Card Reader Interface). The driver is unbuffered, non-interrupt, and is used on 2114-15-16 with 8K of memory.

Assembly language

HP supported:
Data Systems Division

010, I/O, PUNCH CARD (continued)

24180A, 16K SIO HP 2891A CARD READER DRIVER

The driver processes requests for input from the 2891A Card Reader (with 12882 Card Reader Interface). The driver is unbuffered, non-interrupt, and is used on 2114-16 with at least 16K of memory.

Assembly language

HP supported:
Data Systems Division

24181A, BCS HP 2891A CARD READER DRIVER (D.11)

The BCS driver processes requests for input from the HP 2891A Card Reader (with 12882 Card Reader Interface) under interrupt or DMA control.

Assembly language

HP supported:
Data Systems Division

24182B, DOS HP 2891A CARD READER DRIVER (DVR11)

This DOS/DOS-M driver processes requests for input from the HP 2891A Card Reader (with 12882 Card Reader Interface).

Assembly language

HP supported:
Data Systems Division

24224A, RTE HP 2891A CARD READER DRIVER (DVR11)

Provides input/output capabilities for the HP 2891A Card Reader under the Real-Time Executive. The HP 12882 Card Reader Interface is required.

Assembly language

HP supported:
Data Systems Division

24264A, 4K SIO HP 2892A CARD READER DRIVER

This driver operates an HP 2892A Card Reader in an SIO environment. The driver reads Hollerith characters from 80-column tabular cards, in accordance with EIA standard RS292, and stores these characters in ASCII.

Assembly language, absolute.

HP supported:
Data Systems Division

24265A, 8K SIO HP 2892A CARD READER DRIVER

This driver operates an HP 2892A Card Reader in an SIO environment. The driver reads Hollerith characters from 80-column tabular cards, in accordance with EIA standard RS292, and stores these characters in ASCII.

Assembly language, absolute.

HP supported:
Data Systems Division

24266A, 16K SIO HP 2892A CARD READER DRIVER

This driver operates an HP 2892A Card Reader in an SIO environment. The driver reads Hollerith characters from 80-column tabular cards, in accordance with EIA standard RS292, and stores these characters in ASCII.

Assembly language, absolute.

HP supported:
Data Systems Division

24272B, DOS HP 2892A CARD READER DRIVER (DVR11)

This driver reads Hollerith coded cards through an HP 2892A card reader and converts to ASCII form. This driver also reads in the column image or the packed binary forms of binary.

Assembly language, relocatable.

HP supported:
Data Systems Division

24274A, BCS HP 2892A CARD READER DRIVER (D.11)

This driver reads Hollerith coded cards by means of an HP 2892A card reader and converts to ASCII form. This driver also reads in the column image or the packed-binary forms of binary.

Assembly language, relocatable.

HP supported:
Data Systems Division

010, I/O PUNCH CARD (continued)

29030A, RTE HP 2892A CARD READER DRIVER (DVR11)

The HP 29030 Driver (DVR11) controls the HP 2892A Card Reader through an HP 12924 Interface Card operating in the HP Real-Time Executive environment. The driver may be used to read Hollerith data, packed binary data, or

column binary image data into a user's buffer.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

011, I/O, PRINTER

20527B, 4K SIO HP 2778A LINE PRINTER DRIVER

Used by 4K computers, this SIO driver controls I/O operations with an HP 2778 or 2778-001 Line Printer.

Equipment required is one HP 2778 or 2778-001 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20528A, 8K SIO HP 2778A LINE PRINTER DRIVER

Used by 8K computers, this SIO driver controls I/O operations with an HP 2778 or 2778-001 Line Printer.

Equipment required is one HP 2778 or 2778-001 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20529A, 16K SIO HP 2778A LINE PRINTER DRIVER

Used by 16K or larger computers, this SIO driver controls I/O operations with an HP 2778 or 2778-001 Line Printer.

Equipment required is one HP 2778 or 2778-001 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20800C, RTE HP 2778A LINE PRINTER DRIVER (DVR12)

Used with an HP 2778 or 2778-001 Line Printer, this RTE driver controls computer output operations.

Equipment required is one HP 2778 or 2778-001 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20991C, DOS HP 2778A LINE PRINTER DRIVER (DVR12)

Used with an HP 2778 or 2778-001 Line Printer, this DOS and DOS-M driver controls computer output operations.

Equipment required is one HP 2778 or 2778-001 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

22095A, BASIC HP 2778A LINE PRINTER DRIVER

This BASIC driver overlays a portion of the 20392A BASIC Operating System, causing output data to be listed either on the line printer or the teleprinter, depending on switch register settings.

(continued)

011, I/O, PRINTER (continued)

Equipment required is one Line Printer and one 2752 or 2754 Teleprinter, each with interface kit.

Assembly language, absolute.

Contributed:
Matthew Simon
HP, Eastern Sales Region

22258A, HP 2767 LINE PRINTER BASIC DRIVER

This driver adds high speed printout capabilities to HP BASIC 20392. Programs may be listed, or data may be output from a running BASIC program using the normal LIST or PRINT commands. A switch register setting controls the optional line printer or teleprinter output.

Assembly language, absolute

Contributed:
Bjoern Lindberg
HP, Sweden/Stockholm

22399A, HP 2778/2767 LINE PRINTER PATCH FOR EDUCATIONAL BASIC

This patch provides line printer capability for the HP 2007 Educational BASIC system (HP 24160-60001 rev A). Two versions of the patch permit using either the HP 2767A or HP 2778A line printer. Requests for STOP message, READY message, line feeds, question mark (input statement) and "/" (escape) are routed to both the teletype and the line printer. In addition the CR/LF associated with system commands and input statements are changed to line feed only in order that these appear on both TTY and printer. The SCRATCH system command, when issued in batch mode (CARD), causes a page eject in order to provide list output separation. All other data is printed only on the line printer (i.e., PRINT statements). When switch 15 is "OFF", all output is directed to the teletype.

Assembly language, absolute.

Contributed:
David R. McClellan
HP, Southern Sales Region

22408A, BASIC CALLABLE LINE PRINTER DRIVER

This routine provides the HP BASIC System 20392A with a line printer capability for the HP 2778A. A special technique of line printer buffering allows the HP 2778A to

operate at maximum speed and utilize the full line printer carriage width.

Assembly language, absolute.

Contributed:
Ed Doust
HP, Corporate

22409A, EDUCATIONAL BASIC HP 2767 LINE PRINTER DRIVER

This modification to Educational Basic allows the Hewlett-Packard 2767A Line Printer to be used as the list device on the Hewlett-Packard 2007A Educational System.

Optionally, the line printer or teleprinter may be chosen as the list output device through a Switch register setting. Complete compatibility with Educational BASIC is maintained including flexibility for core specification. With this modification the throughput of Educational BASIC in the batch mode is significantly increased and is limited only by the speed of the card reader.

Assembly language, absolute.

Contributed:
Warren Nelson
HP, Canada/North Burnaby

22411A, A.B. DICK VIDEOJET SIO LINE PRINTER DRIVER

This SIO driver is designed to operate the A.B. Dick 9600 Videojet Printer. It interfaces HP 2114, 2115, 2116 Series computers using the HP 12566 micro-circuit interface card with positive true logic.

This driver is designed to operate only with the line printer compatible teleprinter driver. The punch portion of the teleprinter driver is overlaid by the Videojet driver. Hence, a punch driver must also be present in the software configuration with this driver when punching is required.

Equipment required includes an A.B. Dick 9600 Videojet line printer and an HP 12566 microcircuit interface card.

Assembly language, absolute.

Contributed:
Bill Alexander
HP, Midwest Sales Region

011, I/O, PRINTER (continued)

24164B, 4K SIO HP 2767 LINE PRINTER DRIVER

Used by 4K computers, this SIO driver controls output operations for an HP 2767 Line Printer.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, absolute

HP supported:
Data Systems Division

24165B, 8K SIO HP 2767 LINE PRINTER DRIVER

Used by 8K computers, this SIO driver controls output operations for an HP 2767 Line Printer.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24166B, 16K SIO HP 2767 LINE PRINTER DRIVER

Used by 16K or larger computers, this SIO driver controls output operations for an HP 2767 Line Printer.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24167B, BCS HP 2767 LINE PRINTER DRIVER (D.16)

This BCS driver controls output operations for an HP 2767 Line Printer.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

24168C, DOS HP 2767 LINE PRINTER DRIVER (DVR12)

This DOS and DOS-M driver controls output operations for the HP 2767 Line Printer. Features include line spacing, paging, and status checking.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

24169A, RTE HP 2767 LINE PRINTER DRIVER (DVR12)

This RTE driver controls output operations for the HP 2767 Line Printer.

Equipment required is one HP 2767 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

24171B, BCS HP 2778A LINE PRINTER DRIVER (D.12)

This BCS driver controls output operations for the HP 2778 or 2778-001 Line Printer.

Equipment required is one HP 2778 Line Printer, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

24268A, 4K SIO HP 2610A/2614A LINE PRINTER DRIVER

This SIO driver prints ASCII through the HP 2610A or the HP 2614A line printer.

Assembly language, absolute.

HP supported:
Data Systems Division

011, I/O, PRINTER (continued)

24269A, 8K SIO HP 2610A/2614A LINE PRINTER DRIVER

This SIO driver prints ASCII through the HP 2610A or the HP 2614A line printer.

Assembly language, absolute.

HP supported:
Data Systems Division

24270A, 16K SIO HP 2610A/2614A LINE PRINTER DRIVER

This SIO driver prints ASCII through the HP 2610A or the HP 2614A line printer.

Assembly language, absolute.

HP supported:
Data Systems Division

24271A, DOS HP 2610A/2614A LINE PRINTER DRIVER (DVR12)

This driver supports the HP 2610A or HP 2614A line printer in a DOS or DOS-M system.

Assembly language, relocatable.

HP supported:
Data Systems Division

24273A, BCS HP 2610A/2614A LINE PRINTER DRIVER (D.12)

This BCS driver prints ASCII and performs form control on the HP 2610A or HP 2614A line printer.

Assembly language, relocatable.

HP supported:
Data Systems Division

24301A, 12K SIO HP 2767 LINE PRINTER DRIVER

This SIO driver operates an HP 2767 Line Printer in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

24302A, 12K SIO HP 2778A LINE PRINTER DRIVER

This SIO driver operates an HP 2778A Line Printer in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

24303A, 12K SIO HP 2610A/2614A LINE PRINTER DRIVER

This SIO driver operates an HP 2610A/2614A Line Printer in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

29028A, RTE HP 2610A/2614A LINE PRINTER DRIVER (DVR12)

DVR12 is an RTE driver that controls output operations for an HP 2610A or HP 2614A Line Printer. The driver operates in an interrupt mode, without DMA transfer capability, through the I/O control EXEC call in RTE.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

012, DATA ACQUISITION SYSTEMS

20076A, BCS HP 2312A DRIVER (D.55)

This BCS driver acquires measurements from an HP 2312A High-Speed Low-Level Data Acquisition Subsystem. A control word specifies the data channel and measurement range, and the measurement acquired is forwarded in binary form to the calling program. Routine 20078A is used for calling this driver from FORTRAN or ALGOL.

Equipment required is one HP 2312A High-Speed Low-Level Data Acquisition Subsystem.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20209C, DACE LIBRARY

This program library provides the standard programs required by the HP 12659A Data Acquisition and Control Executive Operating System.

Equipment required is 8K of core storage, the HP 12659A DACE Operating System, and one HP 12539 Time Base Generator.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20235A, RTE HP 2323A SUBSYSTEM DRIVER (DVR77)

This RTE driver acquires 8-4-2-1 BCD measurements from an HP 2323A Low-Speed Data Acquisition Subsystem. Control words from the calling program establish the data channel to be sampled, delay, meter function (type of measurement), meter range, and mode (measurement or calibration check). As well as supplying the measured value to the calling program in 8-4-2-1 BCD form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. Program 20288A can be used to convert the BCD measurement to floating point form.

Equipment required is one HP 2323A Low-Speed Data Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

HP supported:

Automatic Measurement Divisions

20236A, RTE HP 2320A/2322A SUBSYSTEM DRIVER (DVR76)

This RTE driver acquires 8-4-2-1 or 4-2-2-1 BCD measurements from an HP 2320A or 2322A Low-Speed Data Acquisition Subsystem. Control words from the calling program establish the data channel to be sampled, delay, meter function (type of measurement), meter range, and mode (measurement or calibration check). Upon acquiring a measurement, the routine furnishes it to the calling program in BCD form. The measurement can be converted to floating point form by routine 20288.

Equipment required is one HP 2320A or 2322A Low-Speed Data Acquisition Subsystem (8-4-2-1 or 4-2-2-1 BCD output).

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20398A, RTE HP 2312A DRIVER (DVR55)

This RTE driver acquires measurements from an HP 2312A High-Speed Low-Level Data Acquisition Subsystem. A control word establishes the data channel to be sampled, and the measurement acquired is forwarded in binary form to the calling program. The routine takes advantage of the privileged interrupt capability of the RTE Operating System, and measurements can be taken at a maximum rate of approximately 5 KHz.

Equipment required is one HP 2312A High-Speed Low-Level Data Acquisition Subsystem, and one HP 12620A Special I/O card.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20501E, BCS SCN-ANALOG 8-4-2-1 SCAN ROUTINE (D.77)

This BCS driver acquires 8-4-2-1 BCD measurements from an HP 2320A or 2322A Low-Level Data Acquisition Subsystem. The measurements are forwarded in 8-4-2-1 form to the calling program. Control words establish the data channel to be sampled, delay, type of measurement, sample time, mode (measurement or calibration check), and meter range. Automatic range selection can be programmed if the measuring instrument has this optional feature.

(continued)

012, DATA ACQUISITION SYSTEMS (continued)

The 8-4-2-1 measurements acquired can be converted to floating-point form by program 20210.

Equipment required is one HP 2320A or 2322A Low-Speed Data Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20517C, BCS SCN-ANALOG 4-2-2-1 SCAN ROUTINE (D.77)

This BCS driver acquires 4-2-2-1 BCD measurements from an HP 2322A Low-Speed Data Acquisition Subsystem. The measurements are converted to 8-4-2-1 form and forwarded to the calling program. Control words establish the data channel to be sampled, delay, and type of measurement. Automatic range selection can be used if the measuring instrument has this optional feature.

The 8-4-2-1 measurements provided by the routine can be converted to floating-point form by program 20210.

Equipment required is one HP 2322A Low-Speed Data Acquisition Subsystem (4-2-2-1 BCD output).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20532A, BCS HP 2321A SUBSYSTEM (HP 3450/2911A) SCAN ROUTINE SCN 34 (D.77)

This driver acquires 8-4-2-1 BCD measurements from an HP 2321A Low-Speed Data Acquisition Subsystem. Control words from the calling program establish the data channel to be sampled, scanner delay, meter function (type of measurement), and mode (normal, 100-millisecond meter delay, 100-megohm input, 1/60-second gate, or any combination of the last three). Meter range is specified by a control word; alternatively, automatic range selection, a standard feature of the meter, can be employed if desired. As well as supplying the measured value to the calling program in BCD form, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. Program 20533A can be used to convert the BCD measurement to floating point form.

Equipment required is one HP 2321A Low-Speed Acquisition Subsystem (8-4-2-1 BCD output).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

22199A, BASIC LANGUAGE DATA ACQUISITION SYSTEM

The GOL1 program, named after its originator, is a sophisticated and versatile data acquisition program. Providing 24-hour, 7-day per week data monitoring capabilities, the program virtually eliminates the human factor, and the possibility for human error, from the data collection process. The program permits close control of all phases of the measurement and data-conversion operation. If a plotter is included in the equipment used, graphs may be prepared from the values measured.

The principal features of the program are listed below.

- a. Program control from the computer switch register.
- b. Detection of response failure in the measuring system.
- c. Maintenance of a time-of-day clock in the computer.
- d. 200 channels of analog input, with a sample time of 0.1 second per channel, and a dynamic range from 1 microvolt to 1500 volts per channel.
- e. 16 channels of high speed analog-to-digital conversion, at a rate of up to 100,000 data samples per second.
- f. 100 channels for thermocouple monitoring.
- g. Perkin-Elmer Laser input.
- h. 16-bit digital input or output.
- i. 2 channels of analog output, 0 to +10 volts, suitable for an X-Y plotter.
- j. An output capability for closing any combination of 1 to 16 relays.
- k. An IBM-compatible magnetic tape system, with a transfer rate of approximately 30,000 characters per second.

(continued)

012, DATA ACQUISITION SYSTEMS (continued)

While the data collection system uses an HP 3450A Digital Multi-Function Meter as the measuring instrument, the program can easily be altered to permit the use of many other models of HP digital voltmeter.

The program functions under the 20392A BASIC Program System, and requires a 16K, 24K, or 32K computer.

Full information on the program is furnished in the handbook *Computerized Data Acquisition Operating Instruction Manual*. This manual is included in the documentation package for the program.

Equipment required is one each of the following:

- a. HP 3450A Digital Multi-Function Meter.
- b. HP 2911B Crossbar Scanner.
- c. HP 5610A Analog-to-Digital Converter.
- d. HP 12555A Digital-to-Analog Converter.
- e. HP 12551B Relay Output Register.
- f. HP 12539A Time Base Generator Interface Kit.
- g. HP 12554A General Purpose Duplex Register.
- h. Datum/PEC 35 inch-per-second, 800 bits-per-inch, 9-track Magnetic Tape Unit; or HP 2020 Magnetic Tape Unit; or HP 3030 Magnetic Tape Unit.

Assembly language, absolute.

Contributed:
Gene Olig
Research and Development Department
Giddings & Lewis Machine Tool Company

22361A, DOS-M BINARY FILE DATA ACQUISITION

This program provides continuous analog data acquisition from a multiplexed ADC to a DOS-M Binary File. Six channels of analog information are sampled with the HP 2310B Multiverter under control of the HP 12539A time base generator using sampling intervals of one millisecond or greater. The digitized information obtained at up to 6000 samples per second may be fed continuously to a CRT display or to a DOS-M binary file on a 2870A disc store.

The main Fortran program interfaces the operator obtaining disc labels, file name and sampling intervals — before calling the Assembly language subroutine which handles the continuous analog data acquisition and display or storage.

Equipment required includes 16K core, an HP 2870 disc, an HP 2310B/12554A-M2 multi-channel analog to digital con-

verter, an HP 12539A time base generator, and an HP 12555 dual digital to analog converter.

FORTTRAN IV/Assembly language, relocatable.

Contributed:
Neal Kelly
HP, Eastern Sales Region

22380C, HP BASIC DRIVER SYSTEM WITH BINARY I/O

The BASIC Driver System with binary data I/O enables the user to control the HP 80501B Audio Data Processor by means of conversational Hewlett-Packard BASIC language. It modifies standard HP BASIC 20392 and adds the following features: The compiler can be restarted with or without deleting the stored program; the switch register can be read from BASIC language level enabling the user to control the actions of the program; the teletype interrupt mode can be switched off or on from BASIC enabling the teletype to read data from paper tape because the jump to the STOP-READY point is inhibited; binary data on paper tape can be read or punched from BASIC language level.

BASIC callable drivers for the following devices or interfaces are included: HP 12539A Time base generator (providing "elapsed time" and/or "time-of-day"); HP 12555 A D-to-A converter (with 8 service routines for X-Y display); HP 12551B Relay output register; HP 12564A A-to-D Converter; HP 8064A Real Time Analyzer with or without HP 8065A Extension (controlling the analyzer and reading spectra). The BASIC Driver System includes a configurator that can change the configuration or delete routines that are not required, a set of routines for digital and analog data acquisition, and a routine for transfer of data arrays. Exhaustive diagnostic messages are printed in case of hardware trouble or programming errors.

Assembly language, absolute

Contributed:
Hans Biesel
HP, Germany/Boeblingen

29000A, RTE HP 2321A SUBSYSTEM DRIVER (DVR74)

This FORTRAN callable driver, used by the RTE Operating System, acquires 8-4-2-1 BCD measurements from an HP 2321A Low-Speed Data Acquisition Subsystem. Control words from the calling program specify the data channel to be sampled, scanner delay, meter function (type of measurement), and mode (normal, 100-millisecond meter delay, 100-megohm input, 1/60-second gate, or any combination of the last three). Meter range also is specified

(continued)

012, DATA ACQUISITION SYSTEMS (continued)

by a control word; alternatively, automatic range selection, a standard feature of the meter, can be employed if desired. As well as supplying the measured value to the calling program, the routine furnishes an additional word which indicates the type of measurement for which the meter is set. The measurement can be supplied to the calling program either in floating point form or in 8-4-2-1 BCD form.

Equipment required is the one HP 2321A Low-Speed Data Acquisition Subsystem, and the Extended Arithmetic Unit option for the computer.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29004A, COUPLER SERIAL INTERFACE BCS DRIVER (D.66)

D.66 is a relocatable assembly language driver that transfers data between the HP 2570A/2575A Coupler/Controller interfaced with a HP 12813 card and a HP 2100 family computer interfaced with a HP 12665 card. Any number of HP 2570A/2575A Coupler/Controllers can be controlled by D.66. FORTRAN/ALGOL READ or WRITE statements can be used.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29007A, BCS NON-DMA DRIVER FOR HP 2313A SUBSYSTEM (D. 62)

D. 62 is a BCS driver that acquires measurements from an HP 9600A/G Option G00 (HP 2313A) Data Acquisition Subsystem. Data is acquired in the form of 12-bit words through single channel, sequential, or random modes. Two bits are supplied for HP 2930 and subsystem pacer status. Subroutine I2313 is used to pass parameters and data between the driver and FORTRAN or ALGOL programs.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29008A, BCS DMA DRIVER FOR HP 2313A SUBSYSTEM (D. 62A)

D. 62A is a BCS driver that acquires measurements from an HP 9600A/G Option G00 (HP 2313A) Data Acquisition Subsystem. Data is acquired using DMA, in the form of 12-bit words, through single channel monitor or sequential modes. Two bits are supplied for HP 2930 and subsystem pacer status. Subroutine I2313 is used to pass parameters and data between the driver and FORTRAN or ALGOL programs.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29009A, RTE DRIVER DVR62

DVR62 is an RTE driver that acquires measurements from an HP 9600E/F-Option G00 (HP 2312A) Data Acquisition Subsystem. The driver can dynamically obtain a DMA channel for itself to speed data acquisition in single channel monitor or sequential modes. The driver, though associated with the HP 2313A Subsystem, is general purpose in several ways. Some of the functions DVR62 will perform are:

1. Output n 16-bit words. } Using DMA if user
2. Input n 16-bit words. } specified.
3. Alternately output and input 16-bit words using two separate buffers.
4. Alternately output 16-bit words from two separate buffers.
5. Alternately output 1 constant 16-bit word, then a word from a buffer.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

14902A, BCS DIGITAL VOLTAGE SOURCE POWER SUPPLY DRIVER D.70

This BCS Driver requires HP 12661 DVS interface. D.70 processes clear, control write, and read requests. Power supplies are programmed by writes; reads return status information on DVS operation. Up to 8 DVSs may be chained to one interface card and be programmed by D.70. D.70 also does data conversion and formatting.

D.70 can handle both "timing" and "alarm" interrupts, but not at the same time. "Timing" mode interrupts are effective during write processing, "Alarm" mode interrupts are handled after writing has terminated. An external user routine, ALARM, can be called when an "Alarm" interrupt occurs, if the user sets the driver in this feature (otherwise only the DVS EQT status words are affected). The user can set and reset this feature at run time.

Assembly language, relocatable.

HP supported:
New Jersey Division

20073C, BCS HP 5610A ANALOG-TO-DIGITAL DRIVER, NON-DMA (D.56)

This BCS driver acquires measurements from an HP 2311A High-Speed Data Acquisition Subsystem. Data is acquired in the form of 10-bit words at a rate up to 48 kHz (for 2114- or 2115-series computers), or up to 60 kHz (for 2116-series computers). The routine operates in either of two ways: single-channel monitor, or sequential scan of 2 to 16 data channels. Program 20074A is used for furnishing parameters to the driver from FORTRAN or ALGOL programs. The 10-bit words acquired are forwarded unchanged to the calling program. The faster, DMA version of this routine is program 20093.

Equipment required is one HP 2311A High-Speed Data Acquisition Subsystem.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20074A, FORTRAN/ALGOL INTERFACE ROUTINE (L5610)

This routine provides the interface between FORTRAN or ALGOL compiler programs and the drivers for the HP 2311A High-Speed Data Acquisition Subsystem. (These drivers are programs 20073 and 20093.) The routine allows

the correct transfer of measurement parameters to the driver.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20093C, BCS HP 5610A ANALOG-TO-DIGITAL DRIVER, DMA (D.56A)

This BCS driver acquires measurements from an HP 2311A High-Speed Data Acquisition Subsystem. Data is acquired in the form of 10-bit words at a rate up to 100 kHz. The routine operates in either of two ways: single-channel monitor, or sequential scan of 2 to 16 data channels. Program 20074A is used for furnishing parameters to the driver from FORTRAN or ALGOL programs. The 10-bit words acquired are forwarded unchanged to the calling program. The non-DMA version of this routine is program 20073.

Equipment required is the Direct Memory Access option for the computer, and one HP 2311A High-Speed Data Acquisition Subsystem.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20094B, MULTI/MINIVERTER SCAN ROUTINE SCNMV (D.76)

This BCS driver acquires measurements from an HP 2310A, 2310B, or 2310C High-Speed Data Acquisition Subsystem. A control word program specifies the data channel to be sampled, and the measurement acquired is forwarded in binary form to the calling program.

Equipment required is one HP 2310A, 2310B, or 2310C High-Speed Data Acquisition Subsystem, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20297D, RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR56)

This RTE driver acquires measurements from an HP 2310A A/D Converter, 2310B Multiverter, 2310C Miniverter System, or 2311A High-Speed Data Acquisition Subsystem.

(continued)

013,I/O, A/D—D/A (continued)

A control word from the calling program specifies the data channel or channels to be sampled.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20396A, RTE HP 12564A 10-BIT ANALOG-TO-DIGITAL CARD DRIVER (DVR57)

This RTE driver acquires measurements from an HP 12564A Analog-to-Digital Converter Interface Kit. The range of analog voltage furnished to the converter kit is ± 1 volt or ± 10 volts, depending on a jumper connection in the kit. Conversion (aperture) time is 17.6 microseconds. The digital output is furnished in the form of a 10-bit floating-point number.

Equipment required is one HP 12564A Analog-to-Digital Converter Interface Kit, with analog data source and connecting cables.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

22281A, MINIVERter DRIVER

This program acquires data from analog signals through the Hewlett-Packard HP2310C Miniverter system. The system has a capacity of 128 multiplexed input channels which time-share an analog-to-digital converter. The output of the ADC is stored in a buffer which can be read into memory. A possible sampling rate of 20 KHz can be achieved in monitor mode. It differs from D.76 and MCONV in that it is loaded as a subroutine at run time, requires half as much storage, and controls the sampling speed.

Assembly language, relocatable.

Contributed:
Joseph L. Lau
Airesearch Manufacturing Co.

22304A, HP 5610A ANALOG-TO-DIGITAL DRIVER — FORTRAN CALLABLE

There are three routines in this package; two drivers and a Time Base Generator subroutine which delays execution of a program in the BCS environment. The first driver is designed to command a single reading from the A-D converter and return to the calling program. The second driver is designed to command readings from a number of

different channels where the rate is controlled by the time base generator.

Assembly language, relocatable.

Contributed:
Kile Baker
Montana State University

22331A, DOS HP 2322A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER

This FORTRAN callable HP 2322 A-D Subsystem Driver is self-configuring and operates under a minimum DOS system. Through calls to the EXEC it processes the channel number converting binary to BCD, and outputs it to the scanner. A DVM measurement is taken and control is returned to the EXEC.

Equipment required is an HP 2401C DVM, HP 2911A/B Crossbar Scanner, and HP 12604B DSI, an HP 12533A DVM Program Interface, and an HP 12535A Scanner Program Interface.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22466B, HP 2311A SUBSYSTEM DOS-M DRIVER

This is a special DOS-M driver for the HP 2311A High-Speed Data Acquisition Subsystem. It has a new non DMA random mode, and does not include the HP 2310 functions of the RTE driver. The calling sequence is RTE compatible which requires the driver to be core resident.

Its measuring modes include: digital encode, digital pace, sequential encode, sequential pace, digital free run, sequential free run, and random.

Assembly language, relocatable.

Contributed:
Klaus Stamer
HP, Germany/Frankfurt

22472A, HP 2310/2311 SUBSYSTEM DRIVER FOR DOS-M

This program is a DOS-M driver for the HP 2310/2311 High-Speed Data Acquisition Subsystems. It uses a DMA

(continued)

013, I/O, A/D – D/A (continued)

channel to input data. Encode to the subsystem can be computer, internally, or pacer generated, and channel selection can be random or sequential.

Assembly language, relocatable.

Contributed:
Grant Munsey
HP, Neely Sales Region

22475A, HP 2311A SUBSYSTEM DRIVER - BASIC CALLABLE

This program is a driver for the HP 2311 High-Speed Data Acquisition Subsystem, callable from HP Basic Version 20392. It allows single-channel (or random) mode and sequential mode, does not use DMA and does not overlay matrix routine. During driver execution the interrupt system is disabled.

Assembly language, absolute.

Contributed:
Horst Metz
HP, Germany/Munich

22507A, CONVERSION ROUTINE FOR HP 2058E SUBSYSTEM RTE DRIVER

This subroutine does a series of measurements on an HP 2058E Option 167 Subsystem (HP 3480A Voltmeter - HP

3485A Scanner), and then does the conversion of the data to floating point.

The subroutine uses the HP 2058E Scanner Subsystem RTE Driver (DVR57), contributed program HP 22508.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

22508A, HP 2058E SCANNER SUBSYSTEM RTE DRIVER (DVR57)

This is an RTE driver for the HP 2058E Option 167 Scanner Subsystem (HP 3480A Voltmeter with HP 3485A Scanner). The driver permits you to do a series of measurements on the same (digitise) or different (sequential) channels. The driver works under DMA to obtain the maximum speed of the subsystem (1000 measurements/sec.).

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

014, I/O, GRAPHIC

20014A, BCS PLOTTER DRIVER (D.10)

This BCS driver controls I/O operations with a Calcomp Model 565 Plotter.

Equipment required is one Calcomp Model 565 Digital Incremental Plotter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20581A, DOS PLOTTER DRIVER (DVR10)

This DOS and DOS-M driver controls I/O operations with a Calcomp Model 565 Plotter.

Equipment required is one Calcomp Model 565 Digital Incremental Plotter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

014, I/O, GRAPHIC (continued)

20808B, RTE PLOTTER DRIVER (DVR10)

This RTE driver controls output operations with a Calcomp Model 565 Plotter.

Equipment required is one Calcomp Model 565 Digital Incremental Plotter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

22077B, CALCOMP PLOTTER DRIVER — BASIC CALLABLE

This driver, used with the 20392 BASIC Operating System, controls I/O operations with a Calcomp Model 565 Plotter.

The routine plots points and straight lines. Movement, in increments of 0.01 inch (0.254 millimeter), takes place in any of eight directions. User subroutines can be written to permit plotting complex figures.

Equipment required is one Calcomp Model 565 Digital Incremental Plotter, with interface kit.

Assembly language, absolute.

Contributed:
David R. McClellan
HP, Southern Sales Region

22080A, HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER — FORTRAN CALLABLE

This driver sets up CRT displays on an HP 1300A Large Screen Display. The X and Y axes are plotted, if desired.

Equipment required is one HP 2331A X-Y Display Subsystem, consisting of an HP 1300 X-Y Large Screen Display and a dual D/A converter interface kit.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22217B, HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER — BASIC CALLABLE

This driver, used by the HP 20392 BASIC Operating System, sets up CRT displays on an HP 1300A Large Screen

Display. The X and Y axes are plotted, if desired.

Equipment required is one HP 2331A X-Y Display Subsystem, consisting of an HP 1300 X-Y Large Screen Display and a dual D/A converter interface kit.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22219A, HIGH SPEED CONTINUOUS LINE PLOTTER FOR HP 7004B

By providing controlled pen-carriage acceleration, this routine allows an HP 7591A Point Plotting System to be used as a high speed continuous-line plotter. (The HP 7591A System employs an HP 7004 X-Y Recorder for plotting points.) When the point plotting system employs the standard driver to draw a straight line, the line is drawn with a slight curvature because of the differing inertias of the X-axis and Y-axis carriages. The lighter carriage accelerates more rapidly than the other carriage, giving rise to the curvature in the line. The CS1 subroutine overcomes this problem by incrementally increasing the value of the coordinate furnished to the lighter carriage as the carriage accelerates, until the full value of the coordinate is reached. The heavier carriage receives the full value of its coordinate without delay. An increment-size factor allows rough fast plotting, or accurate slower plotting.

When the carriage is moved with the pen off the paper, the full values of both coordinates are furnished without delay to both carriages, resulting in maximum operating speed. Additionally, all pen-up functions use the interrupt I/O method, allowing the computer to be used for other purposes while the interrupt is awaited.

The subroutine, which is named after its contributor, is FORTRAN and ALGOL callable.

Equipment required is one HP 7591A Point Plotting System with two HP 17171A DC Preamplifiers, two J20-6130BR or J20-6933AR D-A Converters, one HP 14535A Multiplex Interface Kit, and one HP 12554A 16-Bit Duplex Register. (If 8-bit resolution is sufficient, an HP 12555A Dual D-A Converter can be substituted for the D-A converters listed.)

Assembly language, relocatable.

Contributed:
C.M. Schade
Information Systems Laboratory
Stanford University

014, I/O, GRAPHIC (continued)

22242A, X-Y PLOTTING ROUTINE

This FORTRAN callable routine, named after its contributor, draws graphs on an X-Y plotter. A maximum of 255 points can be plotted. The X and Y coordinates can both be specified for each point; or, alternatively, only the Y ordinate need be furnished, in which case the abscissa is incremented by a fixed amount for each successive data point. If desired, a square, an X, or a + sign can be centered at each data point, or the points can be connected by a straight line. The point of origin can either be specified by the calling program or it can be selected by the routine to suit the quadrant or quadrants in which the data points lie. Similarly, the scale can either be specified, or it can be selected by the routine to suit the magnitude of the largest ordinate and abscissa supplied. The coordinates must be furnished as floating point arrays.

Equipment required is one X-Y plotter capable of receiving pairs of analog inputs ranging from 0 volts to +10 volts, one HP 12555 Digital-to-Analog Converter, and one HP 12551 Relay Register with Interrupt Interface Kit.

Assembly language, relocatable.

Contributed:
Bob R. Walker
General Dynamics Corp., Convair Aerospace Division

22253B, OSCILLOSCOPE PLOTTING SUBROUTINE

This routine allows use of a standard oscilloscope for displaying data. A set of X, Y axes is displayed on each plot and an accompanying message is on the teleprinter indicating the value of the origin and the scope scale factor in user units per division. Scaling information can be included in the call or it can be computed in the subroutine. FORTRAN-callable.

Equipment required is 4K of core, a teletype, an HP 12555 Digital-to-Analog Converter, and an oscilloscope.

Assembly language, relocatable.

Contributed:
John R. Lorch
Naval Weapons Center

22263A, PLOT, RELAY, WAIT

These routines provide point or line plotting capability to an X-Y Recorder. PLOT controls the analog recorder, RELAY controls the pen by opening and closing relays, or

outputting the number of the switch to be changed to the relay register (this can affect any or all of the switches in the relay register), while WAIT provides necessary time delays. FORTRAN callable.

Equipment required includes an HP Analog X-Y Recorder modified to provide external pen lowering and raising, a dual channel 8-bit digital-to-analog interface card, and a 16-bit relay register card (non-interrupt or interrupt).

Assembly language, relocatable.

Contributed:
Kile Baker
Montana State University

22279A, BASIC PLOT SUBROUTINES

This series of absolute assembly language subroutines operate under the HP 20392A BASIC operating system to control a simple X-Y recording system. The six subroutines are accessed through a CALL statement to initialize channel numbers for the dual D-A board and relay output register board, set X-scale or Y-scale values, plot an (X,Y) coordinate by either a straight line or point plot, raise or lower the plotter pen, and generate a delay while the controls on the X-Y recorder are being adjusted.

Equipment required is one HP 2752A teleprinter, an HP 12555A Dual Channel D-A Converter, an HP 12554A 16-bit Relay Register Interface Card, and an HP X-Y Analog Recorder.

Assembly language, absolute.

Contributed:
John S. Shema
Montana State University

22291C, DOS/DOS-M HP 2331 X-Y SCOPE DISPLAY

Point, character and graph display are available in connection with HP 2331 X-Y Scope subsystem. The software generates point coordinates (8 bit for X, 8 bit for Y) into a user defined buffer and provides for image refresh out of this buffer every 20 msec. Calls are compatible with BCS HP 2331 software.

FORTTRAN II/Assembly, relocatable.

Contributed:
Fritz Joern
HP, Germany/ Frankfurt

A014, I/O, GRAPHIC (continued)

22315A, CONTINUOUS DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE

This FORTRAN callable I/O subroutine enables the continuous display of a data array onto an X-Y oscilloscope via a dual 8-bit digital-to-analog converter. Up to 2000 points can be refreshed every 20 μ s under interrupt control.

Equipment required is 8K core, an HP 12555A dual digital to analog converter, and an HP X-Y oscilloscope and interconnection cable.

Assembly language, relocatable.

Contributed:
John Nosler
University of Oregon

22316A, VARIABLE DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE

This FORTRAN callable I/O subroutine displays array data via a dual 8-bit digital to analog converter onto an X-Y oscilloscope under interrupt control. 256 points of a buffered array are displayed consecutively. Calling parameters allow the programmer to pan across the data, specify the channel of a vertical cursor, and turn off the cursor.

Equipment required is 4K core, an HP 12555A dual digital to analog converter, and an HP X-Y oscilloscope and interconnection cable.

Assembly language, relocatable.

Contributed:
John Nosler
University of Oregon

22318A, HP 1331C STORAGE SCOPE DRIVER — BASIC CALLABLE

This routine operates with the HP BASIC system 20392A to display data on the HP 1331C Storage Scope. The MAT statement has been replaced by DISP for 'display.' DISP is used like PRINT. A CALL statement erases the screen.

Equipment required includes an HP 12555A dual digital to analog converter.

Assembly language, absolute.

Contributed:
Bjoern Lindberg
HP, Sweden/Stockholm

22379A, SIO LIST OUTPUT TO A STORAGE SCOPE

This driver will provide list output to a storage scope or teleprinter using standard SIO modules. It may be used in an 8K or 16K environment by assembling with an N or Z option respectively.

Equipment required includes an HP 12555A Dual D/A Converter Output Card, and a Storage Scope with remote Z-axis and erase control.

Assembly language, absolute.

Contributed:
James L. Miller
HP, Medical Electronics Division

22390A, HP 7004 X-Y RECORDER LIBRARY

This set of routines displays points, straight lines, or arcs of a circle or parabola by interpolating between points on an HP 7004 X-Y Recorder. Characters or numbers are displayed in integer or floating point format. Any program which RUNs in the HP 2331A subsystem environment will RUN without modification in the HP 7004 environment using this library.

These subroutines are FORTRAN or assembler callable and can be used with any standard Hewlett Packard relocatable library.

FORTRAN II/Assembly language, relocatable.

Contributed:
Professor Sergio Marsich
Istituto di Costruzioni Navali
Universita di Genova/Italy

22391A, HP 1331C SIO SCOPE DISPLAY DRIVER

This driver routine replaces the TTY SIO Driver when an HP 1331C X-Y Display is available. It provides faster output than the TTY when hard copy is not necessary.

Equipment required includes 8K or 16K core, an HP 1331C option 016 X-Y Display, and an HP 12555A D/A Interface Card.

Assembly language, absolute.

Contributed:
Robert O. Smith
University of Mississippi Medical Center

014, I/O, GRAPHIC (continued)

22464A, TEKTRONIX 4010 VIDEO DISPLAY UNIT DRIVER – BASIC CALLABLE

This BASIC callable driver controls input and output from a Tektronix 4010 Video Display Unit. It can be used for vector output, to position an alpha numeric character, to erase the VDU screen, to position input using the cross hair cursor, and to input the current display position. The driver is designed for use with an 8K HP 2100 series computer, the HP 20392A BASIC system, and the 4010 VDU interfaced with a modified HP 12531C Teletype.

Assembly language, absolute.

Contributed:
C. J. Derrett
Medical Research Council, England

22471A, HP 7210 PLOTTER DRIVER FOR DOS-M

This program is a driver for the HP 7210 plotter. The driver does not require DMA and is short so that it may be made core resident without significantly decreasing the user area of a DOS-M system. The program which calls the driver is responsible for generating the proper command word sequence, since the driver does not check the sequence for legality. The driver returns status at the completion of each call.

Assembly language, relocatable.

Contributed:
Grant Munsey
HP, Neely Sales Region

22473A, HP 7210 PLOTTER DRIVER FOR RTE

This program is a driver for the HP 7210 plotter. The driver does not require DMA and is short so that it may be made core resident without significantly decreasing the user area of an RTE system. The program which calls the driver is responsible for generating the proper command word sequence since the driver does not check the sequence for legality. The driver returns status at the completion of each call.

Assembly language, relocatable.

Contributed:
Grant Munsey
HP, Neely Sales Region

22505A, RTE HP 1331C STORAGE SCOPE DRIVER (DVR47)

This RTE driver allows points to be output and erased on the HP 1331C Storage Scope. The driver does not work under interrupt, therefore, the number of points output should be kept small in order not to block higher priority devices. The contributed package HP 22506 is a set of subroutines designed to work with this driver. The only equipment required besides the scope is the HP 12555A/B interface.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

22506A, RTE HP 1331C STORAGE SCOPE LIBRARY

This package consists of five FORTRAN-callable subroutines designed to use an HP 1331C Storage Scope Display in an RTE environment. The subroutines permit the user to output points, lines, and characters on the display, and also to do an erase with automatic suspension of the program. The package requires the HP 12555A Dual D/A Interface and the contributed RTE HP 1331C Scope Driver, HP 22505.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

22509A, DOS/DOS-M HP 1331C STORAGE SCOPE LIBRARY

This package consists of four FORTRAN-callable subroutines designed to use an HP 1331C Storage Scope Display in a DOS/DOS-M environment. The subroutines permit the user to output points, lines, and characters on the display. There is also an erase subroutine, which waits one second before returning to the calling program. The package requires the contributed DOS/DOS-M HP 1331C Scope Driver, HP 22510, and also the HP 12555A/B Dual D/A Interface.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

014, I/O, GRAPHIC (continued)

22510A, DOS/DOS-M HP 1331C STORAGE SCOPE DRIVER (DVR47)

This DOS/DOS-M driver allows points to be output and erased on the HP 1331C Storage Scope. The driver does not work under interrupt, therefore, the number of points output should be kept small in order not to block higher priority devices. The contributed package HP 22509 is a set of subroutines designed to work with this driver. The only equipment required besides the scope is the HP 12555A/B interface.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium/Brussels

23900A, DOS STORAGE SCOPE DRIVER (DVR46, \$EX50)

This driver for a DOS or DOS-M system writes alphanumeric characters on a storage type oscilloscope or scan converter. It is called by a standard write request.

Hardware required is an HP 5661A Display Subsystem or an HP 1331C Storage Scope with remote erase capability and an HP 12555A D/A Interface card.

HP supported:
Medical Electronics Division

015, I/O, DISC/DRUM

20079A, 8K SIO DISC/DRUM DRIVER

Used by 8K computers, this SIO driver simulates magnetic tape unit operation by transferring data to or from a disc or drum memory unit. The routine overlays the core storage locations used by the 8K magnetic tape SIO driver; a magnetic tape unit therefore cannot be used when this routine is employed.

Equipment required is the Direct Memory Access option for the computer; and one HP 2770 or 2771 Disc Memory or one HP 2773, 2774, or 2775 Drum Memory. An interface kit and a power supply are required for the disc or drum memory.

Assembly language, absolute.

HP supported:
Data Systems Division

20081A, 16K SIO DISC/DRUM DRIVER

Used by 16K or larger computers, this SIO driver simulates magnetic tape unit operation by transferring data to or from a disc or drum. The routine overlays the core storage locations used by the 16K magnetic tape SIO driver; a magnetic tape unit therefore cannot be used when this routine is employed.

Equipment required is the Direct Memory Access option for the computer; and one HP 2770 or 2771 Disc Memory or one HP 2773, 2774, or 2775 Drum Memory. An inter-

face kit and a power supply are required for the disc or drum memory.

Assembly language, absolute.

HP supported:
Data Systems Division

20747C, RTE DISC/DRUM DRIVER (DVR30)

This RTE driver controls disc or drum I/O operations. Both system and user I/O requests are recognized.

Equipment required is the Direct Memory Access option for the computer; and one HP 2770 or 2771 Disc Memory or one HP 2773, 2774, or 2775 Drum Memory. An interface kit and a power supply are required for the disc or drum memory.

Assembly language, relocatable.

HP supported:
Data Systems Division

20995B, DOS DISC/DRUM DRIVER (DVR30)

This DOS driver controls disc or drum I/O operations. Both system and user I/O requests are recognized.

(continued)

015, I/O,DISC/DRUM (continued)

Equipment required is the Direct Memory Access option for the computer; and one HP 2770 or 2771 Disc Memory or one HP 2773, 2774, or 2775 Drum Memory. An interface kit and power supply are required for the disc or drum memory.

Assembly language, relocatable.

HP supported:
Data Systems Division

22063A, HP 2770A/2771A DISC DRIVER — FORTRAN CALLABLE

This driver controls disc I/O operations. The routine accepts separate floating-point track and sector addresses, and assembles them into complete address words.

Equipment required is the Direct Memory Access option for the computer, and one HP 2770 or 2771 Disc Memory with interface kit and power supply.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22111C, HP 2770A/2771A DISC DRIVER — BASIC CALLABLE

This driver controls disc I/O operations. The routine accepts separate floating-point track and sector addresses, and assembles them to form complete address words. The routine runs under the 20392 BASIC Operating System.

Equipment required is the Direct Memory Access option for the computer, and one HP 2770 or 2771 Disc Memory with interface kit and power supply.

Assembly Language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22216B, HP 2870A CARTRIDGE DISC DRIVER — BASIC CALLABLE

This driver, used with the HP 20392 BASIC Operating System, controls I/O operations with an HP 2870A Moving Head Disc Unit.

Equipment required is the Direct Memory Access option for the computer, and one HP 2870A Moving Head Disc Unit with interface kit, disc controller, power supply, and cabinet.

Assembly language, absolute.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22225B, HP 2870A CARTRIDGE DISC DRIVER — FORTRAN CALLABLE

This driver controls I/O operations with an HP 2870A Moving Head Disc Unit.

Equipment required is the Direct Memory Access option for the computer, and one HP 2870A Moving Head Disc Unit with interface kit, disc controller, power supply, and cabinet.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22233C, DOS-M PRIVILEGED DISC I/O ROUTINES

This program, used by the DOS-M Operating System, greatly improves the access time to user file data. Execution-time improvement of about 8 to 1 can be achieved. Error checking is performed to protect the data base. The program achieves its greatest usefulness in 8K computers.

Assembly language, relocatable.

Contributed:
David R. McClellan
HP, Southern Sales Region

22301A, HP 2870A CARTRIDGE DISC MEMORY DRIVER — FORTRAN CALLABLE

This FORTRAN callable driver accepts requests to perform read, write, initialize data, check data, clear, and status operations on the HP 2870A Cartridge Disc Memory in a BCS environment. The driver is written so as to permit concurrent I/O operations by utilizing the interrupt system. DMA channel assignments are dynamic, but I/O select codes are assigned at assembly time. The driver operates multiple drives on a single controller by accepting a physical unit number as a parameter in the calling sequence.

(continued)

015, I/O, DISC/DRUM (continued)

Assembly language, relocatable.

Contributed:

Dave McClellan
HP, Southern Sales Region

24156E, DOS-M HP 2870/7900/7901 DISC DRIVER (DVR31)

This DOS-M driver controls I/O operations with the HP 2870A Moving Head Disc Unit.

Equipment required is the Direct Memory Access option for the computer, and one HP 2870A Moving Head Disc Unit with interface kit, disc controller, power supply, and cabinet.

Assembly language, relocatable.

HP supported:
Data Systems Division

24226C, DOS-M HP 2883 DISC DRIVER (DVR31)

This DOS-M driver controls I/O operations with the HP 2883 Disc Memory.

Equipment required is one HP 2883 Disc Memory.

Assembly language, relocatable.

HP supported:
Data Systems Division

29013C, RTE HP 2870/7900 MOVING HEAD DISC DRIVER (DVR31)

This driver is used in the HP Real-Time Executive system to operate the HP 2870/7900 Moving Head Disc Driver.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

016, I/O, MAGNETIC TAPE

13021B, 8K SIO HP 7970 MAGNETIC TAPE DRIVER

Used by 8K computers, this SIO driver controls I/O operations for up to four HP 7970 9-Track Magnetic Tape Units.

Equipment required is HP 7970 Magnetic Tape drive and 13181 interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

13022B, 16K SIO HP 7970 MAGNETIC TAPE DRIVER

Used by 16K computers, this SIO driver controls I/O operations for up to four HP 7970 9-Track Magnetic Tape Units.

Equipment required is HP 7970 Magnetic Tape drive and 13181 interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

016, I/O, MAGNETIC TAPE (continued)

13023B, BCS MAGNETIC TAPE DRIVER

This BCS driver controls I/O operations for up to four HP 7970 Magnetic Tape Units.

Equipment required is one to four HP 7970 Magnetic Tape Units with interface kit. If the computer is of the HP 2114 series, or if the magnetic tape unit has the 45 inch-per-second option, the Direct Memory Access option for the computer is also required.

Assembly language, relocatable.

HP supported:
Data Systems Division

13024A, DOS HP 7970 MAGNETIC TAPE DRIVER (DVR23)

This DOS and DOS-M driver controls I/O operations for up to four HP 7970 Magnetic Tape Units.

Equipment required is one HP 7970 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

13025A, RTE HP 7970 MAGNETIC TAPE DRIVER (DVR 23)

This RTE driver controls I/O operations for one HP 7970 Magnetic Tape Unit.

Equipment required is one HP 7970 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

13026B, BCS 7-TRACK DRIVER WITHOUT DMA

This BCS driver controls I/O operations for up to four HP 7970 7-Track Magnetic Tape Units.

Equipment required is one-to-four HP 7970 7-track tape units with interface kit 13182A. Direct memory access is not available.

Assembly language, relocatable.

HP supported:
Data Systems Division

13027B, BCS MAGNETIC TAPE DRIVER 7-TRACK DMA

This BCS driver controls I/O operations for up to four HP 7970 7-Track Magnetic Tape Units.

Equipment required is one-to-four HP 7970 7-track tape units with interface kit 13182A. Direct memory access is required for tape speed greater than 37.5 ips.

Assembly language, relocatable.

HP supported:
Data Systems Division

13029B, 8K SIO MAGNETIC TAPE DRIVER 7-TRACK

Used by 8K computers, this SIO driver controls I/O operations for up to four HP 7970 Magnetic Tape Units.

Equipment required is one to four HP 7970 Magnetic Tape Units, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

13030B, 16K SIO MAGNETIC TAPE DRIVER 7-TRACK

Used by 16K computers, this SIO driver controls I/O operations for up to four HP 7970 Magnetic Tape Units.

Equipment required is one to four HP 7970 Magnetic Tape Units, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20007A, BCS INCREMENTAL MAGNETIC TAPE DRIVER (D.20)

This BCS driver controls I/O operations with a Kennedy 1406 or 1506 (write only) Incremental Magnetic Tape Transport.

Equipment required is one Kennedy 1406 or 1506 Incremental Magnetic Tape Transport, with HP 12537A interface kit.

(continued)

016, I/O, MAGNETIC TAPE (continued)

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20013F, BCS HP 2020 MAGNETIC TAPE DRIVER (D.21)

This BCS driver controls I/O operations with an HP 2020 Magnetic Tape Unit.

Equipment required is one HP 2020 Magnetic Tape Unit, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20022F, BCS HP 3030 MAGNETIC TAPE DRIVER (D.22)

This BCS driver controls I/O operations for an HP 3030 Magnetic Tape Unit.

Equipment required is one HP 3030 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

20314D, 8K SIO HP 2020 MAGNETIC TAPE DRIVER

Used by 8K computers, this SIO driver controls I/O operations for an HP 2020 Magnetic Tape Unit.

Equipment required is one HP 2020 Magnetic Tape Unit, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20315C, 4K SIO HP 2020 MAGNETIC TAPE DRIVER

Used by 4K computers, this SIO driver controls I/O operations with an HP 2020 Magnetic Tape Unit.

Equipment required is one HP 2020 Magnetic Tape Unit, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20321C, 16K SIO HP 2020 MAGNETIC TAPE DRIVER

Used by 16K or larger computers, this SIO driver controls I/O operations with an HP 2020 Magnetic Tape Unit.

Equipment required is one HP 2020 Magnetic Tape Unit, with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20331C, 8K SIO HP 3030 MAGNETIC TAPE DRIVER

Used by 8K computers of the HP 2115 or 2116 series, this SIO driver controls I/O operations with an HP 3030 Magnetic Tape Unit.

Equipment required is one HP 3030 Magnetic Tape Unit, with interface kit, and the Direct Memory Access option for the computer.

Assembly language, absolute.

HP supported:
Data Systems Division

20334C, 16K SIO HP 3030 MAGNETIC TAPE DRIVER

Used by 16K computers of the HP 2115 or 2116 series, this SIO driver controls I/O operations with an HP 3030 Magnetic Tape Unit.

Equipment required is one HP 3030 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, absolute.

HP supported:
Data Systems Division

20336B, 4K SIO HP 3030 MAGNETIC TAPE DRIVER

Used with 4K computers of the HP 2115 or 2116 series, this SIO driver controls I/O operations with an HP 3030 Magnetic Tape Unit.

(continued)

016,I/O, MAGNETIC TAPE (continued)

Equipment required is one HP 3030 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, absolute.

HP supported:
Data Systems Division

20806D, RTE HP 3030 MAGNETIC TAPE DRIVER (DVR22)

This RTE driver, used with computers of the HP 2115 or 2116 series, controls I/O operations with an HP 3030 Magnetic Tape Unit.

Equipment required is one HP 3030 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

20997C, DOS HP 3030 MAGNETIC TAPE DRIVER (DVR22)

This DOS and DOS-M driver, used with computers of the HP 2115 or 2116 series, controls I/O operations with an HP 3030 Magnetic Tape Unit.

Equipment required is one HP 3030 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

22100A, FILE THREE INPUT FOR MTS ALGOL

ALMAG is an absolute MTS program which allows the ALGOL compiler to use as its source Magnetic Tape File Three rather than a punched tape reader. This serves as an aid to program editing. The program overlays part of the photoreader driver, and for that reason imposes no added storage requirement.

Equipment required is one HP 2020, 3030, or 7970 Magnetic Tape Unit, with interface kit.

Assembly language, absolute.

Contributed:
James D. Reed
Hughes Aircraft Co.

22181A, RTE HP 2020 MAGNETIC TAPE DRIVER

This RTE driver controls I/O operations with the HP 2020 Magnetic Tape Unit. When writing on tape, the routine converts ASCII data to alphanumeric BCD form; the routine then records the BCD characters on tape with even parity. When reading tape, the routine acquires alphanumeric BCD characters with even parity, and converts the characters to ASCII. No provision is made for writing or reading without ASCII-BCD conversion.

Equipment required is one HP 2020 Magnetic Tape Unit with interface kit, and the Direct Memory Access option for the computer.

Assembly language, relocatable.

Contributed:
David F. Denman
HP, Eastern Sales Region

22208A, HP 3030G MAGNETIC TAPE DRIVER — FORTRAN CALLABLE

This FORTRAN callable driver controls I/O operations with the HP 3030G Magnetic Tape Unit. When reading records, the driver returns a word count to the calling program.

Assembly language, relocatable.

Contributed:
Steven A. Stark
HP, Eastern Sales Region

22239A, HP 7970 MAGNETIC TAPE DRIVER — BASIC CALLABLE

This driver performs three functions on the 7970 through separate CALLs from HP BASIC 20392A. One call performs a binary write of a given length on a particular magnetic tape unit, 0 through 3. The second call does a binary read and the third positions the tape, writes an EOF or an EOR gap.

Assembly language, absolute.

Contributed:
Michael Naughton
HP, Midwest Sales Region

016, I/O, MAGNETIC TAPE (continued)

22270C, ALGOL OPERATING SYSTEM FOR MTS

These two routines enable the ALGOL user to compile, load, and execute ALGOL programs entered through any standard device without having to punch object code on paper tape under MTS. If the source program is entered from a keyboard device using MTS overlay program ONLINE, then punching tape, marking cards, etc. can be eliminated entirely. By using switch register options, simultaneous compilation and source/assembly listings can be obtained. Loading and execution of the compiled program is accomplished through standard MTS directives.

Assembly language, absolute.

Contributed:
Henry Gibbs-Rogers
Computing, Etc.

22319A, DOS/DOS-M HP 2020 MAGNETIC TAPE DRIVER

This HP 2020 Magnetic Tape driver operates under a standard DOS or DOS-M system to handle input/output transfers and special control functions. All communication with the driver is through calls to EXEC. They are identical to HP 3030 calls except that binary transfer requests are rejected by the driver.

Assembly language, relocatable.

Contributed:
Dennis I. Smith
Montana State University

22414A, NON-DMA BCS HP 3030 DRIVER

This is a modified version of the HP 3030 BCS driver. It does not use DMA and it turns off the interrupt system during all data transfers. It allows the HP 3030 to be used in a BCS or MTS environment with the HP 2100. The driver initiates, continues, and completes any tape operations initiated through Input/Output Control, (.IOC.).

Assembly language, relocatable.

Contributed:
Larry L. Wear
HP, Neely Sales Region

22458B, DOS/DOS-M HP 7970 7-TRACK MAGNETIC TAPE DRIVER (DVR24) WITH DMA

This DOS and DOS-M driver controls I/O operations for up

to four HP 7970 7-track magnetic tape units using DMA. Equipment required is one HP 7970 7-track magnetic tape unit with interface kit and the Direct Memory Access option for the minimum DOS-M system.

Assembly language, relocatable.

Contributed:
Al Walthers
HP, Data Systems Division

22461A, FILE AND REWIND FOR THE TENNECOMP TP-1371 MINIDEK SYSTEM

These Fortran-callable subroutines allow a program to dump an array from memory onto a magnetic tape cassette or to read from magnetic tape cassette into an array in memory. It requires a minimum BCS System with a Tennencomp TP-1371 Minidek System.

Assembly language, relocatable.

Contributed:
Norman Love
Maryville College

22462A, READ/WRITE ROUTINES FOR THE TENNECOMP TP-1371 MINIDEK SYSTEM

These BASIC-callable subroutines allow a user to store and retrieve data from a magnetic tape cassette. The user has control of how much memory is used, which track on the tape and which transport are used, and whether the function is read or write.

The following are required:

HP computer with Educational BASIC version HP 24160A, and Tennencomp TP-1371 Minidek System.

Assembly language, absolute.

Contributed:
Norman D. Love
Maryville College

22512A, DOS-M DRIVER PACKAGE FOR ACCESSING FRONT-END MAGNETIC TAPE

This package allows a DOS-M main computer to access a magnetic tape attached to a 16K front-end computer. The package consists of two drivers which communicate via the standard Hewlett-Packard interconnect link. One of the drivers is the DOS-M driver DVR21. It is invoked either by an EXEC subroutine call or by a console command to

(continued)

016, I/O, MAGNETIC TAPE (continued)

perform an I/O operation on the front-end magnetic tape. The second driver operates in the front-end computer and interfaces with the BCS magnetic tape driver.

Assembly language, relocatable.

Contributed:
Dave Mackie
HP, Data System Division

24304A, 12K SIO HP 3030 MAGNETIC TAPE DRIVER

This SIO driver operates an HP 3030 Magnetic Tape Unit in 12K systems.

Assembly language, absolute.

HP supported:
Data Systems Division

24312A, 12K SIO HP 7970 MAGNETIC TAPE DRIVER

Used by 12K computers, this SIO driver controls I/O operations for up to four HP 7970 Magnetic Tape Units.

Assembly language, absolute.

HP supported:
Data Systems Division

017, LOADERS

20001D, 4K BCS RELOCATING LOADER

Used by 4K computers, this BCS loader reads relocatable binary programs from punched tape. The address portion of each memory reference instruction and each jump instruction is converted to an absolute address, and page linkages are established. All instructions are placed in core storage at addresses assigned by the loader. The loader will not operate on binary programs derived from ALGOL.

Assembly language, relocatable.

HP supported:
Data Systems Division

20018H, BCS RELOCATING LOADER

Used by 8K or larger computers, this BCS loader reads relocatable binary programs from punched tape or magnetic tape. The address portion of each memory reference instruction and each jump instruction is converted to an absolute address, and page linkages are established. All instructions are placed in core storage at addresses assigned by the loader.

Assembly language, relocatable.

HP supported:
Data Systems Division

20925C, DOS RELOCATING LOADER

This DOS loader, used only by computers of the 2116 series, reads relocatable binary programs from punched

tape, magnetic tape, or disc. The input can also be provided by a compiler or assembler. The address portion of each memory reference instruction and each jump instruction is converted to an absolute address, and page linkages are established. All instructions are placed on the disc at addresses assigned by the loader.

Assembly language, relocatable.

HP supported:
Data Systems Division

22009B, BOOTSTRAP LOADER GENERATOR

This program produces a punched tape containing computer instructions constituting either a basic binary loader or a basic binary disc loader. Also furnished by the program is a typed set of instructions for using the tape produced. By employing a bootstrap bootstrap, consisting of 11 instructions entered through the switch register, the bootstrap loader tape can be read into the required positions of core storage. Bootstrap loader tapes can be produced for any core storage capacity used in HP computers.

Assembly language, absolute.

Contributed.

22223C, LOADER BOOTSTRAP

This program provides a simple method of entering a basic binary loader or a basic binary disc loader. First, twelve instructions are entered into the switch register. These instructions indicate the configuration of the computer

(continued)

017, LOADERS (continued)

system, and also serve as a driver for acquiring the bootstrap tape. After the tape has been read, the basic binary loader or basic binary disc loader is ready for use in memory. The program includes preparation of a check sum to detect tape reader errors. A test of the loader protect switch is also made.

Assembly language, absolute.

Contributed:

Fritz Joern
HP, Germany/Frankfurt

22297A, OFFLINE RELOCATING LOADER

This relocating loader program runs in a minimum 4K SIO system; it accepts as input relocatable object programs produced by the assembler or compilers and produces as output an absolute binary tape (with external references resolved) for any other specified target computer with memory up to 32K. Lower and upper base page, memory, and upper common bounds may be specified on the teletype at RUN time, and are independent of the executing machine size.

The programmer who normally codes in absolute assembly language and does his own I/O or uses an SIO system will find this offline loader useful. He can code in relocatable format in a page free manner, since the loader will establish his base page linkages. Note, however, that neither the formatter nor .IOC. are contained within this "loader", but they can be loaded, relocated, and linked by the offline loader to produce a complete program. Relocated programs can even be made to work in an SIO environment by substituting OCT 114102 for JSB 102B,I (for example). A FORTRAN program which does I/O without the formatter can thus gain 1 to 1-1/2 K of core space.

Assembly language, absolute.

Contributed:

Don Mactaggart
Canadian Marconi Co.

22342A, DOS-M "HARDWARE" BOOT

This program allows the user to boot up a DOS-M system with an HP 2870 or HP 7900 disc from the hardware protected area of memory. Thus, there is no need to load in the normal paper tape boot. (The paper tape BBL is of course destroyed.)

Assembly language, absolute.

Contributed:

Jerry W. Allen
HP, Neely Sales Region

22344A, "ON-LINE" SYSTEM LOAD FOR MOVING-HEAD RTE

This program allows the user to start up a Moving-Head RTE System from another RTE System (with a Fixed-Head or Moving-Head Disc) within the same hardware configuration without halting the computer and loading a paper tape bootstrap. The I/O channels of the Moving-Head Disc, the subchannel number and the starting track number of the system to be started are specified in the program directive. A typical directive might be "ON,RTEM,22,1,100".

Assembly language, relocatable.

Contributed:

Roland E. Jahn
HP, Medical Electronics Division

22345A, "ON-LINE" MOVING-HEAD RTE BOOTSTRAP FROM DOS-M OR DOS

This program allows the user to start up a Moving-Head RTE System from a DOS or DOS-M System within the same hardware configuration without halting the computer and loading a paper tape bootstrap. The I/O Channels of the Moving-Head Disc, the subchannel number and the starting track number of the system to be started are specified in the program directive. A typical directive might be ":PR,RTEM,22,1,100".

Assembly language, relocatable.

Contributed:

Roland E. Jahn
HP, Medical Electronics Division

22349A, DOS-M BOOTSTRAP PROGRAM FOR DOS-M OR DOS

This program allows the user to start up a DOS-M System from another DOS-M or DOS System within the same hardware configuration without halting the computer and loading a paper tape bootstrap. The I/O channels of the Moving-Head Disc and the subchannel number are specified in the program directive. A typical directive might be ":PR,DOSM,22,1".

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017, LOADERS (continued)

This program works in a system with or without memory protect.

Assembly language, relocatable.

Contributed:
Roland E. Jahn
HP, Medical Electronics Division

22350A, DOS-M BOOTSTRAP PROGRAM FROM RTE

This program allows the user to start up a DOS-M System from an RTE System (with a Fixed-Head or Moving-Head Disc) within the same hardware configuration without halting the computer and loading a paper tape bootstrap. The I/O channels of the Moving-Head Disc and the sub-channel number are specified in the program directive. A typical directive might be: "ON,DOSM,22,1".

Assembly language, relocatable.

Contributed:
Roland E. Jahn
HP, Medical Electronics Division

22357A, MTS BOOT FROM DOS-M

This program allows a user in the DOS-M environment to boot in the magnetic tape system. Thus, with the DOS-M boot program on magnetic tape he can then switch back to DOS-M. The end result being the elimination of loading paper tape boots and a much smoother operator procedure. Requires 16K core memory (but may be modified for 8K), and HP 22354, DOS-M Store Absolutes.

Assembly language, relocatable.

Contributed:
Jerry W. Allen
HP, Neely Sales Region

22448B, CORE RESIDENT DOS-M BOOTSTRAP

This program will install in memory a combination paper tape/disc loader for an HP 7900/7901 or HP 2870 DOS-M system, thus eliminating the need for the paper tape DOS-M bootstrap. Once in core, it will bring up sub-channels 0-7 of a DOS-M system.

FORTTRAN II/Assembly language, relocatable.

Contributed:
Doug Baskins
HP, Eastern Sales Region

22488A, DOS-M ABSOLUTE BINARY TAPE LOADER

This set of programs, operating as a user program under DOS-M, enables the user to perform the following two operations: store absolute binary tapes in DOS-M user files of type B and load programs from these files into core. The package requires an HP 7900 Disc.

FORTTRAN II/Assembly language, relocatable.

Contributed:
Francois Gaullier
HP, France/Orsay

22519A, DOS-M AUTOLOAD ROUTINE

If run directly before turning off the computer, this program allows an automatic restart of a DOS-M system. The program stores a bootstrap in core from location 17663 to 17076, and it also stores a start instruction in the power fail trap cell. It then executes a halt. When power is restored to the computer, the system will automatically be reloaded once the disc (HP 2870 or HP 7900) is ready. If power fail hardware is not present, the bootstrap can be manually started.

Assembly language, relocatable.

Contributed:
R. J. Rowlands
CSIRO Division of Protein Chemistry

22533A, RESTORE BASIC BINARY LOADER (PBOOT)

Operating in a DOS-M environment, this program, PBOOT, installs the HP standard Basic Binary Loader in protected core. It is particularly useful as a complement to HP 22448, Core Resident DOS-M Bootstrap, which installs a DOS-M bootstrap in protected core. Once a system is brought up with the core resident bootstrap, PBOOT easily restores protected core with the standard paper tape loader.

Assembly language, relocatable.

Contributed:
H. F. Letts
HP, Southern Sales Region

24155D, DOS-M RELOCATING LOADER

This DOS-M loader reads from punched tape, magnetic tape, or disc, programs which have been provided by a DOS, DOS-M, or RTE compiler or assembler. The address portion of each memory reference instruction and each jump instruction is converted to an absolute address, and

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017, LOADERS (continued)

page linkages are established. All instructions are placed on the disc at addresses assigned by the loader. This program cannot be used by the HP 2115A Computer.

Assembly language, relocatable.

HP supported:
Data Systems Division

29022A, RTE RELOCATING LOADER

This RTE loader, used only by computers of the HP 2116 series, reads relocatable binary programs from punched tape, magnetic tape, or disc. The input can also be provided by

a compiler or assembler. The address portion of each memory reference instruction and each jump instruction is converted to an absolute address, and page linkages are established. All instructions are placed in core storage or on the disc at addresses assigned by the loader.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

018, TRANSLATORS LANGUAGE

20392B, BASIC SYSTEM

This software product is an operating system intended for user programs written in BASIC language. The operating system consists of a BASIC language interpreter, together with additional program modules to permit independent operation. The only I/O device used is one teleprinter; this machine can read or punch paper tape and provide keyboard inputs and printed outputs.

User programs written for this operating system can perform any function within the capabilities of BASIC language, the amount of core storage available, and the I/O device employed. BASIC, the programming language used, was developed by Dartmouth College as an easy-to-learn programming tool intended for nonprofessional computer programmers. BASIC is conversational in nature, and requires only a knowledge of the English language and an understanding of the decimal numbering system. A person can become completely familiar with BASIC after six hours of instruction, and can write simple programs in an hour. While easy to learn, the version of BASIC used can perform such mathematically sophisticated tasks as matrix dimensioning and manipulation. Full information on BASIC language is provided in the publication *HP BASIC* (HP order no. 02116-9077).

This operating system differs from the Educational BASIC System (software product 24160, A018) only in that no punched card/mark sense card reader is used.

Equipment required is 8K of core storage.

Assembly language, absolute.

HP supported:
Data Systems Division

20548A, FORTRAN COMPILER

Using SIO drivers, this compiler converts FORTRAN II source programs to relocatable binary form for execution under the BCS Operating System. An assembly language listing is produced, if desired.

Assembly language, absolute

HP supported:
Data Systems Division

20549A, 4K FORTRAN COMPILER

Intended for 4K computers and using SIO drivers, this compiler converts FORTRAN II source programs to relocatable binary form for execution under the BCS Operating System. An assembly language listing is also produced.

Assembly language, absolute.

HP supported:
Data Systems Division

018, TRANSLATORS LANGUAGE (continued)

20598C, DOS ASSEMBLER

Used by the DOS Operating System, this assembler converts assembly-language source programs to relocatable or absolute binary form. The relocatable binary programs run under the DOS, DOS-M, RTE, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

20599C, DOS FORTRAN

Used by the DOS Operating System, this compiler converts FORTRAN II source programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the DOS, DOS-M, RTE, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

20874D, RTE ASSEMBLER

Used by the RTE Operating System, this assembler converts assembly-language source programs to relocatable or absolute binary form. The relocatable binary programs run either under the DOS, DOS-M, RTE, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

20875E, RTE FORTRAN

Used by the RTE Operating System, this compiler converts FORTRAN II source programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the RTE, DOS, DOS-M, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

22013B, INVERSE ASSEMBLER

This program accepts an absolute binary program tape and creates from it an assembly language listing. When the Inverse Assembler is used, the normal photoreader driver is

replaced by an equivalent of the basic binary loader.

Assembly language, relocatable.

Contributed:
J. D. Sankey
Canadian National Research Council

22065A, FORTRAN TRANSLATOR, IBM 1800 TO HP FORTRAN II

This translator is designed to assist in changing IBM FORTRAN IV programs to HP FORTRAN II or IV. The translator produces a line-by-line translation of HP IBM 1800 FORTRAN programs. The translator operates with punched tape input and output media; magnetic tape or punched card output can be provided with minor program modifications.

Assembly language, relocatable.

Contributed:
Jim Fearnside
HP, Medical Electronics Division

22201D, PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM

This program system is an interpreter which allows up to eight users to simultaneously employ the facilities of a large subset of HP 20392 BASIC Operating System. As well as permitting multiple-user access, other differences from the HP 20392 program system are as follows:

- a. No matrix statements.
- b. No WAIT statements.
- c. No BYE statements.
- d. GOSUB's may be nested to any depth.
- e. Syntax error typeouts have no line numbers.

No log-on or log-off procedures are required, and no identity codes are used. Allocation of available core storage can be made to each user at the time of system configuration.

(continued)

018, TRANSLATORS LANGUAGE (continued)

Equipment required is 8K of storage.

Assembly language, absolute.

Contributed:

Dowell Martz and William Tyler
Department of Physics
Pacific Union College

22255D, MSU MULTI-TERMINAL HP BASIC SYSTEM WITH CARD READER CAPABILITY

This multi-terminal HP BASIC system with card reader capability is an expandable low cost "time-share" system requiring an HP 2116B computer with 16K, two to five teleprinters with interface, and a time base generator. The optional card reader (HP 2761-007 Mark-Sense Card Reader for Educational Basic) can be used for input on one of the four user ports.

The system provides 8500 words of memory which can be divided among the four users, automatic logging and accounting of users for unattended operation, and a message command for signalling the computer operator. User code words for sign-on prevent unauthorized use. A RENUMBER command resequences statements, a PTAPE command loads user-developed or system library programs from the photoreader, CALL and WAIT statements are deleted, and all other user commands are identical to those of HP single-terminal BASIC, 20392.

Assembly language, absolute.

Contributed:

N. K. Shrauger
Montana State University

22261A, MINI-BASIC

Subroutine "Long" modifies HP BASIC to allow longer user programs than are normally possible. In addition to deleting Matrix Operations, the SQR, SIN, COS, TAN, and ATN functions are deleted. The remaining library is moved to other locations. The result is a gain of 1050B words available for the User's program over the Matrix deleted version, which is itself a gain over Standard BASIC of 1353B words.

Subroutine "Long" modifies the Syntax Analyzer so that the deleted functions produce error messages if their use is attempted. Square Roots may be found by using the " \uparrow .5" method instead of "SQR".

While Subroutine "Long" may be used with any 8K or longer memory, the greatest value is to the 8K size, where the percentage of User's Program Space gained is the most significant.

Assembly language, absolute.

Contributed:

Roy Jacobus
Westinghouse Electric Corporation

22292B, ABSOLUTE OBJECT DECODER

DECODE is a two-pass ALGOL program designed to produce a pseudo-source listing and/or tape complete with labels; the tape would assemble back to the original absolute. The inverse assembly would be relatively easy to edit into a functional equivalent of the original source. The generation of DEF, ABS, DEC, DEX, BSS, and OCT are not within the scope of this program.

ALGOL/Assembly language, relocatable.

Contributed:

Herb Shear / Ed Doust
HP, Scientific Instruments Division

22295A, BCS INTERPRETER FOR FLOATING POINT OPERATIONS

The interpreter achieves significant core savings for floating point operations at the expense of execution time by replacing all floating point library routines. Under BCS it accepts binary output from the special assembler included in this package which translates the seven additional opcodes required for interpretive floating point arithmetic. The special assembler is an unconfigured absolute binary tape which will operate in a 4K memory. The interpreter is of particular value to users with a minimum configuration.

Assembly language, relocatable.

Contributed:

Michel Virard
Canadian Marconi Company

22326A, DOS-M RELOCATABLE BASIC

Relocatable BASIC for DOS-M is essentially equivalent to Hewlett-Packard's single terminal BASIC system, HP 20392A. Two additional commands have been added to this version; PUNCH for high-speed punch output, and PLIST for line printer output. "LIST" generates output to a teleprinter or CRT. This version is non-EAU and cannot access the disc to SAVE user programs or data files.

(continued)

018, TRANSLATORS LANGUAGE (continued)

Equipment required includes a 16K DOS-M, and optionally, an HP 2767 line printer.

Assembly language, relocatable.

Contributed:

Eugene Dement
Martin-Marietta Corporation

22327E, SNOBOL COMPILER FOR DOS/DOS-M

SNOBOL is a language translator designed for the manipulation of strings. Features of the language include symbolic naming of strings and pattern-matching. In addition to a basic set of primitive string valued functions, the system includes the facility for defining functions. These defined functions facilitate the programming recursive procedures.

Hewlett-Packard France SNOBOL extends the capabilities of SNOBOL3; decimal numbers of unlimited precision are allowed, and arithmetic expressions without parentheses are evaluated according to a hierarchy of operations. Dynamic allocation of the number of decimal digits to represent a number make it a practical business language.

Other applications of Hewlett-Packard France SNOBOL include typesetting, formatting, editing, searching, symbolic mathematics, text preparation, natural language translation, linguistics, and music analysis.

Assembly language, relocatable.

Contributed:

Paul Gavarini/Francois Gaullier/Francoise Mons
HP, France/Orsay

22385A, SYMBOLIC MARCO ASSEMBLER FOR THE HP 2100

This is a symbolic assembler with macro-instructions, generalized literals, extended inter-program linkage, and numerous other useful additions; it is intended to serve as a replacement for existing HP assembly programs. The source language is similar but not identical to that of the standard assembler. It may be assembled using the standard HP assembler.

This assembler functions in a standard SIO environment and requires 8K core.

Assembly language, absolute.

Contributed:

Robert A. Saunders
HP, Automatic Measurement Division

22389A, DOS-M EAU RELOCATABLE BASIC

Relocatable BASIC for DOS-M is essentially equivalent to Hewlett-Packard's single terminal BASIC system, HP 20392A. Two additional commands have been added to this version; PUNCH for high-speed punch output, and PLIST for line printer output. "LIST" generates output to a teleprinter or CRT. This version is EAU and cannot access the disc to SAVE user programs or data files.

A format for adding assembly language subroutines to be referenced by a CALL is included in this documentation.

Assembly language, relocatable.

Contributed:

Eugene Dement
Martin-Marietta Corporation

22396A, AN HP ASSEMBLER FOR THE IBM 360

HPA is a two pass assembler for the HP 2100 symbolic assembly language. It is written in IBM 360 assembly language for execution on the IBM System 360/67 under OS/360. HPA runs in a batch processing mode and can be used to obtain listings, error messages, cross reference tables, and object code for loading into the HP 2100 series computers. The program produces a binary output file to magnetic tape, disc, punched cards, paper tape, or any standard IBM output device.

360 Assembly language.

Contributed:

Dr. Harold Stone/James Peterson / Ed Porter
Stanford University

22415B, DOS ABSOLUTE OBJECT DECODER

DOS Absolute Object Decoder is a DOS version of HP 22292 BCS Absolute Object Decoder. It is an ALGOL program designed to produce a pseudo-source from an absolute binary tape, complete with labels, which will assemble back to the original absolute. Such a tape would be relatively easy to decipher and edit into a functional equivalent of the original source.

Decoding is by word comparison with the consolidated coding sheet. A programmer may generate a binary word by any of several methods, depending on his purpose. DCODE tries to convert to machine instructions if possible, otherwise to an OCT constant. The generation of DEF,

(continued)

018, TRANSLATORS LANGUAGE (continued)

ABS, ASC, DEC, DEX and BSS pseudo instructions, expression operands and OCT other than by default are not within the scope of this program.

ALGOL

Contributed:
Karl Helness
HP, Data Systems Division

22417B, SUPER BASIC FOR DOS-M

Super BASIC for DOS-M is essentially equivalent to Hewlett-Packard's single terminal BASIC system HP 20392A. Some important differences include three (3) additional commands: PUNCH for high-speed punch tape output, PLIST for line printer output, and LOAD for inputting user programs from DOS-M source files. This program uses the disc work area for temporary storage allowing a total user program and array storage of 32K words. Switch register control output, terminate execution, and delete REMARK statements. Statement numbers range from 1 to 32767. GOTO and GOSUB statements may be followed by arithmetic expressions or line numbers. Requires 8K or 16K DOS-M with EAU.

Assembly language, relocatable.

Contributed:
Joel Rubenstein
Martin Marietta Corporation

22438A, DOS-M RELOCATABLE REVERSE ASSEMBLER

This program will reverse assemble (produce an Assembly-type listing) from relocatable object code located in disc files, the JBIN area of the disc, the disc-resident library, magnetic tape, or paper tape. The relocatable object code may have been produced by either the assembler or a compiler using a DOS-M system.

Assembly language, relocatable.

Contributed:
Dennis I. Smith
Montana State University

22439A, 8K SIO RELOCATABLE REVERSE ASSEMBLER

This program will reverse assemble (produce an Assembly-type listing) from relocatable object code located on paper tape. The relocatable object code may have been produced by either the assembler or a compiler.

Assembly language, absolute.

Contributed:
Dennis I. Smith
Montana State University

22440A, 8K SIO ABSOLUTE REVERSE ASSEMBLER

This program will reverse assemble (produce an Assembly-type listing) from absolute object code located on paper tape. The absolute object code may have been produced by either the assembler or the BCS relocating loader.

Assembly language, absolute.

Contributed:
Dennis I. Smith
Montana State University

22443A, DOS/RTE ALGOL COMPILER

This package provides the user with a modified HP 24129 ALGOL compiler. The modification outputs a more readable object code listing than the unmodified ALGOL compiler. For any given operating system the ALGOL compiler requires at least 8K more core than the minimum for that system. Thus, the code for object listing is minimized. For users with more core, this version of the compiler will give a pseudo-assembly language formatted object code listing.

Assembly language, relocatable.

Contributed:
Larry Byler
HP, Data Systems Division

22449A, TYPE 3 LANGUAGE GENERATOR

This absolute assembly program generates Type 3 Languages (also known as "regular languages") from the set of productions (the grammar) entered by the user. The Type 3 Languages are the simplest of the four classes of formal languages established by Noam Chomsky. Most programming languages, for example, are the next level up in complexity: the Type 2, or "context-free" languages. A "language" here means a "set of strings." Among the Type 3 Languages that can be generated with this program are the number systems up to base 7 and some of the subsets of the set of well-formed (in the algebraic sense) parentheses. The program was originally designed as an educational aid, namely, to check the answers to problems in which students are asked to find a grammar that will generate a given set of strings. It also includes the capability for

(continued)

018, TRANSLATORS LANGUAGE (Continued)

substituting English words for terminals, and thus permits generation of sets of simple English sentences.

This self-contained program requires 16K of core and a teletype.

Assembly language, absolute.

Contributed:
Peter Schorer
HP, Santa Clara Division

22476A, MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC 20392A

This package consists of ten BASIC callable subroutines which operate under a modified version of the 20392A BASIC system. The subroutines are written in assembly language and provide such capabilities as run-time byte-, integer-, and string-manipulations, ASCII data input, table read-in and look-up, and calls to a subset of machine instructions.

The functions accessible at run-time include:

1. A structured table of ASCII-strings, integers, and reals can be established in common.
2. A string of bytes can be moved from anywhere in core to the array or common area in BASIC.
3. Numbers can be fixed or floated.
4. Memory reference instructions can be applied to two integers in a BASIC variable.

A set of verification programs in BASIC accompany this package. Of general interest is a program for converting a BASIC source tape into a foldable tape and a program for listing core contents at run time.

Equipment required is an HP BASIC system version 20392A with 8K of core storage, a teleprinter, and for complete capabilities, a photoreader.

Assembly language, absolute.

Contributed:
Dr. J. Schrama
Central Laboratory D.S.M.

22494A, HAVERING EDUCATIONAL BASIC FOR DOS-M

HAVERING BASIC for DOS-M is essentially equivalent to Hewlett-Packard's single terminal Educational Basic System HP 24160. Some important differences include two (2) additional commands: BYE terminates the use of BASIC

and returns the user to DOS-M, REN renumbers the user's program. Two (2) additional statements have been introduced: PTAPE is used in the same way as INPUT but the paper tape reader is used instead of the teletype, PUNCH is used in the same way as PRINT but produces paper tape output. There are also three (3) additional Matrix input/output statements: MAT PUNCH punches a copy of a matrix, MAT INPUT and MAT PTAPE read a matrix from the teletype and paper tape reader respectively. The commands GET, SAVE and KILL provide facilities for keeping a program library on disc in DOS-M ASCII data files.

Assembly language, relocatable.

Contributed:
W. R. Broderick
London Borough of Havering, England

22529A, INTEL 8008 ASSEMBLER FOR HP 2100

This program, ASMI, runs on an HP 2100 series computer and assembles INTEL 8008 micro-computer source code. It is a two-pass assembler which will run in a DOS-M, RTE, or BCS environment. An 8K computer is required for BCS, 12K for DOS-M.

The input to ASMI is a paper tape source containing symbolic language instructions. The output is a line printer (or teletype) listing of the symbol table, the code generated by the assembler, and the source code. It would be easy to modify the program to punch the output code in INTEL "BNPF" format.

ALGOL

Contributed:
Glen Worstell
HP, Loveland

24031B, EXTENDED ASSEMBLER, NON-EAU

Using SIO drivers, this assembler converts assembly-language source programs to relocatable or absolute binary form for execution by non-EAU computers. The translation is extended to include recognition of literals, to provide a listing of control commands, and to handle conditional or repeated source statements. The programs produced run under the BCS Operating System.

Equipment required is 8K of core storage.

Assembly language, absolute.

HP supported:
Data Systems Division

018, TRANSLATORS LANGUAGE (continued)

24032B, EXTENDED ASSEMBLER, EAU

Using SIO drivers, this assembler converts assembly-language programs to relocatable or absolute binary form for execution by EAU-equipped computers. The translation is extended to include recognition of literals, to provide a listing of control commands, and to handle conditional or repeated source statements. The programs produced run under the BCS Operating System.

Equipment required is 8K of core storage.

Assembly language, absolute.

HP supported:
Data Systems Division

24038B, 4K ASSEMBLER, NON-EAU

Intended for 4K computers and using SIO drivers, this assembler converts assembly-language programs to relocatable or absolute binary form for execution by non-EAU computers. The programs produced run under the BCS Operating System.

Assembly language, absolute.

HP supported:
Data Systems Division

24039B, 4K ASSEMBLER, EAU

Intended for 4K computers and using SIO drivers, this assembler converts assembly-language programs to relocatable or absolute binary form for execution by EAU-equipped computers. The programs produced run under the BCS Operating System.

Assembly language, absolute.

HP supported:
Data Systems Division

24044B, ALGOL COMPILER

Using SIO drivers, this compiler converts ALGOL programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the BCS Operating System.

Equipment required is 8K of core storage.

Assembly language, absolute.

HP supported:
Data Systems Division

24129B, RTE/DOS ALGOL COMPILER

Used by the RTE, DOS, and DOS-M Operating Systems, this compiler converts ALGOL programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the DOS, DOS-M, RTE, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

24158B, DOS-M ASSEMBLER

Used by the DOS-M Operating System, this assembler converts assembly-language programs to relocatable or absolute binary form. The relocatable binary programs run under the DOS-M, DOS, RTE, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

24159B, DOS-M FORTRAN

Used by the DOS-M Operating System, this compiler converts FORTRAN II programs to relocatable binary form. An assembly language listing is also produced. The programs produced run under the DOS-M, DOS, RTE, or BCS Operating system.

Assembly language, relocatable.

HP supported:
Data Systems Division

24160A, EDUCATIONAL BASIC SYSTEM

This software product is an operating system intended for user programs written in BASIC language. The operating system consists of a BASIC language interpreter together with additional program modules to permit independent operation. Two I/O devices are used — a teleprinter and a punched card/mark sense card reader. As well as furnishing printed outputs and a means for keyboard inputs, the teleprinter can punch or read paper tape.

(continued)

018, TRANSLATORS LANGUAGE (Continued)

User programs written for this operating system can perform any function within the capabilities of BASIC language, the amount of core storage available, and the I/O devices employed. BASIC, the programming language used, was developed by Dartmouth College as an easy-to-learn programming tool intended for nonprofessional computer programmers. BASIC is conversational in nature, and requires only a knowledge of the English language and an understanding of the decimal numbering system. A person can become completely familiar with BASIC after six hours of instruction, and can write simple programs in an hour. While easy to learn, the version of BASIC used can perform such mathematically sophisticated tasks as matrix dimensioning and manipulation. Full information on BASIC language is provided in the publication *HP BASIC* (HP order no. 02116-9077).

The Educational BASIC system is intended primarily for classroom instruction, although programs may be written for this operating system to permit a wide variety of other uses. In classroom use, the operating system can be employed in courses ranging from simple arithmetic to such college level subjects as geophysics, econometrics, differential equations, and comparative sociology. Students' programs are usually entered into the computer from mark sense cards; this eliminates the queuing at the teleprinter which has been a disadvantageous feature of other classroom computer systems. An additional advantage is that the mark sense cards can be prepared as homework assignments, and entered into the computer at the next classroom session.

As well as executing student programs, the operating system can be used to provide a printout of student grades. Classroom assignment tasks and other functions pertaining to the educational field also are possible.

This operating system differs from the BASIC System (software product 20392, A018) only in that it uses a punched card/mark sense card reader.

Equipment required is 8K of core storage, and one HP 2761A-007/008 Optical Mark Reader with interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24170C, RTE/DOS FORTRAN IV COMPILER

Used by the RTE, DOS, and DOS-M Operating System, this compiler converts FORTRAN IV programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the RTE, DOS, DOS-M, or BCS Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

24177B, RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)

Used by the RTE, DOS, and DOS-M Operating System, this compiler converts FORTRAN IV programs to relocatable binary form. An assembly language listing is also provided. The programs produced run under the RTE, DOS, DOS-M, or BCS Operating System. The compiler demonstrates a decided increase in speed over program 24170. However, program 24177 requires 10K of core storage, and thus cannot be used by computers with small core-storage capacity. Features of program 24177 include a source program listing with page headings and line numbers, and a symbol listing which includes the name, address, type, usage, and location (local, common, dummy, or external) of all source-program symbols.

Assembly language, relocatable.

HP supported:
Data Systems Division

24246A, EXTENDED ASSEMBLER FLOATING POINT

Using SIO drivers, this assembler converts assembly-language source programs to relocatable or absolute binary form for execution by HP 2100 computers equipped with floating point hardware. The translation is extended to include recognition of literals, to provide a listing of control commands and to handle conditional or repeated source statements. The programs produced run under BCS control.

Assembly language, relocatable

HP Supported:
Data Systems Division

24247A, 4K ASSEMBLER FLOATING POINT

This assembler, using SIO drivers, converts assembly-language source programs to relocatable or absolute binary form for execution by HP 2100 computers with the floating-point option. The programs produced run under BCS control.

Assembly language, relocatable.

HP supported:
Data Systems Division

018, TRANSLATORS LANGUAGE (continued)

24279A, BCS HP 2100 MICRO ASSEMBLER

This program converts symbolic microcode for the HP 2100 Computer into microprocessor binary code. A program listing with a symbol table and a binary tape is produced

during assembly. The source is Algol.

ALGOL

HP supported:
Data Systems Division

019, EXTERNAL INTERRUPT PROCESSING

22235A, FORTRAN POWER FAIL LINK

This routine is a relocatable function which, when called links the power-fail restart interrupt to a FORTRAN program. This permits the program to be restarted without manipulation of panel controls. Simplified restart is extremely useful when a computer without high-speed I/O devices is used by untrained personnel.

Equipment required is the power failure auto-restart option for the computer.

Assembly language, relocatable.

Contributed:
Stroud Custer
HP, Eastern Sales Region

020, REAL TIME SYSTEM

22401A, RTE SELF SUSPEND ROUTINE

This routine allows a user to "program" a Suspend for a specified length of time in his applications program. If the calling routine was in the time list before suspension, it will be reinstated and rescheduled in the time list.

Assembly language, relocatable.

Contributed:
J.O. Askew
American Telephone & Telegraph Co.

Equipment required includes the BCS with 8K of core storage, a teletype, HP 12539A Time Base Generator, HP 12551B Relay Register Interface, and HP 2761 Mark Sense Card Reader.

FORTRAN II/Assembly language, relocatable.

Contributed:
Ted Slater
Simon Fraser University

22451A, RELAY TIMER FOR HP 12551B RELAY REGISTER INTERFACE

This package provides a method for controlling the time duration for each of a set of relay register contact closure configurations for the HP 12551B Relay Register Interface. Duration times are specified through sets of execution control parameters and measured using an HP 12539A Time Base Generator Interface (TBG). The contributed program titled MTS/BCS System Absolute Dump (HP 22257) is used by this package.

29016D, REAL TIME EXECUTIVE OPERATING SYSTEM

The Real-Time Executive (RTE) Operating System uses multiprogramming and priorities to schedule real-time and background programs that can be core-resident or disc-resident. RTE controls all I/O and interrupt processing, with the exception of special privileged interrupts, which can circumvent RTE for exceptionally rapid response.

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020, REAL TIME SYSTEM (continued)

Full information on the RTE Operating System is given in the publication *Real-Time Executive Software System* (02005-90002).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

021, SYSTEM LIBRARIES

20201C, BCS PLOTTER LIBRARY

Used by the BCS Operating System, these FORTRAN-callable routines perform the following functions, and display the results on a Calcomp Model 565 Plotter:

- a. Scale Cartesian coordinates to a specified graph size.
- b. Generate scaled X and Y axes for the graph.
- c. Generate a curve for the graph, with symbols or data points marked.

Equipment required is one Calcomp Model 565 Digital Incremental Plotter, with interface kit.

Assembly language, relocatable.

HP supported:
Data Systems Division

20810B, RTE/DOS PLOTTER LIBRARY

Used by the DOS, DOS-M, and RTE Operating Systems, these FORTRAN-callable routines perform the following functions, and display the results on a Calcomp Model 565 Plotter:

- a. Scale Cartesian coordinates to fit a specified graph size.
- b. Generate scaled X and Y axes for the graph.
- c. Generate a curve for the graph, with symbols or data points marked.

Assembly language, relocatable.

HP supported:
Data Systems Division

22329A, SCIENTIFIC SUBROUTINE PACKAGE

This package of 64 scientific subroutines solves problems in polynomial operations, matrices, linear and non-linear equations, fourier analysis, and integration and differentiation. Additionally a uniform and normal random number generator and thirteen special functions are included. All routines are written in FORTRAN and can be used with any Hewlett Packard 2100 family system. Some were adapted to HP FORTRAN II from existing scientific subroutines (IBM 360) and others were written at Hewlett Packard France.

FORTRAN II/FORTRAN IV

Contributed:
Paul Gavarini/Jean Arban
HP, France/Orsay

22362A, STACK ROUTINES

This set of subroutines allows an Assembly Language program to perform stack operations. The package contains the following routines: CLRST, PUSH, PULL and REMOVE. CLRST clears the stack by setting the upper limit for the number of items in the stack in the first location of the stack. It also sets the pointer in the second position to point to the first free location in the stack (which is the third word of the stack). The upper limit must be stack length-2. PUSH stores an item onto the stack and increments the pointer. REMOVE removes the top item from the stack by decrementing the pointer. The package serves as a tool for recursive calls of programs.

These subroutines may be configured into the user's system library under DOS or DOS-M. Error exits result in calls to the EXEC.

Assembly language, relocatable.

Contributed:
Erkki Anttila
Technical University of Helsinki/Finland

021, SYSTEM LIBRARIES (continued)

24145B, BCS RELOCATABLE LIBRARY, EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the BCS Operating System, and are intended for computers equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN or ALGOL compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Equipment required is 8K of core storage and EAU.

Assembly language, relocatable.

HP supported:
Data Systems Division

24146B, BCS RELOCATABLE LIBRARY, NON-EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the BCS Operating System, and are intended for computers not equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN or ALGOL compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Equipment required is 8K of core storage.

Assembly language, relocatable.

HP supported:
Data Systems Division

24147B, 4K BCS RELOCATABLE LIBRARY, NON-EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the BCS Operating System, and are intended for 4K computers not equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Assembly language, relocatable.

HP supported:
Data Systems Division

24148B, 4K BCS RELOCATABLE LIBRARY, EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the BCS Operating System, and are intended for 4K computers equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Equipment required is the EAU option.

Assembly language, relocatable.

HP supported:
Data Systems Division

24149B, BCS FORTRAN IV LIBRARY

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used by the BCS Operating System, and are called automatically by the FORTRAN IV compiler when the user program is compiled under the RTE, DOS, or DOS-M Operating System. In many instances the subroutines can also be called directly by the source program. The FORTRAN IV library is used in addition to the appropriate BCS relocatable library. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Assembly language, relocatable.

HP supported:
Data Systems Division

24150D, RTE/DOS RELOCATABLE LIBRARY, NON-EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with RTE, DOS, or DOS-M Operating System, and are intended for computers not equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN or ALGOL compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Assembly language, relocatable.

HP supported:
Data Systems Division

021, SYSTEM LIBRARIES (continued)

24151D, RTE/DOS RELOCATABLE LIBRARY, EAU

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the RTE, DOS, or DOS-M Operating System, and are intended for computers equipped with EAU. The subroutines are called automatically by the assembler or by the FORTRAN or ALGOL compiler, and in many instances they can be called directly by the source program. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Assembly language, relocatable.

HP supported:
Data Systems Division

24152C, RTE/DOS FORTRAN IV LIBRARY

This library contains subroutines which perform a wide variety of mathematical and utility operations. The subroutines are used with the RTE, DOS, or DOS-M Operating System. They are called automatically by the FORTRAN IV compiler, and in many instances they can be called directly by the source program. The library is used in addition to the appropriate RTE, DOS, or DOS-M relocatable library. A full description of each subroutine is furnished in the publication *Relocatable Subroutines* (HP order no. 02116-91780).

Assembly language, relocatable.

HP supported:
Data Systems Division

24153C, RTE/DOS HP FORTRAN FORMATTER

This routine interprets formats, performs formatted-data transfers, provides unformatted I/O transfers of binary data, furnishes the means for free-field input, and provides buffer-to-buffer format conversion. The routine is used with the RTE, DOS, or DOS-M Operating System.

Assembly language, relocatable.

HP supported:
Data Systems Division

24245A, HEWLETT-PACKARD COMMERCIAL SUBROUTINES

The Hewlett-Packard Commercial Subroutines provide solutions to business applications and make FORTRAN an easy and powerful commercial language.

FORTRAN/Assembly language, relocatable.

HP supported:
Data Systems Division

24248B, RTE/DOS RELOCATABLE LIBRARY — FLOATING POINT

This extensive library of mathematical and utility subroutines is used with RTE, DOS or DOS-M and run as an HP 2100A computer equipped with the floating-point option. The subroutines are called automatically by a non-floating point assembler or by the FORTRAN or ALGOL compiler.

FORTRAN/Assembly language, relocatable.

HP supported:
Data Systems Division

24249B, 4K BCS RELOCATABLE LIBRARY — FLOATING POINT

This extensive library of mathematical and utility subroutines is used with BCS on 4K HP 2100A computers equipped with the floating-point option. The subroutines are called automatically by a non-floating point assembler or the FORTRAN compiler.

Assembly language, relocatable.

HP supported:
Data Systems Division

24250B, BCS RELOCATABLE LIBRARY — FLOATING POINT

This extensive library of mathematical and utility subroutines is used with BCS on a HP 2100A computer equipped with the floating-point option. The subroutines are called automatically by a non-floating point assembler or by the FORTRAN or ALGOL compiler.

Assembly language, relocatable.

HP supported:
Data Systems Division

24283A, WCS I/O UTILITY ROUTINE (WCSIO)

WCSIO is a FORTRAN and Algol-callable library that allows programmatic load and/or read of a WCS module.

Assembly language, relocatable.

HP supported:
Data Systems Development Division

022, SYSTEM UTILITIES

22273A, CLEAR JOB BINARY AREA IN DOS/DOS-M

This program clears the job binary area in DOS/DOS-M for further compile and load operations in the same job. It is particularly helpful when compilations with errors write rubbish on the job binary area.

Assembly language, relocatable.

Contributed:

Fritz Joern

HP, Germany/Frankfurt

22375A, REMOTE HP 2100 ACCESS TO A 32K DOS

This system allows up to 11 remote HP 2100 computers to access programs stored on a centrally located DOS system. All programs must be stored in absolute binary form. The remote computer may request a program transfer, a data transfer to a previously reserved data file on DOS, and the time of day. All other operations, such as program addition, program deletion, file reservation, etc. are performed by a DOS user program which is part of this package.

Equipment required includes a 32K DOS, an HP 2773A Drum, an I/O Extender, DMA, and EAU as the central computer. Up to eleven 4K remote computers may be interfaced using 2 microcircuit interface cards (HP 12566A), and 36 twisted-pair connecting cables up to 300 feet in length (HP 8120-1283).

FORTRAN IV/Assembly language, relocatable and absolute

Contributed:

Glen Worstell

HP, Loveland Division

22377A, DOS-M DISC INITIALIZE/PROTECT UTILITY

This set of programs, operating as a USER PROGRAM under DOS-M, enables the user to perform the following:

- a. DUMP a "protected" copy of current System Disc onto another Subchannel Disc.
- b. Initialize any Subchannel Disc other than Current System Subchannel Disc.
- c. Protect or Unprotect selected tracks on any given Subchannel Disc.
- d. Produce a status report on any given Subchannel Disc, indicating the condition of each track with respect to being flagged Protected, Unprotected, or Defective.

It requires a minimum DOS-M system, version HP 24225C or later and an HP 2870 or HP 7900 disc. It will not work with the HP 2883 disc.

FORTRAN IV/Assembly language, relocatable.

Contributed:

Bill Williams

HP, Data Systems Division

22398A, RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING

RTE JOB PROCESSOR is a foreground disc resident routine for the HP 2005A, 2005B, or 2005C Real Time Executive which provides a primitive job control language for controlling the execution of programs from a batch device such as a card reader, mag tape or tape reader. The program accepts directives for job, statement, end job, pause, comment, logical source declaration, load and go assignment, schedule request, and job processor terminate.

Typical uses of this program might include compiling, loading, and executing a FORTRAN or assembly language program in the background of RTE, or running a series of programs to perform a specific task (either foreground or background).

Assembly language, relocatable.

Contributed:

David R. McClellan

HP, Southern Sales Region

22416A, CREATE DOS-M DIRECTORY ENTRY UNDER PROGRAM CONTROL

Subroutine DIREN provides the DOS-M user with a method of establishing directory entries for files created under program control. The user writes data of the appropriate type starting at the beginning of the work area keeping count of the number of sectors used. When data storage is complete, a call to the appropriate entry point of DIREN creates the new directory entry. It is FORTRAN callable.

Assembly language, relocatable.

Contributed:

Tom Winker

HP, Neely Sales Region

022, SYSTEM UTILITIES (continued)

22445A, RTE TRACK ASSIGNMENT TABLE LOG

This program is useful as a utility routine in the Real Time Executive System. Its function is to list out the track assignments of the RTE System and auxiliary discs (LU2 and LU3) at the time of execution. It does this by interrogating the RTE Track Assignment Table (TAT). If a track is assigned to the system, "SYSTEM" is printed; if allocated as global, "GLOBAL" is printed; if allocated as own, the name and type of the program to which it is assigned is printed; and if not assigned, "AVAIL" is printed.

Assembly language, relocatable.

Contributed:
Stanton L. Nelson
HP, Neely Sales Region

22446A, MAGNETIC TAPE SYSTEM PROGRAM CATALOG

This program, designed for a Magnetic Tape System, prints a catalog of the names of the absolute programs residing on the first file of the user's system mag-tape. It also prints the names of the relocatable library programs stored on the second file together with a listing of all entry points and external names that are referenced by each relocatable program.

Assembly language, absolute.

Contributed:
S. Zamosciany
Raytheon Company

22457A, DEFINE AND FILL FILES FROM DOS-M USER PROGRAM

These routines, callable from FORTRAN or Assembler user programs, allow access to any area on the current user disc subchannel for I/O Transfer. They can be used to define and fill any one of the following types of DOS-M user files: relocatable binary, ASCII source statements, binary data, and ASCII data.

EAU on a minimum DOS-M system is sufficient for this package.

Assembly language, relocatable.

Contributed:
Ted Slater
Simon Fraser University/Canada

22465A, EXTENDED PRECISION ADAPTER FOR BCS

These adapter routines allow a user in the BCS environment to call extended precision routines from the Fortran IV library (HP 24149) for an accuracy of 23 bits. It is loaded before the library and can call the following functions: SIN, COS, ARCTAN, EXP, LN(=ALOG).

Two tapes are included in this package; the source tapes for the adapter routines, and the relocatable binary tape containing the adapter routines and the extended precision routines of the FORTRAN IV library. They are FORTRAN, ALGOL, and ASSEMBLER callable.

Assembly language, relocatable.

Contributed:
Dr. Rolf Robcke
HP, Germany/Frankfurt

22468A, EXPAND/CONTRACT DOS-M FILES

Subroutine CHNGE is a FORTRAN callable, relocatable assembly language routine which can expand or contract an ASCII or binary data file on DOS-M without destroying the existing data on the file. All following files on the disc are moved up or back, and the directory is adjusted accordingly.

Assembly language, relocatable.

Contributed:
Susan Jean Temple
Montana State University

22477A, FLOATING POINT OVERLAY FOR HP BASIC

This program provides an overlay for BASIC (HP 20392) which takes advantage of the floating point hardware option on the HP 2100 computer. The overlay results in floating point machine code replacing BASIC arithmetic subroutines. The improvement in running time is on the order of five as compared to the non-floating point version of BASIC. This overlay is compatible with previously written user assembly routines because base page linkage addresses are not altered.

Assembly language, absolute.

Contributed:
R. A. Gray
University of California

022, SYSTEM UTILITIES (continued)

22485A, DOS-M DIRECTORY LISTING PROGRAM WITH MASKING FACILITY

This program provides the DOS-M user with a masking facility to control directory listings. The user inputs a file name of the form XX**, *X*X, etc. where an asterisk

denotes a masked position. This can, for example, result in a listing of all programs beginning with "DBC".

FORTRAN IV/ Assembly language, relocatable.

Contributed:

D. A. Betts

The University of Calgary/Canada

100, DATA HANDLING

101, EDITING

20100B, SYMBOLIC EDITOR

This program edits and updates symbolic programs or files. The input is a file to be edited and a file of editing information. The output is an altered symbolic file. The edit file may be entered from the keyboard or from the standard input unit.

Assembly language, absolute.

HP supported:
Data Systems Division

20805C, RTE EDITOR

This RTE program edits and updates symbolic programs or files. The input is a file to be edited and a file of editing information. The output is an altered symbolic file. The edit file may be entered from the keyboard or from the standard input unit.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

22114A, REPRODUCE/EDIT PAPER TAPE

This program furnishes the means for manually editing punch tape in any of the following formats:

- a. Relocatable binary
- b. Binary data
- c. Absolute binary
- d. Source language
- e. Time-sharing source language

Records may be added by reading punch tape, or deleted by advancing tape in the tape reader. Separate tapes can be combined into a single tape. Tape from the BASIC Compiler can be formatted for other time-share systems. An express mode gives nonstop copy reproduction.

Assembly language, absolute.

Contributed:
Barry S. Todd
Naval Weapons Center

22171A, FORTRAN UNIT REFERENCE NUMBER EDITOR

This FORTRAN II program allows the user to alter the unit reference number of an input/output statement written in FORTRAN II. The program is conversational, and asks for required information on the teleprinter. Written for use with the Stat-Pack program group, this program is not itself a part of Stat-Pack.

FORTRAN II

Contributed:
Roland E. Jahn
HP, Medical Electronics Division

22285C, CONVERSATIONAL DOS-M DISC FILE EDITOR

This program edits DOS-M user source files by instructions from the system teleprinter or batch device. Files or portions of files can be merged and lines may be deleted, inserted, or modified. All occurrences of a character string such as a label, a variable name, an array, etc. can be replaced by a new string using a single command.

The user is further aided by the flexibility of specifying the destination file if different from the source file, listing the current line or line number while editing, editing in a conversational mode, and the optional rescanning of the destination file.

Assembly language, relocatable.

Contributed:
Michael Sweet
University College of North Wales

22286A D H SYMBOLIC EDITOR

This absolute program is a flexible editor for FORTRAN and Assembler source programs. Operating characteristics are similar to the HP Editor, 20100, but include these special features; edit commands may be entered in any order and are not restricted to the ascending order of source statements affected; selected parts of the source programs may be edited and listed simultaneously; lines to be edited may be specified by label or line number; a hierarchy for performing edit operations is well-defined; and a scheme for editing the current edit file is provided for

(continued)

101, EDITING (continued)

the non-typist programmer.

Assembly language, absolute.

Contributed:

B. R. Beadle

Giddings & Lewis Machine Tool Company

The file or portions of it may be listed on the TTY (with or without line numbers), or punched out on either the TTY or a high speed punch. The program is coded in absolute assembly language, resides entirely on base page, and uses its own I/O drivers. One page of memory is reserved for address storage. The remaining available memory is used to store the symbolic file, two ASCII characters per word.

22371A, QUOTATION MARKS CONVERSION IN DOS/DOS-M FILES

This program changes (') to (") in DOS/DOS-M files. It requires DOS-M Word Oriented File Access and string lookup routine, HP 22277.

Assembly language, absolute.

Contributed:

Bruce T. Lucas

Naval Weapons Center

FORTTRAN IV/Assembly language, relocatable.

Contributed:

Klaus Stamer

HP, Germany/Frankfurt

22500A, DOS-M RELOCATABLE PROGRAM TAPE EDITOR

"RED" is a program designed to extend and complement the DOS-M relocatable program handling capabilities. Although designed principally for magnetic-tape-to-magnetic-tape operation, its program input may be from any device. It is especially useful for maintaining a relocatable "user library" file on the user disc. Programs may be placed in a single file (saving space), :Dumped to magnetic tape, edited with RED, then re-:Stored.

22393A, ON-LINE EDITOR

This editor program allows the user to prepare a symbolic file by entering it directly into available memory from the TTY. Alternatively, a file may be prepared off-line on paper tape and loaded into memory with a tape reader. Editing operations are conversational, and are performed on-line using the TTY. The procedures are similar to those used in constructing a "BASIC" program. Available editing operations include deleting, replacing, and inserting lines or series of lines. A limited degree of character editing is possible.

FORTTRAN IV

Contributed:

Prentiss R. Mooney

102, INFORMATION STORAGE AND RETRIEVAL

22198C, MAGNETIC TAPE STORAGE AND RETRIEVAL PROGRAM

This independent program performs any of the following functions:

- a. Records punched tape images on magnetic tape. If additional images are subsequently recorded, the end-of-file mark is removed and a new one is placed after the new material.
- b. Under manual control, removes the last record written on magnetic tape.

- c. Verifies that data recorded on the magnetic tape is identical with the contents of a specified core storage area.
- d. Makes a punched tape duplicating data on the magnetic tape.
- e. Lists data from the magnetic tape on a line printer or teleprinter.
- f. Reads the magnetic tape and lists on a line printer or teleprinter a directory of programs recorded on the tape.

(continued)

102, INFORMATION STORAGE AND RETRIEVAL (continued)

Program 22209C (classification code A106) performs additional functions using the format of program 22198.

Equipment required is 16K of core storage (limited functions are possible with 8K), the Direct Memory Access option for the computer, one HP 3030G or 7970 Magnetic Tape Unit with interface kit, and one HP 2752 Teleprinter, HP 2754 Teleprinter, or one HP 2600A Terminal, with interface kit.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22272A, DISC/DRUM UTILITY

This absolute program under control of the system teleprinter accepts commands to save, restore, and verify information stored on the disc/drum with information stored on magnetic tape. It is useful for creating a disc/drum backup copy on magnetic tape. For efficiency, tape record length is the same as the track length. Selected sectors may also be listed in octal on the teleprinter.

Equipment required includes 16K memory, EAU, DMA, and HP disc or drum, and any HP magnetic tape drive.

Assembly language, absolute

Contributed:
John H. Welsch
HP Laboratories

22284A, DOS-M DUMP/RESTORE PROGRAM

This set of programs enables the user to save the contents of DOS-M subchannels on magnetic tape using either the 2870A (IOMEC), 2883A (ISS), or 7900A (HP) disc. The saved disc contents may later be restored to the same or different subchannels from magnetic tape. A feature is included to verify the magnetic tape file with the contents of the disc sub-channel.

FORTTRAN II/Assembly language, relocatable.

Contributed:
Bill Williams
HP, Data Systems Division

22299A, DOS/DOS-M SOURCE STORAGE AND RETRIEVAL

This program allows the user to store and retrieve source files on magnetic tape under control of DOS or DOS-M. Unlike the :DU command, it writes all necessary end-of-file marks. Additionally, the user may write a file, purge a file, list a directory of files, search for a given file by file name and end execution. The search feature is followed by a return to the disc monitor, "@", so that a user may store ":ST,S" to disc. All files are named and dated. The program is self-configuring and requests all necessary parameters through the system console.

Assembly language, relocatable.

Contributed:
Richard Strauss
HP, Medical Electronics Division

22356A, PACKED MAGNETIC TAPE STORAGE AND RETRIEVAL FOR DOS-M

Two separate programs store and retrieve "packed" source, relocatable, and absolute code on magnetic tape under DOS-M. Each record is packed with a maximum of 2048 words. Approximately 50 source programs can be stored on one 600' reel of tape. Each file contains one program and is labelled at the beginning. Input and output may be cards, paper, or disc.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22482A, HP 2020B MAGNETIC TAPE STORAGE & RETRIEVAL

This independent program is a modification of Magnetic Tape Storage and Retrieval, HP 22198, for use with the HP 2020B Magnetic Tape unit. It provides the following functions:

- a. Records punched tape images on magnetic tape. If additional images are subsequently recorded, the end-of-file mark is removed and a new one is placed after the new material.
- b. Under manual control, removes the last record written on magnetic tape.

(continued)

102, INFORMATION STORAGE AND RETRIEVAL (continued)

- c. Verifies that data recorded on the magnetic tape is identical with the contents of a specified core storage area.
- d. Makes a punched tape duplicating data on the magnetic tape.
- e. Lists data from the magnetic tape on a line printer or teleprinter.
- f. Reads the magnetic tape and lists on a line printer or teleprinter a directory of programs recorded on the tape.

Equipment required is an HP 2100 series computer with 8K of core storage for limited capability or 16K for complete capabilities, the Direct Memory Access option for the computer, one HP 2020B Magnetic Tape Unit, one HP 2767A or 2778A Printer (or Teletypewriter), one photo-reader, and one teleprinter or console.

Assembly language, absolute.

Contributed:

H. Mark Grove

Walter Reed Army Medical Center

22483B, APPLICATIONS DATA MANAGEMENT PACKAGE (ADM)

ADM is a collection of subroutines and programs which will run under the control of DOS-M on an HP 2100 computer. The purpose of the package is to assist the user in performing data management functions on DOS-M. The subroutines are callable from FORTRAN or Assembler language. The programs are particular implementations of the subroutines, designed to perform certain standard functions without additional programming by the user.

The subroutines give the user the following capabilities:

- a. Serial or direct access-Block records in a disc sector. Both storage and retrieval are by relative record address.
- b. Sequential access-Sort records on up to 9 fields in ascending or descending order. Retrieval is then sequential.
- c. Selected access-Select only those records whose field values meet a set of conditions specified by the user. Access may be serial, sequential or indexed.
- d. Hash index-Records are accessed through a hash index maintained by ADM subroutines. Storage and retrieval is accomplished by a key field transformation which provides a pointer to the record containing that key

field value. Thus access or storage to a particular record whose key field value is known can be accomplished in two or three seeks (100 milliseconds) no matter where the record is located.

- e. Sequential index-A binary search is conducted for a record whose key fields are specified to be greater than, equal to, or less than values supplied by the user. A binary search takes $\log_2 N$ seeks in an N record data set. This method has advantage over hash index when the key field is not known exactly or where there are more than one key fields. However it requires more seeks.
- f. Input/output devices. Input data can come from cards or magnetic tape; output is to the console or printer. Transfer of data from tape to disc to printer can be accomplished with record selection and formatting.
- g. Fields are ASCII character strings. They need not begin or end on word boundaries. Numeric strings may be added, subtracted or multiplied using ADM subroutines.
- h. Data sets may be transferred from one disc to another without unnecessary system seeks.
- i. Program segment overlays may be accomplished without unnecessary system seeks.
- j. A complete data set or a conditionally selected subset may be copied or concatenated to another data set on disc or on an I/O device.
- k. Fields are referenced by name.

FORTRAN IV/Assembly language, relocatable.

Contributed:

Tony Turner/Harry Kline

HP, Data Systems Division

22484A, DOS-M USER FILE DESCRIPTION DIRECTORY

This program, operating under DOS-M, is designed to maintain a disc file containing the symbolic names of selected user files together with as many as 64 characters of descriptive information on each file. The file may be listed selectively by file name or completely on any output device. Entries into the directory are made by file name and purged files are automatically removed from the directory.

FORTRAN IV/Assembly language, relocatable.

Contributed:

Maurice C. Cote

HP, Eastern Sales Region

102, INFORMATION STORAGE AND RETRIEVAL (continued)

24228B, DOS-M/HP 2000C/F TIME-SHARE BASIC FILE HANDLER

The File Handler is used to input files or programs that have been dumped onto magnetic tape by a 2000C TSB system into a DOS-M environment. The program can also be used to dump files onto magnetic tape for input to TSB.

ALGOL and assembly language, relocatable.

HP supported:
Data Systems Division

24240A, DOS-M HP 2000C TIME-SHARED BASIC FILE INTERFACE PACKAGE

This routine accesses files (generated in a DOS-M system by the DOS-M/2000C TSB File Handler program, HP 24228A), records and data items without the need of maintaining relative sector numbers, end-of-file or end-of-record marks.

Assembly language, relocatable.

HP supported:
Data Systems Division

104, CHARACTER/SYMBOL MANIPULATION

22081A, BIT OPERATIONS (SET, CLEAR, TEST) — FORTRAN CALLABLE

These subroutines set or clear any bit of any specified word. In addition, the status of any bit can be tested by a FORTRAN "IF" statement.

Assembly language, relocatable.

Contributed:
Allan P. Sherman
HP, Medical Electronics Division

22207A, CHARACTER AND BIT STRING PROCEDURES FOR ALGOL

These ALGOL-callable code procedures permit integer arrays to be manipulated as character strings and bit strings. The strings may be concatenated or broken into substrings; individual characters or bits may be examined and changed.

ALGOL

Contributed:
John H. Welsch
HP Laboratories

22204A, DATA BLOCK MOVEMENT

This routine moves data from one area of core storage to another. The source and destination areas must each be contiguous.

Assembly language, relocatable.

Contributed:
G. L. Davis
Automatic Electric Labs, Inc.

22404A, SPACE SAVING ASCII STORAGE ROUTINES

This routine, used in the assembly language environment, handles ASCII string elements containing 8 characters. Usually such a string is stored in 4 computer words. Since the standard ASCII character set contains only 64 different characters (40 to 137 octal), these 8-bit characters are unnecessary. A string element containing 8 characters can be stored in 3 computer words, thus saving 25% of the memory space originally required.

This program consists of 2 routines. Routine 'COMPR' transfers a string element (8 characters) from a source block (4 words) to a destination block (3 words). Routine 'EXPND' inversely transfers a string element from a source block (3 words) to a destination block (4 words).

(continued)

104 CHARACTER/SYMBOL MANIPULATION (continued)

The calls to the routines can be easily chained thus transferring strings of character blocks.

Assembly language, relocatable.

Contributed:

Hans R. Biesel
HP, Germany/Boeblingen

22467A, INTEGER EXTRACTION FROM A STRING OF TEXT

This FORTRAN-callable program searches a string of ASCII text and returns the value of the first integer encountered. Thus it allows a free field for mixed Hollerith-integer input.

Assembly language, relocatable.

Contributed:

Arthur J. Levy
General Electric Company

22504A, CHARACTER PACKING AND UNPACKING

This package of four FORTRAN callable subroutines allows simple manipulation of characters into packed and unpacked formats. Characters can be unpacked into successive words, either right justified with a preceding zero or left justified followed by a blank, and packed from either of these forms. This allows card images to be read using nA2 format, unpacked so that individual characters can be tested, and repacked two characters per word.

Assembly language, relocatable.

Contributed:

R. J. Rowlands
CSIRO Division of Protein Chemistry/Australia

105, CODE/RADIX CONVERSION

20096A, CONVERSION ROUTINE MCONV

This routine is used with the HP 2310 A/D Converter, 2310B Multiverter, or 2310C Miniverter System. Data words of up to 14 bits are acquired from one of these equipment items. The routine converts each binary word from left-justified to right-justified form, then changes the number to integer form.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20210A, CONVERSION ROUTINE ICONV

The ICONV routine converts 8-4-2-1 BCD numbers to floating point form. The floating point value is complemented if the sign is negative. If the number represents frequency or resistance, it is appropriately scaled. The routine is designed for use with the HP 2401C or 2402A Integrating Digital Voltmeter; these measuring instruments are used in the HP 2320A and 2322A Low-Speed Data Acquisition Subsystem.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

20288A, RTE CONVERSION ROUTINE CONVERT

This RTE routine converts 8-4-2-1 BCD numbers to floating point form. Each BCD number consists of six digits, a sign, and a decimal point. The routine complements the floating point value if the sign is negative. If the number represents frequency or resistance, it is appropriately scaled. The routine is designed for use with the HP 2401C or 2402A Integrating Digital Voltmeter; these measuring instruments are used in the HP 2320A and 2322A Low-Speed Data Acquisition Subsystems.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

105, CODE/RADIX CONVERSION (Continued)

20533A, CONVERSION ROUTINE CONV34

The CONV34 routine converts BCD numbers to floating point form. The floating point value is complemented if the sign is negative. The routine is designed for use with the HP 3450A Multi-Function Meter.

Equipment required is at least 8K of core storage.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

22086A, EBCDIC to ASCII TRANSLATOR

This routine reads 80-column card images from 9-track magnetic tape, converts the data acquired from EBCDIC to ASCII code, and furnishes the ASCII characters in one or more of the following ways:

- a. List card images.
- b. Punch card images.
- c. Punch with columns 73-80 blank, and with trailing ASCII "space" characters omitted.
- d. Halt when any predefined group of characters is detected.
- e. Halt after each card image.
- f. Read without output (to advance tape rapidly to a desired area).

Equipment required is one HP 3030 Magnetic Tape Unit, with interface kit.

Assembly language, relocatable.

Contributed:
HP, Medical Electronics Division

22093A, ASCII/IBM 8-LEVEL CHARACTER CONVERSION ROUTINE

This routine reads IBM 8-level characters from 9-track magnetic tape, converts the characters to ASCII form, and lists or punches the ASCII characters on the teleprinter. The program also reads ASCII characters from punch cards, converts the characters to IBM 8-level code, and records the 8-level characters on magnetic tape.

Assembly language, relocatable.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22214A, CHARACTER CODE TRANSLATOR

This MTS program translates from ASCII to EBCDIC, and from EBCDIC to ASCII. Each translated character can be placed in the core storage location from which the corresponding untranslated character was acquired. Alternatively, the translated character can be placed in a different core storage location. The original characters and the translated characters are packed two characters per 16-bit word.

By preparing different conversion tables for the program, a user can convert any 8-bit (or less) code to any other 8-bit (or less) code.

Assembly language, relocatable.

Contributed:
G. L. Davis
Automatic Electric Labs, Inc.

22274A, 4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE

These two routines convert 4-2-2-1 BCD data to binary. The data is read by the supported driver, DVR40 from a DSI card connected to a five-digit counter. Input is five digits, twenty bits, stored in two words; output is a two-word floating point number. The range and function returned by some instruments are ignored. It can be easily modified to convert data from an eight-digit counter. FORTRAN-callable.

Assembly language, relocatable.

Contributed:
M. H. Kendall III
Wyle Laboratories

22433A, ASCII/INTEGER CONVERSION ROUTINE

This FORTRAN callable function converts a substring of ASCII characters into an integer value or vice versa.

Assembly language, relocatable.

Contributed:
Umberto Paolucci
HP, Italy/Milan

106, DUPLICATION

20312A, PUNCH/VERIFY ROUTINE

The Punch/Verify Routine reproduces and verifies punched tapes.

Assembly language, absolute.

HP Supported:
Data Systems Division

22041E, PUNCHED TAPE DUPLICATOR

This independent program furnishes a reliable method for copying punched tapes. Either source-language tapes or binary tapes can be duplicated. As a tape original is read into core storage, the checksum is verified. Verification of a duplicated tape against the tape image in core storage also is possible.

The program can combine two or more punched tapes into a single tape, with or without a four feed-hole separation between data from different tapes. A configured tape can be produced from an unconfigured original. As an additional function, a bootstrap loader tape can be punched, duplicating the loader which is in core storage.

Core storage capacity of the computer can be of any magnitude. However, for duplicating lengthy tapes 16K or more may be required. An error printout is furnished if a tape exceeds the core storage capacity. During the reading of a tape original, a countdown in the B-register illustrates the amount of core storage available for the remainder of the tape image. When punching is taking place, the program halts if end-of-tape is detected.

For reading and punching, either high-speed tape reader and punch units can be employed, or the corresponding units in the teleprinter can be used.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22113B, MTS PUNCHED TAPE DUPLICATOR

The MTS Punched Tape Duplicator reads punched tape and stores the data in File No. 3 on magnetic tape. Then, under operator control, duplicates of the punched tape are made at the teleprinter or on a high-speed punch. Finally, each duplicate tape can be read and checked against the source material in File No. 3; an error indication is provided if there is a discrepancy.

Assembly language, absolute.

Contributed:
Bill Swanson
HP, Southern Sales Region

22180C, FAST PUNCH VERIFY

“Fast” Punch/Verify permits rapid duplication, verification, and comparison of paper tapes punched in any format. The tape reader and punch run continuously and simultaneously at maximum rates by utilizing program interrupts. A releasable configuration section allows tailoring the program to any memory size and I/O configuration, while allowing maximum memory space for storing the master in core for verification.

Assembly language, absolute.

Contributed:
David R. McClellan
HP, Southern Sales Region

22197A, SINGLE DRIVE MAGNETIC TAPE COPY PROGRAM

This DOS program copies or reblocks magnetic tapes with a single tape unit in the computer system. The disc is used for intermediate storage. Verification is made between the master tape and the disc, and between the disc and each copy tape.

Equipment required is one HP 7970A or 3030G Magnetic Tape Unit, with interface kit.

FORTRAN II

Contributed.

22209C, DRUM BASED MAGNETIC TAPE DUPLICATOR

Using source magnetic tapes with the format produced by program 22198 (classification code 102), this independent program performs any of the following functions:

- a. The program makes copies of a magnetic tape using a single magnetic tape unit. The drum is used for intermediate storage.
- b. The program allows many magnetic tapes to be combined on the drum. A single magnetic tape can then be prepared from the drum files.

(continued)

106, DUPLICATION (continued)

- c. The program can purge any specified file from the drum.
- d. Magnetic tape files on the drum can be sorted by ID number.
- e. Selected files on the drum can be recorded on magnetic tape.
- f. A directory of programs recorded on magnetic tape can be listed on a line printer or teleprinter.

Because this is an independent program, the magnetic tape format and drum format are not compatible with the formats used in standard HP operating systems. Therefore, the magnetic tapes produced must be transferred to punched tape, using program 22198, before use in an operating system.

Equipment required is 16K of core storage, and the Direct Memory Access and Extended Arithmetic Unit options for the computer. Also required is an HP 2773/4/5 Drum Memory with power supply and interface kit, and an HP 3030 Magnetic Tape Unit with interface kit.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22252A, RTE/DOS DUPLICATOR PROGRAM

This RTE and DOS program duplicates punched tapes. The data from the master tape is stored on disc, and one or more copy tapes are then punched from the disc file. Checksum verification is performed, and each copy tape can be reread and compared with the disc file.

Assembly language, relocatable.

Contributed:
Alberto Panni
HP, Italy/Milan

22360A, DOS-M PAPER TAPE REPRODUCER

This paper tape reproducer for DOS-M uses a double buffer to achieve maximum speed on input/output devices. When used with the contributed photoreader driver, HP 22353, absolute binary tapes can be reproduced as well as source and relocatable binary. Checksums are computed on relocatable and absolute binary format tapes.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22368A, PAPER TAPE COPY

This absolute program punches and verifies paper tapes of any format. It can also copy a file from a magnetic tape or disc via the appropriate SIO driver. Checksums are verified via the photoreader while the punch operation is still in progress. Copy also allows a user to concatenate tapes.

Assembly language, absolute.

Contributed:
George Anzinger
HP, Automatic Measurement Division

22535A, MAGNETIC TAPE COPY

This absolute program copies one magnetic tape onto another. It has extensive error recovery and a large input buffer, varying with different memory sizes. The program will copy any track tape (if the appropriate SIO drivers are used), or any tape generated by the contributed program HP 22198. Included in the program is a routine which allows the user to position the tape to any file and record before copying. Equipment required is an HP 2100 series computer, a teletype, and two magnetic tape units.

Assembly language, absolute.

Contributed:
Larry W. Smith
HP, Neely Sales Region

107, SORTING AND MERGING

20237A, LIBRARIAN

Using SIO drivers, this program modifies library tapes of relocatable routines, arranging the routines in the order specified by the user.

Assembly language, absolute.

HP supported:
Data Systems Division

22079B, NUMERIC STRING SORT FOR ASCII RECORDS

This program reads records of string data. Each record is prefixed by a four-digit numeric code used by the program for sorting the records. Then the numeric code is dropped, and the string records are printed out "in order."

This program reads either punched or marked sense cards or can read from the teletype. The string data may be up to 48 characters in length and is pre-fixed by a four-digit integer in the first four columns. The string begins in column seven. The data is read into the computer in random order. The computer then counts the number of strings and prints each string out in order from the lowest to the highest four-digit integer.

FORTRAN II

Contributed:
Robert Richardson
HP, Eastern Sales Region

22116A, ORDERING A FLOATING POINT ARRAY

This subroutine arranges a floating point single-dimension array in ascending or descending order. The original arrangement of data is destroyed. The subroutine is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22167A, ORDERING A FIXED POINT ARRAY

This subroutine arranges a fixed point single-dimension array in ascending or descending order. The original arrangement of data is destroyed. The subroutine is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22168A, RANKING A FLOATING POINT ARRAY

This subroutine arranges a floating point single-dimension array in ascending or descending order. The original arrangement of data is not destroyed. The subroutine is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22169A, ORDERING A FLOATING POINT ARRAY

This subroutine arranges a floating point single-dimension array in ascending order. The original arrangement of data is destroyed. The subroutine is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22282A, DOS-M LIBRARIAN

The DOS-M Librarian accepts paper or magnetic tape input to shorten, lengthen, or modify relocatable libraries. The user communicates with the librarian by means of commands typed in through the system console. Program input is created by Prepare Tape System (PTS) or the :DU command of DOS-M and output is on punched paper tape.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22343A FIELD SORT

This ALGOL procedure sorts ASCII or integer data into alphabetic and/or numeric order. The user specifies the number of records to be sorted, the record length, and the

(continued)

107, SORTING AND MERGING (continued)

field on which the sort is to be performed. The remaining data in each record is carried along unchanged by FIELD-SORT. Sorting is conducted "in place" consequently the sorted data replaces the unsorted data in core storage.

ALGOL

Contributed:
Jim Katzman
Amdahl Corporation

22376A, ASCII DISC FILE FIELD SORT

This program generates ASCII files under DOS or DOS-M and allows the user to sort the files according to ASCII hierarchy. The sort is accomplished according to a user specified field containing from 1 to 10 characters. Fields are sorted from left to right. A maximum of 1000 lines may be sorted. The sort is completely core based and requires 16K.

FORTRAN II.

Contributed:
George W. Taylor
HP, Neely Sales Region

22383A, ALPHANUMERIC RECORD SORT

This program performs a very rapid ASCII Code sort in an 8K BCS environment. The program uses two disc or magnetic tape files for scratch area and sorted data output. Optionally the sorted data may be dumped to the line printer, paper tape or a third disc/magnetic tape file with a substantial improvement in execution time.

Up to four separate fields may be selected in order of sorting significance. Each field may range from a single column to the entire length of the record.

ALGOL/Assembly language, relocatable.

Contributed:
Marlin Schell
HP, Data Systems Division

22430A, NUMERIC SORT

There are three subroutines in this package for a fast "in-core" sort of integers, reals, and double precision numbers. It requires a minimum of 8k core, and is FORTRAN IV callable.

FORTRAN IV/Assembly language, relocatable.

Contributed:
Enrico P. Mariani
HP, Italy/Milan

22479A, ALPHANUMERIC DISC FILE SORT

Operating under 16K DOS or DOS-M, this program performs a rapid ASCII Code sort and generates an ASCII file in which the sorted data is stored. The program will merge input from any number of user source files as well as from other input devices. Sorted data can be dumped to magnetic tape during sort execution or at some later time.

Up to four separate fields may be selected in order of sorting significance, and may be sorted in either ascending or descending order. Each field, indicated by column numbers, may range from a single column to the entire length of the record.

This program requires an HP 7900, HP 2870, or HP 2883 Disc.

ALGOL/Assembly language, relocatable.

Contributed:
Marlin Schell
HP, Data Systems Division

108, DATA HANDLING UTILITIES

22090A, KEYBOARD TAPE GENERATOR

This program accepts octal data and ASCII commands from the teleprinter keyboard, and generates an absolute-address punched tape suitable for loading by the Basic Binary Loader or for use as a bootstrap loader.

Assembly language, absolute.

Contributed:
Stroud S. Custer
HP, Eastern Sales Region

22165A, CARD TO MAGNETIC TAPE UTILITY

This program creates magnetic tape files from mark sense cards and/or punched cards. Any of a variety of tape formats can be used. The program converts from Hollerith Code to ASCII or EBCDIC Code, and labeled or unlabeled tapes can be produced. The block size (number of cards per record) and logical record size (number of card columns per record) can be specified. Unblocked tape records can be produced, if desired. The program provides 200 card/minute throughput to tape.

Equipment required are the Direct Memory Access and Extended Arithmetic Unit options for the computer, and one HP 2761A-007 Optical Mark Reader with interface kit, and one HP 3030 Magnetic Tape Unit with interface kit.

Assembly language, relocatable.

Contributed:
David R. McClellan
HP, Southern Sales Region

22166A, MAGNETIC TAPE TO PRINT UTILITY PROGRAM

Under teleprinter keyboard control, this program dumps magnetic tape files onto a line printer. The tape records may have any of a variety of formats, and either ASCII or EBCDIC files can be accommodated.

Equipment required is the Direct Memory Access option for the computer, one HP 3030 Magnetic Tape Unit with interface kit, and one line printer with interface kit.

Assembly language, relocatable.

Contributed:
David R. McClellan
HP, Southern Sales Region

22341A, FTN IV CORE SAVER

This subroutine allows the FORTRAN IV program that uses only FORTRAN II I/O functions to use the FORTRAN II formatter and thus save a considerable number of words. The savings in RTE/DOS are a maximum of $1562_8 = 882_{10}$ words. In BCS the savings are a maximum of $1213_8 = 651_{10}$ words.

Assembly language, relocatable.

Contributed:
George Anzinger
HP, Automatic Measurement Division

22347A, DOS/DOS-M SOURCE FILE VERIFY PROGRAM

This program provides the capability of comparing a source program against a source file on DOS or DOS-M. The user provides the logical unit of the input device and the name of the source file. The program reads the tape and compares it with the disc file, record by record. If a line is found that does not agree, the disc and tape version are printed out. A final statement is made that the verify is "Good" or "Not Good."

By using this program with the standard DOS/DOS-M features, ":ST,S" and ":DU", one can duplicate source tapes and verify the read and punch operations.

FORTTRAN II/Assembly language, relocatable.

Contributed:
Roland E. Jahn
HP, Medical Electronics Division

22354A, DOS-M STORE ABSOLUTES

This program "STAB" uses the contributed photoreader driver, HP 22353, to read an absolute object tape into a user buffer area and then stores the tape in a disc file of type BD, binary data. This file is created under program control with the corresponding directory entry. STAB allows the user to create disc files of any type under program control along with the corresponding directory entry.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

108, DATA HANDLING UTILITIES (continued)

22355A, DOS-M PAPER TAPE/DISC VERIFY

This program allows a user to verify paper tapes of any format against a disc file under DOS-M. If used in conjunction with the contributed photoreader driver, HP 22353, and the DOS-M Store Absolutes, HP 22354, this program will verify absolute object tapes against a binary data file.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22358A, EASY MAGNETIC TAPE I/O AND STATUS INFORMATION

This utility is used in a DOS/DOS-M or RTE environment to eliminate the tedious programming required to achieve magnetic tape data transfer or status information. It checks for on line condition, write ring present, end of tape, and CALLs EXEC for data transfers and status. By checking the indicators returned by this routine the user maintains the flexibility of branching in his own program.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22359A, HANDI-0

This group of nine utility programs allows the DOS-M user to page the line printer, produce leader on the punch, write a ": :" to magnetic tape, rewind magnetic tape, back space magnetic tape file(s), back space magnetic tape record(s), forward space magnetic tape file(s), forward space magnetic tape record(s), and convert card input to paper or magnetic tape eliminating trailing spaces. All necessary calls are performed by the program.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22381A, RELOCATABLE MODULE LISTER

This program allows a user to selectively list the following records from relocatable tapes; NAM, ENT, EXT, DBL, and END along with their relocatable addresses. The listing may

be generated in either symbolic or octal format under BCS, MTS, DOS, or DOS-M. Errors such as checksums, parity, etc. are also listed.

Assembly language, relocatable.

Contributed:
Dave Snyder
HP, Santa Clara Division

22392A, RELOCATABLE OBJECT UTILITY LIBRARIAN

This program reads relocatable object tapes under BCS and optionally lists program length, length of common in octal, names of entry points, and external references. Each program may be selectively punched onto a library tape.

Assembly language, relocatable.

Contributed:
Thad Smith III
National Bureau of Standards

22400A, ZERO

This ALGOL callable routine stores zeroes or ASCII blanks throughout an array. It is most useful when repeated calls to the library "INDEX" routine would tend to slow program execution. It requires 8K core and was written for the BCS environment.

Assembly language, relocatable.

Contributed:
Ed Doust
HP, Corporate

22495A, FORTRAN FORMATTED READ FROM DOS-M S-TYPE USER FILES

This relocatable subroutine enables FORTRAN programs to read data previously stored on source type DOS-M user files. This allows the use of the file editing and managing capabilities of the DOS-M operating system for data files as well as for source files.

Assembly language, relocatable.

Contributed:
Franco E. Bertora
University of Genova, Italy

109, MEDIA CONVERSION

22427A, MEDIA CONVERSION

This program converts ASCII code from one type of storage media to another. Conversion modes allowed are: card to mag tape, card to list and card to paper tape; mag tape to list and mag tape to paper tape; paper tape to list, paper tape to mag tape, and paper tape to paper tape. The program responds to user commands under DOS-M and is compatible with the :STORE and :DUMP directives.

Assembly language, relocatable.

Contributed:
Bjoern Lindberg
HP, Sweden/Stockholm

24310A, KODAK APPLICATION LIBRARY

COM applications for use in reformatting printer tapes as output to KODAK KOM-80/KOM-90.

Assembly language, relocatable.

HP supported:
Data Systems Division

110, FILE MANAGEMENT

22277A, DOS-M FILE ACCESS AND STRING LOOKUP

Subroutine DISC provides word-oriented access to serial disc files under DOS-M. The user program specifies only the relative word number within the file and the routine calculates the physical track and sector addresses. It buffers user's requests through a one-sector buffer. User READ requests are performed as logical reads (i.e. if the required sector is already in core, the disc is not physically accessed). No logical WRITE is attempted. A FORTRAN program is included that demonstrates the use of subroutine DISC as a string lookup routine.

Assembly language, relocatable.

Contributed:
Rudolf Beuerlein
HP, Germany/Frankfurt

22330B, PSEUDO REPORT GENERATOR

This program, operating in a DOS-M environment, enables the user to define, construct, edit, and list ASCII data files in selective output formats. Flexible data base definition enables the user to specify how many data fields as well as the number of characters per field up to a maximum logical record length of 256 characters. Key fields may also be specified and later used in selected listings. Considerable flexibility is provided in the type of listing that may be produced from the data in an existing data file. Typical applications are production of mailing lists, personnel lists, etc.

ALGOL.

Contributed:
Bill Williams
HP, Data Systems

22364A, EFMP RECORD READ/WRITE

This program allows a user to read or write Integer, Octal, or ASCII records (of N words) on any file in the EFMP environment.

FORTRAN IV.

Contributed:
Enrico Mariani
HP, Italy/Milan

22369A, DOS-M FILE WRITER

This program allows a DOS-M user to write integers, reals, or ASCII data on a specified part of a specified file.

It is conversational.

FORTRAN IV.

Contributed:
Enrico Mariani
HP, Italy/Milan

110 FILE MANAGEMENT (continued)

22373B, ITEMIZED EXTENDED FILE MANAGEMENT PACKAGE

This small package of software working in the EFMP environment gives the user an easy way to handle records divided into items (fields).

It consists of programs designed to maintain a directory for itemized files, subroutines that allow easy use of itemized files, and general purpose programs for listing, checking, etc.

It requires a 16K DOS-M system with EFMP, the Extended File Management Package.

FORTRAN IV.

Contributed:
Enrico P. Mariani
HP, Italy/Milan

22429A, EFMP FILE TRANSFER

This program transfers the contents of an EFMP file to a new destination file or an already existing file. It requires another user program, HP 22433.

FORTRAN IV

Contributed:
Enrico P. Mariani
HP, Italy/Milan

22432A, EFMP DIRECTORY LISTER

This program may be used to list an Extended File Management Package directory.

FORTRAN IV

Contributed:
Bjoern Lindberg
HP, Sweden/Stockholm

22486A, EFMP READ/WRITE WITH FORTRAN IV INPUT/OUTPUT LISTS

This package is a "software interface" between the FORTRAN IV user and the Extended File Management Package. It allows the user to define disc files by specifying number of record, record length, and disc pack; and to use FORTRAN IV READ/WRITE statements. In addition it

will check for an end-of-file condition, provide a transmission log, and purge files. This package simplifies simulation of the disc I/O statements of IBM and CDC computers on the HP 2100 series. Both random and sequential access are provided.

Assembly language, relocatable.

Contributed:
Dr. Rolf Robcke
HP, Frankfurt/Germany

22525A, READ/WRITE DOS-M FILES IN RTE ENVIRONMENT

This routine, operating in a RTE environment, enables the user to read and write on DOS-M files. The files must have been previously created by a DOS-M system. The routine checks the DOS-M directory to determine the origin and the length of the file, and then reads or writes data on the file. Track switching is automatically done and tests are made to be sure the user stays within the file. The disc containing the DOS-M file must be declared as a peripheral disc in the RTE system.

This routine is particularly useful when data acquisition is done in a RTE system, and later the data must be used in a DOS-M system because more core is required to process it.

Assembly language, relocatable.

Contributed:
Wim Roelandts
HP, Belgium / Brussels

22528A, SERIAL ACCESS TO DOS-M FILES

This subroutine allows a DOS-M user to serially access disc files, thus making packing and unpacking of files possible. Up to ten files can simultaneously be opened to the subroutine, and for each opened file, the user must provide a buffer of at least one sector (larger for faster processing). Read and write operations on the files are performed on a logical basis. Status and control operations allow the user to specify the relative word within a file that he wants transferred. Once a file is opened to this subroutine, it is no longer referenced by name, but by an index.

Assembly language, relocatable.

Contributed:
Jacques Sansdrap
Cliniques Universitaires St. Pierre/Belgium

110 FILE MANAGEMENT (continued)

24227D, DOS-M EXTENDED FILE MANAGEMENT PACKAGE

The Extended File Management Package (EFMP) extends the file handling capabilities of DOS-M by allowing the user to create and access files with different record lengths, security codes, etc. EFMP consists of a series of EXEC modules and a utility program (UTIL). The prerequisites are DOS-M with 16K core.

Assembly language and FORTRAN IV.

HP supported
Data Systems Division

29033A, REAL-TIME EXECUTIVE FILE MANAGEMENT PACKAGE

The File Manager is an optional software module (option Y01) of HP Real-Time Executive (RTE) Systems. It provides convenient, orderly storage, and easy access of programs and data (files) kept on the moving-head and/or fixed-head disc memory unit of the RTE systems.

The File Manager organizes all user-defined storage for this data into named files and provides access to these files

through operator commands entered at the system console, or in response to program calls. At the same time, the File Manager provides safeguards which can be used to assure that no program interferes destructively with the files used by another program.

In brief, the File Manager performs the following functions:

Provides security on system and file level to prevent unauthorized access.

Creates new files; modifies existing files; and purges obsolete files.

Provides exclusive control of I/O devices, other than discs, which use standard peripheral calling sequences.

The File Manager requires the HP 9600E/F RTE System or HP 2300E software package (HP 29016D or later software), including the HP 29029 RTE Multiple-Device System Control Driver (DVR00).

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

112, SPECIAL FORMAT DATA TRANSFER

22172C, IOC — FORTRAN CALLABLE

This subroutine allows direct calls to .IOC from a FORTRAN program, resulting in data transfers which avoid the formatter. Without the formatter no data conversion can be made, and ASCII input characters are stored in ASCII form, and binary inputs are stored in binary form.

Assembly language, relocatable.

Contributed:
Fritz Joern
HP, Germany/Frankfurt

22238A, FORTRAN RUN-TIME FORMAT SPECIFICATION

This subroutine provides FORTRAN input and output statements with a format reference to an array whose contents may be defined at run time, rather than to a labelled program source statement. During execution, the format pointer in the compiler-generated assembly code is changed to the actual parameter (typically, an integer array name) with which the subroutine is called.

Assembly language, relocatable.

Contributed:
Don Pettengill
HP, Data Systems Division

112, SPECIAL FORMAT DATA TRANSFER (continued)

22386A, MULTIRECORD FORMATTED OUTPUT LISTER

This program provides user capability to output multi-record formatted data streams to one or more list devices via user command control under DOS. Ostensibly for line-printer listings of punched cards, the user command set allows selective input from several devices and juxtaposition of these input fields. The command set also controls insertions of spaces, characters, portions of a core-saved record, page numbers, page headings, top of form line-spaces, and linefeeds into the data stream. The user may vary output record length by stripping trailing blanks, or partially suppress a listing of the output data stream via command control.

The command set itself may be partially input through the terminal in a conversational mode or mixed with the input data stream in a card reader, photoreader, or other input device.

ALGOL.

Contributed:
Herbert Shear
HP, Data Systems Division

24305A, MAGNETIC TAPE REFORMATTING SYSTEM

The HP 2022A Magnetic Tape Reformatting System (MTRS) provides HP 2100A computers with the capability to reformat magnetic tape records for subsequent transfer to an output device. MTRS processes 7- or 9-track tape records in non-return-to-zero-inversion (NRZI) or phase-enclosed (PE) format at densities of 200, 556, 800 and 1600 characters per inch and tape speeds of up to 45 inches per second. The system includes operator selectable reformatting routines to control the processing of the magnetic tape records.

MTRS reformats magnetic tape records by transferring data from the tape unit to central memory through a DMA channel, executing the reformatting program that is stored in memory, and transferring the reformatted data through another DMA channel to the output device when requested by that device.

Assembly language, relocatable/absolute.

HP supported:
Data Systems Division

200, TESTING, DEBUGGING, AND PROGRAMMING AIDS

201, TRACING

22193A, INTERPRETIVE BINARY SIMULATOR

The Interpretive Binary Simulator provides the user with an interpretive execution of any program that will run in an 8K computer. The Simulator is similar to program 20002, the BCS Debug Routine, but differs as follows:

- a. Tracing can be conducted through IOC and its I/O drivers.
- b. A mnemonic printout of simulated instructions is provided.
- c. Absolute code is simulated. Relocatable tapes must be prepared by selecting the absolute BCS option.

- d. Internally, the Interpretive Binary Simulator appears to be functioning in an 8K computer, but the Simulator requires 16K for its own storage.

Equipment required is 16K of core storage.

Assembly language, relocatable.

Contributed:
Michael E. Sullivan
HP, Automatic Measurement Division

202 INSTRUMENT TEST

14901B, HP 21XX VERIFICATION AND TEST FOR THE HP 6936A

This program tests an HP 6936/37 system attached to any HP 2100 family computer. The program sends test signals to, and receives information from, the HP 6936/37 system through a buffered TTY. The TTY driver is included in the program; no external drivers are required.

Tests 1 to 4 verify proper system operation; no special equipment is required.

Assembly language, relocatable.

HP supported:
New Jersey Division

The diagnostic does not test any Multiprogrammer I/O cards.

Assembly language, absolute.

HP supported:
New Jersey Division

14905B, HP 6940A/6941A DIAGNOSTIC

This diagnostic allows a quick check of the initial installation of an HP 6940A/6941A, using interface kit 14543A. (This program is included with that kit.) This diagnostic assumes that the 12566B interface has already been proven operational (by another diagnostic). This diagnostic performs five tests: (1) I/O card basic test, (2) Multiprogrammer flag and interrupt test, (3) Computer-Multiprogrammer Data interface, (4) Multiprogrammer-Computer Data interface and (5) 6941A Addressing and flag timing.

20337D, HP 12604B DATA SOURCE INTERFACE DIAGNOSTIC

This routine tests the HP 12604B Data Source Interface Kit, together with the associated digital voltmeter.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20348C, HP 12556B POSITIVE TRUE 40-BIT OUTPUT REGISTER DIAGNOSTIC

This routine tests the HP 12556B 40-Bit Output Register.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

202, INSTRUMENT TEST (continued)

20429C, HP 2912A PROGRAMMER CARD DIAGNOSTIC

This routine tests the HP 2912A Reed Scanner and the associated interface kit.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20436A, HP 12661A DVS PROGRAM CARD DIAGNOSTIC

This routine tests the HP 12661A interface card and the associated 6200/6800 programmable power supply.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

24142A, PROCESSOR INTERCONNECT CABLE DIAGNOSTIC

This routine tests the cable in the HP 12875A Processor Interconnect Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24196A, HP 2100A GENERAL PURPOSE REGISTER TEST

This HP 2100A program tests for proper operation of general purpose interface cards. Currently used for 8-bit and 16-bit duplex registers and 16-bit microcircuit registers.

Assembly language, absolute.

HP supported:
Data Systems Division

24197A, HP 2100A PROCESSOR INTERCONNECT CABLE TEST

This HP 2100A program checks the 12875A Processor Interconnect Cable for hardware errors.

Assembly language, absolute.

HP supported:
Data Systems Division

24199A, HP 2100A CONTROLLER MICROCIRCUIT TEST

This HP 2100A program tests the proper operation of the 12849 Controller Microcircuit Interface Card in the HP 2100A computer.

Assembly language, absolute.

HP supported:
Data Systems Division

24289A, HP 12930A UNIVERSAL INTERFACE DIAGNOSTIC

The purpose of this diagnostic is to verify the proper operation of the 12930A Universal Interface with 2100 family computer.

Assembly language, absolute.

HP supported:
Data Systems Division

203, DISC/DRUM EQUIPMENT TEST

13041B, HP 7900/13210 DIAGNOSTIC

This program tests the HP 7900 Moving-Head Disc Drive and associated interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24184B, FIXED HEAD DISC/DRUM DIAGNOSTIC

This diagnostic routine tests the HP 2770/71 Disc Memory and the HP 2773/74/75 Drum Memory.

Assembly language, absolute.

HP supported:
Data Systems Division

203, DISC/DRUM EQUIPMENT TEST (continued)

24203A, HP 2100A CARTRIDGE DISC MEMORY DIAGNOSTIC

This HP 2100A program confirms proper output, input and control functions for the cartridge disc memory. Rapid checkout of the controller is provided in addition to exhaustive testing of the drive. The test operator may choose to run under the default mode or define his own test with teleprinter and switch register options. Provision is made for serial checkout of up to four drives. Interaction between drives also can be tested. This diagnostic does not provide checkout of more than one controller. Either DMA channel can be used.

Assembly language, absolute.

HP supported:
Data Systems Division

24204A, HP 2100A DISC FILE (HP 2883) DIAGNOSTIC

This diagnostic test program for the HP 2100A computer confirms proper input, output and control functions for the HP 2883 Disc File. Rapid checkout of the controller is provided in addition to exhaustive testing of the drive. The test operator may choose to run under the default mode or define his own test with teleprinter and switch register options. Provision is made for serial checkout of up to two drives. This diagnostic does not provide checkout of more than one controller. Either DMA channel can be used.

Assembly language, absolute.

HP supported:
Data Systems Division

24207A, HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC

This HP 2100A program tests input, output and control functions of the device under test. The program rapidly checks the interface and exhaustively tests the device itself. The user can design his own tests for specific functions. This diagnostic does not check more than one disc or drum at one time.

Assembly language, absolute.

HP supported:
Data Systems Division

24236A, HP 2883 DISC FILE DIAGNOSTIC

Tests input, output, and control functions for the HP 2883 Disc File with an HP 2116, 2115, or 2114 computer. Rapid checkout of one controller and exhaustive, serial testing of two disc drives are provided. The user can employ a default mode or define his own tests through teleprinter and switch register program options. Either DMA channel may be used. This program obsoletes the HP 2883 Disc File Diagnostic, HP order number 24176A.

Assembly language.

HP supported:
Data Systems Division

24237A, CARTRIDGE DISC MEMORY DIAGNOSTIC

Tests input, output, and control functions for the Cartridge Disc Memory with an HP 2116, 2115, or 2114 computer. Rapid checkout of one controller and exhaustive, serial testing of up to four disc drives are provided. Interaction between drives may also be tested. The user can employ a default mode or define his own tests through teleprinter and switch register program options. Either DMA channel may be used. This program obsoletes the Cartridge Disc Memory Diagnostic, HP order number 20585B.

Assembly language.

HP supported:
Data Systems Division

204, MAGNETIC TAPE EQUIPMENT TEST

13020E, HP 7970/13181A DIAGNOSTIC

This program tests the proper operation of the HP 7970 9-track Magnetic Tape Unit and 13181A Interface Kit. Equipment required is 4k computer, teletype, one to four magnetic tape drives and interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

13028E, DIAGNOSTIC FOR HP 7970/13182A MAGNETIC TAPE

This program tests the HP 7970 7-Track Magnetic Tape Unit and the HP 13182A Interface Kit. Teletype is required. Length: 4K with SIO TTY driver. It requires the HP 7970 Magnetic Tape Drive, any 4K HP computer, and any HP teleprinter.

Assembly language, absolute.

HP supported:
Data Systems Division

13031C, HP 7970E/13183 DIAGNOSTIC

This program verifies proper operation of the HP 7970E/13183 (Read/Write) System combination.

Assembly language, absolute.

HP supported:
Data Systems Division

13042B, HP 7970E-215/13184 DIAGNOSTIC

This program tests the data transfer performance of the HP 13184 Interface and the HP 7970E-215 Tape Drive with multi-formats.

Assembly language, absolute.

HP supported:
Data Systems Division

20411B, TEST: KENNEDY INCREMENTAL MAGNETIC TAPE UNIT

This routine tests the Kennedy 1406 or 1506 Incremental Magnetic Tape Transport and the associated HP interface kit.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20433E, HP 3030 MAGNETIC TAPE UNIT DIAGNOSTIC

This routine tests the HP 3030 Magnetic Tape Unit and the associated interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20516B, HP 2020 MAGNETIC TAPE UNIT DIAGNOSTIC

This routine tests the HP 2020 Magnetic Tape Unit and the associated interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

205, GRAPHIC EQUIPMENT TEST

20390A, HP 12560A PLOTTER DIAGNOSTIC

This routine tests the Calcomp Model 563 or 565 Digital Incremental Plotter employing the HP 12560A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

207, DUMPING

22174A, BCS DUMP IN BBL FORMAT

This program dumps the contents of core storage onto punch tape. Alternatively, the teleprinter can provide a printout of the contents of core storage. The I/O select code of the punch or teleprinter is set into the switch register before starting, and the tape or printout provided is in absolute form. The program is useful for debugging.

Assembly language, relocatable.

Contributed:
Fritz Joern
HP, Italy/Milan

22251A, MAGNETIC TAPE TO LINE PRINTER ROUTINE

Used by the MTS Operating System, this program prints the contents of IBM 360 System magnetic tapes on a Data Products 4300 Line Printer. The tapes can be unlabelled or can have standard labels, and either a fixed, variable, or undefined format can be used. If the format is undefined, the data is printed 60 lines per page, single space. Printer control characters on the tape can be of the USASI type or machine type, or no printer control characters need be used. The program has the capability of skipping designated files. The output is furnished at a rate of 1,000 lines per minute, and all characters are identical with those that would be printed by the IBM 360 System. The magnetic tape lateral recording density can be either 200, 556, or 800 bits per inch.

Equipment required is 16K of core storage, the Direct Memory Access option for the computer, one HP 3030 Magnetic Tape Unit with interface kit, and one Data Products 4300 Line Printer with interface kit.

Assembly language, relocatable.

Contributed:
Jim Overman
HP, Palo Alto

22257A, MTS/BCS SYSTEM ABSOLUTE DUMP

This program dumps an absolute tape under BCS. When used as input to Prepare Tape system, it generates only three data records on file one instead of the usual several hundred. Faster access time under MTS and a significant savings in magnetic tape are the benefits of this program. It can be used along with or instead of the Basic Control System absolute dump option.

When used as a general routine it can dump an entire BCS system or selected core sections enabling system modification without reassembly and generation of a new absolute tape.

Assembly language, relocatable.

Contributed:
Thomas J. Winker
HP, Neely Sales Region

22259A, DOS TO MAGNETIC TAPE DUMP

This absolute program dumps selected source files of length less than 237 sectors, from DOS to a nine-track 7970/3030 in a format compatible with the Magnetic Tape Storage and Retrieval Program, 22198. It is loaded over a "halted" DOS and uses base page constants to find the system directory track and handle the 90/128 sector per track discs. Requires 16K Disc Operating System.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22260A, MAGNETIC TAPE TO DOS DUMP

This absolute program loads source files over a "halted" 16K DOS from a nine-track magnetic tape which has been previously prepared by the Magnetic Tape Storage and Retrieval Program, 22198. Any number of tape records may be concatenated to form a single source file on DOS.

The 16K DOS may have a 90 or 128 disc/drum with an HP 7970 or 3030 magnetic tape unit.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22280A, ABSOLUTE CORE DUMP ROUTINE

This routine allows dumping selected areas of core onto tape in a format compatible for loading with the Basic Binary Loader. Two versions are supplied to the user; one absolute for loading through the Basic Binary Loader, and one relocatable for loading through the Basic Control System. No external subprograms are called.

207, DUMPING (continued)

Assembly language, relocatable and absolute.

Contributed:

Donald C. Dougherty
Applied Research Laboratories

22290A, CORE PUNCH IN BBL FORMAT

This program punches selected areas of core in a format which can be reloaded by the Basic Binary Loader. The user inputs the necessary parameters through the switch register at RUN time. Provisions exist to allow punching an absolute tape which will reload to another part of the core. This feature is useful for moving data.

Assembly language, absolute.

Contributed:

Dave Snyder
HP, Santa Clara Division

22300B, QUICK FIXED HEAD SDUMP

This absolute assembly program uses the magnetic tape and teleprinter SIO drivers to dump or load the contents of a fixed head disc to or from magnetic tape. The program contains its own internal disc "SIO" driver. Speed is obtained by writing one magnetic tape record per logical disc track.

The hardware parity check in the magnetic tape controller is augmented by a software checksum written onto magnetic tape. Requires 16K core, any HP fixed head disc, DMA, any HP magnetic tape drive, and an HP 2752A teleprinter.

Assembly language, absolute.

Contributed:

Charles Chernack
HP, Eastern Sales Region

22322A, ABSOLUTE OCTAL OR DECIMAL CORE DUMP

This absolute program dumps core to the teleprinter in double spaced records consisting of one octal address and eight octal or decimal images of word contents. The test program "Character Frequency Distribution in Tape" together with "dump" is useful for detecting defects in paper tape and paper tape devices as well as debugging and scanning programs without accessible source.

Assembly language, absolute.

Contributed:

Dr. J. Schrama
Central Laboratory D.S.M./The Netherlands

22340A, 360 FORMAT MAGNETIC TAPE DUMP

This program accepts ASCII paper tape or IBM 029 punched cards as input and dumps images to an OS/360 compatible nine track magnetic tape. Output may be ASCII or EBCDIC code, standard labelled or unlabelled magnetic tapes with fixed or variable blocked records. It operates under control of BCS.

Equipment required includes 16K core, any HP photo-reader or HP 2761 card reader, and an HP 7970 nine track magnetic tape unit.

ALGOL/Assembly language, relocatable.

Contributed:

Ted Slater
Simon Frazer University/Canada

22454A, QUICK SDUMP FOR HP 7900A MOVING HEAD DISC

This absolute assembly program will dump or load data from an HP 7900A Moving Head Disc to or from a magnetic tape unit. SIO drivers are expected for the magnetic tape and for a teletype. The program has a verify option and will dump an optional number of tracks.

Equipment required includes 8K core, an HP 7900A Moving Head Disc, any HP magnetic tape drive, an HP teleprinter, and DMA.

Assembly language, absolute.

Contributed:

T. J. Ballew
HP, Southern Sales Region

22463A, HP 7900 DISC TO DISC DUMP

This set of programs will allow the operator to transfer data between the fixed and removeable platters of an HP 7900A Moving Head Disc. Protected and defective cylinder flags are transferred to the destination disc. Any contiguous block of tracks can be transferred or verified. All data written on a disc track is read and compared with

(continued)

207, DUMPING (Continued)

original data during a copy operation. The operator can choose to patch up to twenty random locations during a transfer. It operates under BCS and requires 16K with DMA.

Assembly language, relocatable.

Contributed:

T. J. Ballew
HP, Southern Sales Region

22469A, HP 2870 DISC TO DISC DUMP

This absolute assembly program copies one subchannel of an HP 2870 disc to another subchannel. During the dump the appropriate tracks are protected, and after the dump a verify option compares the information on the two selected channels. The program functions within the user's configured SIO environment.

The equipment required is 8K core, an HP Teleprinter, DMA, and an HP 2870 Cartridge Disc Unit.

Assembly language, absolute.

Contributed:

Dennis I. Smith
Montana State University

22480A, DUMP FROM DOS-M MAGNETIC TAPE STORAGE AND RETRIEVAL (HP 22198) FORMAT

Utility program to be loaded over halted DOS-M, which will dump selected source files (SS) from the DOS-M to a 9-track HP 7970/3030 in a format compatible with the Magnetic Tape Storage and Retrieval Program (HP 22198). The utility may be used to append to an existing mag tape.

The SS file must be less than 237 sectors long, and a 16K computer is required. The program must be configured after loading for the mag tape and disc select code, but it will use DOS-M base page constants to find the system directory track and to handle the HP 2870/7900 disc drives.

Requires DMA.

Assembly language, absolute.

Contributed:

Ted Slater
Simon Fraser University/Canada

22481B, LOAD DOS-M FROM MAGNETIC TAPE STORAGE AND RETRIEVAL (HP 22198) FORMAT

This absolute assembly program loads source files over a "halted" 16K DOS-M system from a nine-track magnetic tape which has been previously prepared by the Magnetic Tape Storage and Retrieval Program, HP 22198. Any number of tape records may be concatenated to form a single source file on DOS-M.

The 16K DOS-M system must have DMA, an HP 3030 or 7970 Magnetic Tape Unit, an HP 2870 and 7900 Disc Drive, and a teleprinter.

Assembly language, absolute.

Contributed:

Ted Slater
Simon Fraser University/Canada

22501A, HEXADECIMAL/OCTAL LIST OF ANSI-COMPATIBLE MAGNETIC TAPE (TDUMP)

Operating as a stand alone program or under a Magnetic Tape System, this program reads an ANSI-compatible 9-track magnetic tape, converts the information into hexadecimal or octal characters, and prints it on the list device. Also printed is the file count, record count, and byte number count. Prior to printing, the magnetic tape can be positioned to any record by the use of switch register options. If the length of the record exceeds available core, a message is printed, and as much of the record as fits is dumped.

Depending on control statement parameters, the output list format can be 72 or 120 characters per line. This allows the list device to be the HP 2778 or HP 2767 line printer, the HP 2752 or HP 2754 teletype, or the HP 2600 CRT.

The program requires an HP 7970 tape drive with the appropriate interface and DMA.

Assembly language, absolute.

Contributed:

Larry Byler
HP, Data System Division

22530A, CHERNACK (HP 22198) MAGNETIC TAPE SOURCE FORMAT TO DOS-M SOURCE FILE (CHERN)

Operating under DOS-M, CHERN reads a tape record previously prepared by the Magnetic Tape Storage and Retrieval Program (HP 22198). It reformats the record

(continued)

207, DUMPING (continued)

into a DOS-M source file and optionally calls the language translator (ASMB, FTN4, or ALGOL) specified in the source file control statement. Following assembly or compilation the source file is not retained, unless the user specifies the correct option and a name for the file. The main purposes of CHERN is to obtain source program listings from 22198 format without the intermediate step of dumping to paper tape. This program cannot be used to store binary files.

CHERN requires a nine track magnetic tape unit and will run on all memory sizes of DOS-M. The length of the source program which CHERN can process depends on the memory available after the initialization section of CHERN is released. Therefore systems with 16K will be limited to processing 22198 records of approximately 10000 words.

Option parameters for CHERN may be entered with the :PROG directive, interactively at the keyboard, or from a batch device. If a 22198 tape contains more than one record per complete program, CHERN will concatenate these records into one file until a valid "END" line is found. If one record on a 22198 tape contains more than one program, CHERN will store all of the programs in one DOS-M file.

Assembly language, relocatable.

Contributed:
Larry Byler
HP, Data Systems Division

208, CORE STORAGE TEST

20403A, LOW MEMORY ADDRESS TEST

This program verifies the accessibility of all memory addresses below the test block.

Assembly language, absolute.

HP supported:
Data Systems Division

20404A, HIGH MEMORY ADDRESS TEST

This program verifies the accessibility of all memory addresses above the test block.

Assembly language, absolute.

HP supported:
Data Systems Division

20405A, HP 2116A LOW MEMORY CHECKERBOARD TEST

Intended for the 2116A computer, this diagnostic program tests core storage with worst-case word patterns. All addresses below the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

20406A, HP 2116A HIGH MEMORY CHECKERBOARD TEST

Intended for the 2116A computer, this program tests core storage with worst-case word patterns. All addresses above the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

20426A, HP 2116B HIGH MEMORY CHECKERBOARD TEST

Intended for 2116B computer, this program tests core storage with worst-case word patterns. All addresses above the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

20427A, HP 2116B LOW MEMORY CHECKERBOARD TEST

Intended for the 2116B computer, this program tests core storage with worst-case word patterns. All addresses below the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

208, CORE STORAGE TEST (Continued)

20512A, HP 2116A/14A HIGH MEMORY CHECKER-BOARD TEST

Intended for 2115A and 2114A computers, this program tests core storage with worst-case word patterns. All addresses above the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

20513A, HP 2115A/14A LOW MEMORY CHECKER-BOARD TEST

Intended for 2115A and 2114A computers, this program tests core storage with worst-case word patterns. All addresses below the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

24161A, HP 2116C LOW MEMORY PATTERN TEST

Intended for use with the 2116C computer, this program tests core storage with worst-case word patterns. All addresses below the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

24162A, HP 2116C HIGH MEMORY PATTERN TEST

Intended for use with the 2116C computer, this program tests core storage with worst-case word patterns. All addresses above the test block are checked.

Assembly language, absolute.

HP supported:
Data Systems Division

24193A, HP 2100A LOW MEMORY PATTERN TEST

This HP 2100A program resides in low core and tests for proper operation of 2100A high memory under worst case noise conditions.

Assembly language, absolute.

HP supported:
Data Systems Division

24194A, HP 2100A HIGH MEMORY PATTERN TEST

This HP 2100A program resides in high core and tests for proper operation of 2100A low memory under worst case noise conditions.

Assembly language, absolute.

HP supported:
Data Systems Division

24198B, HP 2100A MEMORY PARITY CHECK TEST

This HP 2100A program tests for proper operation of the HP 2100A memory parity check circuitry.

Assembly language, absolute.

HP supported:
Data Systems Division

24211A, HP 2100A LOW MEMORY ADDRESS TEST

This HP 2100A program tests the memory address register and an area of core specified by the user. It resides in low core (100_g through 143_g).

Assembly language, absolute.

HP supported:
Data Systems Division

24212A, HP 2100A HIGH MEMORY ADDRESS TEST

This HP 2100A program tests the memory address register and an area of core specified by the user. It resides in high core (3600_g through 3643_g).

Assembly language, absolute.

HP supported:
Data Systems Division

209, CENTRAL PROCESSING UNIT TEST

20400A, ALTER-SKIP INSTRUCTION TEST

This program tests all instructions in the alter-skip group.

Assembly language, absolute.

HP supported:
Data Systems Division

20401B, MEMORY REFERENCE INSTRUCTION TEST

This program tests all instructions in the memory-reference group.

Assembly language, absolute.

HP supported:
Data Systems Division

20402D, SHIFT-ROTATE INSTRUCTION TEST

This program tests all instructions in the shift-rotate group.

Assembly language, absolute.

HP supported:
Data Systems Division

20415A, INTERRUPT DIAGNOSTIC

This program tests the computer interrupt system.

Assembly language, absolute.

HP supported:
Data Systems Division

24208A, HP 2100A ALTER-SKIP INSTRUCTION TEST

This HP 2100A program tests the alter-skip group of instructions.

Assembly language, absolute.

HP supported:
Data Systems Division

24209A, HP 2100A MEMORY REF. INSTRUCTION TEST

This HP 2100A program tests the memory reference group of instructions.

Assembly language, absolute.

HP supported:
Data Systems Division

24210A, HP 2100A SHIFT-ROTATE INSTRUCTION TEST

This HP 2100A program tests the shift-rotate group of instructions.

Assembly language, absolute.

HP supported:
Data Systems Division

24214A, HP 2100A EXTENDED ARITHMETIC UNIT TEST

This HP 2100A program tests the extended arithmetic group of instructions.

Assembly language, absolute.

HP supported:
Data Systems Division

24215A, HP 2100A INTERRUPT TEST

This program tests the HP 2100A Interrupt Logic and the interrupt capability of any of its I/O slots.

Assembly language, absolute.

HP supported:
Data Systems Division

211, DEBUGGING AIDS

20002B, BCS DEBUG ROUTINE

Employed in conjunction with a user program, the BCS Debug Routine performs any of the following functions:

- a. Furnishes a printout of selected portions of core storage.
- b. Provides a printout of instructions in the sequence in which they are executed.
- c. Modifies the contents of specified registers or core storage locations.
- d. Halts the user program at designated break points.
- e. Allows a user program to begin at any desired point.
- f. Lists the absolute address of the origin of the user program.

Assembly language, relocatable

HP supported:
Data Systems Division

22088A, OCTAL UTILITY SYSTEM (HOCUS)

Designed for use with independent user programs, Hocus performs any of the following operations:

- a. Loads any absolute binary tape.
- b. In absolute binary form, reproduces on punched tape the contents of specified sections of core storage.
- c. Compares an absolute binary tape with the contents of a specified section of core storage.
- d. Furnishes a teleprinter printout of the contents of a specified core storage location, and permits modification of the contents of the core storage location.
- e. Provides a teleprinter printout of the contents of a specified section of core storage.
- f. Searches core storage for a desired word and furnishes a teleprinter printout of its address, or of the addresses of all words which are different.
- g. Fills a specified section of core storage with a specified word.
- h. Brings about a jump to an address typed on the teleprinter.

- i. Reproduces any absolute-binary punched tape.

Though an independent program, Hocus is compatible with the BASIC Operating System.

Assembly language, absolute.

Contributed:
George V. Woodley
HP, Automatic Measurement Division

22190A, ABSOLUTE PROGRAM CONTROL SYSTEM

This program can either be used as an independent control program, or its subroutines can be inserted into other programs. It performs the following operations:

- a. Enters data into memory.
- b. Lists core storage contents in binary, decimal, or ASCII form.
- c. Punches binary tape compatible with the Absolute Binary Loader.
- d. Transfers program control to any location in memory.
- e. Executes one instruction without loading.
- f. Debugs by stepping through a number of instructions at a time. Simulated registers are used and can be printed out. Fifteen breakpoints can be entered. Jump instructions and subroutines can be listed each time they occur.

Subroutines available include:

- a. Octal, decimal or ASCII keyboard input.
- b. ASCII character input.
- c. Byte input from teleprinter punched tape reader.
- d. Octal, decimal or ASCII printer output.
- e. ASCII character output.
- f. Byte output for teleprinter punch.
- g. Carriage control, space, question mark.
- h. Teleprinter system interrupt.

Assembly language, absolute.

Contributed:
Barry S. Todd
Naval Weapons Center

211, DEBUGGING AIDS (continued)

22293A, OCTAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM

OCTAPUS is a troubleshooting aid which eliminates time consuming toggling from the switch register. It is a self-configuring, self-contained program residing within the bounds of a single page in core. Communication is conversational through the teleprinter. The following functions can be performed: assembly into core, inverse assembly from core, punch absolute tape from core, load absolute tape to core, verify absolute tape to core, dump core to teleprinter in octal and jump to any location in core.

Assembly language, absolute.

Contributed:
Harvey Thackston
HP, Southern Sales Region

22314A, RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR

This program produces a Cross-Reference Table of Symbolic names used in HP Assembly language programs. It accepts an assembler source tape as input under RTE, and produces a list of symbols in alphabetical order as output. The symbol name is followed by its location in the program and a list of references.

Assembly language, relocatable.

Contributed:
J. D. Sankey
National Research Council of Canada

22526A, DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR

Operating in a 16K DOS-M system this program generates a cross reference table for FORTRAN IV programs, similar in form to that produced for assembly language programs. Each program and subprogram is handled separately. Program source statements may come from I/O devices or from disc source files.

FORTRAN IV

Contributed:
Thomas J. Andrews

22527A, DEBUG FOR ABSOLUTE/BCS PROGRAMS

This small program is intended for on-line inter-active debugging of absolute and BCS programs. It is also useful for preparation of small test programs and for dumping of patched programs onto paper tape.

A particularly useful feature of this program is the ability to set up to six traps in a program simultaneously. When a trap cell is reached during the execution of the program, the A, B, Overflow, and Extend registers are displayed and the machine halts. In addition to setting traps, DEBUG allows the user to open specified locations and input in octal or ASCII; dump memory in octal or ASCII; compare memory with masking; open and display registers; and begin executing at any desired location.

Assembly language, absolute.

Contributed:
Larry Lotito
HP, Data Systems Division

24109B, CROSS-REFERENCE SYMBOL TABLE GENERATOR

From an assembly language source program, this program produces and prints an alphabetized cross-reference list of all symbols appearing in the program. Each symbol is followed by the sequence number of the statement in which it is defined, and by the sequence numbers of all statements referring to the symbol. Program 24123, 24125, or 24127 (classification code A002) must be used as the teleprinter or line-printer driver.

Assembly language, absolute.

HP supported:
Data Systems Division

24223B, DOS CROSS-REFERENCE ROUTINE

This program processes an assembly language source program under DOS/DOS-M and produces a list of all symbols in the source program and all references to each symbol.

Assembly language, absolute.

HP supported:
Data Systems Division

211 DEBUGGING AIDS (continued)

24281A, MICRO DEBUG EDITOR

The Micro Debug Editor is a multipurpose program designed to load a given WCS module and to aid the user in debugging his microprograms.

Assembly language, relocatable.

HP supported:
Data Systems Division

212, PROGRAMMING AIDS

20078A, BCS HP 2312A DRIVER/FORTRAN INTERFACE ROUTINE (L2312)

This routine links FORTRAN or ALGOL requests to the 20076A BCS HP 2312A Driver (D.55). The request must be initiated by the 20078A routine in order to provide the required buffer address parameters.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

Assembly language, relocatable.

Contributed:
J. D. Sankey
Division of Applied Physics
National Research Council of Canada

22014A, BINARY TAPE EDITOR

This program allows manipulation of absolute-address data blocks. When used in conjunction with the Inverse Assembler (program 22013, classification code A018) and with the Assembler program appropriate to the operating system employed, it facilitates the production of a valid inverse-assembly listing.

The Binary Tape Editor (BTD) lists the starting addresses of specified data blocks on a binary punched tape, and can duplicate designated data blocks of a binary tape with the purpose of producing a "continuous" set of tape segments that can be located without halts by the Basic Binary Loader.

Some typical uses of BTED are the following:

- a. To inverse-assemble a specified part of a binary punched tape.
- b. To create a single binary punched tape from two or more binary punched tapes.
- c. To produce from a binary punched tape a second tape in which a data block has been changed.

Equipment required is the Extended Arithmetic Unit.

22015B, BASIC LINE RESEQUENCER

The BASIC Line Resequencer Program provides a means of changing the line numbers of a BASIC program. Any statement in the BASIC program which references a changed line number is altered to correspond. The original execution sequence of the BASIC program is retained.

Assembly language, absolute.

Contributed:
T. D. MacCoun
Quindar Electronics, Inc.

22016C, SYMBOLIC ALPHANUMERIC GENERATOR

Furnishing a means of labelling a program or routine, this program generates a block-lettering leader or trailer for a punched tape.

Assembly language, absolute.

Contributed:
Charles Chernack
HP, Eastern Sales Region

22064B, AUTOMATIC TABBING PROGRAM

This program, used when typing and punching assembly language programs on the teleprinter, automatically spaces to the correct columns for operation code, operand, and comments. The program also prevents certain illegal operations, such as comments extending beyond column 52. The program allows at least a 30-percent increase in the effi-

(continued)

212, PROGRAMMING AIDS (continued)

ciency of making program tapes.

Assembly language, absolute.

Contributed:

Jim Fearnside

HP, Medical Electronics Division

22089A, TELEPRINTER OCTAL INPUT PROGRAM

This program permits the user to enter routines by means of the teleprinter. The routine is typed using the octal equivalent of binary machine code. The teleprinter furnishes a printed record of the routine entered, allowing examination for mistakes. One use of this program is to permit service technicians to quickly enter test routines for troubleshooting the computer. The program can also serve as a test of the switch-register switches and the circuit associated with these switches.

Assembly language, absolute,

Contributed:

Robert Richardson

HP, Eastern Sales Region

22096A, SCOPE SYMBOLIC LISTER

Operating under switch register control, the Symbolic Lister reads a program from punched tape and displays on a CRT screen a symbolic-editor type of listing of the program. The 20208A Scope Display Library is required.

Equipment required is 16K of core storage, the Direct Memory Access option for the computer, and either an HP 2331A X-Y Display Subsystem or any oscilloscope that can be used with the HP 12555A interface kit.

Assembly language, relocatable.

Contributed:

M. H. Kendall

Redstone Arsenal

22191A, NAM-ENT-EXT EDITOR

This program is used to change the symbols in NAM, ENT, and EXT statements in relocatable programs on binary punched tapes.

Assembly language, absolute.

Contributed:

Alberto L. Panni

HP, Italy/Milan

22205A, TABULATION AND FORM-FEED CALLS FOR HP 2754 TELEPRINTER

This software product consists of three subroutines which respectively perform the following functions:

- a. Move the carriage of an HP 2754 Teleprinter horizontally to the next horizontal tabulation stop.
- b. Rotate the platen of an HP 2754 Teleprinter to the next vertical tabulation stop.
- c. Rotate the platen of an HP 2754 Teleprinter to the top of the next page.

Equipment required is one HP 2754 Teleprinter, with interface kit.

Assembly language, relocatable.

Contributed:

G. L. Davis

Automatic Electric Labs, Inc.

22250A, EXEC CALL ADAPTER ROUTINE

This routine, used by the BCS or MTS Operating System, accepts RTE, DOS, and DOS-M EXEC calls, permitting RTE, DOS, and DOS-M programs to run under BCS or MTS. However, disc or drum operations are not possible if the BCS or MTS computer system does not include these I/O units. The ICODE words accepted by the routine are the following:

- a. 1, READ (with or without WAIT)
- b. 2, WRITE (with or without WAIT)
- c. 3, CONTROL
- d. 13, STATUS
- e. 6, STOP
- f. 7, PAUSE
- g. 8, 9, 10, 11, and 12, CHAINING
- h. 11, TIME (set to zero)

It should be noted that RTE, DOS, or DOS-M logical unit numbers apply when this routine is used. Additional functions of the routine are to permit the use of simple binary READ/WRITE/CONTROL requests and chain requests under BCS or MTS.

Assembly language, relocatable.

Contributed:

Fritz Joern

HP, Germany/Frankfurt

212, PROGRAMMING AIDS (Continued)

22267A, MTS FORTRAN CHAIN

CHAIN is a relocatable subroutine configured into MTS file two which permits a FORTRAN program to chain to an absolute program on file one through a CALL statement.

Assembly language, relocatable.

Contributed:

Stroud Custer
HP, Eastern Sales Region

22269A, PAPER TAPE TITLER

This FORTRAN-callable subroutine allows the user to label his paper tapes under program control. Character size is equivalent to the width of eight-level punched paper tape.

Assembly language, relocatable.

Contributed:

Eugene Burmeister
HP, Loveland

22278A, TAB FOR PREPARING FORTRAN TAPES

FTFRAN is an online absolute program for the preparation of FORTRAN source tapes. It is written for a system having only a teleprinter as the output device. Edit file tapes can also be prepared using this program.

Assembly language, absolute.

Contributed:

Tom Prewitt
Delco Electronics

22287A, CHAIN FROM PHOTOREADER IN HP BASIC

This program allows a user to chain programs via the photoreader in HP BASIC, 20392, by executing the SCRATCH, PTAPE, and RUN commands. The statement CALL (63) has to be located immediately before the END statement to facilitate the chaining feature.

Assembly language, absolute.

Contributed:

Peter Frye
HP, Germany/Berlin

22289A, ALGOL ARRAY TRANSFER FOR SEGMENTATION

This routine allows the transfer of array data between ALGOL main and segments under DOS, DOS-M, or RTE. Since COMMON is not normally available in ALGOL, this routine accepts the addresses of up to 10 ALGOL arrays and saves the addresses of the array tables. Another call allows the segments to get these addresses so that it may use the original array directly. Thus, COMMON is established between a main program and its segments by copying the original array table of MAIN into a dummy array table of the segment. Requires ALGOL compiler HP 24129B.

ALGOL/Assembly language, relocatable.

Contributed:

Fritz Joern
HP, Germany/Frankfurt

22310A, FORTRAN/ALGOL ARRAY TRANSFER ROUTINE

The transfer of arrays between a Fortran Program and an Algol Procedure is normally not possible, because there are no array tables in the procedure for the dummy array parameters. This routine creates such array tables which refer to external Fortran arrays. These may be in normal storage or in common. In the Algol procedure, the dimensions can be handled dynamically, so you are able to change array dimensions at Run-Time. The maximum number of indices is three with respect to FTN4. The arrays may be of type real or integer.

Contributed:

Dr. Rolf Robcke
HP, Germany/Frankfurt

22320A, DOS/DOS-M HP 2020/3030 MAGNETIC TAPE CONTROL PROGRAM

This program allows a DOS or DOS-M system operator to manipulate an HP 2020 or HP 3030 magnetic tape unit. Parameters entered with the :PROG,LOADR command determine the operations to be performed: write end-of-file, forward space, back space, rewind, and rewind-standby. Up to four of these operations can be performed with one command.

Assembly language, relocatable.

Contributed:

Dennis I. Smith
Montana State University

212, PROGRAMMING AIDS (continued)

22346A, DOS/DOS-M ASSEMBLY LANGUAGE COMMENT INSERTER

This Assembly Language Comment Inserter reads a source assembly language program from a disc file (or paper tape or magnetic tape), prints each statement on the teleprinter allowing the user to add comments if desired and then outputs the commented source to paper tape or magnetic tape. In case the output device is a magnetic tape, the program does the necessary handling of the magnetic tape and, upon completion of the program, the commented source is ready to be stored on the disc using a ":ST,S" command. Previously commented lines are duplicated without teletype output. A switch option allows duplicating sections without adding comments. This program is similar in operation to 22105 but with the above additional features.

Assembly language, relocatable.

Contributed:

Roland E. Jahn

HP, Medical Electronics Division

22351A, ASCII STRING SEARCH FROM DISC FILE

This program searches a source file on the disc for all occurrences of a specified string of characters as input from the system console or batch device. The maximum string length is 72 characters. The located strings are listed on the line printer or system console by line number and position within the line, and the line itself is printed. Non-printing characters are listed in octal. Requires a minimum DOS or DOS-M System.

FORTRAN II/Assembly language, relocatable.

Contributed:

Allan P. Sherman

HP, Medical Electronics Division

22352A, ACII STRING SEARCH FROM PHOTOREADER

This program searches a source tape for all occurrences of a specified string of characters as input from the teleprinter. The maximum string length is 72 characters and non-printing characters are listed in octal. The located strings are identified by line number and position within the line, and the line itself is listed on the teleprinter or line printer.

FORTRAN II/Assembly language, relocatable.

Contributed:

Allan P. Sherman

HP, Medical Electronics Division

22366A, ALGOL SEGMENT RETURN TO MAIN PROGRAM

Subroutine SEGLINK permits a user to leave an ALGOL main program at any point, call in a segment, execute the segment, and return to the main program at the same point for further execution.

Used in conjunction with HP 22289 ALGOL ARRAY Transfer, this package provides flexible and powerful capabilities to the ALGOL programmer in a DOS/DOS-M environment.

Assembly language, relocatable.

Contributed:

Glyn Harris

HP, England/Slough

22428A, ASSEMBLER JUSTIFICATION PROGRAM

This relocatable program accepts as input any HP Assembler source tape. It produces as output the same Assembler statements with the label, opcode, operand, and comment fields justified.

Special features include switch register options for easy operation under BCS or DOS-M.

ALGOL

Contributed:

Tony Chambers

HP, England/Slough

22431A, DOS-M SEGMENT RETURN TO MAIN

This FORTRAN-ALGOL callable subroutine allows a user in the DOS-M environment to return to a main program from a segment. Optionally, the label at which execution will be resumed may be specified.

Assembly language, relocatable.

Contributed:

Bjoern Lindberg

HP, Sweden/Stockholm

212, PROGRAMMING AIDS (continued)

22444A, COMMENT INSERTER FOR ASSEMBLER PROGRAMS

This program assists in adding comments to Assembly Language Source Programs.

One record of the Source Program is read by the photo-reader and printed on the teletype. The teletype is then tabulated to Column 21 or three spaces past the last character in the Source Program record, whichever is greater. The user now types the comment to be added, followed by carriage return and line feed (if no comment then type space, carriage return, line feed). The entire record will now be punched. The steps above will be repeated for each record of the Source Program.

To terminate with trailer, type a slash: "/".

Hardware required is: Computer, Tape Reader, Tape Punch, Teletype.

ALGOL

Contributed:

John Galbreath

HP, Data Systems Division

22455A, HP 'IDEAL' COMMERCIAL SUBROUTINE LIBRARY

This set of 18 assembly and 1 FORTRAN routine provides the means of business application programming with little FORTRAN experience, making HP FORTRAN an easy and powerful commercial language. This set is easy to learn, easy to use, efficient, fast, accurate and provides editing capabilities. Error detection is provided in appropriate routines. Programs were developed using DOS-M system but could RUN in a 4K BCS environment.

FORTRAN/Assembly language, relocatable.

Contributed:

Roger Baker/ John Woeller

Jones & Henry Engineers Limited

22524A, RTE ALPHANUMERIC TAPE LABEL GENERATOR

Operating in a RTE environment, this program provides a means of labelling a paper tape by generating a block-lettering leader or trailer on the tape.

Assembly language, relocatable.

Contributed:

James D. Reed

Hughes Aircraft Company

29010A, HP 2313A DRIVER FORTRAN/ALGOL INTERFACE ROUTINE (I2313)

I2313 provides the interface between FORTRAN or ALGOL compiled programs, and drivers D. 62 or D. 62A for the HP 9600A/G-Option G00 (HP 2313A) Data Acquisition Subsystem. The routine allows the correct transfer of measurement parameters to the driver.

Assembly language, relocatable.

HP Supported:

Automatic Measurement Division

29011A, BINARY INTERFACE ROUTINE R2313 TO DVR62

R2313 provides the interface between Assembler, FORTRAN, or ALGOL compiled programs, and driver DVR62. The routine allows and safeguards transfer of measurement parameters in a multiprogramming environment. The subroutine consists of four modules that allow the user to configure his operating software to suit his hardware environment. These modules are designed as RTE Utility Library Subroutines which are type 7 programs.

Assembly language, relocatable.

HP Supported:

Automatic Measurement

29017A, FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65 (L65)

L65 is a relocatable assembly language subroutine that interfaces FORTRAN/ALGOL READ or WRITE statements to D.65. The subroutine also allows FORTRAN or ALGOL programs to make the necessary D.65 CLEAR and STATUS calls.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

29018A, LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DRIVER D.65 (DIR65)

DIR65 is a relocatable assembly language subroutine that performs I/O requests through the HP 12665 card when D.65 is in the Listen Mode. DIR65 must be called by the user's interrupt-scheduled program.

Assembly language, relocatable.

HP supported:

Automatic Measurement Division

212, PROGRAMMING AIDS (continued)

29019A, LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65 (DRL65)

DRL65 is a relocatable assembly language subroutine that performs I/O requests through the HP 12665 card when D.65 is in the Listen Mode. DRL65 must be called by the user's interrupt-scheduled FORTRAN or ALGOL program.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29020A, FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.66 (L66)

L66 is a relocatable assembly language subroutine that is called by FORTRAN or ALGOL programs when the user does not want to use READ or WRITE statements in D.66.

(READ and WRITE statements use the HP Formatter.) The subroutine also allows FORTRAN or ALGOL programs to make any necessary CLEAR or STATUS calls required to operate D.66.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

29021A, FORTRAN/ALGOL INTERFACE SUBROUTINE FOR RTE DRIVER DVR65 (DLK65)

DLK65 is a utility subroutine which must be used by FORTRAN or ALGOL programs making a DVR65 output request and I/O data call.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

213, PAPER TAPE EQUIPMENT TEST

20408C, HP 2737 PUNCH TAPE READER TEST

This routine tests the HP 2737A Punch Tape Reader and its interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20409C, HP 2753 TAPE PUNCH TEST

This routine tests the HP 2753 Tape Punch with the HP 12536 or 12597-003 interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24189B, HP 2100A TAPE READER TEST

This HP 2100A program tests the HP 2748 Tape Reader or the HP 2758 Tape Reader Reroller with the HP 12597-02 Interface Kit.

Assembly language, absolute

HP supported:
Data Systems Division

24190A, HP 2100A TAPE PUNCH TEST

This HP 2100A program tests the HP 2753 Tape Punch with the HP 12597A-03 Interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24201A, HP 2100A TELEPRINTER TEST

This HP 2100A program tests the HP 12531-60022 Teleprinter Interface card and the HP 2752A or HP 2754 A/B Teleprinter.

Assembly language, absolute.

HP supported:
Data Systems Division

214, PUNCH CARD EQUIPMENT TEST

20347B, HP 2761A-007 OPTICAL MARK READER DIAGNOSTIC, HP 12602A KIT

This routine tests the HP 2761A-007 Optical Mark Reader with the HP 12602A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20899B, HP 2761A-007 OPTICAL MARK READER DIAGNOSTIC, HP 12602B KIT

This routine tests the HP 2761A-007 Optical Mark Reader with the HP 12602B interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24174A, HP 2891 CARD READER DIAGNOSTIC

The program confirms proper operation of the HP 2891 Card Reader and HP 12882 Card Reader Interface.

Assembly language, absolute.

HP supported:
Data Systems Division

24188B, HP 2100A OPTICAL MARK READER TEST (KIT 12602B)

This HP 2100A program tests the operation of the HP 2761A-007 Optical Mark Reader, using the HP 12602B Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24192A, HP 2100A CARD READER (HP 2891/12882) DIAGNOSTIC

This HP 2100A program tests the HP 2891 Card Reader and the HP 12882 Card Reader Interface.

Assembly language, absolute.

HP supported:
Data Systems Division

24267A, HP 2892/12924 CARD READER DIAGNOSTIC

This diagnostic confirms proper operation of the HP 2892 Card Reader and the HP 12924 Interface. A teleprinter is required.

Assembly language, absolute.

HP supported:
Data Systems Division

24297A, HP 3260A/12566B CARD READER/INTERFACE DIAGNOSTIC

This diagnostic program is used to assure that the 3260A Mark Card Reader and its interface (12566B Micro Circuit Card) are functioning properly.

Assembly language, absolute.

HP supported:
Data Systems Division

215, PRINTER EQUIPMENT TEST

20895C, HP 2778 LINE PRINTER DIAGNOSTIC

This routine tests the HP 2778 (120 characters/line) Line Printer and the HP 2778-001 (132 characters/line) Line Printer, together with the associated interface kit. The routine requires the standard carriage-control tape, which is supplied with the HP 12617A interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20999A, HP 2767 LINE PRINTER DIAGNOSTIC

This routine tests the HP 2767 Line Printer and the associated interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24205A, HP 2100A LINE PRINTER (HP 2767) DIAGNOSTIC

This HP 2100A program tests all HP 2767 Line Printer functions, and allows the user to design his own test series for exercising any function.

Assembly language, absolute.

HP supported:
Data Systems Division

24218C, HP 2100A LINE PRINTER (HP 2778) TEST

This HP 2100A program tests the HP 2778 Line Printer for errors and malfunctions. The program requires a standard carriage control tape (in the line printer) and a teleprinter (in reporting errors and messages).

Assembly language, absolute.

HP supported:
Data Systems Division

24275B, HP 2610/2614 LINE PRINTER DIAGNOSTIC

This diagnostic tests the HP 2610 or HP 2614 line printer using an HP 2114, 2115, 2116 or 2100 computer. A teleprinter is required.

Assembly language, absolute.

HP supported:
Data Systems Division

216, A/D-D/A EQUIPMENT TEST

14903A, HP 21XX VERIFICATION AND TEST FOR DIGITAL VOLTAGE SOURCE

This program provides six test routines and one routine to print a test table for the HP 6129, 6130, 6131, or 6133 Digital Voltage Sources. It uses a buffered TTY to pass information to and from the test program. (The TTY driver is included in the program.) No other drivers are required.

Test 1 checks the unit response and programming timings of the DVS. Test 2 checks the front panel meter accuracy.

Tests 3 and 4 check the programmed voltages against actual output voltages to specification. Test 5 tests the current latch programming. Test 6 checks the two types of DVS interrupts. This package requires a five-digit HP Digital Voltmeter.

Assembly language, absolute.

HP supported:
New Jersey Division

216, A/D-D/A EQUIPMENT TEST (continued)

20075D, VERIFY HP 5610A ANALOG-TO-DIGITAL TEST

This routine tests the HP 2311A High-Speed Data Acquisition Subsystem.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20344A, HP 12564A DIAGNOSTIC 10-BIT ANALOG-TO-DIGITAL CARD

This routine tests the HP 12564A Analog-To-Digital Converter.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

217, TELECOMMUNICATIONS EQUIPMENT TEST

20290A, HP 12589A AUTOMATIC CALLING UNIT INTERFACE CARD DIAGNOSTIC

This routine tests the HP 12589 Automatic Calling Unit Interface Card. The routine requires use of the HP 12589-60005 test connector.

Assembly language, absolute.

HP supported:
Data Systems Division

20343A, TELEPRINTER OFF-LINE TEST

This routine consists of a punched tape which is read off-line by the tape reader in an HP 2749, 2752, or 2754 Teleprinter. The routine tests mechanical functions of the teleprinter without using the computer.

HP supported:
Data Systems Division

20393A, HP 12622 SEND (ONLY) INTERFACE TEST

This routine tests the HP 12622 interface card. The routine requires use of the HP 12622-60005 test connector.

Assembly language, absolute.

HP supported:
Data Systems Division

20417C, HP 2116 TELEPRINTER TEST

Intended for computers of the HP 2116 series, this routine tests the HP 2752 or 2754 Teleprinter.

Assembly language, absolute.

HP supported:
Data Systems Division

20420B, HP 2115/2114 TELEPRINTER TEST

Intended for computers of the HP 2115 or 2114 series, this routine tests the HP 2752 or 2754 Teleprinter.

Assembly language, absolute.

HP supported:
Data Systems Division

20535A, HP 12587 SEND/RECEIVE INTERFACE TEST

This routine tests the HP 12587 interface kit. The routine requires use of the HP 12587-60005 test connector.

Assembly language, absolute.

HP supported:
Data Systems Division

217, TELECOMMUNICATIONS EQUIPMENT TEST (continued)

20538A, HP 12621 RECEIVE (ONLY) INTERFACE TEST

This routine tests the HP 12621 interface card. The routine requires use of the HP 12621-60005 test connector.

Assembly language, absolute.

HP supported:
Data Systems Division

24187C, HP 2600 KEYBOARD-DISPLAY TERMINAL TEST

This routine tests the HP 2600A Keyboard-Display Terminal and its interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24200A, HP 2100A KEYBOARD-DISPLAY TERMINAL (HP 2600) TEST

This test program for the HP 2100A Keyboard-Display Terminal (2600) confirms proper operation of the HP 12880-60001 Interface Card and provides visual data patterns that test important functions of the terminal.

Assembly language, absolute.

HP supported:
Data Systems Division

24217A, HP 2100A AUTO CALL UNIT INTERFACE (HP 12589) TEST

This HP 2100A program tests the Automatic Calling Unit interface, HP 12589A, for malfunctions. A test connector is required and a teleprinter is recommended for operating the program.

Assembly language, absolute.

HP supported:
Data Systems Division

24219A, HP 2100A SEND ONLY INTERFACE (HP 12622) TEST

This HP 2100A program tests the HP 12622 Send Interface for errors and malfunctions. A test connector is required

and a teleprinter is recommended for reporting errors and messages.

Assembly language, absolute.

HP supported:
Data Systems Division

24220A, HP 2100A RECEIVE ONLY INTERFACE (HP 12621) TEST

This HP 2100A program tests the Receive Interface (12621) for errors and malfunctions. A test connector is required and a teleprinter is recommended for reporting errors and messages.

Assembly language, absolute.

HP supported:
Data Systems Division

24221B, HP 2100A SEND/RECEIVE INTERFACE (HP 12587) TEST

This HP 2100A program reports errors and malfunctions for the HP 12587 Interface. A test connector is required and a teleprinter is recommended for reporting errors and messages.

Assembly language, absolute.

HP supported:
Data Systems Division

24255B, HP 2100A ASYNCHRONOUS MULTIPLEXOR CONTROL TEST

This program verifies the operation of the HP 12920 asynchronous multiplexor control interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24263C, HP 2100A-2605 CONSOLE PRINTER DIAGNOSTIC

This program verifies the operation of the HP 2605 console printer.

Assembly language, absolute.

HP supported:
Data Systems Division

217, TELECOMMUNICATIONS EQUIPMENT TEST (continued)

29023A, HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC

This routine tests the HP 12772 Coupler Modem Interface Card when connected to a telephone data set.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

29024A, HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC

This routine tests the HP 12773 Computer Modem Interface Card.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

218, SPECIAL DEVICE EQUIPMENT TEST

13043A, HP 13185A COM INTERFACE DIAGNOSTIC

This diagnostic tests the HP 13185A Com Interface. Equipment required is an HP 12566B Micro Circuit Card and an HP 13185-60007 Test Cable.

Assembly language, absolute.

HP supported:
Data Systems Division

20345A, HP 12598 MEMORY PARITY CHECK DIAGNOSTIC

This routine tests the HP 12598 Memory Parity Check option.

Assembly language, absolute.

HP supported:
Data Systems Division

20412B, HP 2116/HP 12539 TIME BASE GENERATOR TEST

Intended for the HP 2116 computer series, this routine tests the HP 12539 Time Base Generator.

Assembly language, absolute.

HP supported:
Data Systems Division

20418D, MEMORY PROTECT DIAGNOSTIC

Intended for the HP 2116 computer series, this routine tests the HP 12581 Memory Protect Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20421A, HP 2115/2114 HP 12539 TIME BASE GENERATOR TEST

Intended for the HP 2115 and 2114 computer series, this routine tests the HP 12539 Time Base Generator.

Assembly language, absolute.

HP supported:
Data Systems Division

20423B, HP 12551 RELAY REGISTER DIAGNOSTIC

This routine tests the HP 12551 Relay Register Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20428B, HP 12588 POWER FAIL WITH AUTO-RESTART TEST

This routine tests the HP 12588 Power Fail with Auto-Restart option.

Assembly language, absolute.

HP supported:
Data Systems Division

218, SPECIAL DEVICE EQUIPMENT TEST (continued)

20434B, HP 2116 POWER FAIL INTERRUPT TEST

Intended for the HP 2116 computer series, this routine tests the power fail interrupt circuits.

Assembly language, absolute.

HP supported:
Data Systems Division

20435A, DMI DIAGNOSTIC

This routine tests the HP 12582A Direct Memory Increment Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20439A, HP 12584 TELEPRINTER MULTIPLEXOR INTERFACE TEST

This routine tests the HP 12584, 12584-001, and 12584-002 Teleprinter Multiplexer Interface Kits.

Assembly language, absolute.

HP supported:
Data Systems Division

20524A, HP 2114B DMA GENERAL DIAGNOSTIC

This routine tests the Direct Memory Access option for the HP 2114B computer. Optimal use of the routine requires the HP 12554 or 12554M1 16-Bit Duplex Register Interface Kit, or the HP 12566M1 or 12566M2 Microcircuit Duplex Register Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20525A, HP 2114B DMA RATE AND TRANSFER DIAGNOSTIC

Intended for the HP 2114B computer, this routine tests the ability of the Direct Memory Access option to use every machine cycle to transfer data to or from core storage. The routine requires certain modifications to the DMA circuit card prior to execution.

Assembly language, absolute.

HP supported:
Data Systems Division

20543A, CONTROLLER MICROCIRCUIT DIAGNOSTIC

This routine tests the HP 12849 Controller Microcircuit Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

20546A, HP 2114B/HP 12616 HIGH SPEED I/O CHANNEL TEST

Intended for the HP 2114B computer, this routine tests the HP 12616 High Speed I/O Channel.

Assembly language, absolute.

HP supported:
Data Systems Division

22333A, HP 9300N DISC EXERCISER

This absolute program simulates the hardware exerciser required for aligning the HP 9300N Disc Drive. A control program consisting of command mnemonics and parameters (if required) is entered through the teleprinter keyboard. One mnemonic and its parameter (if required) is typed on each line followed by carriage return. The program is then executed by typing "ex" and carriage return.

Assembly language, absolute.

Contributed:
Harvey E. Thackston
HP, Southern Sales Region

24144A, HP 12591 MEMORY PARITY CHECK TEST

This diagnostic program tests the HP 12591 Memory Parity-Check option.

Assembly language, absolute.

HP supported:
Data Systems Division

218, SPECIAL DEVICE EQUIPMENT TEST (Continued)

24163A, GENERAL PURPOSE REGISTER DIAGNOSTIC

This routine tests the HP 12597A 8-Bit Duplex Register Interface Kit, the HP 12554 16-Bit Duplex Register Interface Kit, or the HP 12566 16-Bit Microcircuit Register Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24175A, HP 12584C TELEPRINTER MULTIPLEXOR TEST

Verifies proper operation of the 12584-60135 TTY Multiplexor Interface Board in an HP 2116, 2115 or 2114 computer.

Assembly language, absolute.

HP supported:
Data Systems Division

24185A, HP 2115/2116 DMA DIAGNOSTIC

Tests proper operation of the Direct Memory Access option for an HP 2115 or 2116 computer. A special edge connector (for example, HP 1251-0332 with pin 22 wired to pin 23) must be used. This program obsoletes the DMA Diagnostic program, HP order number 20419.

Assembly language, absolute.

HP supported:
Data Systems Division

24186B, EXTENDED ARITHMETIC UNIT DIAGNOSTIC

This routine tests the Extended Arithmetic Unit option.

Assembly language, absolute.

HP supported:
Data Systems Division

24191A, HP 2100A PLOTTER (HP 12560) TEST

This HP 2100A program tests for proper operation of the HP 2791A Plotter and the HP 12560 Plotter Interface kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24195A, HP 2100A DMA DIAGNOSTIC

This HP 2100A program tests in proper operation of the HP 2100A Direct Memory Access Option. The program requires either a HP 12566 microcircuit register using an HP 1251-0332 connector (with pin 22 wired to pin 23) or a TTY with an HP 12531B Interface. (The best configuration uses both.)

Assembly language, absolute.

HP supported:
Data Systems Division

24202A, HP 2100A PRINTER MULTIPLEXOR TEST

This HP 2100A program confirms proper operation of the HP 12584-60135 Teleprinter Multiplexor Interface Board.

Assembly language, absolute.

HP supported:
Data Systems Division

24206B, HP 2100A POWER FAIL DIAGNOSTIC

This HP 2100A program confirms the proper operation of the power fail interrupt for the HP 2100A computer.

Assembly language, absolute.

HP supported:
Data Systems Division

24213B, HP 2100A TIME BASE GENERATOR TEST

This HP 2100A program tests the time base generator. An HP 12539 Interface Kit is required.

Assembly language, absolute.

HP supported:
Data Systems Division

24216B, HP 2100A RELAY REGISTER TEST

This HP 2100A program tests the relay register. An HP 12551B Interface kit is required.

(continued)

218, SPECIAL DEVICE EQUIPMENT TEST (continued)

Assembly language, absolute.

HP supported:
Data Systems Division

24222A, HP 2100A MEMORY PROTECT TEST

This HP 2100A program tests the HP 2100A memory protect feature. A teleprinter is required.

Assembly language, absolute.

HP supported:
Data Systems Division

24251A, HP 2100A FLOATING POINT DIAGNOSTIC

This HP 2100A program tests the hardware for floating add, floating subtract, floating multiply, floating divide, fix and float. Results are verified by software routines.

Assembly language, absolute.

HP supported:
Data Systems Division

24252A, HP 2100A ASYNCHRONOUS CHANNEL MULTIPLEXOR DIAGNOSTIC

This program tests the HP 12920A Asynchronous Multiplexor Interface Kit.

Assembly language, absolute.

HP supported:
Data Systems Division

24282B, HP 12909A PROM WRITER DIAGNOSTIC

This diagnostic verifies proper operation of prom writer card. It also provides the capability to burn proms. Equipment required is a paper tape reader and optionally a teleprinter.

Assembly language, absolute.

HP supported:
Data Systems Division

24284A, HP 12908A WRITABLE CONTROL STORE DIAGNOSTIC

The HP 12908A Writable Control Store Diagnostic tests the WCS module. Test patterns are written into the module to verify correct WCS operation. The source language is assembly language. DMA and a teleprinter are optional.

Assembly language, relocatable.

HP supported:
Data Systems Division

29005B, HP 12665 COMPUTER SERIAL INTERFACE CARD DIAGNOSTIC

This routine tests the HP 12665 Computer Serial Interface card. The B revision improves operation of oscilloscope test loops within the diagnostic.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

29006A, HP 12813 DIAGNOSTIC

This routine tests the HP 12813 Coupler Serial Interface Card.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

219, DATA ACQUISITIONS SYSTEMS TEST

20072C, VERIFICATION: DACE AXEPT

This verification program contains a working example of Data Acquisition and Control Executive tasks which will operate in any of the following HP equipment systems: 2310A, 2310B, 2310C, 2320A, 2322A, 2323A.

Equipment required is one HP 12539 Time Base Generator.

Assembly language, relocatable.

HP supported:
Automatic Measurement Division

20077B, HP 2312A SUBSYSTEM TEST

This routine tests the HP 2312A Low-Speed Data Subsystem.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20338D, HP 2310C VERIFICATION TEST

This routine tests the HP 2310C Miniverter System.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20339B, TEST: HP 2310A/B SUBSYSTEM

This diagnostic routine tests the HP 2310A A/D Converter or the HP 2310B Multiverter.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20341B, TEST HP 2912 SCANNER/DVM

This diagnostic routine tests the HP 2323A Low-Speed Data Acquisition Subsystem.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20349D, VERIFY HP 2911 SCANNER/DVM TEST

This routine tests the HP 2911A Guarded Crossbar Scanner, and/or the HP 2401C Integrating Digital Voltmeter or the HP 2402A Integrating Digital Voltmeter, and the associated interface kits.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20530D, HP 2321 VERIFICATION VER34

This routine tests the HP 2321A subsystem.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

20583C, HP 2311 CALIBRATION — TELEPRINTER

Employing a standard-voltage source, this routine is used for calibrating the HP 5610A A to D Converter.

Assembly language, absolute.

HP supported:
Automatic Measurement Division

29012A, HP 2313A SUBSYSTEM VERIFICATION TEST

This routine is an absolute binary test program that requires 8K of computer memory. The program will test and debug the HP 9600A/G-Option G00 (HP 2313A) Data Acquisition Subsystem, and hardware associated with the subsystem. The verification uses a modified version of the subsystem non-DMA Driver D. 62 to operate the subsystem in its software operating modes. In this way the entire data acquisition system, from inputs to data in memory, can be tested and debugged before operating software is written. The verification can also be used as an aid in debugging user's software by comparing data results.

ALGOL

HP supported:
Automatic Measurement Division

300, MATH AND NUMERICAL ANALYSIS

301, MATHEMATICS, GENERAL

22021A, LOCATE MAXIMUM-MINIMUM INTEGER

This routine determines the maximum and minimum of values in an integer array, and indicates the positions in the array of these two values. The routine is FORTRAN callable.

Assembly language, relocatable.

Contributed:

Allan P. Sherman
HP, Medical Electronics Division

22084C, INTEGRATED MATH CALCULATOR PROGRAM

The IMCP program allows the entry of programs into the

computer without the necessity for a formal written program. To accomplish this the computer and teleprinter are employed in a manner similar to that used for operating many desk-top calculators. The teleprinter keyboard serves to enter integer or floating point decimal numbers, and to command 54 different arithmetic operations and functions. This calculator system may be used in "program mode" for repeated computation of long formulas consisting of many dissimilar steps. Six decimal places of accuracy are guaranteed. Requires the BCS FORTRAN IV library, 24149.

Assembly language, relocatable.

Contributed:

Andre F. Peterlunger
Sandoz Chemicals, Switzerland

302, EXTENDED-PRECISION ARITHMETIC

22085B, EXTENDED PRECISION CALCULATOR

The XCAL program allows the entry of programs into the computer without the necessity for a formal written program. To accomplish this the computer and teleprinter are employed in a manner similar to that used for operating many desk-top calculators. The teleprinter keyboard serves to enter integer or floating point decimal numbers, and to command 48 different arithmetic operations and functions. This calculator system may be used in "program mode" for repeated computation of long formulas consisting of many dissimilar steps. Ten decimal places of accuracy are guaranteed.

Assembly language, relocatable.

Contributed:

Andre F. Peterlunger
Sandoz Chemicals, Switzerland

22230A, EXTENDED-PRECISION ARITHMETIC LIBRARY

This group of BCS routines provides the capability for extended-precision addition, subtraction, multiplication, and division. Also provided are facilities for extended-precision I/O operations. The routines are FORTRAN callable.

Assembly language, relocatable.

Contributed:

Klaus Stamer
HP, Germany/Frankfurt

22097C, DOUBLE PRECISION INTEGER LIBRARY

This program adds, subtracts, multiplies, and divides double precision (32-bit) numbers. Numbers up to 2,147,483,648 can be handled. The program is FORTRAN callable.

Assembly language, relocatable.

Contributed:

Enrico Mariani
HP, Italy/Milan

22334A, THREE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES

This package of five subroutines allows a user to perform three-word extended precision arithmetic operations. The extended real numbers have a 38 bit mantissa plus a sign bit. These routines are ALGOL, FORTRAN, or Assembler callable.

Assembly language, relocatable.

Contributed:

Jaroslav Dedek
Technical University, Czechoslovakia

302, EXTENDED-PRECISION ARITHMETIC

22335A, FIVE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES

This package of six subroutines allows a user to perform five-word extended precision arithmetic operations. Each real number has a 63 bit mantissa plus sign and an exponent of 7 bits plus sign and an exponent of 7 bits plus sign.

Arithmetic operations are rounded. These routines are callable from ALGOL, FORTRAN, and Assembler.

Assembly language, relocatable.

Contributed:
Anatol Malijevisky and Peter Vonka
Technical University, Czechoslovakia

303 COMPLEX ARITHMETIC

22234A, COMPLEX MATH PACKAGE

This program offers fundamental complex-mathematics capabilities for floating point numbers and for numbers in a special packed format which makes efficient use of storage space. The resolution of the packed number is approximately 0.025 percent (12 significant bits).

In the floating point format, addition, subtraction, multiplication, and division can be performed. The capability to convert to polar form is included.

Using the packed format, addition, subtraction, multiplication, and division can be performed, referencing directly the packed numbers as arguments. The capability to convert to polar form, and to convert to and from packed format, are included.

This program is FORTRAN and ALGOL callable.

Assembly language, relocatable.

Contributed:
Earle Ellis
HP, Data Systems Division

22531A, COMPLEX ARITHMETIC FOR HP BASIC

This BASIC-callable subroutine allows addition, subtraction, multiplication and division of complex numbers. It also allows a number of the form $X1 + iX2$ to be converted to the form $L1 * e^{iF1}$ and vice versa. The contributed program HP 22078, High Speed Punch Driver-BASIC Callable, can be used with this subroutine.

Assembly language, absolute.

Contributed:
Per Christiansson
Lund Institute of Technology/Sweden

304 BCD/ASCII ARITHMETIC

22268B, DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES

The Decimal Arithmetic routines perform addition, subtraction, and multiplication of ASCII numeric character strings of up to 64 characters. Mixing of signed, unsigned, fixed point and real strings are allowed in the same operation. Leading, trailing, and interspersed non-numeric characters are ignored, while decimal-point placement and sign handling are automatic.

The Move/Compare routines CALL the Decimal Arithmetic to move or compare character strings. Characters are moved

from left to right, and overlapping is permitted. Characters are compared from left to right, and the first mismatch determines the relation. A condition code is returned to indicate that the source string is less than, equal to, or greater than the comparison string.

Together these routines allow total manipulation of alphanumeric character strings. ALGOL or FORTRAN-callable.

Assembly language, relocatable.

Contributed:
David R. McClellan
HP, Southern Sales Region

(continued)

306, FUNCTIONS, COMPUTATION OF

22017A, GAMMA FUNCTION ROUTINE

This routine computes the gamma function by means of the recursion relation and polynomial approximation method. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22018A, K BESSEL FUNCTION ROUTINE

This routine computes the K Bessel function for a given argument and order. In the method used, the routine computes zero order and first order Bessel functions, using series approximations. The routine then computes the Nth order function by means of recurrence relation. Accuracy is usually five decimal places; in worst-case situations accuracy is four decimal places. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22019A, I BESSEL FUNCTION ROUTINE

This routine computes the I Bessel function for a given argument and order. The routine uses either series or asymptotic approximation, depending on the range of the argument. Accuracy is usually five decimal places; in worst-case situation accuracy is four decimal places. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22020A, Y BESSEL FUNCTION ROUTINE

This routine computes the Y Bessel function for a given argument and order. The routine uses the recurrence relation and polynomial approximation technique. Accuracy is usually five decimal places; in worst-case situations accuracy is four decimal places. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22117A, TRANSFORMATIONS

This Stat-Pack FORTRAN program performs any of 25 transformations on one or two input variables. Results are printed and punched, if desired. The transformations include computation of square roots, logarithms, exponential functions, and combination trigonometric and square root functions, as well as various linear functions.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22256A, FRESNEL INTEGRAL EVALUATION

This routine computes the Fresnel sine and cosine integrals

$$S(W) = \int_0^W \sin\left(\frac{\pi}{2} t^2\right) dt$$

$$C(W) = \int_0^W \cos\left(\frac{\pi}{2} t^2\right) dt$$

to an accuracy of 11 digits using the Extended Precision Floating-Point routines on the FORTRAN IV Relocatable Library. The accuracy desired is a parameter as well as the upper limit of integration (W). Both S(W) and C(W) are returned.

FORTRAN IV.

Contributed:
Jim Katzman
Amdhal Corporation

22511A, INVERSE SIN AND COS ROUTINE

The two entry points of this routine, ASINE and ACOS, will return, as a normal precision real value, the inverse SIN and COS of an argument. The function is callable from FORTRAN and assembly language and will operate in a DOS, DOS-M, or RTE environment.

Assembly language, relocatable.

Contributed:
R. J. Rowlands
CSIRO Division of Protein Chemistry/Australia

309, CURVE FITTING

22022A, SOLUTION OF LINEAR LEAST SQUARES PROBLEMS

This subroutine solves linear least squares problems. In accomplishing this, the routine minimizes the Euclidean norm of $B-A*X$, where A is an M -by- N matrix with M not less than N . In the special case where $M=N$, systems of linear equations may be solved. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22220A, LINEAR LEAST SQUARES PROBLEM SOLVER

ALGOL callable, this procedure solves the linear least squares problem:

$$\|A_{\underline{x}} - \underline{b}\|_2 = \text{minimum},$$

where $\| \cdot \|_2$ indicates the Euclidean norm and A is an m by n ($m \geq n$) real matrix of rank n . A matrix decomposition based on orthogonal Householder transformations is used, rather than solving the normal equations $A^T A_{\underline{x}} = A^T \underline{b}$.

Many vectors, \underline{b} , may be given for solution with increased efficiency.

ALGOL

Contributed:

John H. Welsch

HP Laboratories

310, NUMERICAL INTEGRATION

22023A, TRAPEZOIDAL INTEGRATION ROUTINE

This routine computes the vector integral values for a given general table of argument and function values. Beginning with $Z(1)=0$, vector Z is evaluated by means of the trapezoidal rule (second order formula). The routine is FORTRAN callable.

FORTRAN II

Contributed.

22024A, TRAPEZOIDAL INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT

This routine computes the vector of integral values for a given equidistant table of function values. Beginning with $Z(1)=0$, vector Z is evaluated by means of the trapezoidal rule (second order formula). The routine is FORTRAN callable.

FORTRAN II

Contributed.

22025A, SIMPSON AND NEWTON'S 3/8 INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT

This routine computes the vector of integral values for a given equidistant table of function values. The input vector of function values must consist of at least 3 elements. Beginning with $Z(1)=0$, vector Z is evaluated by means of Simpson's rule, Newton's 3/8 rule, or a combination of these two rules. Truncation error, computed by the fourth-order method, in most instances is of the order H^{**5} . In the worst-case situation, however, the truncation error of $Z(2)$ is of the order H^{**4} . The routine is FORTRAN callable.

FORTRAN II

Contributed.

22026A, HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE

This routine computes the vector of integral values for a given general table of argument, function, and derivative

(continued)

310, NUMERICAL INTEGRATION (Continued)

values. Using the Hermitian Fourth Order Integration Formula, vector Z is evaluated beginning with $Z(1) = 0$. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22027B, HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT

This routine computes the vector of integral values for a given equidistant table of function and derivative values. Beginning with $Z(1) = 0$, vector Z is evaluated by means of the Hermitian Fourth Order Integration Formula. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22028A, HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE

This routine computes the vector of integral values for a given general table of argument, function, first derivative, and second derivative values. Beginning with $Z(1) = 0$, vector Z is evaluated by means of the Hermitian Sixth Order Integration Formula. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22029A, HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT

This routine computes the vector of integral values for a given equidistant table of function, first derivative, and second derivative values. Beginning with $Z(1) = 0$, vector Z is evaluated by means of the Hermitian Sixth-Order Integration Formula. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22144A, INTEGRATION ROUTINE

This Stat-Pack routine evaluates the definite integral for a function with values of equidistant discrete points. The integral is computed by Simpson's method, giving the exact value of the integral if the function is a polynomial of degree not greater than 3. There must be an odd number of data points. The routine is FORTRAN callable.

FORTRAN II

Contributed.

Roland Jahn

HP, Medical Electronics Division

311, POLYNOMIALS AND POLYNOMIAL EQUATIONS

22030B, COMPLEX ROOTS OF A REAL POLYNOMIAL

Using the quotient-difference algorithm with displacement, this routine calculates all real and complex roots of a polynomial expression. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22395A, REAL & COMPLEX ROOTS OF A POLYNOMIAL WITH REAL COEFFICIENTS

This routine calculates all real and complex roots of a given polynomial with real coefficients.

The roots of the polynomial are calculated by means of the quotient-difference algorithm with displacement.

FORTRAN II.

Contributed:

Don Mactaggart

Canadian Marconi Company

312, MATRIX OPERATIONS

22031A, ADD ROWS OF MATRICES

This routine adds corresponding elements of a row of one matrix to a row of another matrix. The output matrix must be a general matrix, and must not be stored in the same location as the input matrix unless the input matrix also is general. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22032A, RANK AND BASIS ROUTINE

For a given $m \times n$ matrix, the following calculations are performed by this routine:

- a. Determine rank and linearly independent rows and columns (basis)
- b. Factorize a submatrix of maximal rank.
- c. Express nonbasic rows in terms of basic rows.
- d. Express basic variables in terms of free variables.

The left hand triangular factor is normalized so that the diagonal contains all 1's, thus allowing storage of the sub-diagonal part.

Gaussian elimination technique is used for calculation of the triangular factors of a given matrix. Complete pivoting is built in. In the case of a singular matrix, only the triangular factors of a submatrix of maximal rank are retained. The remaining parts of the resultant matrix give the dependencies of rows and the solution of the homogeneous matrix equation $A \cdot X = 0$.

This routine is FORTRAN callable.

FORTRAN II

Contributed.

22118B, MATRIX INVERSION SUBROUTINES

FORTRAN callable, these five Stat-Pack subroutines perform the following functions:

- a. The Symmetric Matrix Inversion Subroutine inverts a matrix, working only with the diagonal elements and the elements above the diagonal. Maximum dimension of the matrix is 20×20 .

- b. The Maximum Pivotal Element Matrix Inversion Subroutine finds the maximum pivotal element on each row, places these elements in a diagonal, inverts the matrix, then restores the rows and columns to their proper places. Maximum dimension of the matrix is 20×20 .
- c. The Quick Matrix Inversion Subroutine is a rapid method for inverting a matrix. No checks are made for singularity. Maximum dimension of the matrix is 15×15 .
- d. The Matrix Inversion with Check for Significance of Pivotal Element Subroutine inverts a matrix, checking first to determine whether the diagonal elements exceed a specified tolerance. There are no provisions for changing rows to eliminate zero elements on the diagonal. Maximum dimension of the matrix is 10×10 .
- e. The Matrix Inversion Simultaneous-Equation Solver inverts the indicated matrix and solves a set of simultaneous equations, returning the solution, the inverted matrix, and the determinant of the system. Maximum dimension of the matrix is 20×20 .

FORTRAN II

Contributed:

Ronald Jahn

HP, Medical Electronics Division

22119A, MATRIX ARITHMETIC SUBROUTINE

This Stat-Pack subroutine adds, subtracts, or multiplies two 2-dimensional matrices which are conformable. Data is entered one row at a time. Maximum matrix size is 20×20 . The routine is FORTRAN callable.

FORTRAN II

Contributed:

Roland Jahn

HP, Medical Electronics Division

22120A, MATRIX ARITHMETIC PROGRAM

This Stat-Pack program adds, subtracts, or multiplies two 2-dimensional matrices which are conformable. Maximum matrix size is 20×10 .

FORTRAN II

Contributed:

Roland Jahn

HP, Medical Electronics Division

313, EIGENVALUES AND EIGENVECTORS

22192A, EIGENVALUES OF A SYMMETRIC REAL MATRIX

This routine uses Householder's method and the QR algorithm to find all the eigenvalues of a symmetric matrix.

ALGOL

Contributed:
John H. Welsch
HP Laboratories

314, SYSTEMS OF LINEAR EQUATIONS

22033A, SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS

Using Gauss elimination with complete pivoting, this routine solves a general system of simultaneous linear equations. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22034A, SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, BAND-MATRIX

This routine solves a system of simultaneous linear equations with a coefficient matrix of band structures. To preserve the band structure in the remaining coefficient matrices, the solution is obtained by means of the Gauss-elimination method with column pivoting only. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22035A, SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, SYMMETRIC MATRIX

This routine solves a system of simultaneous linear equations with a symmetric coefficient matrix whose upper triangular part is assumed to be stored columnwise. To preserve symmetry in the remaining coefficient matrices, the solution is obtained by means of the Gauss-elimination method with column pivoting only. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22122A, SIMULTANEOUS EQUATION SOLVER PROGRAM

Using the Gaussian elimination method, this program solves up to 22 simultaneous equations whose coefficients are in a single input matrix. A check for matrix singularity is not performed. The program controls its own I/O operations, using any I/O driver in the operating system employed. The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22123A, SIMULTANEOUS EQUATION SOLVER ROUTINE

Using the Gaussian elimination method, this routine solves up to 22 simultaneous equations whose coefficients are in a single input matrix. A check for matrix singularity is not performed. The routine does not control its own I/O operations. The routine is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

316, INTEGRAL TRANSFORMS

22036A, REAL FOURIER TRANSFORM

This FORTRAN callable routine finds the Fourier coefficients of a one-dimension real array. Using the Cooley-Tukey algorithm, the routine gives the coefficients of $2*(2**M)$ real points when given the input of $2*(2**M)$ real function values whose arguments are equally spaced. Program 22037 (classification code A316) is required.

Equipment required is 16K of core storage to compile, 8K to execute.

FORTRAN II

Contributed.

22037B, COMPLEX FOURIER TRANSFORM

The function of this FORTRAN callable routine is to perform discrete complex Fourier transforms on a complex 3-dimension array where each dimension is a power of 2.

Equipment required is 16K of core storage to compile, 8K to execute.

FORTRAN II

Contributed.

22189B, GENERAL FAST FOURIER TRANSFORM

This routine employs an efficient algorithm for finding the Fourier transform of a function. The expression evaluated is:

$$F(n) = \frac{1}{N} \sum_{i=0}^{N-1} F(i) e^{-j i n \frac{2\pi}{N}}$$

Where the $f(i)$ are in general complex. The Cooley-Tukey algorithm is used, offering large savings in time and storage over other methods. The number of input data must be an integer power of two, and the data must be complex.

Inverse transforms can also be taken with this routine. The inverse transform is:

$$F(i) = \sum_{n=0}^{N-1} F(n) e^{j i n \frac{2\pi}{N}}$$

The routine is FORTRAN callable.

FORTRAN II.

Contributed:
Peter K. Bice
HP, Microwave Division

22218A, FAST FOURIER TRANSFORM

This routine finds the Fourier transform of complex, multi-dimensional, complex data. The defining equation is:

$$\text{TRANSFORM}(k_1, k_2, \dots) = \text{SUM}(\text{DATA}_{j_1, j_2, \dots}) \\ * \text{EXP}(\text{ISIGN} * 2 * \text{PI} * \\ \text{SQRT}(-1) * ((j_1 - 1) * \\ (k_1 - 1) / \text{NN}(1) + (j_2 - 1) \\ * (k_2 - 1) / \text{NN}(2) + \dots))$$

This quantity is summed for all j_1, k_1 between 1 and $\text{NN}(1)$, j_2, k_2 between 1 and $\text{NN}(2)$, etc. There is no limit to the number of k 's (i.e., no limit on the number of dimensions). Also, there is no restriction on the length of the dimensions, although the program runs faster when the lengths are composite integers, and especially fast when the lengths are powers of two.

Both forward ($\text{ISIGN}=-1$) and inverse ($\text{ISIGN}=+1$) transforms can be calculated. If a -1 transform is followed by a $+1$ transform, the original data will reappear multiplied by $\text{NTOT}=(\text{NN}(1)*\text{NN}(2)*\dots)$.

The routine places the following restrictions on input data and transform values:

- a. The number of input data and the number of transform values must be the same.
- b. Both the input data and the transform values must represent equispaced points in their respective domains of time and frequency. Calling these spacings DELTA T and DELTA F , it must be true that $\text{DELTA F} = 2 * \text{PI} / [\text{NN}(1) * \text{DELTA T}]$. Of course, DELTA T need not be the same for every dimension.
- c. Conceptually, at least, the input data and the transform output represent single cycles of periodic functions.

The routine is FORTRAN callable.

FORTRAN II

Contributed:
Electronics Research Laboratory
Stanford University

318, ORDINARY DIFFERENTIAL EQUATIONS

22038A, SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS

Used by the RTE or DOS Operating System, this FORTRAN callable routine solves a system of first-order ordinary general differential equations with given initial values.

A fourth order method, Hammings Modified Predictor-Corrector Method, is used. This procedure requires four preceding points for computation of a new vector Y of the dependent variables.

The fourth-order Runge-Kutta method is used for adjustment of the initial increment and for computation of starting values. During the entire routine, the increment is automatically adjusted by halving or doubling.

For maximum flexibility in output, an output subroutine must be supplied by the user.

FORTRAN II

Contributed.

400, PROBABILITY AND STATISTICS

401, UNIVARIATE AND MULTIVARIATE PARAMETRIC STATISTICS

22145B, CONFIDENCE INTERVAL FOR MEAN AND VARIANCE OF A NORMAL DISTRIBUTION

This program calculates the upper and lower confidence limits for the mean and variance of a sample, assuming the data to be normally distributed. The user may specify a confidence level of 0.90, 0.95, or 0.99 for the confidence limits of the sample mean. The program generates 0.95 confidence limits for the sample variance, and handles a maximum of 900 data points. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22146C, SAMPLE SIZE DETERMINATION ON THE SAMPLE VARIANCE

This program utilizes an estimate of the sample variance, based on M degrees of freedom and a specified maximum confidence interval length, to determine the sample size required to give any test level estimate of the population mean. The program uses a trial and error method, with the initial sample size specified by the user. The sample size is determined for confidence levels of 0.90, 0.95, and 0.99. This program is part of the State-Pack group.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22156A, PAIRED t-TEST

The Student's t-test for paired observations applies to the case of two samples in which the observations of one sample may be logically related or paired (in time or space), item by item, with the observations of the second sample. The program calculates point estimates (mean, standard deviation, standard error of the mean) for both samples, then calculates the point estimates and value of Student's t on the difference between samples. The value of Student's t is computed for a specified level of confidence, either 0.90, 0.95, or 0.99. A maximum of 600 unweighted (X,Y) data pairs can be handled. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22157B, BARTLETT'S HOMOGENEITY OF VARIANCE TEST

This program tests the hypothesis that the estimated variance from k samples is homogeneous. A one-sided alternative at the 0.95 confidence level is used as the test statistic; that is, if the calculated chi-square value exceeds the tabular value of chi square at the designated probability.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22159B, CHI SQUARE GOODNESS-OF-FIT TEST

This program performs the chi-square goodness-of-fit test, and computes the chi-square value of the test, for any of the following functions: binomial, chi square, F, normal, Poisson, Student's t. The user has the option of specifying the upper and lower bounds for a given number of intervals, or of reading in the endpoints of each interval. A maximum of 1,000 data points can be handled. HP Program 22143, classification code A408, can be used to furnish the source data. HP Program 22159 is part of the Stat-Pack group.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22160A, TESTS OF HYPOTHESIS FOR VARIANCES

The program tests for one of the following:

- a. Whether the variance, σ^2 , of a normal population equals a specified variance, σ_0^2 .
- b. Whether the variances, σ_1^2 and σ_2^2 , are equal, providing both come from a normal population.

Results are determined with a 95-percent confidence interval. A maximum of 500 (X,Y) data pairs or 1,000 data points can be handled. The program is part of the Stat-Pack group.

(continued)

401, UNIVARIATE AND MULTIVARIATE PARAMETRIC STATISTICS (continued)

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22161B, TEST OF HYPOTHESIS FOR MEANS

This program tests (a) whether the mean μ of a normal population equals a specified value μ_0 or (b) whether the means μ_1 and μ_2 are equal (providing both come from a normal population). Both tests first assume $\sigma_1^2 \neq \sigma_2^2$, and then assume $\sigma_1^2 = \sigma_2^2$. Results are determined with a confidence interval of 0.90, 0.95, or 0.99. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22183A, SAMPLE SIZE DETERMINATION TO TEST H_0

This program computes the sample size, n , to test either $H_0: \mu = \mu_1$ or $H_0: \mu_1 = \mu_2$ so that the probability of detecting the significant difference, a , is equal to β . A previous requirement is an estimate of the population variance (for $\mu = \mu_1$) or for the common variance (for $\mu_1 = \mu_2$), S^2 , based on m degrees of freedom. The table used in determining the sample size is read in as data. The value of $k = a^2/s^2$ is computed, located in the table, and the value of n can then be determined. The value of a , the probability of rejecting H_0 when it is true, is 0.10 for a two-tailed test and 0.05 for a one-tailed test. The values determined for β are 0.80 and 0.95. The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

402, TIME SERIES ANALYSIS

22124A, AUTOCORRELATION AND SPECTRAL DENSITY

For a given set of data points and a maximum lag (i.e., harmonic), this program calculates autocorrelation coefficients and power spectral density. The input data can be normalized, if desired. The program will handle a maximum of 300 data points.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22125A, MOVING AVERAGES

This Stat-Pack, FORTRAN program computes a set of moving averages of order N from a time-series of M elements. $M - N + 1$ moving averages are computed and tabulated. The time series may have a maximum of 2000 elements, and the order of the moving average must be less than the number of elements in the time series.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

403, DISCRIMINANT ANALYSIS

22127A, DISCRIMINANT ANALYSIS PROGRAM

Given two groups of data with up to 20 variables per group, this program calculates a linear function of the variables by which the two groups can be discriminated. The linear function found is the one that maximizes the ratio of the following two elements:

- a. The difference between the group means.
- b. The standard deviations within the species.

The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

404, REGRESSION ANALYSIS

22128A, LEAST SQUARES REGRESSION PROGRAM

This program performs the calculations for least-squares polynomial regression up to degree three. The user has the option of specifying the degree of fit (linear, quadratic, or cubic), or of specifying a fit through all three degrees. An analysis of variance is performed for each polynomial fit, as well as analysis of individual terms. If desired, the predicted values and residuals are included in the analysis. The program will handle a maximum of 400 (X,Y) data pairs. The program is part of the Stat-Pack group.

Equipment required is at least 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22129A, LINEAR REGRESSION INTERVAL ESTIMATES

This program computes the linear regression function of one independent variable and the confidence prediction intervals for predicted values of the dependent variable, given a 0.90, 0.95, or 0.99 confidence interval. The regression function is evaluated by the method of least squares. An analysis of variance is included. The program will handle a maximum of 750 (X,Y) data pairs. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22130A, POLYNOMIAL REGRESSION PROGRAM

Using the method of least squares, this program generates an approximating polynomial up to the 15th degree. The degree of regression is determined by an iterative technique, the iterative process being terminated by either of the following:

- a. When the computed standard error of the dependent variable for the i th iteration (degree i) is less than or equal to the maximum allowable error specified by the user.
- b. When the program has fitted the experimental data through a 15th degree polynomial.

The program will handle a maximum of 350 (X,Y) data pairs. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22131A, POLYNOMIAL REGRESSION CONFIDENCE INTERVALS

This program generates confidence interval estimates at a specified confidence level for each predicted point of an i th degree approximating polynomial ($i = 1,6$). The user may select a confidence level of 0.90, 0.95, or 0.99. Estimates of the regression-covariance matrix also are made. The program will handle a maximum of 400 (X,Y) data pairs. The degree of the input polynomial must be less than, or equal to, 6. The program is part of the Stat-Pack group.

(continued)

404, REGRESSION ANALYSIS (Continued)

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22132A, STEPWISE REGRESSION PROGRAM

This program uses multiple regression to obtain the best fit to a set of observations consisting of one dependent variable and multiple independent variables. In the stepwise regression, a number of intermediate regression equations are obtained, in addition to the complete regression equation. These intermediate equations are derived by adding one variable at a time; the variable added is the one that makes the greatest improvement in the least squares goodness-of-fit. The insignificant variables are removed from the regression equation before the addition of a new variable. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22133A, BIOASSAY PROGRAM

This program computes predicted X values for given Y values, and the linear regression data for Y on X. If the regression data is not immediately available, the program accepts X and Y values, and computes the predicted X values from the given Y values. For each predicted X value, the output consists of the given Y values for the point, the average of these Y values, the predicted X value itself, and the upper and lower bounds of the 95-percent confidence interval for the predicted X values. The program is designed to handle a maximum of 600 (X,Y) data pairs. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22134A, ORTHOGONAL REGRESSION PROGRAM

By means of orthogonal polynomials, this program generates a regression polynomial in one independent variable up to the fifth degree. A general statistical analysis is included (including the mean, variance, etc.), and confidence limits are generated for the sample mean at the 0.90, 0.95, and 0.99 confidence levels. The regression analysis is then computed, yielding uncorrelated estimators. The polynomial is rewritten in terms of the original variable X, and an analysis of variance is performed term by term. Back solutions are included in the analysis. The program is designed to handle a maximum of 26 data points at equally spaced distances along the ordinate. The maximum polynomial generated is of degree 5. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22135A, LINEAR REGRESSION WITH REPLICATION

This program computes a linear regression and analysis of variance on data with an equal or unequal number of replications (i.e., multiple Y values for a given X value). The program handles a maximum of 150 unweighted (X,Y) data pairs. The values of the independent variable X must be in ascending sequence in order to establish the number of replicates per value of X. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22136A, NONLINEAR REGRESSION PROGRAM

This program performs nonlinear regression calculations to fit a set of data to a function specified by the user. Corrections to a starting value of the parameter values are computed by iteration cycles until the corrections make no change (within a specified tolerance) in the error sum of squares. It must be noted that the final error sum of squares may be quite large if the data does not fit the desired model well. The program is set up to handle 10 parameters, and the model used must have only one X value for each Y

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404, REGRESSION ANALYSIS (Continued)

value. The procedure is dimensioned to estimate up to 10 parameters from 150 pairs of X and Y values. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22184A, POOLING OF GROUPS IN REGRESSION

Designed to handle a maximum of 15 groups, this program determines whether several groups of data can be pooled into one linear regression. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22185A, MULTIPLE REGRESSION PROGRAM

This program provides an extremely complete statistical analysis, including an analysis of variance table, for estimating the coefficients in the following model:

$$Y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + \epsilon_i (k \leq 9)$$

Output is in printed form, and only a single set of data can be processed in one run.

There can be no more than nine independent and one dependent variable. The number of observations is restricted only when the one-pass option is exercised, and then to 2,400 observation vectors for 10 variables. For n variables there must be at least $(n+1)$ observation vectors. The only input constraint is that the i th observation vector $(y_i, x_{1i}, x_{2i}, \dots, x_{ki})$ must be furnished before the $i+1$ vector. The dependent variable can be in any field. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22187A, NONLINEAR REGRESSION OF A SINGLE-VARIABLE FUNCTION

This program performs nonlinear least squares regression on a single-variable function. The program can operate on any regression model for which FORTRAN functions can be written for evaluation of the partials of the regression model with respect to its regression coefficients. (A user-written program is required for evaluation of the function and its first partials.) A maximum of three independent variables and one dependent variable can be handled, and a maximum of 150 (X,Y) data pairs may be entered per run. The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22188A, NONLINEAR REGRESSION OF AN ARBITRARY FUNCTION

This program performs nonlinear least squares regression on an arbitrary function. The program can operate on any regression model for which FORTRAN functions can be written for evaluation of the partials of the regression model with respect to its regression coefficients. (A user program is required for evaluation of the function and its first partials.) A maximum of three independent variables and one dependent variable can be handled, and a maximum of 150 (X,Y) data pairs may be entered per run. The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

405, RANDOM NUMBER GENERATORS

22194A, PSEUDO-RANDOM NUMBER GENERATOR

This FORTRAN callable routine produces 32-bit random numbers between 0.000000 and 0.999999. If the routine is repeated, the same numbers are produced in the same sequence.

Assembly language, relocatable.

Contributed:

Dale N. Murray
Redstone Arsenal

22265A, FLOATING POINT RANDOM NUMBER GENERATOR

This function generates random numbers between "0" and "1" in floating point and returns the values in the A and B registers.

Assembly language, relocatable.

Contributed:

Dieter Schmidtke
HP, Germany/Frankfurt

22308A, GAUSSIAN RANDOM NUMBER GENERATOR

This ALGOL real procedure Gauss (I) generates Gaussian (normal) distributed random numbers with mean $MY = 0$ and variance $SIGMA^2 = 1$. The procedure requires two random numbers X_1 and X_2 called from the assembly language function `RANRND` which generates random numbers in the interval (0, 1). The test case GAUT plots

the distribution in the form of a histogram with mean zero and variance one. FORTRAN and ALGOL callable.

ALGOL/Assembly Language, relocatable.

Contributed:

Dr. Rolf Robcke
HP, Germany/Frankfurt

22413A, RANDOM INTEGER NUMBER GENERATOR

IRND(M) is a function subprogram which generates pseudo random number integers in the range $0 \leq X \leq M-1$.

The generating random number string is not automatically restarted when the program is restarted. This can be achieved by the FORTRAN callable subroutine STRND.

Assembly language, relocatable.

Contributed:

Hans R. Biesel
HP, Germany/Boeblingen

22434A, RANDOM NUMBER GENERATORS

Two subroutines using the same algorithm to compute uniformly distributed pseudo-random numbers in the interval (0, 1) are included in this package. One is FORTRAN or ALGOL callable. The other is strictly for use with Assembler main programs and is much faster.

The method employed is described in: Applied Numerical Methods, by Carnahan, Luther, and Wilkes, p. 545.

Assembly language, relocatable.

Contributed:

Jaroslav Dedek
Technical University /Czechoslovakia

406, PROBABILITY DISTRIBUTION SAMPLING

22137A, CUMULATIVE DISTRIBUTION PROGRAM

This program generates a frequency distribution for a single data set consisting of 1500 points or less. The mean, median, standard deviation, and interquartiles are included. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:

Roland Jahn
HP, Medical Electronics Division

407, NON-PARAMETRIC STATISTICS

22121A, CROSS-TABULATION PROGRAM

This Stat-Pack program performs a cross-tabulation of two single-dimension fixed point arrays which use a Cartesian coordinate scheme. A maximum of 9999 values can be handled for each cell of the array.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22138A, KENDALL'S COEFFICIENT OF CONCORDANCE: W

This program computes Kendall's Coefficient of Concordance: W. This is a measure of the relation among several rankings. Ties are checked, and the degree of association, W, is adjusted accordingly. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22139A, KENDALL'S COEFFICIENT OF CONCORDANCE

This program computes Kendall's Coefficient of Concordance. No check is made for ties. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22140A, KENDALL'S TAU CORRELATION

This program computes Kendall's tau, a rank correlation coefficient, for a given set of ordered (X,Y) pairs. Asso-

ciated statistics are also produced, and the program determines the presence or absence of ties in the data set and adjusts tau accordingly. The program handles a maximum of 300 (X,Y) data pairs, which must be sorted in ascending algebraic sequency of the X variable. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22147A, MULTIPLE CORRELATION ROUTINE

Using a maximum of 20 variables, with up to 999 observations per variable, this routine calculates the means and standard deviations of each variable. The raw sum of squares, cross-product matrix, the variance-covariance matrix, and the correlation matrix, also are determined. The routine is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22155A, DUNCAN'S MULTIPLE RANGE TEST

This program computes all statistics and tests involved in Duncan's Multiple Range Test with equal or unequal readings per group. The input data can either be the means and the mean square error, or the observations themselves. In the latter case, an analysis of variance for a completely randomized design is performed. Significance levels of either 0.05 or 0.01 can be selected. A maximum of 100 treatments can be handled, with an equal or unequal number of observations per treatment. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

407, NON-PARAMETRIC STATISTICS (continued)

22158B, KOLMOGOROV-SMIRNOV GOODNESS-OF-FIT TEST

For a maximum of 999 data points, this program performs the Kolmogorov-Smirnov goodness-of-fit test for a specified probability distribution. The source data can be tested for fit against any of the following functions: binomial, chi square, F, normal, Poisson, or Student's t. The user has the option of (a) specifying the number of class intervals, (b) letting the program generate class intervals by use of Sturge's rule, or (c) specifying the number of intervals and upper bounds of each interval. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II.

Contributed:

Roland Jahn

HP, Medical Electronics Division

22437A, WILCOXON-MANN-WHITNEY TEST

This program calculates the "rank-sum" (SU) for the smaller of two sets of statistical data. The measure is used as a distribution-independent test of the null hypothesis that the two sets of data are drawn from the same population. Special consideration was given to the procedure for assigning rank in the case of multiple ties so as to avoid biasing the rank-sum.

Equipment required includes a 16K HP 2116B fixed-head disc operating system with EAU and DMA.

FORTRAN II

Contributed:

Dr. W. R. Levick

Australian National University

408, GENERAL STATISTICS

22039A, MEAN, DEVIATION, AND CORRELATION COEFFICIENTS ROUTINE

This FORTRAN callable routine computes means, standard deviations, sums of cross-products of deviations, and correlation coefficients by product-moment correlation coefficients. The number of variables must be greater than the number of observations. The routine is FORTRAN callable.

FORTRAN II

Contributed.

22141A, GENERAL STATISTICS PROGRAM

This program characterizes a particular set of data by performing elementary statistical calculations (point estimates), determining the 0.95 and 0.99 confidence intervals for the sample mean (assuming normal distribution of the data), and generating a histogram of the data points. A maximum of 900 unweighted and ungrouped data points can be handled. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

Contributed:

Roland Jahn

HP, Medical Electronics Division

22142B, GENERAL STATISTICS FOR MULTIPLE GROUPS

This program generates point estimates (mean, variance, standard deviation, and standard error) and confidence interval estimates for the sample mean. The analysis may be performed for a maximum of 99 sets or groups of data in a single execution. The user can elect to determine confidence intervals for the sample mean at the 0.90, 0.95, or 0.99 level of confidence. This program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:

Roland Jahn

HP, Medical Electronics Division

22143A, PROBABILITY SUBPROGRAMS

This software product consists of ten routines which calculate the following probability functions: normal/cumulative probability function, cumulative binomial function, cumulative Poisson function, F cumulative probability function, chi-square cumulative distribution function, chi-square area for critical values, inverse F distribution

(continued)

408, GENERAL STATISTICS (continued)

function, Student's t distribution, normal probability function, and Student's t cumulative probability function. This software product is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22517A, NORMAL DISTRIBUTION

This function returns the probability of exceeding the absolute value of an argument, which is normally distributed with mean 0 and variance 1. The function is based on a polynomial type approximation which gives a maximum error of $3 * 10^{-7}$ (better than machine accuracy). Unlike the Normal Distribution included in the HP 22143 package, which limits the argument to less than 6.0, this function allows all values of the argument. It operates in a DOS or DOS-M environment and is callable from FORTRAN and assembly language.

Assembly language, relocatable.

Contributed:
R. J. Rowlands
CSIRO Division of Protein Chemistry/Australia

22518A, VARIANCE RATIO DISTRIBUTION

For given degrees of freedom, this function returns the probability of exceeding a given value of variance ratio (F distribution). The function is accurate to better than five decimal places, which is important for lower probabilities, and is based on a numeric integration of the exact integral. One of the Probability Subprograms, HP 22143, is similar to HP 22518, except that it is accurate to four decimal places, is somewhat faster, and is based on an approximation to the function.

This function operates in a DOS-M environment and is callable from FORTRAN and assembly language.

FORTRAN IV

Contributed:
R. J. Rowlands
CSIRO Division of Protein Chemistry/Australia

409, CORRELATION ANALYSIS

22126A, CROSS CORRELATION ANALYSIS

This program computes a set of cross-correlation coefficients for two time series. The minimum and maximum lag input determines the number of coefficients computed. The program will handle a maximum of 900 elements for each time series.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22186A, MULTIPLE CORRELATION MATRIX PROGRAM

This program computes the mean, standard deviation, and Pearson's Correlation Coefficient (r) for 2 to 52 variables. There is no limit on the number of observations per variable. The distinguishing feature of the program is that the computed correlations are furnished in matrix form with variable numbers listed, making it easy to identify values. The program is part of the Stat-Pack group.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

410, ANALYSIS OF VARIANCE AND COVARIANCE

22148A, COMPLETELY RANDOMIZED DESIGN

This program performs an analysis of variance on a completely randomized experimental design. A maximum of 400 treatments can be handled, with no restrictions on the number of observations per treatment. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22149A, COMPLETELY RANDOMIZED DESIGN WITH SUBSAMPLING

Using either an equal or an unequal number of observations per treatment, this program performs an analysis of variance on a completely randomized design with subsampling. For unequal observations per subsample, Satterthwaite's Approximate Test procedure is used. The program will handle a maximum of 20 treatments with up to 20 samples per treatment. There is no limit to the number of determinations per sample and treatment. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22150A, RANDOMIZED COMPLETE BLOCK DESIGN

This program performs an analysis of variance on a randomized complete block experimental design. A maximum of 100 treatments and 100 blocks can be handled. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22151B, RANDOMIZED COMPLETE BLOCK DESIGN WITH SUBSAMPLING

This program performs an analysis of variance on a randomized complete block design and subsampling. A maximum of 30 treatments and 30 blocks can be handled. The program is part of the Stat-Pack group.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22152A, TWO-WAY FACTORIAL DESIGN

This program performs an analysis of variance for a two-way factorial in a randomized complete block design. The F test is for a fixed model. Each replicate must be balanced (i.e., the same number of observations is required for each level of each factor). A maximum of 20 levels per factor, and 8 replicates per level, can be handled. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22153A, THREE-WAY FACTORIAL DESIGN

This program performs a 3-factor factorial analysis of variance for a randomized complete block design with replications. The F statistic computation assumes a "fixed effect" model. A maximum of 8 levels of Factor A, 8 levels of Factor B, 5 levels of Factor C, and 8 replications, can be handled. Missing observations are not permitted, and the design must be balanced (i.e., the same number of observations is required for all treatment combinations over all replicates). The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

410, ANALYSIS OF VARIANCE AND COVARIANCE (Continued)

22154A, ANALYSIS OF VARIANCE INFORMATION GENERATOR

This program performs an analysis of variance on a randomized block experimental design with subsampling. There may be an equal or unequal number of subsamples per experimental unit (treatment-block combination). Computation of the noncentrality parameter is included in the analysis. Interaction between treatments and blocks is not assumed. The program is designed to handle a maximum of

7 treatments and 7 blocks and a maximum of 99 subsamples per treatment-block combination. The program is part of the Stat-Pack group.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:

Roland Jahn

HP, Medical Electronics Division

413, GENERAL PROBABILITY

22397A, COMBINATION GENERATOR

This subroutine generates all combinations of N objects taken K at a time. The output is a vector or 1-dimensional FORTRAN array containing a particular combination.

The subroutine as supplied is operable is DOS or DOS-M, but may be used under BCS with trivial modifications.

Assembly language, relocatable.

Contributed:

Wayne Covington

HP, Loveland Division

500, SCIENTIFIC AND ENGINEERING APPLICATIONS

505, NUCLEAR PHYSICS

22325A, COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO CELSIUS DEGREES CONVERSION

This subroutine accepts a value of the voltage read from a copper-constantan thermocouple in microvolts and returns a temperature value in degrees Centigrade. This value is correct to .1 of a Celsius degree. The method for determin-

ing the temperature is interpolation of standard thermocouple tables at 10 degree intervals.

FORTRAN II.

Contributed:

Rodney C. Williams and William L. McLain
Wake Forest University

506, MEDICAL SCIENCES

01530A, ECG INTERPRETIVE SYSTEM

The HP 1530 ECG Interpretive System provides patient history and billing routines and two analysis programs to acquire and process ECG data via telephone-linked terminals or analog tape (batch mode). One analysis program uses the twelve standard leads; the other uses three Frank orthogonal leads.

The system has two versions: Version A, controlled by a modified RTE, requires 16K core memory; Version B, controlled by the 2005C RTE, requires 24K. Recommended system equipment includes:

- HP 2761A Optical Mark Reader
- HP 2748A Punched Tape Reader
- HP 2754B Heavy-Duty Teleprinter
- HP 5614A Character Printer
- HP 5610/11A Data Acquisition Subsystem
- HP 5615A Data Receiver/Controller
- HP 3960A-E15 Analog Tape Recorder
- HP 5613A Three-channel ECG Recorder
- HP 2766A Disc Memory (with HP 2772A Power Supply)

Assembly language, relocatable (12-lead program)
FORTRAN/Assembly language, relocatable (Frank-lead program)

HP supported:

Medical Electronics Division

01532A, HP 1532A ECG DATA COLLECTION SYSTEM

An inexpensive and practical way for hospitals to add an efficient, computer-assisted ECG interpretation capability to their existing computer facilities is the HP 1532A ECG Data Collection System.

After receiving patient inputs from either HP phone or tape terminals, the readily expandable ECG Data Collection System produces a 7- or 9-track IBM compatible, digital magnetic tape containing patient identification and digitized ECG data. The tape can be processed into any compatible administrative computer. The output of the administrative computer then prints out ECG measurements and interpretive statements that assist the cardiologist in his diagnoses.

In addition to the HP 2100 Minicomputer with 8K of memory, other system hardware consists of: HP 7970B Tape Recorder, HP 5616A Data Receiver/Controller (up to 5), HP 5610A A/D Converter, and an HP 2752A Teletype.

Assembly language, relocatable.

HP supported:

Medical Electronics Division

05670A, HP 5670A PATIENT DATA MONITORING SYSTEM

Hewlett-Packard's easy-to-use 5670A Patient Data Monitoring System provides consistent monitoring of important physiological variables, accesses stored data instantly, formats categories of cardiac arrhythmias to reveal new trends, analyzes cardiac functions, automates notes and messages, and prints reports upon demand or periodically.

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506, MEDICAL SCIENCES (continued)

Typical on-line data, such as heart rate, arterial and venous pressures, temperature, respiration, cardiac arrhythmias, and various waveforms are pre-processed by standard HP monitors and then are entered directly into HP's 2100 Minicomputer. Off-line physiological patient information, such as blood gasses, respirator settings, and vital signs are normally entered through HP's new ICU/CCU Keyboard and Control Module, while off-line general housekeeping data, such as patient's name, hospital number, height, weight, and sex are usually entered through the standard Teletype.

A typical four-bed Patient Data Monitoring System might include: HP 2100 with 24K memory, HP 9600-G00 A/D Converter, HP 5666A Digital Clock, Video Display System (2), HP 5664B Keyboard Controller, HP 5665A Keyboard, HP 2754B Teletype, HP 2748A Photoreader, and HP 780 Series Monitors.

Assembly language, relocatable.

HP supported:
Medical Electronics Division

05680A, MEDACE

MEDACE (Medical Data Acquisition Control Executive) is a software package designed to control HP medical data-acquisition systems. MEDACE is particularly suitable for cardiovascular research, bio-medical research, and intensive care monitoring.

Equipment required is at least 8K of core storage, an HP 12539 Time Base Generator or HP 5666A Digital Clock Subsystem, and an HP 5610 A to D Converter with interface kit. Optional equipment is an HP 2761 Optical Mark Reader and an HP 5661 Storage Display Scope.

Assembly language, relocatable.

HP supported:
Medical Electronics Division

05690A, COMPUTERIZED CARDIAC CATHETERIZATION LABORATORY SYSTEM

This system centralizes and automates the processing of patient information obtained during cardiac catheterization from ECG electrodes, pressure transducers, a dye densitometer and manual entries. Using DOS or DOS-M, the system opens and maintains a patient's file. Both unprocessed and pre-analyzed data are entered throughout the catheterization procedure.

A typical hardware configuration includes:

- HP 5691A Keyboard
- HP 5692A Interface/Switching Control Panel
- HP 2100 Computer (minimum 8K memory)
- HP 5610A Analog to Digital Converter
- HP 5611A Pacer
- HP 2752A Teletype
- HP 5667A Video Monitor
- HP 5662A Scan Converter
- HP 8890A Catheterization Laboratory Recording System

FORTTRAN/Assembly language, relocatable.

HP supported:
Medical Electronics Division

05693A, HP 5693A ANGIO ANALYZER OPTION

A user of the HP 5690A Computerized Catheterization Laboratory System can easily enhance his capability in the cardiovascular area by adding the HP 5693A Angio Analyzer Option (Left Ventricular Volume/Function Studies) which measures, semi-automatically, the left ventricular volume and provides all the derived calculations for better assessment of the left ventricular function using cineangio film, or cut film, as an input.

Using HP's proven DOS-M, the HP FORTTRAN II and HP Assembler programs are written in a modular format, permitting user-programming modifications and additions with a minimum of effort. The HP-supplied programs can be operated by anyone with a minimum of training in the handling and interpretation of angiograms.

Some of the beneficial features offered in the HP 5693A include programs that analyze and calculate left ventricular volume using any one of the following techniques: biplane integration, biplane area length, or single plane area length.

(continued)

506, MEDICAL SCIENCES (Continued)

Other programs calculate left ventricular mass, left ventricular compliance, wall stress, left ventricular work, stroke volume, and left ventricular wall motion.

In addition to the HP 5690A Computerized Catheterization Laboratory System, the optional HP 5693 instrumentation might include: one or two variable-speed Stop Monitors, and optionally, a Plotter.

HP FORTRAN II/HP Assembler, relocatable.

HP supported:
Medical Electronics Division

22221B, HP BIOMEDICAL RESPONSE AVERAGING PROGRAM

The HP Biomedical Response Averaging Program was written in conjunction with the University of Michigan's Electroencephalograph Laboratory. The University uses the program to analyze brain response to physiological stimuli; a 24-channel electroencephalograph being the response sensor. It should be noted, however, that the program is by no means constrained to EEG use. The signal-averaging technique employed can be a powerful aid in many fields, including the following:

- a. High-resolution spectroscopy, where signal averaging can help overcome stability problems.
- b. Electrocardiograph work.
- c. Fluorescent decay studies.

The program, which is independent, is furnished on two paper tapes. One contains the compiler, which permits user input at the teleprinter in conversational form. The second tape contains the signal averaging program, which provides

for data accumulation, statistical analysis, the monitoring of four channels on an oscilloscope, and generation of a report furnishing a statistical analysis for each of the 24 data channels.

Signal averaging is conducted at 1 millisecond per point or longer. Additional features include pre-stimulus condition averaging, dual-resolution sweeps, computation of confidence statistics and weighted averages, and pre-set sweep count. The averages, weighted averages, and confidence statistics for any selected data channel are recorded on an X-Y plotter, furnishing a permanent record in graph form.

Equipment required is the following:

- a. 8K of core storage.
- b. HP 2310C Miniverter System, with options 01 and 03.
- c. HP 7004A X-Y Recorder, with interface kit.
- d. Any high quality general purpose oscilloscope, with 4-channel vertical amplifier section and D/A interface kit.
- e. HP 12539 Time Base Generator.
- f. HP 12566 Duplex Register.

Assembly language, absolute.

Contributed:
George Moore
HP, Data Systems

506, MEDICAL SCIENCES (continued)

22222A, BLOOD ACID-BASE VARIABLES DETERMINATION PROGRAM

Using the Astrup technique, this program is an accurate method of determining the acid-base variables in human blood. Two samples of blood are equilibrated with carbon-dioxide/oxygen mixtures of different and known composition, and the pH of each sample is measured. This data, together with an identification of the patient, an optional hemoglobin-concentration measurement, together with other information, is furnished to the computer by means of a marked card. (A slight change to the program allows input from punched tape.) The program "plots" the pH data against nomogram curves, and the output, furnished on the teleprinter, consists of the following:

- a. P_{CO_2} of the sample.
- b. P_{CO_2} of the sample, corrected for hemoglobin oxygen desaturation.
- c. Concentration of bicarbonate of the sample.
- d. Concentration of bicarbonate of the sample, corrected for hemoglobin oxygen desaturation.
- e. Base excess of the sample.
- f. Base excess of the sample, corrected for hemoglobin oxygen desaturation.
- g. Buffer base of the sample.
- h. Buffer base of the sample, corrected for hemoglobin oxygen desaturation.
- i. Carbon dioxide content of the sample.
- j. Carbon dioxide content of the sample, corrected for hemoglobin oxygen desaturation.
- k. Standard bicarbonate.

l. Normal whole blood buffer base.

m. A symbol to denote whether the hemoglobin was physically measured, or calculated from the normal whole blood buffer base.

Equipment required is 8K of core storage.

FORTRAN II

Contributed:
Stan Russell
HP, Midwest Sales Region

22240A, LUNG COMPLIANCE AND RESISTANCE MEASUREMENT SYSTEM

This program enables early detection of the adverse effects of tobacco smoke or other irritants on lung function by determining the resistance to airflow and the compliance of the lung. Intrapleural pressure, volume, and airflow are measured over a breath cycle; tidal volume, respiratory minute volume, respiratory rate, the lung resistances over various parts of the expiration and inspiration cycles, and the dynamic compliance of the total lung are calculated.

The complete cycles are analyzed, each parameter is printed and a further calculation is made of the mean, standard deviation, and coefficient of variance for each parameter.

Equipment required includes 8K memory, 2752A teleprinter, HP 5610 Analog-to-digital Converter, HP 7761A Recording System, HP 350-110CM Preamplifier (2 off), HP 350-5000A Integrating Preamplifier, HP 270 Pressure Transducer, and an HP 268 Flow Transducer.

FORTRAN II.

Contributed:
Glyn Harris
HP, England/Slough

700, BUSINESS AND MANUFACTURING APPLICATIONS

701, JOB REPORTING

22378A, RTE LOGBOOK

The two FORTRAN programs in this package allow a user to "log": time-in of job, description of job, day, time-out of job; and generate a periodic summary report which includes the number of working days, the number of computer hours available, one-line printouts of each job run along with its run-time, total user hours, total computer

hours, and other information pertinent to an RTE environment. Requires 16K core.

FORTRAN II.

Contributed:
Eugene Burmeister
HP, Loveland Division

720, EDUCATIONAL ADMINISTRATION

22266A, MARK SENSE EDUCATIONAL TEST CARD SCORING PROGRAM

This package consists of two assembler subroutines and one FORTRAN main program to read HP 9320-2062 Educational Test Scoring Mark Sense Cards, calculate individual student scores and overall class statistics, and print the results. The first card read contains the correct answers, and each successive card is graded against that master. Incorrect answers are tabulated for each student, as well as the

number of times each answer is chosen for each multiple choice question.

Equipment required includes 8K memory, and HP 2761-07 Mark Sense Reader, and an HP 2752A teleprinter.

FORTRAN II.

Contributed:
Charles Chernack
HP, Eastern Sales Region

800, EDUCATION

880, BUSINESS

22332A, THE EXECUTIVE GAME

THE EXECUTIVE GAME simulates a small industry in which there are up to 9 companies manufacturing and selling a single product. Participants are organized into teams which operate their hypothetical companies in competition with one another. The purpose of THE EXECUTIVE GAME is to provide an imaginary business environment in which participants can practice top-management decision making. The GAME is divided into two programs, and information is transferred between the two programs by means of COMMON storage. Part I accepts and processes team decisions, and Part II outputs Information on Competitors, an Operating Statement, a Cash Flow Statement, an Income Statement, and a Balance Sheet for each team. An additional YEAREND program evaluates each team's performance at the end of each four quarters of play. A text of player's instructions is published by Richard D. Irwin, Inc. (Henshaw and Jackson, *The Executive Game*, 1966). THE EXECUTIVE GAME can be a stimulating and effective learning tool for high school, undergraduate, and graduate business classes, and in management development programs. Minimum hardware requirements include an 8K computer and a teletype.

FORTRAN II.

Contributed:

Dr. Richard J. Ward

Bowling Green State University

22492A, THE EXECUTIVE GAME FOR DOS-M

This program is a DOS-M adaptation of The Executive Game, HP 22332. It simulates a small industry in which there are up to 9 companies manufacturing and selling a single product. Participants are organized into teams which operate their hypothetical companies in competition with one another. The purpose of The Executive Game is to provide an imaginary business environment in which participants can practice top-management decision making. The Game is divided into two programs, Game 1 and Game 3. Game 1 accepts and processes team decisions, and outputs Information on Competitors, an Operating Statement, a Cash Flow Statement, an Income Statement, and a Balance Sheet for each team. Game 3 evaluates each team's performance at the end of each four quarters of play. A text of player's instructions is published by Richard D. Irwin, Inc. (Henshaw and Jackson, *The Executive Game*, 1972). The Executive Game can be a stimulating and effective learning tool for high school, undergraduate, and graduate business classes, and in management development programs. Minimum hardware requirements include a 16K computer, a moving head disc, DMA, EAU, and a teletype.

FORTRAN II/Assembly language, relocatable.

Contributed:

Richard J. Ward, Bowling Green State University

Grant T. Phipps/Elliott N. Gale, State University of New York at Buffalo

900 UNCLASSIFIED
901, DEMONSTRATIONS

22040A, SCOPE DISPLAY DEMO

The Scope Display Demo is a self-teaching tool which demonstrates the uses of the programs in the A900-007 Scope Display Library (HP software product 20208A). The program library is used by the HP 2331A X-Y Display Subsystem, or with any oscilloscope employing the HP 12555 Digital-to-Analog Converter as an interface with the computer. An additional function of the Scope Display Demo is to furnish a means by which ASCII character strings can be moved to the most suitable position on the CRT display; the selected position can then be written into a program.

FORTRAN II

Contributed:
Thomas Winker
HP, Neely Sales Region

22099A, DOS DEMO

This DOS program is designed to demonstrate the major features and capabilities of the Disc Operating System. Two of the features dealt with are batch processing and disc file management. Mark sense cards are used for entering control directives, and the operator can transfer between batch processing and keyboard monitoring to demonstrate the flexibility of the Disc Operating System. The program is intended for a fixed-head disc or drum, and has not been tested with a moving-head disc.

Equipment required is 8K of core storage, one HP 2770/71 Disc Memory with interface kit and power supply or one HP 2773/74/75 Drum Memory with interface kit and power supply, one HP 2761A-007 Optical Mark Sense Card Reader with interface kit, and the following optional devices for the computer: 2-channel Direct Memory Access, Memory Protect, Extended Arithmetic Unit, Memory Parity Check, Extended Arithmetic Unit, and Time Base Generator.

Assembly language, relocatable.

Contributed:
Mark Korell
HP, Data Systems Division

903, GAMES

22094A, JEU DE MORPIONS (GAME OF TIC-TAC-TOE)

This program, named after its contributor, plays a game similar to tic-tac-toe with the user. (Tic-tac-toe is known as "noughts and crosses" in Britain.) The game is played on a 20-square grid, and the objective is to place five X's in adjacent squares, either horizontally, vertically, or diagonally. The program attempts to prevent this and select five adjacent squares of its own. The program is conversational, and the user can select either French or English language. The game is known as "jeu de morpions" in France, and as "go-muku" in Japan.

Assembly language, relocatable.

Contributed:
Paul Gavarini
HP, France/Orsay

22298A, BATTLESHIP

Battleship is a computer game for RTE in which five ships are randomly placed in a matrix by the program. The location of these ships is found by the player who proceeds by trial and error until a hit is achieved. Through successive "hits," he can reconstruct the random matrix.

FORTRAN IV.

Contributed:
Eugene Burmeister
HP, Loveland Division

903, GAMES (continued)

22436A, HANGMAN

This program will play the game of HANGMAN using eighty, five letter words which are read in from the high speed paper tape reader as data. It will ask for letters which it compares with the letters of the word the player chooses.

If the player guesses the letters of the chosen word with less than six errors, he gets to choose another word. If he has six errors a picture of a gallows and a stick man hanging is printed along with the word he was guessing. He then gets to choose another word and continues playing. Requires 8K of core.

FORTRAN II

Contributed:
Norman D. Love
Maryville College

904, PLOTTING ROUTINES

22162B, X-Y PLOTTER ON PRINTER

This routine produces graphs on a teleprinter. An X array is scaled to suit the printed graph, and is plotted against either the element number in the array or against another array, Y. Each data point is marked on the graph as a letter "X", and the coordinates of the point also are printed. The routine can commence at any point in the array, and the output can be either a print plot or a bar plot. A maximum of 200 (X, Y) data pairs can be accepted. The routine is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II.

Contributed:
Roland Jahn
HP, Medical Electronics Division

22163A, TIME SERIES PLOTTER

Available in function form, this subprogram plots fixed-point integers on the teleprinter. If the value of the integer is from 0 to 50, the point appears as an asterisk, the distance from the left margin of the page being proportionate to the value of the point. If the value is over 50, the integer itself is printed in numerical form at the right hand edge of the page. Successive data points are plotted on successive lines down the page. The routine is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

22164B, HISTOGRAM PLOTTER PROGRAM

This program sorts a single dimension floating point array into ascending sequence, and (a) produces a histogram of the data points on the teleprinter or line printer, or (b) furnishes the frequency distribution of the data points, or (c) produces both a histogram and a frequency distribution. The program is part of the Stat-Pack group.

Equipment required is at least a 16K computer.

FORTRAN II'

Contributed:
Roland Jahn
HP, Medical Electronics Division

22182A, HISTOGRAM PLOTTER ROUTINE

This routine sorts a single-dimension floating point array into ascending sequence, and (a) produces a histogram of the data points on the teleprinter, or (b) furnishes the frequency distribution of the data points, or (c) produces both a histogram and a frequency distribution. A maximum of 400 data points can be handled; any number of duplications are allowed. (With a slight change in the routine, more than 400 points can be processed.) The routine is part of the Stat-Pack group, and is FORTRAN callable.

FORTRAN II

Contributed:
Roland Jahn
HP, Medical Electronics Division

904, PLOTTING ROUTINES (continued)

22262A, THREE DIMENSIONAL PLOT SUBROUTINE

This routine projects a three-dimensional object in perspective on a simple X-Y plotting system or graphic display terminal. It transforms an (X, Y, Z) coordinate in three space to an orthographic projection in two space, using four calls. The first call defines the angles of the coordinate axes X, Y, Z allowing display of various rotations of an object. The second and third calls set minimum and maximum (X, Y, Z) values, while the fourth call transforms an (X, Y, Z) coordinate in three space to an (IX, IY) coordinate representation in two space.

FÖRTRAN II.

Contributed:
John S. Shema
Montana State University

22348A, X-Y PLOTTER FOR 11-INCH PAGE PRINTER

This program plots X-Y graphs on an 11-inch page printer from a given set of data points. The data is input free field, ordered, and scaled in both dimensions by the program to fit on one page. Two versions of the program are included; one formatted for output to an HP 2767 line printer, and the other for a teleprinter.

This program allows a quick display of data with the limited resolution of a character printer. Up to 100 samples of 10 different variables can be input with the line printer version. Up to 120 samples of 4 different variables can be input with the teleprinter version.

Equipment required includes 8K core, any HP teleprinter, and, optionally, any HP photoreader and an HP 2767 line printer.

FÖRTRAN II.

Contributed:
Roland E. Jahn
HP, Medical Electronics Division

22425A, THREE DIMENSIONAL TRANSFORMATIONS USING EULER'S ANGLES

This FORTRAN-callable subroutine transforms the coordinates (x, y, z) of a data set to (x', y', z') using Euler's Angles. It is particularly useful in obtaining planar projections of crystal structures. References cited in the documentation give a detailed explanation of the method of Euler's Angles.

Only 8K core and an HP 2752 teleprinter are required, but the routine is particularly useful in conjunction with an HP 1300A Display System. Two test programs demonstrate output on a teleprinter and an HP 1300A Scope.

FÖRTRAN II

Contributed:
Rodney C. Williams and William L. McLain
Wake Forest University

22426A, LOGARITHMIC AXIS GENERATOR FOR THE CALCOMP 565

The purpose of this program is to generate a logarithmic axis on a Calcomp Plotter. It uses several of the subroutines from the HP Plotter Library. The user may specify length of axis, number of cycles, axis label, and x or y direction of axis. Many users may wish to convert this program to a subroutine for use in more general graphic programs. Instructions for this conversion are enclosed. Requires an 8K 2100 computer.

FÖRTRAN II

Contributed:
William L. McLain and Rodney C. Williams
Wake Forest University

904, PLOTTING ROUTINES (continued)

22474A, HP 7210 PLOTTER LIBRARY

These programs, when used with the DOS-M or RTE 7210 Plotter Driver (HP 22471 and HP 22473 respectively), greatly simplify the programming required to do the following: plot lines or points, scale and plot data, axis generation, and plot characters and numbers.

FORTRAN II/Assembly language, relocatable.

Contributed:
Grant Munsey
HP, Neely Sales Region

72000A, HP 7210A PLOTTER DRIVER FOR BCS WITH CHARACTER GENERATOR, D. 10

This Driver interfaces the HP 7210A Graphic Plotter to the BASIC CONTROL SYSTEM. The Driver allows the Plotter to operate in the relative or absolute mode. The pen may be controlled to plot points or lines from the user's program. The Driver also has a built-in Character Generator which allows characters to be any size, any angle and any slant. The character set and font may easily be changed with the program HP 7210A Character Set Generator number HP 72005A, (HP BASIC program library).

Assembly language, relocatable.

HP supported:
San Diego Division

72001A, HP 7210A PLOTTER DRIVER FOR BCS, D. 10

This Driver interfaces the HP 7210A Graphic Plotter to the Basic Control System. The Driver allows the Plotter to operate in the relative and absolute mode. The pen may be controlled to plot points or lines from the user's program. This Driver is designed to have minimum core requirements.

Assembly language, relocatable.

HP supported:
San Diego Division

72002A, HP 7210A DIAGNOSTIC & TEST TAPE

This tape tests the HP 7210A Graphic Plotter when it is interfaced to an HP 2100, HP 2116, HP 2115 or HP 2114 Computer. Any difficulties can also be diagnosed by evaluation of the Plotter response to the test tape.

Assembly language, absolute.

HP supported:
San Diego Division

72003A, BASIC CALLABLE HP 7210A PLOTTER DRIVER WITH CHARACTER GENERATOR

This Driver interfaces the HP 7210A Plotter to the HP BASIC CONTROL SYSTEM. The 7210A Plotter driver allows the programmer to operate the Plotter in relative or absolute mode. The pen may be controlled to plot points or lines from the user's program. This Driver also includes a built-in Character Generator which allows characters to be any size, at any angle and slant. The character set and font may easily be changed with the program HP 7210A Character Set Generator number HP 72005A, (HP BASIC program library).

Assembly language, absolute.

HP supported:
San Diego Division

72004A, BASIC CALLABLE HP 7210A PLOTTER DRIVER

This Driver interfaces the HP 7210A Plotter to the HP Basic Control System. The Driver allows the Plotter to operate in the relative or absolute mode. The pen may be controlled to plot points or lines from the user's program. This Driver is designed to have minimum core requirements.

Assembly language, absolute.

HP supported:
San Diego Division

904, PLOTTING ROUTINES (continued)

72006A, HP 7210A PLOTTER DRIVER FOR DOS-M WITH CHARACTER GENERATOR, DVR-10

This Driver interfaces the HP 7210A Graphic Plotter to the DOS-M Control System. The Driver allows the Plotter to operate in the absolute or relative mode. The pen may be controlled to plot points or lines from the user's program. The Driver also has a built-in Character Generator which allows characters to be drawn any size at any angle and slant. The Character Set and font may easily be changed with the program HP 7210A Character Set Generator number HP 72005A, (HP BASIC program library).

Assembly language, relocatable.

HP supported:
San Diego Division

72007A, HP 7210A PLOTTER DRIVER FOR DOS-M, DVR-10

This Driver interfaces the HP 7210A Graphic Plotter to the DOS-M Control System. The Driver allows the Plotter to operate in the absolute or relative mode. The pen may be controlled to plot points or lines from the user's program. The Driver is designed for minimum core requirements.

Assembly language, relocatable.

HP supported:
San Diego Division

72008A, HP 7210A PLOTTER DRIVER FOR RTE WITH CHARACTER GENERATOR, DVR-10

This Driver interfaces the HP 7210A Graphic Plotter to the RTE Control System. The Driver allows the Plotter to operate in the absolute or relative mode. The pen may be controlled to plot points or lines from the user's program. The Driver also has a built-in character generator which allows characters to be drawn any size at any angle and slant. The character set and font may easily be changed with the program HP 7210A Character Set Generator number HP 72005A, (HP BASIC program library).

Assembly language, relocatable.

HP supported:
San Diego Division

72009A, HP 7210A PLOTTER DRIVER FOR RTE WITH CHARACTER GENERATOR, DVR-10

This Driver interfaces the HP 7210A Graphic Plotter to the RTE Control System. The Driver allows the Plotter to operate in the absolute or relative mode. The pen may be controlled to plot points or lines from the user's programs. This Driver is designed for minimum core requirement.

Assembly language, relocatable.

HP supported:
San Diego Division

905, MICROCODE

22515A, PSEUDO-DMA INPUT (MULTI-CHANNEL)

This microprogram simulates DMA input, allowing the user to define the number of pseudo-DMA channels. When a device interrupt is requested, control is transferred directly to the 2100's microprocessor where the direct memory access functions have been simulated. Each pseudo-DMA channel defined requires two core locations, for word count and core address.

The use of this microprogram offers more than a 600 per cent increase in interrupt handling efficiency over conventional techniques.

Microassembly language.

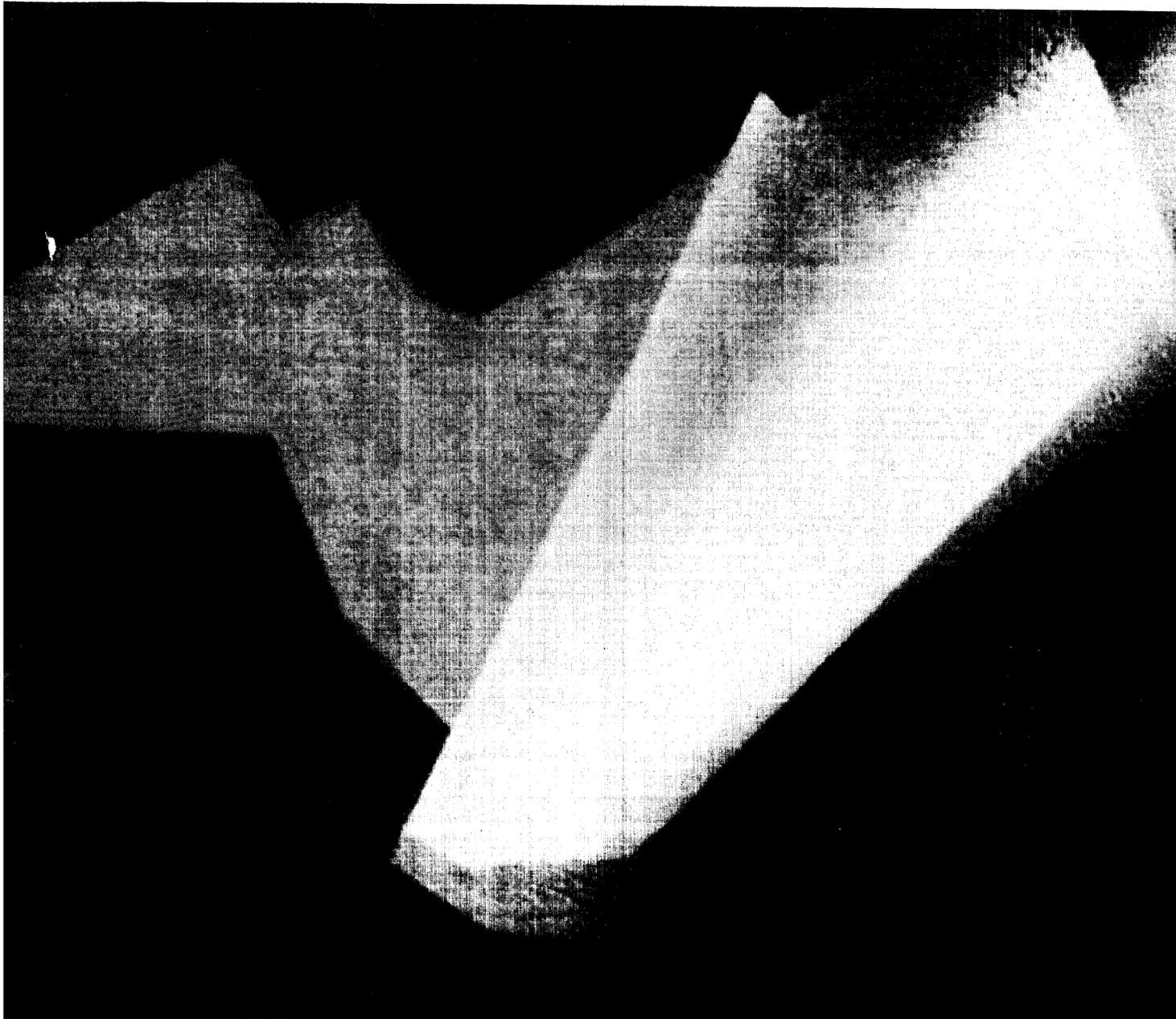
Contributed:
Juris Brempelis
HP, Data Systems Division

22516A, WORD MOVE (INTERRUPTABLE)

The microprogram moves a user specified number of contiguous words from a source to a destination core area five times faster than previously available techniques.

Microassembly language.

Contributed:
Juris Brempelis
HP, Data Systems Division



section II

cross-reference index

This section of the Program Catalog provides the means for locating programs to perform specific tasks.
The section consists of a series of key words, with programs relating to each key word listed below it.

4K			DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER	006	22339A
4K	SIO BUFFERED TELEPRINTER DRIVER	002	20322A		
4K	SIO TELEPRINTER DRIVER, LINE PRINTER COMPATIBLE	002	24123A		
4K	SIO HP 2605A CONSOLE PRINTER DRIVER	002	24256A		
4K	SIO SYSTEM DUMP	008	20301C		
4K	SIO TAPE READER DRIVER	009	20303A		
4K	SIO TAPE PUNCH DRIVER	009	20304A		
4K	SIO TAPE PUNCH DRIVER, IBM 9-LEVEL	009	20317A		
4K	SIO MARK SENSE CARD READER DRIVER	010	20520C		
4K	SIO HP 2691A CARD READER DRIVER	010	24178A		
4K	SIO HP 2892A CARD READER DRIVER	010	24264A		
4K	SIO HP 2778A LINE PRINTER DRIVER	011	20527B		
4K	SIO HP 2767 LINE PRINTER DRIVER	011	24164B		
4K	SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24268A		
4K	SIO HP 7970 MAGNETIC TAPE DRIVER	016	13021B		
4K	SIO HP 2020 MAGNETIC TAPE DRIVER	016	20315C		
4K	SIO HP 3030 MAGNETIC TAPE DRIVER	016	20336B		
4K	BCS RELOCATING LOADER	017	20001D		
4K	FORTRAN COMPILER	018	20549A		
4K	ASSEMBLER NON-EAU	018	24038B		
4K	ASSEMBLER EAU	018	24039B		
4K	ASSEMBLER FLOATING POINT	018	24247A		
4K	BCS RELOCATABLE LIBRARY, NON-EAU	021	24147B		
4K	BCS RELOCATABLE LIBRARY, EAU	021	24148B		
8K					
8K	SIO BUFFERED TELEPRINTER DRIVER	002	20323A		
8K	SIO TELEPRINTER DRIVER, LP-COMPAT	002	24125A		
8K	SIO HP 2605A CONSOLE PRINTER DRIVER	002	24257A		
8K	SIO SYSTEM DUMP	008	20313C		
8K	MAGNETIC TAPE SYSTEM	008	20504B		
8K	SIO TAPE READER DRIVER	009	20305A		
8K	SIO TAPE PUNCH DRIVER	009	20307A		
8K	SIO TAPE PUNCH DRIVER, IBM 9-LEVEL	009	20316A		
8K	SIO CARD READER DRIVER	010	20324B		
8K	SIO MARK SENSE CARD READER DRIVER	010	20521C		
8K	SIO HP 2891A CARD READER DRIVER	010	24179A		
8K	SIO HP 2892A CARD READER DRIVER	010	24265A		
8K	SIO HP 2778A LINE PRINTER DRIVER	011	20528A		
8K	SIO HP 2767 LINE PRINTER DRIVER	011	24165B		
8K	SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24269A		
8K	SIO DISC/DRUM DRIVER	015	20079A		
8K	BCS MAGNETIC TAPE DRIVER	016	13023B		
8K	SIO MAGNETIC TAPE DRIVER 7 TRACK	016	13029B		
8K	SIO HP 2020 MAGNETIC TAPE DRIVER	016	20314D		
8K	SIO HP MAGNETIC TAPE DRIVER	016	20331C		
8K	BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24250B		
12K					
12K	SIO BUFFERED TELEPRINTER DRIVER	002	20329A		
12K	SIO TELEPRINTER DRIVER	002	24299A		
12K	SIO HP 2605A CONSOLE PRINTER DRIVER	002	24300A		
12K	SIO SYSTEM DUMP	008	24298A		
12K	SIO TAPE READER DRIVER	009	20327A		
12K	SIO TAPE PUNCH DRIVER	009	20328A		
12K	SIO HP 2767 LINE PRINTER DRIVER	011	24301A		
12K	SIO HP 2778A LINE PRINTER DRIVER	011	24302A		
12K	SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24303A		
12K	SIO HP 3030 MAGNETIC TAPE DRIVER	016	24304A		
12K	SIO HP 7970 MAGNETIC TAPE DRIVER	016	24312A		
16K					
16K	SIO BUFFERED TELEPRINTER DRIVER	002	20330B		
16K	SIO TELEPRINTER DRIVER, LP-COMPAT	002	24127A		
16K	SIO HP 2605A CONSOLE PRINTER DRIVER	002	24258A		
16K	SIO SYSTEM DUMP	008	20335B		
16K	MAGNETIC TAPE SYSTEM	008	20595B		
16K	SIO TAPE READER DRIVER	009	20319A		
16K	SIO TAPE PUNCH DRIVER	009	20320A		
16K	SIO CARD READER DRIVER	010	20332A		
16K	SIO MARK SENSE CARD READER DRIVER	010	20522C		
16K	SIO HP 2891A CARD READER DRIVER	010	24180A		
16K	SIO HP 2892A CARD READER DRIVER	010	24266A		
16K	SIO HP 2778A LINE PRINTER DRIVER	011	20529A		
16K	SIO HP 2767 LINE PRINTER DRIVER	011	24166B		
16K	SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24270A		
16K	SIO DISC/DRUM DRIVER	015	20001A		
16K	SIO HP 7970 MAGNETIC TAPE DRIVER	016	13022B		
16K	SIO MAGNETIC TAPE DRIVER 7 TRACK	016	13030B		
16K	SIO HP 2020 MAGNETIC TAPE DRIVER	016	20321C		
16K	SIO HP 3030 MAGNETIC TAPE DRIVER	016	20334C		
A TO D CONVERTER					
	RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC STORAGE ROUTINE	006	22317A		
			DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER	006	22339A
			BCS HP 2312A DRIVER (D.55)	012	20076A
			RTE HP 2312A DRIVER (DVR55)	012	20396A
			MULTI/MINIVERTER SCAN ROUTINE SCNMV (D.76)	013	20094B
			HP 5610A ANALOG TO DIGITAL DRIVER - FORTRAN CALLABLE	013	22304A
			BCS HP 2312A DRIVER/FORTRAN INTERFACE ROUTINE (L2312)	212	20078A
			VERIFY HP 5610A ANALOG TO DIGITAL TEST	216	20075D
			HP 12564A DIAGNOSTIC 10-BIT ANALOG TO DIGITAL CARD	216	20344A
			HP 2310C VERIFICATION TEST	219	20336D
			HP 2311 CALIBRATION - TELEPRINTER	219	20583C
			A/D - D/A EQUIPMENT TEST (216)		
			HP 21XX VERIFICATION AND TEST FOR DIGITAL VOLTAGE SOURCE	216	14903A
			VERIFY HP 5610A ANALOG TO DIGITAL TEST	216	20075D
			HP 12564A DIAGNOSTIC 10-BIT ANALOG TO DIGITAL CARD	216	20344A
			HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC VERIFICATION: DACE AXEPT	217	20023A
				219	20072C
			ADDRESS		
			HP 2100A LOW MEMORY ADDRESS TEST	208	24211A
			HP 2100A HIGH MEMORY ADDRESS TEST	208	24212A
			AERONAUTICAL ENGINEERING (517)		
			EFFECTIVE PERCEIVED NOISE LEVEL	517	22384A
			ALGEBRA		
			TRANSFORMATIONS	306	22117A
			ALGOL		
			FORTRAN /ALGOL INTERFACE ROUTINE (L5610)	013	20074A
			FILE THREE INPUT FOR MTS ALGOL	016	22100A
			ALGOL OPERATING SYSTEM FOR MTS	016	22270C
			DOS/RTE ALGOL COMPILER	018	22443A
			ALGOL COMPILER	018	24044B
			RTE/DOS ALGOL COMPILER	018	24129B
			CHARACTER AND RIT STRING PROCEDURES FOR ALGOL	104	22207A
			HP 7970/13181A DIAGNOSTIC	204	13020E
			ALGOL ARRAY TRANSFER FOR SEGMENTATION	212	22289A
			FORTRAN/ALGOL ARRAY TRANSFER ROUTINE	212	22310A
			HP 2313A DRIVER FORTRAN/ALGOL INTERFACE ROUTINE (I2313)	212	29010A
			FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65, L65	212	29017A
			LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DVR., D.65,DIR65	212	29018A
			LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DVR., D.65,DIR65	212	29019A
			FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.66, L66	212	29020A
			FORTRAN/ALGOL INTERFACE SUBROUTINE FOR RTE DRIVER DVR65,DLK65	212	29021A
			ALPHA		
			SYMBOLIC ALPHANUMERIC GENERATOR	212	22016C
			PAPER TAPE TITLER	212	22269A
			RTE ALPHANUMERIC TAPE LABEL GENERATOR	212	22524A
			ANALYSIS OF VARIANCE AND COVARIANCE (410)		
			BARTLETT'S HOMOGENEITY OF VARIANCE TEST	401	22157B
			TESTS OF HYPOTHESIS FOR VARIANCES	401	22160A
			LEAST SQUARES REGRESSION PROGRAM	404	22128A
			LINEAR REGRESSION INTERVAL ESTIMATES	404	22179A
			ORTHOGONAL REGRESSION PROGRAM	404	22134A
			MULTIPLE REGRESSION PROGRAM	404	22185A
			DUNCAN'S MULTIPLE RANGE TEST	407	22155A
			COMPLETELY RANDOMIZED DESIGN	410	22148A
			COMPLETELY RANDOMIZED DESIGN WITH SURSAMPLING	410	22149A
			RANDOMIZED COMPLETE BLOCK DESIGN	410	22150A
			RANDOMIZED COMPLETE BLOCK DESIGN WITH SUBSAMPLING	410	22151B
			TWO-WAY FACTORIAL DESIGN	410	22152A
			THREE-WAY FACTORIAL DESIGN	410	22153A
			ANALYSIS OF VARIANCE INFORMATION GENERATOR	410	22154A
			ARITHMETIC		
			HEWLETT-PACKARD COMMERCIAL SUBROUTINES	021	24245A
			HP 2100A EXTENDED ARITHMETIC UNIT TEST	209	24214A
			INTEGRATED MATH CALCULATOR PROGRAM	301	22084C
			DOUBLE PRECISION INTEGER LIBRARY	302	22097C

THREE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	392	22334A	HP 2402A DIGITAL VOLTMETER DRIVER - BASIC	006	22305A
FIVE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	392	22335A	CALLABLE		
COMPLEX MATH PACKAGE	393	22234A	HP 12598 DATA SOURCE INTERFACE DIAGNOSTIC	202	20337D
COMPLEX ARITHMETIC FOR HP BASIC	393	22531A	HP 12556B POSITIVE TRUE 40-BIT OUTPUT REGISTER	202	20348C
DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES	394	22268B	DIAGNOSTIC		
ASCII					
BCS 40 BIT OUTPUT REGISTER DRIVER D.54	003	20098C	BCD/ASCII ARITHMETIC (304)		
TELEX TO ASCII PHOTOREADER DRIVER	009	22264B	DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES		
SPACE SAVING ASCII STORAGE ROUTINES	104	22404A	304	22268B	
INTEGER EXTRACTION FROM A STRING OF TEXT	104	22467A	BCS		
EBCDIC TO ASCII TRANSLATOR	105	22086A	BCS TELEPRINTER DRIVER D.00		
ASCII/IBM 8-LEVEL CHARACTER CONVERSION ROUTINE	105	22093A	002	22017C	
CHARACTER CODE TRANSLATOR	105	22114A	002	22244B	
ASCII DISC FILE FIELD SORT	107	22376A	16K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM		
ALPHANUMERIC DISC FILE SORT	107	22479A	USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER D.50		
HP 12556B POSITIVE TRUE 40-BIT OUTPUT REGISTER	202	20348C	002	22245A	
DIAGNOSTIC			BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS AND ASYNCHRONOUS DEVICES		
ASSEMBLER					
DOS ASSEMBLER	018	20598C	8K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM		
RTE ASSEMBLER	018	20074D	002	22367A	
INVERSE ASSEMBLER	018	22013B	HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU		
ABSOLUTE OBJECT DECODER	018	22202R	003	24277A	
SYMBOLIC MACRO ASSEMBLER FOR THE HP 2100	018	22385A	006	14900B	
DOS-M RELOCATABLE REVERSE ASSEMBLER	018	22438A	006	14904B	
8K SID RELOCATABLE REVERSE ASSEMBLER	018	22439A	006	14911A	
8K SID ABSOLUTE REVERSE ASSEMBLER	018	22440A	006	20006B	
INTEL 8088 ASSEMBLER FOR HP 2100	018	22529A	006	20009B	
EXTENDED ASSEMBLER NON-EAU	016	24031B	006	20210C	
EXTENDED ASSEMBLER EAU	016	24032B	BCS 8-4-2-1/4-2-2-1 DATA SOURCE INTERFACE DRIVER (D.40A)		
4K ASSEMBLER NON-EAU	018	24033B	006	20012C	
4K ASSEMBLER EAU	018	24039B	BCS 8-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER (D.42A)		
DOS-M ASSEMBLER	018	24158B	006	20024A	
EXTENDED ASSEMBLER FLOATING POINT	018	24246A	006	20025A	
4K ASSEMBLER FLOATING POINT	018	24247A	006	20028B	
BCS HP 2100 MICRO ASSEMBLER	018	24279A	PSEUDO MULTIPROGRAMMING EXECUTIVE FOR BCS		
AUTOMATIC TABBING PROGRAM	212	22064B	008	22441A	
DOS/DOS-M ASSEMBLY LANGUAGE COMMENT INSERTER	212	22340A	008	22452A	
ASSEMBLER JUSTIFICATION PROGRAM	212	22428A	008	24172A	
COMMENT INSERTER FOR ASSEMBLER PROGRAMS	212	22444A	008	24173A	
AUTO RESTART					
FORTAN POWER FAIL LINK	019	22235A	009	20005B	
REAL-TIME EXECUTIVE OPERATING SYSTEM	020	20016D	009	20006B	
HP 12588 POWER FAIL WITH AUTO-RESTART TEST	218	20428B	009	20016A	
HP 2100A POWER FAIL DIAGNOSTIC	218	24206B	010	20019C	
BASIC					
HP 2300A TIME-SHARED BASIC SYSTEM	001	20596F	010	20017R	
HP 2000C TIME-SHARED BASIC SYSTEM	001	24230B	010	20019C	
HP 2000B TO HP 2000C CONVERSION (HP 2003 DISC)	001	24234B	010	24181A	
HP 2000B TO HP 2000C CONVERSION (HP 2070 DISC)	001	24235B	010	24274A	
HP 2000B TIME-SHARED BASIC SYSTEM	001	24239B	011	24167B	
HP 2200C/F TIME-SHARED BASIC LOADER (HP 7900 DISC)	001	24253C	011	24171B	
HP 2000B TO HP 2000C CONVERSION (HP 7900 DISC)	001	24254B	011	24273A	
HP 2000F TIME-SHARED BASIC SYSTEM	001	24276B	012	20076A	
HP 2000E TIME-SHARED BASIC SYSTEM	001	24280B	012	20501F	
HP 2000D TIME-SHARED BASIC LOADER/UTILITY	001	24285B	012	20517C	
TELEPRINTER/LINEPRINTER OUTPUT SELECTOR FOR HP BASIC	002	22231C	012	20532A	
BCS PCMC FAIL TELEPRINTER DRIVER WITH AUTORESTART OPTION	002	22311A	012	20007A	
HP 6940A/6941A DRIVER FOR 20392A BASIC	006	14915A	012	20008A	
HP 2300A TO HP 2000B CONVERSION	006	20078B	013	20073C	
DISC BASIC EXECUTIVE	006	22338A	BCS HP 5610A ANALOG TO DIGITAL DRIVER, DMA, (D.56A)		
BASIC PHOTOREADER DATA INPUT	009	22082B	013	20093C	
HP 2778/2767 LINE PRINTER PATCH FOR EDUCATIONAL BASIC	011	22399A	MULTI/MINIVERTEER SCAN ROUTINE SCMMV (D.76)		
EDUCATIONAL BASIC HP 2767 LINE PRINTER DRIVER	011	22409A	014	20014A	
BASIC LANGUAGE DATA ACQUISITION SYSTEM	012	22199A	015	20091A	
HP 2311A SUBSYSTEM DRIVER - BASIC CALLABLE	013	22475A	8K SID HP 7970 MAGNETIC TAPE DRIVER		
HP 7970 MAGNETIC TAPE DRIVER - BASIC CALLABLE	016	22239A	016	13020B	
READ/WRITE ROUTINES FOR THE TENNECOMP TP-1371 MINIDEK SYSTEM	016	22462A	016	13027B	
BASIC SYSTEM	018	20392B	016	20007A	
PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM	018	22201D	016	20013F	
MSU MULTI-TERMINAL BASIC SYSTEM WITH CARD READER CAPABILITY	018	22255D	016	20022F	
MINI-BASIC	018	22261A	017	20001D	
DOS-M RELOCATABLE BASIC	018	22326A	017	20016H	
DOS-M EAU RELOCATABLE BASIC	018	22389A	017	22297A	
SUPER BASIC FOR DOS-M	018	22417F	018	22295A	
MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC 20392A	018	22476A	018	24279A	
HAVERING EDUCATIONAL BASIC FOR DOS-M	018	22494A	020	20016D	
EDUCATIONAL BASIC SYSTEM	018	24160A	021	24145B	
FLOATING POINT OVERLAY FOR HP BASIC	022	22477A	021	24146B	
OCTAL UTILITY SYSTEM (MOCUS)	211	22088A	021	24147B	
BASIC LINE RESEQUENCER	212	22015F	021	24148B	
CHAIN FROM PHOTOREADER IN HP BASIC	212	22287A	021	24149B	
COMPLEX ARITHMETIC FOR HP BASIC	303	22531A	021	24249B	
COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72003A	107	22383A	
MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72004A	207	22257A	
BCD					
BCS 40 BIT OUTPUT REGISTER DRIVER D.54	003	20098C	211	20002B	
DOS/DOS-M/RTE 3400 DVM DRIVER AND BCD CONVERSION	006	22294A	211	22527A	
BCD/ASCII ARITHMETIC (304)					
DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES					
BCS					
BCS TELEPRINTER DRIVER D.00					
16K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM					
USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER D.50					
BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS AND ASYNCHRONOUS DEVICES					
8K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM					
HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU					
HP 12908A WCS BCS DRIVER (D.33)					
BCS 6936A MULTIPROGRAMMER DRIVER (D.61)					
HP 6940A/6941A BCS DRIVER, D.61					
HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY					
BCS 8-4-2-1 DATA SOURCE INTERFACE DRIVER (D.40)					
BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41)					
BCS 8-4-2-1 SCANNER CONTROL DRIVER (D.42)					
BCS 8-4-2-1/4-2-2-1 DATA SOURCE INTERFACE DRIVER (D.40A)					
BCS 8-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER (D.42A)					
BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41B)					
BCS HP 2912 SCANNER CONTROL DRIVER (D.42B)					
BCS HP 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN-12 (D.77)					
PSEUDO MULTIPROGRAMMING EXECUTIVE FOR BCS					
BCS-FORTRAN/ALGOL MEMORY ALLOCATION ROUTINE					
BCS INPUT/OUTPUT CONTROL, BUFFERED					
BCS INPUT/OUTPUT CONTROL					
BCS TAPE READER DRIVER D.01					
BCS TAPE PUNCH DRIVER D.02					
BCS TAPE PUNCH DRIVER, IBM 8-LEVEL (D.02A)					
BCS CARD READER DRIVER (D.11)					
BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)					
BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)					
BCS HP 2891A CARD READER DRIVER (D.11)					
BCS HP 2892A CARD READER DRIVER (D.11)					
BCS HP 2767 LINE PRINTER DRV. (D.16)					
BCS HP 2778A LINE PRINTER DRV. (D.12)					
BCS HP 2610A/2614A LINE PRINTER DRIVER (D.12)					
BCS HP 2312A DRIVER (D.55)					
BCS SCN-ANALOG 8-4-2-1 SCAN ROUTINE (D.77)					
BCS SCN-ANALOG 4-2-2-1 SCAN ROUTINE (D.77)					
BCS HP 2321A SUBSYSTEM (HP3450/2911A) SCAN ROUTINE SCN 34 (D.77)					
BCS NUM-DMA DRIVER FOR HP 2313A SUBSYSTEM (D.62)					
BCS DMA DRIVER FOR HP 2313A SUBSYSTEM (D.62A)					
BCS HP 5610A ANALOG TO DIGITAL DRIVER, NON-DMA (D.56)					
BCS HP 5610A ANALOG TO DIGITAL DRIVER, DMA, (D.56A)					
MULTI/MINIVERTEER SCAN ROUTINE SCMMV (D.76)					
BCS PLOTTER DRIVER (D.10)					
HP 2070A CARTRIDGE DISC MEMORY DRIVER - FORTRAN CALLABLE					
8K SID HP 7970 MAGNETIC TAPE DRIVER					
BCS 7 TRACK DRIVER W/O DMA					
BCS MAGNETIC TAPE DRIVER 7 TRACK DMA					
BCS INCREMENTAL MAGNETIC TAPE DRIVER (D.20)					
BCS HP 2020 MAGNETIC TAPE DRIVER (D.21)					
BCS HP 3030 MAGNETIC TAPE DRIVER (D.22)					
4K BCS RELOCATING LOADER					
BCS RELOCATING LOADER					
OFFLINE RELOCATING LOADER					
BCS INTERPRETER FOR FLOATING POINT OPERATIONS					
BCS HP 2100 MICRO ASSEMBLER					
REAL-TIME EXECUTIVE OPERATING SYSTEM					
BCS RELOCATABLE LIBRARY, EAU					
RCS RELOCATABLE LIBRARY, NON-EAU					
4K BCS RELOCATABLE LIBRARY, NON-EAU					
4K BCS RELOCATABLE LIBRARY, EAU					
BCS FORTRAN IV LIBRARY					
4K BCS RELOCATABLE LIBRARY - FLOATING POINT					
ALPHANUMERIC RECORD SORT					
MCS/BCS SYSTEM ABSOLUTE DUP					
BCS DEBUG ROUTINE					
DEBUG FOR ABSOLUTE/BCS PROGRAMS					
BCS HP 2312A DRIVER/FORTRAN INTERFACE ROUTINE (L2312)					
'EXEC' CALL ADAPTER ROUTINE					
HP 2100A FLOATING POINT DIAGNOSTIC					
COMPLETE BCS HP 7210A PLOTTER DRIVER DVR.10					
MINIMUM BCS HP 7210A PLOTTER DRIVER DVR.10					
HP 7210A DIAGNOSTIC & TEST TAPE					
COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10					
MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10					
RTE HP 7210A PLOTTER DRIVER DVR.10					
RTE HP 7210A PLOTTER DRIVER DVR.10					

BESSEL FUNCTION			CHAIN FROM PHOTOREADER IN HP BASIC	212	22287A
K BESSEL FUNCTION ROUTINE	306	22018A	ALGOL ARRAY TRANSFER FOR SEGMENTATION	212	22289A
I BESSEL FUNCTION ROUTINE	306	22019A	CHARACTER/SYMBOL MANIPULATION (104)		
Y BESSEL FUNCTION ROUTINE	306	22020A	MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC	018	22476A
BINARY			20392A		
DOS-M BINARY FILE DATA ACQUISITION	012	22361A	BIT OPERATIONS (SET, CLEAR, TEST) - FORTRAN	104	22081A
DOS-M RELOCATABLE PROGRAM TAPE EDITOR	101	22500A	CALLABLE		
BINARY TAPE EDITOR	212	22014A	DATA BLOCK MOVEMENT	104	22204A
BIT			CHARACTER AND BIT STRING PROCEDURES FOR ALGOL	104	22207A
BIT OPERATIONS (SET, CLEAR, TEST) - FORTRAN	104	22081A	CALLABLE		
CHARACTER AND BIT STRING PROCEDURES FOR ALGOL	104	22207A	SPACE SAVING ASCII STORAGE ROUTINES	104	22404A
BOOTSTRAP			INTEGER EXTRACTION FROM A STRING OF TEXT	104	22467A
BOOTSTRAP LOADER GENERATOR	017	22009B	CHARACTER PACKING AND UNPACKING	104	22504A
LOADER BOOTSTRAP	017	22223C	DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES	304	22268B
DOS-M HARDWARE BOOT	017	22342A	COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72003A
ON-LINE SYSTEM LOAD FOR MOVING-HEAD RTE	017	22344A	MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72004A
ON-LINE MOVING-HEAD RTE BOOTSTRAP FROM DOS-M OR	017	22345A	CHECKERBOARD		
DOS			HP 2116A LOW MEMORY CHECKERBOARD TEST	208	20405A
DOS-M BOOTSTRAP PROGRAM FOR DOS-M OR DOS	017	22349A	HP 2116A HIGH MEMORY CHECKERBOARD TEST	208	20406A
DOS-M BOOTSTRAP PROGRAM FROM RTE	017	22350A	HP 2116B HIGH MEMORY CHECKERBOARD TEST	208	20426A
MYS BOOT FROM DOS-M	017	22357A	HP 2116B LOW MEMORY CHECKERBOARD TEST	208	20427A
CORE RESIDENT DOS-M BOOTSTRAP	017	22448B	HP 2116A/14A HIGH MEMORY CHECKERBOARD TEST	208	20512A
DOS-M AUTLOAD ROUTINE	017	22519A	CHEMICAL ENGINEERING (516)		
RESTORE BASIC BINARY LOADER (PBOOT)	017	22533A	COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO	505	22325A
BUSINESS (EDUCATION) (880)			CELSIUS DEGREES CONVERSION		
THE EXECUTIVE GAME	880	20332A	SECOND VIRIAL COEFFICIENTS	516	22435A
THE EXECUTIVE GAME FOR DOS-M	880	22492A	CHEMISTRY (507)		
CALCOMP			HP 3360A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC	006	22407B
BCS PLOTTER DRIVER (D.10)	014	20014A	CALLABLE		
DOS PLOTTER DRIVER (DVR10)	014	20581A	CIVIL ENGINEERING (515)		
RTE PLOTTER DRIVER (DVR10)	014	20808B	CIVIL ENGINEERING COORDINATE GEOMETRY (COGO)	515	22487A
CALCOMP PLOTTER DRIVER - BASIC CALLABLE	014	22677B	CLOCK		
BCS PLOTTER LIBRARY	021	20201C	TIME BASE GENERATOR DRIVER (0.43)	003	20502B
RTE/DOS PLOTTER LIBRARY	021	20810B	TIME-OF-DAY CLOCK	003	22002A
HP 12560A PLOTTER DIAGNOSTIC	205	20390A	HP 12539A TIME BASE GENERATOR DRIVER - FORTRAN	003	22071A
HP 2100A PLOTTER (HP 12560) TEST	210	24101A	CALLABLE		
LOGARITHMIC AXIS GENERATOR FOR THE CALCOMP 565	904	22426A	HP 12539A TIME BASE GENERATOR DRIVER - BASIC	003	22112A
CALCULATOR			CALLABLE		
INTEGRATED MATH CALCULATOR PROGRAM	301	22084C	HP 2100A TIME BASE GENERATOR TEST	210	24213B
EXTENDED PRECISION CALCULATOR	302	22085B	CODE/RADIX CONVERSION (105)		
CARD			RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE	006	22276A
BCS CARD READER DRIVER (D.11)	010	20019C	CONVERSION		
0K SID CARD READER DRIVER	010	20324R	TELEX TO ASCII PHOTOREADER DRIVER	009	22264B
16K SID CARD READER DRIVER	010	20332A	CONVERSION ROUTINE MCONV	105	20096A
4K SID MARK SENSE CARD READER DRIVER	010	20520C	CONVERSION ROUTINE ICONV	105	20216A
0K SID MARK SENSE CARD READER DRIVER	010	20521C	RTE CONVERSION ROUTINE CONVERT	105	20288A
16K SID MARK SENSE CARD READER DRIVER	010	20522C	CONVERSION ROUTINE, CONV34	105	20533A
BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)	010	20817B	EBODIC TO ASCII TRANSLATOR	105	22080A
BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)	010	20819C	ASCII/IBM 8-LEVEL CHARACTER CONVERSION ROUTINE	105	22093A
RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20821B	CHARACTER CODE TRANSLATOR	105	22214A
DOS MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20823C	4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE	105	22274A
4K SID HP 2891A CARD READER DRIVER	010	24176A	ASCII/INTEGER CONVERSION ROUTINE	105	22433A
0K SID HP 2891A CARD READER DRIVER	010	24179A	COMPARE		
16K SID HP 2891A CARD READER DRIVER	010	24180A	FAST PUNCH VERIFY	106	22180C
BCS HP 2891A CARD READER DRIVER (D.11)	010	24181A	DOS/DOS-M SOURCE FILE VERIFY PROGRAM	108	22347A
DOS HP 2891A CARD READER DRIVER (DVR11)	010	24182B	COMPILER		
RTE HP 2891A CARD READER DRIVER (DVR11)	010	24224A	HP 2200A TIME-SHARED BASIC SYSTEM	001	20506F
4K SID HP 2892A CARD READER DRIVER	010	24264A	HP 2300C TIME-SHARED BASIC SYSTEM	001	24230B
0K SID HP 2892A CARD READER DRIVER	010	24265A	BASIC SYSTEM	010	20392B
16K SID HP 2892A CARD READER DRIVER	010	24266A	FORTRAN COMPILER	010	20548A
DOS HP 2892A CARD READER DRIVER (DVR11)	010	24272R	4K FORTRAN COMPILER	010	20549A
BCS HP 2892A CARD READER DRIVER (D.11)	010	24274A	DOS FORTRAN	010	20590C
RTE HP 2892A CARD READER DRIVER (DVR11)	010	29030A	RTE FORTRAN	010	20875F
CARD TO MAGNETIC TAPE UTILITY	106	22165A	SNOBOL COMPILER FOR DOS/DOS-M	010	22327E
HP 2761-A007 OPTICAL MARK READER DIAGNOSTIC, HP	214	20347B	DOS/RTE ALGOL COMPILER	010	22443A
12602A KIT			ALGOL COMPILER	010	24044A
HP 2761A-007 OPTICAL MARK READER DIAGNOSTIC, HP	214	20899B	RTE/DOS ALGOL COMPILER	010	24129B
12602B KIT			DOS-M FORTRAN	010	24159B
HP 2891 CARD READER DIAGNOSTIC	214	24174A	RTE/DOS FORTRAN IV COMPILER	010	24170C
HP 2100A OPTICAL MARK READER TEST (KIT 12602B)	214	24180B	RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)	010	24177B
HP 2100A CARD READER (HP 2891/12602) DIAGNOSTIC	214	24192A	COMPLEX		
HP 2892/12924 CARD READER DIAGNOSTIC	214	24267A	HP 2100A KEYBOARD-DISPLAY TERMINAL (HP 2600) TEST	217	24200A
HP 3260A/12560B CARD READER/INTERFACE DIAGNOSTIC	214	24297A	COMPLEX MATH PACKAGE	303	22234A
CENTRAL PROCESSING UNIT TEST (209)			COMPLEX ARITHMETIC FOR HP BASIC	303	22531A
ALTER-SKIP INSTRUCTION TEST	209	20400A	COMPLEX ROOTS OF A REAL POLYNOMIAL	311	22030B
MEMORY REFERENCE INSTRUCTION TEST	209	20401R	REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL	311	22395A
SHIFT-ROTATE INSTRUCTION TEST	209	20402Q	COEFFICIENTS		
INTERRUPT DIAGNOSTIC	209	20415A	COMPLEX FOURIER TRANSFORM	316	22037B
HP 2100A ALTER-SKIP INSTRUCTION TEST	209	24200A	FAST FOURIER TRANSFORM	316	22218A
HP 2100A MEMORY REF. INSTRUCTION TEST	209	24209A	COMPLEX ARITHMETIC (303)		
HP 2100A SHIFT-ROTATE INSTRUCTION TEST	209	24210A	COMPLEX MATH PACKAGE	303	22234A
HP 2100A EXTENDED ARITHMETIC UNIT TEST	209	24214A	COMPLEX ARITHMETIC FOR HP BASIC	303	22531A
HP 2100A INTERRUPT TEST	209	24215A	CHAIN		
CHAIN			MYS FORTRAN CHAIN	212	22267A

CONCATENATE				D TO A CONVERTER		
PAPER TAPE COPY	106	22366A		HP 1331C STORAGE SCOPE DRIVER - BASIC CALLABLE	014	22318A
CONFIGURE				SIO LIST OUTPUT TO A STORAGE SCOPE	014	22379A
4K SIO SYSTEM DUMP	008	20301C		DATA ACQUISITION SYSTEMS (012)		
8K SIO SYSTEM DUMP	008	20313C		SYNCHRONOUS HIGH SPEED DATA ACQUISITION PROGRAM	003	22170A
16K SIO SYSTEM DUMP	008	20335B		COMPUTER SERIAL INTERFACE RTE DRIVER DVR65	003	20001A
PREPARE TAPE SYSTEM	008	24016A		COUPLER SERIAL INTERFACE RTE DRIVER DVR66	003	20003A
12K SIO SYSTEM DUMP	008	24298A		RCS HP 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN-12 (0.77)	006	20020B
CONTINUOUS SYSTEMS SIMULATION (607)				HP 2402A PROGRAMMER/DATE INTERFERENCE DIAGNOSTIC	006	20430B
CONTINUOUS SYSTEM MODELING PROGRAM (CSMP)	007	22400A		HP 2320 LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22061A
SYSTEM SIMULATION PROGRAM (SSP)	007	22532A		HP 2322A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22062A
CONTROL				HP 2323A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22069A
HP 2100 PROM WRITER CONTROL PROGRAM	003	24207A		HP 3300A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC CALLABLE	006	22407B
HP 2115/2116 DMA DIAGNOSTIC	210	24185A		BCS HP 2312A DRIVER (0.55)	012	20076A
CONVERSION				DACE LIBRARY	012	20209C
BCS 40 BIT OUTPUT REGISTER DRIVER 0.54	003	20090C		RTE HP 2323A SUBSYSTEM DRIVER (DVR77)	012	20235A
CONVERSION ROUTINE FOR HP 2058E SUBSYSTEM RTE DRIVER	013	22507A		RTE HP 2320A/2322A SUBSYSTEM DRIVER (DVR76)	012	20236A
QUOTATION MARKS CONVERSION IN DOS/DOS-M FILES	101	22371A		RTE HP 2312A DRIVER (DVR55)	012	20239A
ASCII/INTEGER CONVERSION ROUTINE	105	22433A		RCS SCN-ANALOG 8-4-2-1 SCAN ROUTINE (0.77)	012	20501E
MEDIA CONVERSION	109	22427A		BCS SCN-ANALOG 4-2-2-1 SCAN ROUTINE (0.77)	012	20517C
HP 12556R POSITIVE TRUE 40-BIT OUTPUT REGISTER DIAGNOSTIC	202	20348C		BCS HP 2321A SUBSYSTEM (HP3450/2911A) SCAN ROUTINE SCN 34 (0.77)	012	20532A
COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO CELSIUS DEGREES CONVERSION	505	22325A		BASIC LANGUAGE DATA ACQUISITION SYSTEM	012	22199A
COOLEY-TUKEY				DOS-M BINARY FILE DATA ACQUISITION	012	22361A
REAL FOURIER TRANSFORM	316	22036A		HP BASIC DRIVER SYSTEM WITH BINARY DATA I/O	012	22300C
GENERAL FAST FOURIER TRANSFORM	316	22189B		RTE HP 2321A SUBSYSTEM DRIVER (DVR74)	012	20000A
CORE STORAGE TEST (200)				COUPLER SERIAL INTERFACE BCS DRIVER 0.66	012	20004A
LOW MEMORY ADDRESS TEST	200	20403A		BCS NON-DMA DRIVER FOR HP 2313A SUBSYSTEM (0.62)	012	20007A
HIGH MEMORY ADDRESS TEST	200	20404A		BCS DMA DRIVER FOR HP 2313A SUBSYSTEM (0.62A)	012	20008A
HP 2116A LOW MEMORY CHECKERBOARD TEST	200	20405A		RTE DRIVER DVR62	012	20009A
HP 2116A HIGH MEMORY CHECKERBOARD TEST	200	20406A		MULTI/MINIVERTER SCAN ROUTINE SCNMV (0.76)	013	20094B
HP 2116B HIGH MEMORY CHECKERBOARD TEST	200	20407A		RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR56)	013	20297D
HP 2116B LOW MEMORY CHECKERBOARD TEST	200	20408A		HP 2310/2311 SUBSYSTEM DRIVER FOR DOS-M	013	20272A
HP 2116A/14A HIGH MEMORY CHECKERBOARD TEST	200	20512A		HP 2311A SUBSYSTEM DRIVER - BASIC CALLABLE	013	22475A
HP 2116A/14A LOW MEMORY CHECKERBOARD TEST	200	20513A		CONVERSION ROUTINE MCONV	105	20095A
HP 2116C LOW MEMORY PATTERN TEST	200	24161A		CONVERSION ROUTINE ICONV	105	20210A
HP 2116C HIGH MEMORY PATTERN TEST	200	24162A		RTE CONVERSION ROUTINE CONVERT	105	20288A
HP 2100A LOW MEMORY PATTERN TEST	200	24193A		CONVERSION ROUTINE, CONV34	105	20533A
HP 2100A HIGH MEMORY PATTERN TEST	200	24194A		HP 2912A PROGRAMMER CARD DIAGNOSTIC	202	20429C
HP 2100A MEMORY PARITY CHECK TEST	200	24198B		RCS HP 2312A DRIVER/FORTRAN INTERFACE ROUTINE (L2312)	212	20078A
HP 2100A LOW MEMORY ADDRESS TEST	200	24211A		FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER 0.65, 1.65	212	20017A
HP 2100A HIGH MEMORY ADDRESS TEST	200	24212A		LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DVM., 0.65, DIR65	212	20018A
CORRELATION ANALYSIS (409)				LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DVM., 0.65, DIR65	212	20019A
AUTOCORRELATION AND SPECTRAL DENSITY	402	22124A		FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER 0.66, L66	212	20020A
POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	404	22131A		HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC	217	20023A
CROSS CORRELATION ANALYSIS	409	22126A		VERIFY HP 2911 SCANNER/DVM TEST	219	20340D
MULTIPLE CORRELATION MATRIX PROGRAM	409	22186A		HP BIOMEDICAL RESPONSE AVEPAGING PROGRAM	506	22221B
COUNTER				DATA ACQUISITION SYSTEMS TEST (219)		
COUNTER DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE	006	22004A		VERIFICATION: DACE AXEPT	219	20072C
COUNTER DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE	006	22106B		HP 2312A SUBSYSTEM TEST	219	20077B
HP 5300 COMPUTING COUNTER DRIVER	006	22447A		HP 2310C VERIFICATION TEST	219	20338B
4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE	105	22274A		TEST: HP 2310A/B SUBSYSTEM	219	20339B
CROSS REFERENCE				TEST: HP 2912 SCANNER/DVM	219	20341B
RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	22314A		VERIFY HP 2911 SCANNER/DVM TEST	219	20349D
DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	211	22526A		HP 2321 VERIFICATION VER34	219	20536D
CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	24109B		HP 2311 CALIBRATION - TELEPRINTER	219	20583C
DOS CROSS REFERENCE ROUTINE	211	24223B		HP 2313A SUBSYSTEM VERIFICATION TEST	219	20012A
CROSSBAR				DATA COMMUNICATIONS		
RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE CONVERSION	006	22276A		16K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM	002	22244B
CURVE FITTING (309)				USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER 0.50	002	22245A
SOLUTION OF LINEAR LEAST SQUARES PROBLEMS	309	22022A		BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS AND ASYNCHRONOUS DEVICES	002	22328C
LINEAR LEAST SQUARES PROBLEM SOLVER	309	22220A		8K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM	002	22367A
LEAST SQUARES REGRESSION PROGRAM	404	22128A		HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1108	002	22372A
LINEAR REGRESSION INTERVAL ESTIMATES	404	22129A		A BCS ASYNCHRONOUS DATA SET INTERFACE DRIVER	002	22374A
POLYNOMIAL REGRESSION PROGRAM	404	22130A		0.70 REVERSE CHANNEL TELECOMMUNICATIONS DRIVER	002	22387A
POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	404	22131A		COMPUTER SERIAL INTERFACE RTE DRIVER DVR65	003	20001A
STEPWISE REGRESSION PROGRAM	404	22132A		COMPUTER SERIAL INTERFACE BCS DRIVER 0.65	003	20002A
BIOASSAY PROGRAM	404	22133A		COUPLER SERIAL INTERFACE RTE DRIVER DVR66	003	20003A
ORTHOGONAL REGRESSION PROGRAM	404	22134A		COUPLER SERIAL INTERFACE BCS DRIVER 0.66	012	20004A
LINEAR REGRESSION WITH REPLICATION	404	22135A		HP 21XX VERIFICATION AND TEST FOR DIGITAL VOLTAGE SOURCE	216	14903A
NONLINEAR REGRESSION PROGRAM	404	22136A		HP 12622 SEND (ONLY) INTERFACE TEST	217	20393A
POOLING OF GROUPS IN REGRESSION	404	22184A		HP 12507 SEND/RECEIVE INTERFACE TEST	217	20535A
MULTIPLE REGRESSION PROGRAM	404	22185A		HP 12621 RECEIVE (ONLY) INTERFACE TEST	217	20538A
NONLINEAR REGRESSION OF A SINGLE-VARIABLE FUNCTION	404	22187A		THREE DIMENSIONAL TRANSFORMATIONS USING EULER'S ANGLES	904	22425A
NONLINEAR REGRESSION OF AN ARBITRARY FUNCTION	404	22188A		DATA HANDLING UTILITIES (100)		
KOLMOGOROV-SMIRNOV GOODNESS-OF-FIT TEST	407	22150B		DOS-M BINARY FILE DATA ACQUISITION	012	22361A
				DOS-M ABSOLUTE BINARY TAPE LOADER	017	22448A
				MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC	018	22476A

RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING	022	22398A	HP 2401C DATA SOURCE INTERFACE DRIVER - FORTRAN	006	22008A
DISC/DRUM UTILITY	102	22272A	CALLABLE		
APPLICATIONS DATA MANAGEMENT PACKAGE (ADM)	102	22483B	HP 3400A DIGITAL VOLTMETER DRIVER - FORTRAN	006	22008A
SPACE SAVING ASCII STORAGE ROUTINES	104	22404A	CALLABLE		
FILESORT	107	22343A	HP 3400A/B DATA SOURCE INTERFACE DRIVER -	006	22055A
KEYBOARD TAPE GENERATOR	108	22090A	FORTRAN CALLABLE		
CARD TO MAGNETIC TAPE UTILITY	108	22165A	HP 2323A LOW SPEED A-T-O-D SUBSYSTEM DRIVER -	006	22069A
MAGNETIC TAPE TO PRINT UTILITY PROGRAM	108	22166A	FORTRAN CALLABLE		
FTN IV CORE SAVER	108	22341A	HP 3400A/B DATA SOURCE INTERFACE DRIVER - BASIC	006	22102B
DOS/DOS-M SOURCE FILE VERIFY PROGRAM	108	22347A	CALLABLE		
DOS-M STORE ABSOLUTES	108	22354A	HP 2402A DATA SOURCE INTERFACE DRIVER - BASIC	006	22104B
DOS-M PAPER TAPE/DISC VERIFY	108	22355A	CALLABLE		
EASY MAGNETIC TAPE I/O AND STATUS INFORMATION	108	22356A	HP 3400A DATA SOURCE INTERFACE DRIVER -BASIC	006	22108C
HANDI-O	108	22359A	CALLABLE		
RELOCATABLE MODULE LISTER	108	22381A	HP 3400A/B DIGITAL VOLTMETER DRIVER - BASIC	006	22215A
RELOCATABLE OBJECT UTILITY LIBRARIAN	108	22392A	CALLABLE		
ZERO	108	22400A	HP 3400A/B DIGITAL VOLTMETER DRIVER - FORTRAN	006	22226B
FORTRAN FORMATTED READ FROM DOS-M S-TYPE USER	108	22495A	CALLABLE		
FILES			DOS/DOS-M/RTE 3400 DVM DRIVER AND BCD CONVERSION	006	22294A
DOS-M FILE ACCESS AND STRING LOOKUP	110	22277A	HP 2402A DIGITAL VOLTMETER DRIVER - BASIC	006	22305A
PSEUDO REPORT GENERATOR	110	22330B	CALLABLE		
EMFP RECORD READ/WRITE	110	22364A	RTE HP 2323A SUBSYSTEM DRIVER (DVR77)	012	20235A
DOS-M FILE WRITER	110	22369A	RTE HP 2320A/2322A SUBSYSTEM DRIVER (DVR76)	012	20236A
TEMPERIZED EXTENDED FILE MANAGEMENT PACKAGE	110	22373B	BCS SCN-ANALOG 8-4-2-1 SCAN ROUTINE (D.77)	012	20501E
EMFP DIRECTORY LISTER	110	22432A	BCS SCN-ANALOG 4-2-2-1 SCAN ROUTINE (D.77)	012	20517C
EMFP READ/WRITE WITH FORTRAN IV INPUT/OUTPUT	110	22486A	BCS HP 2321A SUBSYSTEM (HP3450/2911A) SCAN	012	20532A
LISTS			ROUTINE SCN 34 (D.77)		
READ/WRITE DOS-M FILES IN RTE ENVIRONMENT	110	22525A	HP 2312A SUBSYSTEM TEST	219	20077B
SERIAL ACCESS TO DOS-M FILES	110	22528A	RTE HP 2912 SCANNER/DVM	219	20341B
MULTIRECORD FORMATTED OUTPUT LISTER	112	22306A	VERIFY HP 2911 SCANNER/DVM TEST	219	20349D
HP 'IDEAL' COMMERCIAL SUBROUTINE LIBRARY	212	22455A	HP 2321 VERIFICATION VER34	219	20530D
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS	212	22017A			
DRIVER D.65, L65			DISC OPERATING SYSTEMS (007)		
LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR	212	22018A	HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)	006	14913A
BCS DVR., D.65,DIR65			DISC OPERATING SYSTEM (HP 2770 SERIES DISC/DRUM)	007	20597C
LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE	212	22019A	MOVING-HEAD DISC OPERATING SYSTEM	007	24225F
FOR BCS DVR., D.65,DIR65			RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING	022	22398A
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS	212	22020A			
DRIVER D.66, L66			DISC/DRUM		
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR RTE	212	22021A	DISC OPERATING SYSTEM (HP 2770 SERIES DISC/DRUM)	007	20597C
DRIVER DVR65,DLK65			MOVING-HEAD DISC OPERATING SYSTEM	007	24225F
RTE LOGBOOK	701	22378A			
DATA SET			DISC BASIC EXECUTIVE	008	22338A
16K BINARY SYNCHRONOUS CONTROLLED DATA	002	22244B	BK SID DISC/DRUM DRIVER	015	20079A
COMMUNICATIONS PROGRAM			16K SID DISC/DRUM DRIVER	015	20081A
USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER	002	22245A	RTE DISC/DRUM DRIVER (DVR30)	015	20747C
D.50			DOS DISC/DRUM DRIVER (DVR30)	015	20995B
BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS	002	22328C	HP 2770A/2771A DISC DRIVER - FORTRAN CALLABLE	015	22063A
AND ASYNCHRONOUS DEVICES			HP 2770A/2771A DISC DRIVER - BASIC CALLABLE	015	22111C
HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1108	002	22372A	HP 2870A CARTRIDGE DISC DRIVER - BASIC CALLABLE	015	22216B
A BCS ASYNCHRONOUS DATA SET INTERFACE DRIVER	002	22374A	HP 2870A CARTRIDGE DISC DRIVER - FORTRAN CALLABLE	015	22225B
D.70 REVERSE CHANNEL TELECOMMUNICATIONS DRIVER	002	22387A	DOS-M PRIVILEGED DISC I/O ROUTINES	015	22233C
HP 21XX VERIFICATION AND TEST FOR DIGITAL	216	14903A	HP 2870A CARTRIDGE DISC MEMORY DRIVER - FORTRAN	015	22301A
VOLTAGE SOURCE			CALLABLE		
THREE DIMENSIONAL TRANSFORMATIONS USING EULER'S	904	22425A	DOS-M HP 2870/7900 DISC DRIVE (DVR31)	015	24156E
ANGLES			DOS-M HP 2883 DISC DRIVER (DVR 31)	015	24226C
DDC			RTE TRACK ASSIGNMENT TABLE LOG	022	22445A
HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A	DEFINE AND FILL FILES FROM DOS-M USER PROGRAM.	022	22457A
DEBUGGING AIDS (211)			CONVERSATIONAL DOS-M DISC FILE EDITOR	021	22285C
INTERPRETIVE BINARY SIMULATOR	201	22193A	DISC/DRUM UTILITY	102	22272A
BCS DEBUG ROUTINE	211	20002B	DOS-M DUMP/RESTORE PROGRAM	102	22284A
OCTAL UTILITY SYSTEM (HOCUS)	211	22008A	DOS-M PAPER TAPE/DISC VERIFY	108	22355A
ABSOLUTE PROGRAM CONTROL SYSTEM	211	22190A	FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
OCTAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM	211	22293A	HP 2100A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	22314A	HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	211	22526A	HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
DEBUG FOR ABSOLUTE/BCS PROGRAMS	211	22527A	HP 2883 DISC FILE DIAGNOSTIC	203	24235A
CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	24199B	CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
DOS CROSS REFERENCE ROUTINE	211	24223B	QUICK FIXED HEAD DUMP	207	22300B
MICRO DEBUG EDITOR	211	24281A	QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
DECIMAL			DISC/DRUM EQUIPMENT TEST (203)		
ABSOLUTE OCTAL OR DECIMAL CORE DUMP	207	22322A	HP 7900/13210 DIAGNOSTIC	203	13041R
DEMONSTRATIONS (001)			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
SCOPE DISPLAY DEMO	901	22040A	HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
DOS DEMO	901	22099A	HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
DETERMINANT			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
MATRIX INVERSION SUBROUTINES	312	22118B	HP 2883 DISC FILE DIAGNOSTIC	203	24235A
DIAGNOSTICS (SEE SPECIFIC TYPE OF DIAGNOSTIC)			QUICK FIXED HEAD DUMP	207	22300B
DIGITAL VOLTAGE SOURCE (SEE VOLTAGE SOURCE)			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
DIGITAL VOLTMETER			HP 7900 DISC TO DISC DUMP	207	22463A
BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41)	006	22009B	HP 2870 DISC TO DISC DUMP	207	22469A
BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41B)	006	22024A	ASCII STRING SEARCH FROM DISC FILE	212	22351A
BCS HP 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN=12	006	22020B	HP 9300N DISC EXERCISER	218	22333A
(D.77)			DISC/DRUM EQUIPMENT TEST (203)		
HP 2402A PROGRAMMER/DATE INTERFERENCE DIAGNOSTIC	006	22043B	HP 7900/13210 DIAGNOSTIC	203	13041R
HP 2401C DIGITAL VOLTMETER DRIVER - FORTRAN	006	22008B	FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
CALLABLE			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	207	22300B
			QUICK SDUMP FOR HP 7900A MOVING HEAD DISC	207	22454A
			HP 7900 DISC TO DISC DUMP	207	22463A
			HP 2870 DISC TO DISC DUMP	207	22469A
			ASCII STRING SEARCH FROM DISC FILE	212	22351A
			HP 9300N DISC EXERCISER	218	22333A
			DISC/DRUM EQUIPMENT TEST (203)		
			HP 7900/13210 DIAGNOSTIC	203	13041R
			FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24184B
			HP 2120A CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24203A
			HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	203	24204A
			HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
			HP 2883 DISC FILE DIAGNOSTIC	203	24235A
			CARTRIDGE DISC MEMORY DIAGNOSTIC	203	24237A
			QUICK FIXED HEAD DUMP	2	

DOS-M/HP2000C TIME-SHARE BASIC FILE HANDLER	102	242205	GAS		
DOS-M/HP 2000C TIME-SHARED BASIC FILE INTERFACE PACKAGE	102	24240A		HP 3360A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC CALLABLE	006 22407B
DOS-M STORE ABSOLUTES	108	22354A		SECOND VIRIAL COEFFICIENTS	516 22435A
DOS-M FILE ACCESS AND STRING LOOKUP	110	22277A			
PSEUDO REPORT GENERATOR	110	22330B			
EFMP RECORD READ/WRITE	110	22364A	GAUSSIAN		
DOS-M FILE WRITER	110	22369A		RANK AND BASIS ROUTINE	312 22032A
ITEMIZED EXTENDED FILE MANAGEMENT PACKAGE	110	22373B		SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS	314 22033A
EFMP FILE TRANSFER	110	22429A		SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, BAND-MATRIX	314 22034A
EFMP DIRECTORY LISTER	110	22432A		SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, SYMMETRIC MATRIX	314 22035A
EFMP READ/WRITE WITH FORTRAN IV INPUT/OUTPUT LISTS	110	22486A		SIMULTANEOUS EQUATION SOLVFR PROGRAM	314 22122A
READ/WRITE DOS-M FILES IN RTE ENVIRONMENT	110	22525A		SIMULTANEOUS EQUATION SOLVFR ROUTINE	314 22123A
SERIAL ACCESS TO DOS-M FILES	110	22528A		GAUSSIAN RANDOM NUMBER GENERATOR	405 22308A
DOS-M EXTENDED FILE MANAGEMENT PACKAGE	110	24227D			
REAL-TIME EXECUTIVE FILE MANAGEMENT PACKAGE	110	22633A			
ASCII STRING SEARCH FROM DISC FILE	212	22351A			
FLOATING POINT			GENERAL PROBABILITY (413)		
8K SID HP 7970 MAGNETIC TAPE DRIVER	016	13021B		COMBINATION GENERATOR	413 22397A
EXTENDED ASSEMBLER FLOATING POINT	018	24245A			
4K ASSEMBLER FLOATING POINT	018	24247A	GENERATOR		
RTE/DOS RELOCATABLE LIBRARY - FLOATING POINT	021	24246B		HP 5100B FREQUENCY SYNTHESIZER DRIVER - FORTRAN CALLABLE	006 22075A
4K BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24249B		WAVETEK BASIC DRIVER	006 22200A
FLOATING POINT OVERLAY FOR HP BASIC	022	22477A		HP 5100B FREQUENCY SYNTHESIZER DRIVER - BASIC CALLABLE	006 22211A
COMPLEX MATH PACKAGE	303	22234A		HP 1900 PROGRAMMABLE PULSE GENERATOR - FORTRAN CALLABLE	006 22336A
FORMAT				HP 1900 PROGRAMMABLE PULSE GENERATOR DRIVER - BASIC CALLABLE	006 22337A
HEWLETT-PACKARD COMMERCIAL SUBROUTINES	021	24245A		RTE GENERATOR, MH-RTGEN	008 22014B
FORTRAN RUN-TIME FORMAT SPECIFICATION	112	22238A		RTE GENERATOR, FH-RTGEN	008 22015B
TABULATION AND FORM-FEED CALLS FOR HP 2754 TELEPRINTER	212	22205A		TYPE 3 LANGUAGE GENERATOR	018 22449A
FORTRAN			GRAPHIC DISPLAY		
FORTRAN /ALGOL INTERFACE ROUTINE (L5610)	013	20074A		OSCILLOSCOPE PLOTTING SUBROUTINE	014 22253B
FORTRAN COMPILER	010	20546A		PLOT, RELAY, WAIT	014 22263A
4K FORTRAN COMPILER	010	20549A		BASIC PLOT SUBROUTINES	014 22279A
DOS FORTRAN	010	20599C		CONTINUOUS DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014 22315A
RTE FORTRAN	010	20675E		VARIABLE DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014 22318A
FORTRAN TRANSLATOR, IBM 1800 TO HP FORTRAN II	010	22065A		HP 1331C STORAGE SCOPE DRIVER - BASIC CALLABLE	014 22318A
DOS-M FORTRAN	010	24159B		SIO LIST OUTPUT TO A STORAGE SCOPE	014 22379A
RTE/DOS FORTRAN IV COMPILER	010	24170C		TEKTRONIX 4010 VIDEO DISPLAY UNIT DRIVER-BASIC CALLABLE	014 22464A
RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)	010	24177B		DOS STORAGE SCOPE DRIVER (DVR46, SEX50)	014 23900A
BCS FORTRAN IV LIBRARY	021	24149B		DOS-M DISC INITIALIZE/PROTECT UTILITY	022 22377A
RTE/DOS FORTRAN IV LIBRARY	021	24152C		EFFECTIVE PERCEIVED NOISE LEVEL	517 22384A
RTE/DOS FORTRAN FORMATTER	021	24153C		THREE DIMENSIONAL PLOT SUBROUTINE	004 22262A
FORTRAN UNIT REFERENCE NUMBER EDITOR	091	22171A		X-Y PLOTTER FOR 11 INCH PAGE PRINTER	004 22348A
FORTRAN FORMATTED READ FROM DOS-M S-TYPE USER FILES	108	22495A		COMPLETE BCS HP 7210A PLOTTER DRIVER DVR.10	004 72000A
FORTRAN RUN-TIME FORMAT SPECIFICATION	112	22238A		MINIMUM BCS HP 7210A PLOTTER DRIVER DVR.10	004 72001A
DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	211	22526A		HP 7210A DIAGNOSTIC & TEST TAPE	004 72002A
MIS FORTRAN CHAIN	212	22267A		COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER	004 72003A
FORTRAN/ALGOL ARRAY TRANSFER ROUTINE	212	22310A		MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER	004 72004A
HP 2313A DRIVER FORTRAN/ALGOL INTERFACE ROUTINE (12313)	212	22010A		COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	004 72006A
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65, L65	212	22017A		MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	004 72007A
LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DVR., D.65,DIR65	212	22018A		RTE HP 7210A PLOTTER DRIVER DVR.10	004 72008A
LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DVR., D.65,DIR65	212	22019A		RTE HP 7210A PLOTTER DRIVER DVR.10	004 72009A
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.66, L66	212	22020A			
FORTRAN/ALGOL INTERFACE SUBROUTINE FOR RTE DRIVER DVR65,DLK65	212	22021A		GRAPHIC EQUIPMENT TEST (205)	
COMPLETE BCS HP 7210A PLOTTER DRIVER DVR.10	004	72000A		HP 12560A PLOTTER DIAGNOSTIC	205 20390A
MINIMUM BCS HP 7210A PLOTTER DRIVER DVR.10	004	72001A			
FOURIER			HAMMINGS		
REAL FOURIER TRANSFORM	316	22036A		SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS	318 22038A
COMPLEX FOURIER TRANSFORM	316	22037B			
GENERAL FAST FOURIER TRANSFORM	316	22189B	HERMITIAN		
FAST FOURIER TRANSFORM	316	22218A		SIMPSON AND NEWTON'S 3/8 INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310 22025A
COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	004	72006A		HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE	310 22026A
MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	004	72007A		HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310 22027B
RTE HP 7210A PLOTTER DRIVER DVR.10	004	72008A		HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE	310 22028A
RTE HP 7210A PLOTTER DRIVER DVR.10	004	72009A		HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310 22029A
FUNCTIONS, COMPUTATION OF (306)			HISTOGRAM		
SCIENTIFIC SUBROUTINE PACKAGE	021	22329A		GENERAL STATISTICS PROGRAM	008 22141A
GAMMA FUNCTION ROUTINE	306	22017A		HISTOGRAM PLOTTER PROGRAM	004 22164B
K BESSEL FUNCTION ROUTINE	306	22018A		HISTOGRAM PLOTTER ROUTINE	004 22182A
I BESSEL FUNCTION ROUTINE	306	22019A			
Y BESSEL FUNCTION ROUTINE	306	22020A			
TRANSFORMATIONS	306	22117A	HOUSEHOLDER		
FRESNEL INTEGRAL EVALUATION	306	22256A		LINEAR LEAST SQUARES PROBLEM SOLVER	309 22220A
INVERSE SIN AND COS ROUTINE	306	22511A		EIGENVALUES OF A SYMMETRIC REAL MATRIX	313 22102A
FLOATING POINT RANDOM NUMBER GENERATOR	405	22265A			
GAMES (993)			I/O, A/D - D/A (013)		
JEU DE MORPIONS (GAME OF TIC-TAC-TOE)	003	22094A		HP 6940A/6941A BCS DRIVER, D.61	006 14904B
BATTLESHIP	003	22298A		HP 6940A/6941A RTE DRIVER, DVR61	006 14907A
HANGMAN	003	22436A		HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY	006 14911A
GAMMA				HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)	006 14915A
GAMMA FUNCTION ROUTINE	306	22017A		HP 2320 LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006 22061A

HP 2322A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22062A	COUPLER SERIAL INTERFACE RTE DRIVER DVR66	003	29003A
HP 2323A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22064A	BCS 6936A MULTIPROGRAMMER DRIVER (D,61)	006	14900B
HP 3480A/B DIGITAL VOLTMETER DRIVER - BASIC CALLABLE	006	22215A	HP 6940A/6941A BCS DRIVER, D,61	006	14904B
RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC STORAGE ROUTINE	006	22317A	HP 6940A/6941A RTE DRIVER, DVR61	006	14907A
DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER	006	22339A	HP 6940A DRIVER FOR 20392A BASIC	006	14909A
RTE HP 2321A SUBSYSTEM DRIVER (DVR74)	012	29000A	HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY	006	14911A
BCS DIGITAL VOLTAGE SOURCE POWER SUPPLY DRIVER D,70	013	14902A	HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)	006	14913A
BCS HP 5610A ANALOG TO DIGITAL DRIVER, NON-DMA (D,56)	013	20073C	HP 6940A/6941A DRIVER FOR 20392A BASIC	006	14915A
FORTRAN /ALGOL INTERFACE ROUTINE (L5610)	013	20074A	BCS 8-4-2-1 DATA SOURCE INTERFACE DRIVER (D,40)	006	20008B
BCS HP 5610A ANALOG TO DIGITAL DRIVER, DMA, (D,56A)	013	20093C	BCS DIGITAL VOLTMETER PROGRAM DRIVER (D,41)	006	20009B
MULTI/MINIVERTEER SCAN ROUTINE SCNMV (D,76)	013	20004B	BCS 8-4-2-1 SCANNER CONTROL DRIVER (D,42)	006	20010C
RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR56)	013	20297D	BCS 8-4-2-1/4-2-2-1 DATA SOURCE INTERFACE DRIVER (D,40A)	006	20011B
RTE HP 12564A 10-BIT ANALOG TO DIGITAL CARD DRIVER (DVR57)	013	20396A	BCS 8-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER (D,42A)	006	20012C
MINIVERTEER DRIVER	013	22201A	BCS DIGITAL VOLTMETER PROGRAM DRIVER (D,41B)	006	20024A
HP 5610A ANALOG TO DIGITAL DRIVER - FORTRAN CALLABLE	013	22304A	BCS HP 2912 SCANNER CONTROL DRIVER (D,42B)	006	20025A
DOS HP 2322A LOW SPEED ANALOG TO DIGITAL SUBSYSTEM DRIVER	013	22331A	BCS HP 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN-12 (D,77)	006	20028B
HP 2311A SUBSYSTEM DOS-M DRIVER	013	22466B	RTE HP 12604B DATA SOURCE INTERFACE DRIVER (DVR40)	006	20295A
HP 2310/2311 SUBSYSTEM DRIVER FOR DOS-M	013	22472A	HP 2402A PROGRAMMER/DATE INTERFERENCE DIAGNOSTIC COUNTER DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE	006	20430B
HP 2311A SUBSYSTEM DRIVER - BASIC CALLABLE	013	22475A	HP 2401C DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE	006	22004A
CONVERSION ROUTINE FOR HP 2050E SUBSYSTEM RTE DRIVER	013	22507A	HP 2401C DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE	006	22005B
HP 2050E SCANNER SUBSYSTEM RTE DRIVER (DVR57)	013	22508A	HP 3460A DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE	006	22006A
VERIFY HP 5610A ANALOG TO DIGITAL TEST	216	20075D	HP 3460A/B DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE	006	22055A
HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC	217	20024A	HP 2320 LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22061A
HP 2310C VERIFICATION TEST	219	20333B	HP 2322A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22062A
HP 2311 CALIBRATION - TELEPRINTER	219	20503C	HP 2323A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE	006	22069A
I/O, DISC/DRUM (015)					
8K SIO DISC/DRUM DRIVER	015	20079A	HP 5100B FREQUENCY SYNTHESIZER DRIVER - FORTRAN CALLABLE	006	22075A
16K SIO DISC/DRUM DRIVER	015	20081A	HP 2911A/B CROSSBAR SCANNER DRIVER - BASIC CALLABLE	006	22101B
RTE DISC/DRUM DRIVER (DVR30)	015	20747C	HP 3460A/B DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE	006	22102B
DOS DISC/DRUM DRIVER (DVR30)	015	20909B	HP 2402A DATA SOURCE INTERFAE DRIVER - BASIC CALLABLE	006	22104B
HP 2770A/2771A DISC DRIVER - FORTRAN CALLABLE	015	22063A	COUNTER DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE	006	22106B
HP 2770A/2771A DISC DRIVER - BASIC CALLABLE	015	22111C	HP 2912A REED SCANNER DRIVER - BASIC CALLABLE	006	22107B
HP 2870A CARTRIDGE DISC DRIVER - BASIC CALLABLE	015	22216B	HP 3450A DATA SOURCE INTERFAE DRIVER -BASIC CALLABLE	006	22108C
HP 2870A CARTRIDGE DISC DRIVER - FORTRAN CALLABLE	015	22225B	WAVETEK BASIC DRIVER	006	22200A
DOS-M PRIVILEGED DISC I/O ROUTINES	015	22233C	HP 5100B FREQUENCY SYNTHESIZER DRIVER - BASIC CALLABLE	006	22211A
HP 2870A CARTRIDGE DISC MEMORY DRIVER - FORTRAN CALLABLE	015	22301A	HP 3480A/B DIGITAL VOLTMETER DRIVER - BASIC CALLABLE	006	22215A
DOS-M HP 2870/7900 DISC DRIVE (DVR31)	015	24156E	HP 3480A/B DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE	006	22226B
DOS-M HP 2883 DISC DRIVER (DVR 31)	015	24226C	HP 6131B DIGITAL VOLTAGE SOURCE DRIVER - FORTRAN CALLABLE	006	22227A
RTE HP 2870/7900 MOVING HEAD DISC DRIVER (DVR31)	015	20013C	RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE CONVERSION	006	22276A
DEFINE AND FILL FILES FROM DOS-M USER PROGRAM	022	22457A	DOS/DOS-M/RTE 3400 DVM DRIVER AND BCD CONVERSION	006	22294A
I/O, GRAPHIC (014)					
BCS PLOTTER DRIVER (D,10)	014	20014A	HP 2402A DIGITAL VOLTMETER DRIVER - BASIC CALLABLE	006	22305A
DOS PLOTTER DRIVER (DVR10)	014	20501A	RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC STORAGE ROUTINE	006	22317A
RTE PLOTTER DRIVER (DVR10)	014	20608B	HP 1900 PROGRAMMABLE PULSE GENERATOR - FORTRAN CALLABLE	006	22336A
CALCOMP PLOTTER DRIVER - BASIC CALLABLE	014	22077B	HP 1900 PROGRAMMABLE PULSE GENERATOR DRIVER - BASIC CALLABLE	006	22337A
HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER - FORTRAN CALLABLE	014	22080A	DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER	006	22339A
HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER - BASIC CALLABLE	014	22217B	HP 3360A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC CALLABLE	006	22407B
HIGH SPEED CONTINUOUS LINE PLOTTER FOR HP 7004R X-Y PLOTTING ROUTINE	014	22219A	RTE MULTIPROGRAMMER DRIVER (DVR61)	006	22410A
OSCILLOSCOPE PLOTTING SUBROUTINE	014	22242A	BD,1 BASIC DRIVER FOR HP 8054A REAL TIME ANALYZER	006	22442A
PLOT, RELAY, WAIT	014	22253B	HP 5360 COMPUTING COUNTER DRIVER	006	22447A
BASIC PLOT SUBROUTINES	014	22263A	PRIVILEGED RTE DRIVER FOR THE HP 8054 AUDIO ANALYZER (DVR75)	006	22450A
DOS/DOS-M HP 2331 X-Y SCOPE DISPLAY	014	22279A	RTE HP 2312A DRIVER (DVM55)	012	20308A
CONTINUOUS DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014	22291C	COUPLER SERIAL INTERFACE BCS DRIVER D,66	012	20004A
VARIABLE DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014	22315A	BCS HP 5610A ANALOG TO DIGITAL DRIVER, NON-DMA (D,56)	013	20073C
HP 1331C STORAGE SCOPE DRIVER - BASIC CALLABLE	014	22318A	BCS HP 5610A ANALOG TO DIGITAL DRIVER, DMA, (D,56A)	013	20093C
SIO LIST OUTPUT TO A STORAGE SCOPE	014	22379A	MULTI/MINIVERTEER SCAN ROUTINE SCNMV (D,76)	013	20004B
HP 7004 X-Y RECORDER LIBRARY	014	22390A	RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR56)	013	20297D
HP 1331C SIO SCOPE DISPLAY DRIVER	014	22391A	RTE HP 12564A 10-BIT ANALOG TO DIGITAL CARD DRIVER (DVR57)	013	20396A
TEKTRONIX 4010 VIDEO DISPLAY UNIT DRIVER-BASIC CALLABLE	014	22464A	4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE	105	22274A
HP 7210 PLOTTER DRIVER FOR DOS-M	014	22471A	HP 6940A/6941A DIAGNOSTIC	202	14905B
HP 7210 PLOTTER DRIVER FOR RTE	014	22473A	HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC	217	20023A
RTE HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22505A	HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC	217	20024A
RTE HP 1331C STORAGE SCOPE LIBRARY	014	22506A	I/O, MAGNETIC TAPE (016)		
DOS/DOS-M HP 1331C STORAGE SCOPE LIBRARY	014	22509A	8K SIO HP 7970 MAGNETIC TAPE DRIVER	016	13021B
DOS/DOS-M HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22510A	16K SIO HP 7970 MAGNETIC TAPE DRIVER	016	13022B
DOS STORAGE SCOPE DRIVER (DVR46, SEX50)	014	22900A	BCS MAGNETIC TAPE DRIVER	016	13023B
COMPLETE BCS HP 7210A PLOTTER DRIVER DVR,10	004	72000A	DOS HP 7970 MAGNETIC TAPE DRIVER (DVR23)	016	13024B
MINIMUM BCS HP 7210A PLOTTER DRIVER DVR,10	004	72001A	RTE HP 7970 MAGNETIC TAPE DRIVER (DVR23)	016	13025A
HP 7210A DIAGNOSTIC & TEST TAPE	004	72002A	BCS 7 TRACK DRIVER W/O DMA	016	13026B
COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER	004	72003A	BCS MAGNETIC TAPE DRIVER 7 TRACK DMA	016	13027B
MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER	004	72004A	8K SIO MAGNETIC TAPE DRIVER 7 TRACK	016	13029B
COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR,10	004	72006A	16K SIO MAGNETIC TAPE DRIVER 7 TRACK	016	13030B
MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR,10	004	72007A			
RTE HP 7210A PLOTTER DRIVER DVR,10	004	72008A			
RTE HP 7210A PLOTTER DRIVER DVR,10	004	72009A			
I/O, INSTRUMENT (006)					
TIME BASE GENERATOR DRIVER (D,43)	003	20502B			
HP 12551B RELAY REGISTER INTERFACE DRIVER - BASIC CALLABLE	003	22313A			

BCS INCREMENTAL MAGNETIC TAPE DRIVER (D.20)	016	20007A	16K SIO HP 2891A CARD READER DRIVER	010	24180A
BCS HP 2020 MAGNETIC TAPE DRIVER (D.21)	016	20013F	BCS HP 2891A CARD READER DRIVER (D.11)	010	24181A
BCS HP 3030 MAGNETIC TAPE DRIVER (D.22)	016	20022F	DOS HP 2891A CARD READER DRIVER (DVR11)	010	24182B
8K SIO HP 2020 MAGNETIC TAPE DRIVER	016	20314D	RTE HP 2891A CARD READER DRIVER (DVR11)	010	24224A
4K SIO HP 2020 MAGNETIC TAPE DRIVER	016	20315C	4K SIO HP 2892A CARD READER DRIVER	010	24264A
16K SIO HP 2020 MAGNETIC TAPE DRIVER	016	20321C	8K SIO HP 2892A CARD READER DRIVER	010	24265A
8K SIO HP MAGNETIC TAPE DRIVER	016	20331C	16K SIO HP 2892A CARD READER DRIVER	010	24266A
16K SIO HP 3030 MAGNETIC TAPE DRIVER	016	20334C	DOS HP 2892A CARD READER DRIVER (DVR11)	010	24272B
4K SIO HP 3030 MAGNETIC TAPE DRIVER	016	20336B	BCS HP 2892A CARD READER DRIVER (D.11)	010	24274A
RTE HP 3030 MAGNETIC TAPE DRIVER (DVR22)	016	20006D	RTE HP 2892A CARD READER DRIVER (DVR11)	010	29030A
DOS HP 3030 MAGNETIC TAPE DRIVER (DVR22)	016	20997C			
FILE THREE INPUT FOR MTS ALGOL	016	22100A	I/O, SPECIAL DEVICE (003)		
RTE HP 2020 MAGNETIC TAPE DRIVER	016	22101A			
HP 3030G MAGNETIC TAPE DRIVER - FORTRAN CALLABLE	016	22208A	BCS POWER FAIL TELEPRINTER DRIVER WITH	002	22311A
HP 7970 MAGNETIC TAPE DRIVER - BASIC CALLABLE	016	22239A	AUTORESTART OPTION		
ALGOL OPERATING SYSTEM FOR MTS	016	22270C	BCS 40 BIT OUTPUT REGISTER DRIVER D.54	003	20098C
DOS/DOS-M HP 2020 MAGNETIC TAPE DRIVER	016	22319A	TIME BASE GENERATOR DRIVER (D.43)	003	20502B
NON-DMA BCS HP 3030 DRIVER	016	22414A	TIME-OF-DAY CLOCK	003	22002A
DOS/DOS-M HP 7970 7-TRACK MAGNETIC TAPE DRIVER	016	22458B	HP 12539A TIME BASE GENERATOR DRIVER - FORTRAN	003	22071A
(DVR24) WITH DMA			CALLABLE		
FILE AND REWIND FOR THE TENNECOMP TP-1371	016	22461A	HP 12539A TIME BASE GENERATOR DRIVER - BASIC	003	22112A
MINIDISK SYSTEM			CALLABLE		
READ/WRITE ROUTINES FOR THE TENNECOMP TP-1371	016	22462A	SYNCHRONOUS HIGH SPEED DATA ACQUISITION PROGRAM	003	22170A
MINIDISK SYSTEM			PROGRAM EXECUTION TIMER	003	22195B
DOS-M DRIVER PACKAGE FOR ACCESSING FRONT-END	016	22512A	HP 12551A/B RELAY REGISTER INTERFACE DRIVER -	003	22299B
MAGNETIC TAPE			FORTRAN CALLABLE		
12K SIO HP 3030 MAGNETIC TAPE DRIVER	016	24304A	HP 12551B RELAY REGISTER INTERFACE DRIVER -	003	22313A
12K SIO HP 7970 MAGNETIC TAPE DRIVER	016	24312A	BASIC CALLABLE		
			HP 12908A WCS BCS DRIVER (D.33)	003	24277A
I/O, PAPER TAPE (009)			HP 12908A WCS DOS DRIVER (DVR33)	003	24278A
DOS-M REMOTE TAPE READER DRIVER	002	22246B	HP 2100 PROM WRITER CONTROL PROGRAM	003	24287A
BCS TAPE READER DRIVER D.01	009	20005B	COMPUTER SERIAL INTERFACE RTE DRIVER DVR65	003	20091A
BCS TAPE PUNCH DRIVER D.02	009	20006F	COMPUTER SERIAL INTERFACE BCS DRIVER D.65	003	29002A
BCS TAPE PUNCH DRIVER, IBM 8-LEVEL (D.02A)	009	20016A	COUPLER SERIAL INTERFACE RTE DRIVER DVR66	003	20003A
4K SIO TAPE READER DRIVER	009	20303A	BCS 5936A MULTIPROGRAMMER DRIVER (D.61)	006	14900B
4K SIO TAPE PUNCH DRIVER	009	20304A	HP 6940A/6941A BCS DRIVER, D.61	006	14904B
8K SIO TAPE READER DRIVER	009	20306A	HP 6940A/6941A RTE DRIVER, DVR61	006	14907A
8K SIO TAPE PUNCH DRIVER	009	20307A	HP 6940A DRIVER FOR 20392A BASIC	006	14909A
8K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20316A	HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY	006	14911A
4K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20317A	HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)	006	14913A
16K SIO TAPE READER DRIVER	009	20319A	HP 6940A/6941A DRIVER FOR 20392A BASIC	006	14915A
16K SIO TAPE PUNCH DRIVER	009	20320A	WAVEYEC BASIC DRIVER	006	22200A
12K SIO TAPE READER DRIVER	009	20327A	HP 1900 PROGRAMMABLE PULSE GENERATOR - FORTRAN	006	22336A
12K SIO TAPE PUNCH DRIVER	009	20328A	CALLABLE		
RTE TAPE READER DRIVER (DVR01)	009	20743D	HP 1900 PROGRAMMABLE PULSE GENERATOR DRIVER -	006	22337A
RTE HIGH SPEED PUNCH DRIVER (DVR02)	009	20745B	BASIC CALLABLE		
DOS TAPE READER DRIVER (DVR01)	009	20947C	COUPLER SERIAL INTERFACE BCS DRIVER D.66	012	20904A
DOS HIGH SPEED PUNCH DRIVER (DVR02)	009	20949B	HP 6940A/6941A DIAGNOSTIC	202	14905B
RUN-TIME DATA INPUT FOR BASIC	009	22044B	ORTHOGONAL REGRESSION PROGRAM	404	22134A
HIGH SPEED PUNCH DRIVER - BASIC CALLABLE	009	22075B			
BASIC PHOTOREADER DATA INPUT	009	22082B	I/O, STATUS PROCESSING (004)		
HP 2754A PUNCH/LIST IN KT MODE	009	22176A	PROGRAM EXECUTION TIMER	003	22195B
FAST DOS/DOS-M PHOTOREADER DRIVER	009	22247B	FORTRAN I/O STATUS FUNCTION	004	22236A
TELEX TO ASCII PHOTOREADER DRIVER	009	22264B	BCS INPUT/OUTPUT CONTROL, BUFFERED	008	24172A
DOS/DOS-M PHOTOREADER DRIVER TO READ ABSOLUTE	009	22353A	BCS INPUT/OUTPUT CONTROL	008	24173A
BINARY TAPES					
CORE SIZE INDEPENDENT PHOTO READER SIO DRIVER	009	22490A	I/O, TELECOMMUNICATIONS (002)		
CORE SIZE INDEPENDENT PAPER TAPE PUNCH SIO DRIVER	009	22491A			
I/O, PRINTER (011)			BCS TELEPRINTER DRIVER D.00	002	20017C
4K SIO HP 2778A LINE PRINTER DRIVER	011	20527B	4K SIO BUFFERED TELEPRINTER DRIVER	002	20322A
8K SIO HP 2778A LINE PRINTER DRIVER	011	20528A	8K SIO BUFFERED TELEPRINTER DRIVER	002	20323A
16K SIO HP 2778A LINE PRINTER DRIVER	011	20529A	12K SIO BUFFERED TELEPRINTER DRIVER	002	20329A
RTE HP 2778A LINE PRINTER DRIVER (DVR12)	011	20800C	16K SIO BUFFERED TELEPRINTER DRIVER	002	20330B
DOS HP 2778A LINE PRINTER DRIVER (DVR12)	011	20991C	RTE TELEPRINTER DRIVER (DVR00)	002	20741D
BASIC HP 2778A LINE PRINTER DRIVER	011	22095A	DOS TELEPRINTER DRIVER (DVR00)	002	20905D
HP 2767 LINE PRINTER BASIC DRIVER	011	22258A	TELEPRINTER/LINEPRINTER OUTPUT SELECTOR FOR HP	002	22237C
HP 2778/2767 LINE PRINTER PATCH FOR EDUCATIONAL	011	22399A	BASIC		
BASIC			16K BINARY SYNCHRONOUS CONTROLLED DATA	002	22244B
BASIC CALLABLE LINE PRINTER DRIVER	011	22408A	COMMUNICATIONS PROGRAM		
EDUCATIONAL BASIC HP 2767 LINE PRINTER DRIVER	011	22409A	USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER	002	22245A
A,B, DICK VIDEO/JFT SIO LINE PRINTER DRIVER	011	22411A	D.50		
4K SIO HP 2767 LINE PRINTER DRIVER	011	24164B	DOS-M REMOTE TAPE READER DRIVER	002	22246B
8K SIO HP 2767 LINE PRINTER DRIVER	011	24165B	BCS POWER FAIL TELEPRINTER DRIVER WITH	002	22311A
16K SIO HP 2767 LINE PRINTER DRIVER	011	24166B	AUTORESTART OPTION		
BCS HP 2767 LINE PRINTER DRVP. (D.16)	011	24167B	BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS	002	22328C
DOS HP 2767 LINE PRINTER DRIVER (DVR12)	011	24168C	AND ASYNCHRONOUS DEVICES		
RTE HP 2767 LINE PRINTER DRIVER (DVR12)	011	24169A	8K BINARY SYNCHRONOUS CONTROLLED DATA	002	22367A
BCS HP 2778A LINE PRINTER DRVR. (D.12)	011	24171B	COMMUNICATIONS PROGRAM		
4K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24268A	HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1100	002	22372A
8K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24269A	A BCS ASYNCHRONOUS DATA SET INTERFACE DRIVER	002	22374A
16K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24270A	D.70 REVERSE CHANNEL TELECOMMUNICATIONS DRIVER	002	22387A
DOS HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	011	24271A	CORE-SAVING TELEPRINTER I/O DRIVER AND CODE	002	22394A
BCS HP 2610A/2614A LINE PRINTER DRIVER (D.12)	011	24273A	CONVERSION ROUTINE		
12K SIO HP 2767 LINE PRINTER DRIVER	011	24301A	HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU	002	22453B
12K SIO HP 2778A LINE PRINTER DRIVER	011	24302A	CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER	002	22489A
12K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24303A	(LINE PRINTER COMPATIBLE)		
RTE HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	011	29028A	CDC USER 200 TERMINAL SIMULATOR	002	22496A
			4K SIO TELEPRINTER DRIVER, LINE PRINTER	002	24123A
			COMPATIBLE		
			8K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24125A
I/O, PUNCH CARD (010)			16K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24127A
BCS CARD READER DRIVER (D.11)	010	20019C	DOS-M SYSTEM TELEPRINTER DRIVER (DVR05)	002	24157B
8K SIO CARD READER DRIVER	010	20324B	4K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24256A
16K SIO CARD READER DRIVER	010	20332A	8K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24257A
4K SIO MARK SENSE CARD READER DRIVER	010	20520C	16K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24258A
8K SIO MARK SENSE CARD READER DRIVER	010	20521C	BCS HP 2605A CONSOLE PRINTER DRIVER (D.25)	002	24259A
16K SIO MARK SENSE CARD READER DRIVER	010	20522C	DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)	002	24260A
BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)	010	20817B	12K SIO TELEPRINTER DRIVER	002	24299A
BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)	010	20819C	12K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24300A
RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20821B	RTE MULTIPLE DEVICE SYSTEM CONTROL DRIVER (DVR00)	002	29029A
DOS MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20823C	SIO LIST OUTPUT TO A STORAGE SCOPE	014	22379A
4K SIO HP 2891A CARD READER DRIVER	010	24178A	RELOCATABLE MODULE LISTER	100	22381A
8K SIO HP 2891A CARD READER DRIVER	010	24179A	ABSOLUTE OCTAL OR DECIMAL CORE DUMP	207	22322A

HEXADECIMAL/OCTAL LIST OF ANSI-COMPATIBLE MAGNETIC TAPE (TDUMP)	207	225014	MINI-BASIC	018	222614
TELEPRINTER OCTAL INPUT PROGRAM	212	220894	BCS INTERPRETER FOR FLOATING POINT OPERATIONS	018	222954
IBM					
HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU	002	22453R	INTERRUPT		
AN HP 2110-FAMILY SIMULATOR FOR THE IBM 360	008	22042C	PRIVILEGED WTE DRIVER FOR THE HP 8054 AUDIO	006	22450A
BCS TAPE PUNCH DRIVER, IBM 8-LEVEL (D.02A)	009	20016A	ANALYZER (DVR75)		
8K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20316A	BCS 7 TRACK DRIVER W/O DMA	016	13026R
4K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20317A	INTERLUPT DIAGNOSTIC	209	20415A
FORTTRAN TRANSLATOR, IBM 1800 TO HP FORTTRAN II	018	22065A	HP 2100A INTERRUPT TEST	209	24215A
AN HP ASSEMBLER FOR THE IBM 360	018	22390A	HP 2100A FLOATING POINT DIAGNOSTIC	218	24251A
MAGNETIC TAPE TO LINE PRINTER ROUTINE	207	22251A			
360 FORMAT MAGNETIC TAPE DUMP	207	22340A	INVERSE		
INFORMATION STORAGE AND RETRIEVAL (102)					
DISC BASIC EXECUTIVE	008	22338A	INVERSE ASSEMBLER	018	22013R
MAGNETIC TAPE SYSTEM PROGRAM CATALOG	022	22440A	ABSOLUTE OBJECT DECODER	018	22292R
DOS-M DIRECTORY LISTING PROGRAM WITH MASKING FACILITY	022	22485A	DOS-M RELOCATABLE REVERSE ASSEMBLER	018	22438A
MAGNETIC TAPE STORAGE AND RETRIEVAL PROGRAM	102	22198C	8K SIO RELOCATABLE REVERSE ASSEMBLER	018	22439A
DISC/UPUM UTILITY	102	22272A	8K SIO ABSOLUTE REVERSE ASSEMBLER	018	22440A
DOS-M DUMP/RESTORE PROGRAM	102	22284A	OCTAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM	211	22293A
DOS/DOS-M SOURCE STORAGE AND RETRIEVAL	102	22299A	INVERSE SIN AND COS ROUTINE	306	22511A
PACKED MAGNETIC TAPE STORAGE AND RETRIEVAL FOR DOS-M	102	22356A	JOB REPORTING (701)		
HP 2020B MAGNETIC TAPE STORAGE & RETRIEVAL APPLICATIONS DATA MANAGEMENT PACKAGE (ADM)	102	22482A	RTE LOGHOOK	701	22378A
DOS-M USER FILE DESCRIPTION DIRECTORY	102	22484A	KENNEDY		
DOS-M/HP2000C TIME-SHARE BASIC FILE HANDLER	102	24228B	BCS INCREMENTAL MAGNETIC TAPE DRIVER (D.20)	016	20007A
DOS-M/HP 2000C TIME-SHARED BASIC FILE INTERFACE PACKAGE	102	24240A	TEST: KENNEDY INCREMENTAL MAGNETIC TAPE UNIT	204	20411R
FIELD SORT	107	22343A	KEYBOARD		
READ/WRITE DOS-M FILES IN RTE ENVIRONMENT	110	22525A	BCS HP 2605A CONSOLE PRINTER DRIVER (D.25)	002	24259A
DOS-M EXTENDED FILE MANAGEMENT PACKAGE	110	24227D	DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)	002	24260A
DOS TO MAGNETIC TAPE DUMP	207	22259A	KEYBOARD TAPE GENERATOR	108	22090A
MAGNETIC TAPE TO DOS DUMP	207	22260A	HP 2600 KEYBOARD-DISPLAY TERMINAL TEST	217	24187C
DUMP FROM DOS-M MAGNETIC TAPE STORAGE AND RETRIEVAL (HP 22198) FORMAT	207	22480A	LABEL		
LOAD DOS-M FROM MAGNETIC TAPE STORAGE & RETRIEVAL (HP 22198) FORMAT	207	22481R	SYMBOLIC ALPHANUMERIC GENERATOR	212	22010C
CHERNACK (HP 22198) MAGNETIC TAPE SOURCE FORMAT TO DOS-M SOURCE FILE	207	22530A	PAPER TAPE TITLER	212	22269A
			RTE ALPHANUMERIC TAPE LABEL GENERATOR	212	22524A
INSTRUCTION					
ALTER-SKIP INSTRUCTION TEST	209	20400A	LANGUAGE TRANSLATORS (SEE TRANSLATORS, LANGUAGE)		
MEMORY REFERENCE INSTRUCTION TEST	209	20401R	LEAST SQUARES		
SHIFT-ROTATE INSTRUCTION TEST	209	20402D	SOLUTION OF LINEAR LEAST SQUARES PROBLEMS	309	22022A
HP 2100A ALTER-SKIP INSTRUCTION TEST	209	24208A	LINEAR LEAST SQUARES PROBLEM SOLVER	309	22220A
HP 2100A MEMORY REF. INSTRUCTION TEST	209	24209A	LEAST SQUARES REGRESSION PROGRAM	404	22128A
HP 2100A SHIFT-ROTATE INSTRUCTION TEST	209	24210A	LINEAR REGRESSION INTERVAL ESTIMATES	404	22129A
			POLYNOMIAL REGRESSION PROGRAM	404	22130A
INSTRUMENT TEST (202)					
HP 21XX VERIFICATION AND TEST FOR THE HP 6936A	202	14901R	POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	404	22131A
HP 6940A/6941A DIAGNOSTIC	202	14905B	NONLINEAR REGRESSION OF A SINGLE-VARIABLE FUNCTION	404	22187A
HP 1260B DATA SOURCE INTERFACE DIAGNOSTIC	202	20337D	NONLINEAR REGRESSION OF AN ARBITRARY FUNCTION	404	22188A
HP 12556B POSITIVE TRUE 40-BIT OUTPUT REGISTER DIAGNOSTIC	202	20344C	LIBRARY		
HP 2912A PROGRAMMER CARD DIAGNOSTIC	202	20429C	DACE LIBRARY	012	20209C
HP 12661A DVS PROGRAM CARD DIAGNOSTIC	202	20430A	8K SIO HP 7970 MAGNETIC TAPE DRIVER	016	13021R
PROCESSOR INTERCONNECT CABLE DIAGNOSTIC	202	24142A	BCS PLOTTER LIBRARY	021	20201C
HP 2100A GENERAL PURPOSE REGISTER TEST	202	24196A	RTE/DOS PLOTTER LIBRARY	021	20810R
HP 2100A PROCESSOR INTERCONNECT CABLE TEST	202	24107A	BCS RELOCATABLE LIBRARY, EAU	021	24145R
HP 2100A CONTROLLER MICROCIRCUIT TEST	202	24199A	BCS RELOCATABLE LIBRARY, NON-EAU	021	24146R
HP 12930A UNIVERSAL INTERFACE DIAGNOSTIC	202	24209A	4K BCS RELOCATABLE LIBRARY, NON-EAU	021	24147R
HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC	217	22024A	4K BCS RELOCATABLE LIBRARY, EAU	021	24148R
VERIFICATION: DACE AXEPT	219	20072C	RCS FORTRAN IV LIBRARY	021	24149R
TEST: HP 2310A/8 SUBSYSTEM	219	20339R	RTE/DOS RELOCATABLE LIBRARY, NON-EAU	021	24150R
			RTE/DOS RELOCATABLE LIBRARY, EAU	021	24151D
INTEGER					
INTEGER EXTRACTION FROM A STRING OF TEXT	104	22467A	RTE/DOS FORTRAN IV LIBRARY	021	24152C
			RTE/DOS FORTRAN FORMATTER	021	24153C
INTEGRAL TRANSFORMS (316)					
REAL FOURIER TRANSFORM	316	22036A	RTE/DOS RELOCATABLE LIBRARY - FLOATING POINT	021	24248R
COMPLEX FOURIER TRANSFORM	316	22037R	4K BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24249R
GENERAL FAST FOURIER TRANSFORM	316	22189R	WCS I/O UTILITY ROUTINE (WCSIO)	021	24283A
FAST FOURIER TRANSFORM	316	22218A	LIBRARIAN	107	20237A
			DOS-M LIBRARIAN	107	22282A
			RELOCATABLE OBJECT UTILITY LIBRARIAN	108	22392A
			KODAK APPLICATION LIBRARY	109	24310A
			DOUBLE PRECISION INTEGFR LIBRARY	302	22097C
INTEGRATION					
FRESNEL INTEGRAL EVALUATION	310	22256A	LINE PRINTER		
TRAPEZOIDAL INTEGRATION ROUTINE	310	22023A	CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER (LINE PRINTER COMPATIBLE)	002	22489A
TRAPEZOIDAL INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22024A	4K SIO TELEPRINTER DRIVER, LINE PRINTER COMPATIBLE	002	24123A
SIMPSON AND NEWTON'S 3/8 INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22025A	8K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24125A
HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE	310	22026A	16K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24127A
HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22027R	4K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24256A
HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE	310	22028A	8K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24257A
HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22029A	16K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24258A
INTEGRATION ROUTINE	310	22144A	RCS HP 2605A CONSOLE PRINTER DRIVER (D.25)	002	24259A
			DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)	002	24259A
			12K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24260A
			4K SIO HP 2778A LINE PRINTER DRIVER	002	24300A
			8K SIO HP 2778A LINE PRINTER DRIVER	011	20527B
			16K SIO HP 2778A LINE PRINTER DRIVER	011	20528A
			RTE HP 2778A LINE PRINTER DRIVER (DVR12)	011	20529A
			DOS HP 2778A LINE PRINTER DRIVER (DVR12)	011	20800C
			BASIC HP 2778A LINE PRINTER DRIVER	011	20991C
			HP 2707 LINE PRINTER BASIC DRIVER	011	22095A
				011	22258A
INTERPRETER					
BASIC SYSTEM	018	20392R			
PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM	018	22201D			

HP 2778/2767 LINE PRINTER PATCH FOR EDUCATIONAL BASIC	011	22399A	BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24250B
BASIC CALLABLE LINE PRINTER DRIVER	011	22408A	MAGNETIC TAPE SYSTEM PROGRAM CATALOG	022	22446A
EDUCATIONAL BASIC HP 2767 LINE PRINTER DRIVER	011	22409A	DOS-M RELOCATABLE PROGRAM TAPE EDITOR	101	22500A
A.B. DICK VIDEOJET SIO LINE PRINTER DRIVER	011	22411A	MAGNETIC TAPE STORAGE AND RETRIEVAL PROGRAM	102	22198C
4K SIO HP 2767 LINE PRINTER DRIVER	011	24164B	DISC/DRUM UTILITY	102	22272A
8K SIO HP 2767 LINE PRINTER DRIVER	011	24165B	DOS-M DUMP/RESTORE PROGRAM	102	22284A
16K SIO HP 2767 LINE PRINTER DRIVER	011	24166B	DOS/DOS-M SOURCE STORAGE AND RETRIEVAL	102	22299A
RCS HP 2767 LINE PRINTER DRVR. (D.16)	011	24167B	PACKED MAGNETIC TAPE STORAGE AND RETRIEVAL FOR DOS-M	102	22356A
DOS HP 2767 LINE PRINTER DRIVER (DVR12)	011	24168C	HP 2708 MAGNETIC TAPE STORAGE & RETRIEVAL	102	22482A
RTE HP 2767 LINE PRINTER DRIVER (DVR12)	011	24169A	DOS-M/HP2000C TIME-SHARE BASIC FILE HANDLER	102	24228B
8CS HP 2778A LINE PRINTER DRVR. (D.12)	011	24171B	MTS PUNCHED TAPE DUPLICATOR	106	22113B
4K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24268A	SINGLE DRIVE MAGNETIC TAPE COPY PROGRAM	106	22197A
8K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24269A	DRUM BASED MAGNETIC TAPE DUPLICATOR	106	22209C
16K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24270A	MAGNETIC TAPE COPY	106	22535A
DOS HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	011	24271A	CARD TO MAGNETIC TAPE UTILITY	108	22165A
RCS HP 2610A/2614A LINE PRINTER DRIVER (D.12)	011	24273A	MAGNETIC TAPE TO PRINT UTILITY PROGRAM	108	22166A
12K SIO HP 2767 LINE PRINTER DRIVER	011	24301A	EASY MAGNETIC TAPE I/O AND STATUS INFORMATION	108	22358A
12K SIO HP 2778A LINE PRINTER DRIVER	011	24302A	HANDI-O	108	22359A
12K SIO HP 2610A/2614A LINE PRINTER DRIVER	011	24303A	MAGNETIC TAPE REFORMATTING SYSTEM	112	24305A
RTE HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	011	29028A	HP 790R/13210 DIAGNOSTIC	203	13041R
MAGNETIC TAPE TO PRINT UTILITY PROGRAM	108	22160A	HP 7970E/13183A DIAGNOSTIC	204	13031C
MAGNETIC TAPE TO LINE PRINTER ROUTINE	207	22251A	HP 7970E-215/13184 DIAGNOSTIC	204	13042R
HP 2778 LINE PRINTER DIAGNOSTIC	215	20899C	TEST: KENNEDY INCREMENTAL MAGNETIC TAPE UNIT	204	20411R
HP 2767 LINE PRINTER DIAGNOSTIC	215	20999A	HP 3030 MAGNETIC TAPE UNIT DIAGNOSTIC	204	20433E
HP 2100A LINE PRINTER (HP2767) DIAGNOSTIC	215	24205A	HP 2220 MAGNETIC TAPE UNIT DIAGNOSTIC	204	20516R
HP 2100A LINE PRINTER (HP 2778) TEST	215	24218C	MAGNETIC TAPE TO LINE PRINTER ROUTINE	207	2251A
			MTS/BCS SYSTEM ABSOLUTE DUMP	207	22257A
			DOS TO MAGNETIC TAPE DUMP	207	22259A
			MAGNETIC TAPE TO DOS DUMP	207	22260A
			360 FORMAT MAGNETIC TAPE DUMP	207	22340A
			QUICK DUMP FOR HP 790R MOVING HEAD DISC	207	22454A
			DUMP FROM DOS-M MAGNETIC TAPE STORAGE AND RETRIEVAL (HP 22198) FORMAT	207	22490A
			LOAD DOS-M FROM MAGNETIC TAPE STORAGE & RETRIEVAL (HP 22198) FORMAT	207	22481B
			HEXADECIMAL/OCTAL LIST OF ANSI-COMPATIBLE MAGNETIC TAPE (TDUMP)	207	22501A
			CERNACK (HP 22198) MAGNETIC TAPE SOURCE FORMAT TO DOS-M SOURCE FILE	207	22530A
			MTS FORTRAN CHAIN	212	22267A
			DOS/DOS-M HP 2020/3030 MAGNETIC TAPE CONTROL PROGRAM	212	22320A
			ALGOL SEGMENT RETURN TO MAIN PROGRAM	212	22366A
			HP 2100A FLOATING POINT DIAGNOSTIC	218	24251A
			MAGNETIC TAPE EQUIPMENT TEST (204)		
			HP 797R/13181A DIAGNOSTIC	204	13020E
			DIAGNOSTIC FOR HP 797R/13182A MAGNETIC TAPE	204	13028E
			HP 7970E/13183A DIAGNOSTIC	204	13031C
			HP 7970E-215/13184 DIAGNOSTIC	204	13042R
			TEST: KENNEDY INCREMENTAL MAGNETIC TAPE UNIT	204	20411R
			HP 3030 MAGNETIC TAPE UNIT DIAGNOSTIC	204	20433E
			HP 2220 MAGNETIC TAPE UNIT DIAGNOSTIC	204	20516R
			MARK SENSE		
			4K SIO MARK SENSE CARD READER DRIVER	010	20520C
			8K SIO MARK SENSE CARD READER DRIVER	010	20521C
			16K SIO MARK SENSE CARD READER DRIVER	010	20522C
			BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)	010	20617B
			BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)	010	20619C
			RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20621B
			DOS MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20623C
			HP 2100A OPTICAL MARK READER TEST (KIT 12602B)	214	24188R
			MARK SENSE EDUCATIONAL TEST CARD SCORING PROGRAM	720	22266A
			MATHEMATICS, GENERAL (301)		
			LOCATE MAXIMUM-MINIMUM INTFGR	301	22021A
			INTEGRATED MATH CALCULATOR PROGRAM	301	22044C
			EXTENDED-PRECISION ARITHMETIC LIBRARY	302	22230A
			THREE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	302	22334A
			FIVE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	302	22335A
			COMPLEX MATH PACKAGE	303	22234A
			TRANSFORMATIONS	306	22117A
			MATRIX OPERATIONS (312)		
			SCIENTIFIC SUBROUTINE PACKAGE	021	22329A
			SOLUTION OF LINEAR LEAST SQUARES PROBLEMS	309	22022A
			LINEAR LEAST SQUARES PROBLEMS SOLVER	309	22220A
			ADD ROWS OF MATRICES	312	22031A
			RANK AND BASIS ROUTINE	312	22032A
			MATRIX INVERSION SUBROUTINES	312	22118R
			MATRIX ARITHMETIC SUBROUTINE	312	22119A
			MATRIX ARITHMETIC PROGRAM	312	22120A
			SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS	314	22033A
			SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, BAND-MATRIX	314	22034A
			SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, SYMMETRIC MATRIX	314	22035A
			SIMULTANEOUS EQUATION SOLVER PROGRAM	314	22122A
			SIMULTANEOUS EQUATION SOLVER ROUTINE	314	22123A
			MEDIA CONVERSION (109)		
			MEDIA CONVERSION	109	24297A
			KODAK APPLICATION LIBRARY	109	24310A
			MEDICAL SCIENCES (506)		
			ECG INTERPRETIVE SYSTEM	506	01530A
			HP 1532A ECG DATA COLLECTION SYSTEM	506	01532A

HP 5670A PATIENT DATA MONITORING SYSTEM	506	05670A	HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22027R
MEDACE	506	05680A	HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE	310	22028A
COMPUTERIZED CARDIAC CATHETERIZATION LABORATORY SYSTEM	506	05690A	HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22029A
HP 5693A ANGIO ANALYZER OPTION	506	05693A	INTEGRATION ROUTINE	310	22144A
HP BIOMEDICAL RESPONSE AVERAGING PROGRAM	506	22221R			
BLOOD ACID-BASE VARIABLES DETERMINATION PROGRAM	506	22222A			
LUNG COMPLIANCE AND RESISTANCE MEASUREMENT SYSTEM	506	22240A			
MEMORY			OCAL		
BCS-FORTRAN/ALGOL MEMORY ALLOCATION ROUTINE	008	22452A	OCAL UTILITY SYSTEM (HOCUS)	211	22098A
DATA BLOCK MOVEMENT	104	22204A	OCAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM	211	22293A
LOW MEMORY ADDRESS TEST	208	20403A	ORDINARY DIFFERENTIAL EQUATIONS (318)		
HIGH MEMORY ADDRESS TEST	208	20404A	SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS	318	22038A
HP 2116A LOW MEMORY CHECKERBOARD TEST	208	20405A			
HP 2116A HIGH MEMORY CHECKERBOARD TEST	208	20406A	OSCILLOSCOPE		
HP 2116B HIGH MEMORY CHECKERBOARD TEST	208	20426A	OSCILLOSCOPE PLOTTING SUBROUTINE	014	22253R
HP 2116B LOW MEMORY CHECKERBOARD TEST	208	20427A	DOS/DOS-M HP 2331 X-Y SCOPE DISPLAY	014	22291C
HP 2116A/14A HIGH MEMORY CHECKERBOARD TEST	208	20512A	DOS STORAGE SCOPE DRIVER (DVR46, SEX50)	014	23090A
HP 2115A/14A LOW MEMORY CHECKERBOARD TEST	208	20513A	SCOPE SYMBOLIC LISTER	212	22096A
HP 2116C LOW MEMORY PATTERN TEST	208	24161A	SCOPE DISPLAY DEMO	001	22040A
HP 2116C HIGH MEMORY PATTERN TEST	208	24162A			
HP 2100A LOW MEMORY PATTERN TEST	208	24193A			
HP 2100A HIGH MEMORY PATTERN TEST	208	24194A	PAPER TAPE		
HP 2100A LOW MEMORY ADDRESS TEST	208	24211A	DOS-M REMOTE TAPE READER DRIVER	002	22246R
HP 2100A HIGH MEMORY ADDRESS TEST	208	24212A	BCS TAPE READER DRIVER D.01	009	20095B
MEMORY REFERENCE INSTRUCTION TEST	209	20401R	BCS TAPE PUNCH DRIVER D.02	009	20006B
HP 1259B MEMORY PARITY CHECK DIAGNOSTIC	218	20345A	BCS TAPE PUNCH DRIVER, IBM 8-LEVEL (D.02A)	009	20016A
MEMORY PROTECT DIAGNOSTIC	218	20490A	4K SIO TAPE READER DRIVER	009	20303A
HP 2114B OMA GENERAL DIAGNOSTIC	218	20524A	4K SIO TAPE PUNCH DRIVER	009	20304A
HP 2114B OMA RATE AND TRANSFER DIAGNOSTIC	218	20525A	8K SIO TAPE READER DRIVER	009	20306A
HP 12591 MEMORY PARITY CHECK TEST	218	24144A	8K SIO TAPE PUNCH DRIVER	009	20307A
HP 12909A PROM WRITER DIAGNOSTIC	218	24202R	8K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20316A
			4K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	009	20317A
MICROCODE (905)			16K SIO TAPE READER DRIVER	009	20319A
PSEUDO-DMA INPUT (MULTI-CHANNEL)	005	22515A	16K SIO TAPE PUNCH DRIVER	009	20320A
WORD MOVE (INTERRUPTABLE)	005	22516A	12K SIO TAPE READER DRIVER	009	20327A
MOVING AVERAGES			12K SIO TAPE PUNCH DRIVER	009	20328A
MOVING AVERAGES	402	22125A	RTE TAPE READER DRIVER (DVR01)	009	20743D
			RTE HIGH SPEED PUNCH DRIVER (DVR02)	009	20745B
			DOS TAPE READER DRIVER (DVR01)	009	20987C
			DOS HIGH SPEED PUNCH DRIVER (DVR02)	009	20989B
MULTIPLE			RUN-TIME DATA INPUT FOR BASIC	009	22044B
DISCRIMINANT ANALYSIS PROGRAM	403	22127A	HIGH SPEED PUNCH DRIVER - BASIC CALLABLE	009	22078B
STEPWISE REGRESSION PROGRAM	404	22132A	BASIC PHOTOREADER DATA INPUT	009	22092B
MULTIPLE REGRESSION PROGRAM	404	22185A	HP 2754A PUNCH/LIST IN KT MODE	009	22176A
MULTIPLE CORRELATION ROUTINE	407	22147A	FAST DOS/DOS-M PHOTOREADER DRIVER	009	22247B
GENERAL STATISTICS FOR MULTIPLE GROUPS	408	22142R	CORE SIZE INDEPENDENT PHOTO READER SIO DRIVER	009	22490A
MULTIPLE CORRELATION MATRIX PROGRAM	409	22186A	CORE SIZE INDEPENDENT PAPER TAPE PUNCH SIO DRIVER	009	22491A
			PUNCH/VERIFY ROUTINE	106	20312A
MULTIPLEXOR			PUNCHED TAPE DUPLICATOR	106	22041E
BCS 6936A MULTIPROGRAMMER DRIVER (D.61)	006	14900R	MIS PUNCHED TAPE DUPLICATOR	106	22113B
HP 12584 TELEPRINTER MULTIPLEXOR INTERFACE TEST	218	20439A	FAST PUNCH VERIFY	106	22100C
HP 12584C TELEPRINTER MULTIPLEXOR TEST	218	24175A	RTE/DOS DUPLICATOR PROGRAM	106	22252A
HP 2100A PRINTER MULTIPLEXOR TEST	218	24202A	DOS-M PAPER TAPE REPRODUCER	106	22308A
HP 2100A ASYNCHRONOUS CHANNEL MULTIPLEXOR DIAGNOSTIC	218	24252A	PAPER TAPE COPY	106	22308A
			KEYBOARD TAPE GENERATOR	108	22090A
			DOS-M PAPER TAPE/DISC VERIFY	108	22355A
			BINARY TAPE EDITOR	212	22014A
			PAPER TAPE TITLER	212	22289A
			ASCII STRING SEARCH FROM PHOTOREADER	212	22322A
			HP 2737 PUNCH TAPE READER TEST	213	20496C
			HP 2753 TAPE PUNCH TEST	213	20499C
			HP 2100A TAPE READER TEST	213	24189B
			HP 2100A TAPE PUNCH TEST	213	24190A
			PAPER TAPE EQUIPMENT TEST (213)		
			HP 2737 PUNCH TAPE READER TEST	213	20496C
			HP 2753 TAPE PUNCH TEST	213	20499C
			HP 2100A TAPE READER TEST	213	24189B
			HP 2100A TAPE PUNCH TEST	213	24190A
			HP 2100A TELEPRINTER TEST	213	24201A
			PARITY		
			HP 2100A MEMORY PARITY CHECK TEST	208	24198B
			HP 1259B MEMORY PARITY CHECK DIAGNOSTIC	218	20345A
			HP 12591 MEMORY PARITY CHECK TEST	218	24144A
			PHYSICS (505)		
			COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO CELSIUS DEGREES CONVERSION	505	22325A
			PLOTTING ROUTINES (904)		
			BCS PLOTTER DRIVER (D.10)	014	20014A
			DOS PLOTTER DRIVER (DVR10)	014	20581A
			RTE PLOTTER DRIVER (DVR10)	014	20896B
			CALCOMP PLOTTER DRIVER - BASIC CALLABLE	014	22077R
			HIGH SPEED CONTINUOUS LINE PLOTTER FOR HP 7004B	014	22219A
			X-Y PLOTTING ROUTINE	014	22242A
			OSCILLOSCOPE PLOTTING SUBROUTINE	014	22253B
			PLOT, WAIT	014	22283A
			BASIC PLOT SUBROUTINES	014	22279A
			HP 7004 X-Y RECORDER LIBRARY	014	22390A
			RTE HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22595A
			DOS/DOS-M HP 1331C STORAGE SCOPE LIBRARY	014	22599A
			DOS/DOS-M HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22510A
			X-Y PLOTTER ON PRINTER	004	22152B
			TIME SERIES PLOTTER	004	22163A
			HISTOGRAM PLOTTER PROGRAM	004	22164B

HISTOGRAM PLOTTER ROUTINE	904	22182A	ABSOLUTE PROGRAM CONTROL SYSTEM	211	22192A
THREE DIMENSIONAL PLOT SUBROUTINE	904	22262A	OCTAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM	211	22293A
X-Y PLOTTER FOR 11 INCH PAGE PRINTER	904	22348A	RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	22314A
THREE DIMENSIONAL TRANSFORMATIONS USING EULER'S ANGLES	904	22425A	DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	211	22526A
LOGARITHMIC AXIS GENERATOR FOR THE CALCOMP 565	904	22426A	DEBUG FOR ABSOLUTE/BCS PROGRAMS	211	22527A
HP 7210 PLOTTER LIBRARY	904	22474A	BCS HP 2312A DRIVER/FORTRAN INTERFACE ROUTINE (L2312)	212	20078A
COMPLETE BCS HP 7210A PLOTTER DRIVER DVR.10	904	72000A	BINARY TAPE EDITOR	212	22014A
MINIMUM BCS HP 7210A PLOTTER DRIVER DVR.10	904	72001A	BASIC LINE RESEQUENCER	212	22015B
HP 7210A DIAGNOSTIC & TEST TAPE	904	72002A	SYMBOLIC ALPHANUMERIC GENERATOR	212	22016C
COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72003A	AUTOMATIC TABBING PROGRAM	212	22064B
MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER	904	72004A	TELEPRINTER OCTAL INPUT PROGRAM	212	22089A
COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	904	72006A	SCOPE SYMBOLIC LISTER	212	22096A
MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10	904	72007A	NAM-ENT-EXT EDITOR	212	22191A
RTE HP 7210A PLOTTER DRIVER DVR.10	904	72008A	TABULATION AND FORM-FEED CALLS FOR HP 2754 TELEPRINTER	212	22205A
RTE HP 7210A PLOTTER DRIVER DVR.10	904	72009A	'EXEC' CALL ADAPTER ROUTINE	212	22250A
POLYNOMIAL			MTS FORTRAN CHAIN	212	22267A
COMPLEX ROOTS OF A REAL POLYNOMIAL	311	22030B	PAPER TAPE TITLER	212	22269A
POLYNOMIAL REGRESSION PROGRAM	404	22130A	TAB FOR PREPARING FORTRAN TAPES	212	22278A
POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	404	22131A	CHAIN FROM PHOTOREADER IN HP BASIC	212	22287A
NONLINEAR REGRESSION OF A SINGLE-VARIABLE FUNCTION	404	22187A	ALGOL ARRAY TRANSFER FOR SEGMENTATION	212	22289A
POLYNOMIALS AND POLYNOMIAL EQUATIONS (311)			FORTRAN/ALGOL ARRAY TRANSFER ROUTINE	212	22310A
SCIENTIFIC SUBROUTINE PACKAGE	021	22329A	DOS/DOS-M HP 2020/3030 MAGNETIC TAPE CONTROL PROGRAM	212	22320A
COMPLEX ROOTS OF A REAL POLYNOMIAL	311	22030B	DOS/DOS-M ASSEMBLY LANGUAGE COMMENT INSERTER	212	22346A
REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL COEFFICIENTS	311	22395A	ASCII STRING SEARCH FROM DISC FILE	212	22351A
POWER FAIL			ASCII STRING SEARCH FROM PHOTOREADER	212	22352A
FORTRAN POWER FAIL LINK	019	22235A	ALGOL SEGMENT RETURN TO MAIN PROGRAM	212	22360A
REAL-TIME EXECUTIVE OPERATING SYSTEM	020	29016D	ASSEMBLER JUSTIFICATION PROGRAM	212	22428A
HP 12500 POWER FAIL WITH AUTO-RESTART TEST	210	20420B	DOS-M SEGMENT RETURN TO MAIN	212	22431A
HP 2110 POWER FAIL INTERRUPT TEST	210	20434B	COMMENT INSERTER FOR ASSEMBLER PROGRAMS	212	22444A
HP 2100A POWER FAIL DIAGNOSTIC	210	24206B	HP 'IDEAL' COMMERCIAL SUBROUTINE LIBRARY	212	22455A
PREPARATION OF SYSTEMS (008)			RTE ALPHANUMERIC TAPE LABEL GENERATOR	212	22524A
PREPARE CONTROL SYSTEM	008	20021C	HP 2313A DRIVER FORTRAN/ALGOL INTERFACE ROUTINE (I2313)	212	22910A
4K SID SYSTEM DUMP	008	20301C	BINARY INTERFACE ROUTINE R2313 TO DVR62	212	29011A
8K SID SYSTEM DUMP	008	20313C	FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65, L65	212	29017A
16K SID SYSTEM DUMP	008	20335B	LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DVR., D.65,DIR65	212	29018A
8K MAGNETIC TAPE SYSTEM	008	20504B	LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DVR., D.65,DRL65	212	29019A
16K MAGNETIC TAPE SYSTEM	008	20505B	FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.66, L66	212	29020A
SYSTEM DUMP	008	20802C	FORTRAN/ALGOL INTERFACE SUBROUTINE FOR RTE DRIVER DVR65,DLK65	212	29021A
HP 2000A TO HP 2000B CONVERSION	008	20878B	WORD MOVE (INTERRUPTABLE)	905	22516A
AN HP 2116-FAMILY SIMULATOR FOR THE IBM 360	008	22042C	PUNCH CARD EQUIPMENT TEST (214)		
DISC BASIC EXECUTIVE	008	22336A	HP 2761-A007 OPTICAL MARK READER DIAGNOSTIC, HP 12002A KIT	214	20347B
PSEUDO MULTIPROGRAMMING EXECUTIVE FOR RCS	008	22441A	HP 2761-A007 OPTICAL MARK READER DIAGNOSTIC, HP 12002B KIT	214	20899B
BCS-FORTRAN/ALGOL MEMORY ALLOCATION ROUTINE	008	22452A	HP 2891 CARD READER DIAGNOSTIC	214	24174A
CREATE DSGEN MAGNETIC TAPE	008	22493A	HP 2100A OPTICAL MARK READER TEST (KIT 12602R)	214	24188B
PREPARE TAPE SYSTEM	008	24016A	HP 2100A CARD READER (HP 2891/12882) DIAGNOSTIC	214	24192A
BCS INPUT/OUTPUT CONTROL, BUFFERED	008	24172A	HP 2892/12924 CARD READER DIAGNOSTIC	214	24267A
BCS INPUT/OUTPUT CONTROL	008	24173A	HP 3200A/12566B CARD READER/INTERFACE DIAGNOSTIC	214	24297A
12K SID SYSTEM DUMP	008	24298A	QUOTIENT-REMAINDER		
RTE GENERATOR, MH-RTGEN	008	29014B	EIGENVALUES OF A SYMMETRIC REAL MATRIX	313	22192A
RTE GENERATOR, FH-RTGEN	008	29015B	RANDOM NUMBER GENERATORS (405)		
ALGOL OPERATING SYSTEM FOR MTS	016	22270C	PSEUDO-RANDOM NUMBER GENERATOR	405	22194A
BOOTSTRAP LOADER GENERATOR	017	22009B	FLOATING POINT RANDOM NUMBER GENERATOR	405	22265A
LOADER BOOTSTRAP	017	22223C	GAUSSIAN RANDOM NUMBER GENERATOR	405	22308A
FTN IV CORE SAVER	100	22341A	RANDOM INTEGER NUMBER GENERATOR	405	22413A
RELOCATABLE OBJECT UTILITY LIBRARIAN	100	22392A	RANDOM NUMBER GENERATORS	405	22434A
PRINTER (SEE LINE PRINTER OR TELEPRINTER)			RANK		
PRINTER EQUIPMENT TEST (215)			KENDALL'S COEFFICIENT OF CONCORDANCE: W	407	22138A
HP 2770 LINE PRINTER DIAGNOSTIC	215	20895C	KENDALL'S COEFFICIENT OF CONCORDANCE	407	22139A
HP 2767 LINE PRINTER DIAGNOSTIC	215	20999A	KENDALL'S TAU CORRELATION	407	22140A
HP 2100A LINE PRINTER (HP2767) DIAGNOSTIC	215	24205A	RAYTHEON		
HP 2100A LINE PRINTER (HP 2770) TEST	215	24218C	MINIINVERTER DRIVER	013	22281A
HP 2610/2614 LINE PRINTER DIAGNOSTIC	215	24275B	REAL		
PRIVILEGED			RTE GENERATOR, MH-RTGEN	008	29014B
PRIVILEGED RTE DRIVER FOR THE HP 8054 AUDIO ANALYZER (DVR75)	006	22450A	RTE GENERATOR, FH-RTGEN	008	29015B
DOS-M PRIVILEGED DISC I/O ROUTINES	015	22233C	COMPLEX ROOTS OF A REAL POLYNOMIAL	311	22030B
PROBABILITY DISTRIBUTION SAMPLING (406)			REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL COEFFICIENTS	311	22395A
CHI SQUARE GOODNESS-OF-FIT TEST	401	22159B	REAL TIME SYSTEMS (020)		
CUMULATIVE DISTRIBUTION PROGRAM	406	22137A	HP 6940A/6941A RTE DRIVER, DVR61	006	14907A
PROBABILITY SUBPROGRAMS	408	22143A	RTE SELF SUSPEND ROUTINE	020	22401A
NORMAL DISTRIBUTION	408	22517A	RELAY TIMER FOR HP 12551B RELAY REGISTER INTERFACE	020	22451A
VARIANCE RATIO DISTRIBUTION	408	22518A	REAL-TIME EXECUTIVE OPERATING SYSTEM	020	29016D
PROGRAMMING AIDS (212)			RECURSIVE		
FORTRAN /ALGOL INTERFACE ROUTINE (L5610)	013	20074A	SNOBOL COMPILER FOR DOS/DOS-M	018	22327E
FILE THREE INPUT FOR MTS ALGOL	016	22100A	STACK ROUTINES	021	22362A
EXPAND/CONTRACT DOS-M FILES	022	22468A			
DOS-M RELOCATABLE PROGRAM TAPE EDITOR	101	22500A			
FORTRAN FORMATTED READ FROM DOS-M S-TYPE USER FILES	108	22495A			
BCS DUMP IN BBL FORMAT	207	22174A			
BCS DEBUG ROUTINE	211	20002B			
OCTAL UTILITY SYSTEM (MOCUS)	211	22006A			

REFERENCE					
	FORTRAN UNIT REFERENCE NUMBER EDITOR	101	22171A	RTE RELOCATING LOADER	017 29022A
	REGISTER			RTE ASSEMBLER	018 20874D
	HP 12551A/B RELAY REGISTER INTERFACE DRIVER -	003	22229B	RTE FORTRAN	018 20875E
	FORTRAN CALLABLE			RTE/DOS ALGOL COMPILER	018 24129B
	HP 12551B RELAY REGISTER INTERFACE DRIVER -	003	22313A	RTE/DOS FORTRAN IV COMPILER	018 24170C
	BASIC CALLABLE			RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)	018 24177B
	RELAY TIMER FOR HP 12551B RELAY REGISTER	020	22451A	RTE SELF SUSPEND ROUTINE	020 22401A
	INTERFACE			RTE/DOS RELOCATABLE LIBRARY, NON-EAU	021 24150D
	HP 2100A GENERAL PURPOSE REGISTER TEST	202	24196A	RTE/DOS RELOCATABLE LIBRARY, EAU	021 24151D
	HP 12551 RELAY REGISTER DIAGNOSTIC	218	20423B	RTE/DOS FORTRAN IV LIBRARY	021 24152C
	CONTROLLER MICROCIRCUIT DIAGNOSTIC	218	20543A	RTE/DOS FORTRAN FORMATTER	021 24153C
	GENERAL PURPOSE REGISTER DIAGNOSTIC	218	24163A	RTE/DOS RELOCATABLE LIBRARY - FLOATING POINT	021 24248B
	HP 2100A RELAY REGISTER TEST	218	24216B	RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING	022 22398A
	REGRESSION ANALYSIS (404)			RTE TRACK ASSIGNMENT TABLE LOG	022 22445A
	AUTOCORRELATION AND SPECTRAL DENSITY	402	22124A	RTE EDITOR	101 20805C
	DISCRIMINANT ANALYSIS PROGRAM	403	22127A	RTE CONVERSION ROUTINE CONVERT	105 20208A
	LEAST SQUARES REGRESSION PROGRAM	404	22128A	4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE	105 22274A
	LINEAR REGRESSION INTERVAL ESTIMATES	404	22129A	RTE/DOS DUPLICATOR PROGRAM	106 22252A
	POLYNOMIAL REGRESSION PROGRAM	404	22130A	EASY MAGNETIC TAPE I/O AND STATUS INFORMATION	108 22358A
	POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	404	22131A	READ/WRITE DOS-M FILES IN RTE ENVIRONMENT	110 22525A
	STEPWISE REGRESSION PROGRAM	404	22132A	REAL-TIME EXECUTIVE FILE MANAGEMENT PACKAGE	110 20933A
	BIOASSAY PROGRAM	404	22133A	'EXEC' CALL ADAPTER ROUTINE	212 22250A
	ORTHOGONAL REGRESSION PROGRAM	404	22134A	ALGOL ARRAY TRANSFER FOR SEGMENTATION	212 22289A
	LINEAR REGRESSION WITH REPLICATION	404	22135A	RTE ALPHANUMERIC TAPE LABEL GENERATOR	212 22524A
	NONLINEAR REGRESSION PROGRAM	404	22136A	BINARY INTERFACE ROUTINE R2313 TO DVR62	212 20911A
	POOLING OF GROUPS IN REGRESSION	404	22184A	ECG INTERPRETIVE SYSTEM	506 01530A
	MULTIPLE REGRESSION PROGRAM	404	22185A	BATTLESHIP	903 22298A
	NONLINEAR REGRESSION OF A SINGLE-VARIABLE	404	22187A	HP 7210 PLOTTER LIBRARY	904 22474A
	FUNCTION				
	NONLINEAR REGRESSION OF AN ARBITRARY FUNCTION	404	22188A	RUNGE-KUTTA	
	CROSS CORRELATION ANALYSIS	409	22126A	SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS	318 22038A
	MULTIPLE CORRELATION MATRIX PROGRAM	409	22186A	SAMPLE	
	REMOTE			SAMPLE SIZE DETERMINATION ON THE SAMPLE VARIANCE	401 22146C
	HP 2100 REMOTE JOB ENTRY TO IBM HOST CPU	002	22453B	SAMPLE SIZE DETERMINATION TO TEST HQ	401 22183A
	CDC USER 200 TERMINAL SIMULATOR	002	22496A	SCANNER	
	REMOTE HP 2100 ACCESS TO A 32K DOS	022	22375A	RCS B-4-2-1 SCANNER CONTROL DRIVER (D,42)	006 20010C
	REPORT GENERATORS (005)			RCS B-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER	006 20012C
	RTE LOGBOOK	701	22378A	(D,42A)	
	ROOTS			RCS HP 2912 SCANNER CONTROL DRIVER (D,42B)	006 20025A
	COMPLEX ROOTS OF A REAL POLYNOMIAL	311	22030B	HP 2911A/B CROSSBAR SCANNER DRIVER - BASIC	006 22101B
	REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL	311	22395A	CALLABLE	
	COEFFICIENTS			HP 2912A REED SCANNER DRIVER - BASIC CALLABLE	006 22107B
	RTE			RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE	006 22276A
	RTE TELEPRINTER DRIVER (DVR00)	002	20741D	CONVERSION	
	RTE MULTIPLE DEVICE SYSTEM CONTROL DRIVER (DVR00)	002	29029A	CONVERSION ROUTINE FOR HP 2058E SUBSYSTEM RTE	013 22507A
	HP 6940A/6941A RTE DRIVER, DVR01	006	14907A	DRIVER	
	RTE HP 12604B DATA SOURCE INTERFACE DRIVER	006	20295A	HP 2058E SCANNER SUBSYSTEM RTE DRIVER (DVR57)	013 22508A
	(DVR40)			HP 2912A PROGRAMMER CARD DIAGNOSTIC	202 20429C
	RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE	006	22276A	TEST1 HP 2912 SCANNER/DVM	219 20341B
	CONVERSION			VERIFY HP 2911 SCANNER/DVM TEST	219 20349D
	DOS/DOS-M/RTE 3480 DVM DRIVER AND BCD CONVERSION	006	22294A	HP 2321 VERIFICATION VER34	219 20530D
	RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC	006	22317A	SCOPE (SEE OSCILLOSCOPE)	
	STORAGE ROUTINE			SIMPSON	
	RTE MULTIPROGRAMMER DRIVER (DVR61)	006	22410A	SIMPSON AND NEWTON'S 3/8 INTEGRATION ROUTINE,	310 22025A
	PRIVILEGED RTE DRIVER FOR THE HP 8054 AUDIO	006	22450A	EQUAL INTERVAL ARGUMENT	
	ANALYZER (DVR75)			INTEGRATION ROUTINE	310 22144A
	SYSTEM DUMP	008	20802C	SIMULATION	
	RTE GENERATOR, MH-RTGEN	008	29014B	HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1108	002 22372A
	RTE GENERATOR, FH-RTGEN	008	29015B	CDC USER 200 TERMINAL SIMULATOR	002 22496A
	RTE TAPE READER DRIVER (DVR01)	009	20743D	AN HP 2116-FAMTLY SIMULATOR FOR THE IBM 360	008 20042C
	RTE HIGH SPEED PUNCH DRIVER (DVR02)	009	20745B	AN HP ASSEMBLER FOR THE IBM 360	018 20396A
	RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	010	20821B	INTEL 8008 ASSEMBLER FOR HP 2100	018 22529A
	RTE HP 2891A CARD READER DRIVER (DVR11)	010	24224A	INTERPRETIVE BINARY SIMULATOR	201 22193A
	RTE HP 2892A CARD READER DRIVER (DVR11)	010	29030A	HP 9300B DISC EXERCISER	218 22333A
	RTE HP 2778A LINE PRINTER DRIVER (DVR12)	011	20800C	PSEUDO-RANDOM NUMBER GENERATOR	405 22194A
	RTE HP 2767 LINE PRINTER DRIVER (DVR12)	011	24169A	CONTINUOUS SYSTEM MODELING PROGRAM (CSMP)	607 22460A
	RTE HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	011	29028A	THE EXECUTIVE GAME	880 22332A
	RTE HP 2323A SUBSYSTEM DRIVER (DVR77)	012	20235A	THE EXECUTIVE GAME FOR DOS-M	880 22492A
	RTE HP 2320A/2322A SUBSYSTEM DRIVER (DVR76)	012	20236A	SIMULTANEOUS	
	RTE HP 2312A DRIVER (DVR55)	012	20398A	MATRIX INVERSION SUBROUTINES	312 22118B
	RTE HP 2321A SUBSYSTEM DRIVER (DVR74)	012	29000A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS	314 22033A
	RTE DRIVER DVR62	012	29009A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS,	314 22034A
	RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR56)	013	20297D	BAND-MATRIX	
	RTE HP 12564A 10-BIT ANALOG TO DIGITAL CARD	013	20396A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS,	314 22035A
	DRIVER (DVR57)			SYMMETRIC MATRIX	
	CONVERSION ROUTINE FOR HP 2058E SUBSYSTEM RTE	013	22507A	SIMULTANEOUS EQUATION SOLVER PROGRAM	314 22122A
	DRIVER			SIMULTANEOUS EQUATION SOLVER ROUTINE	314 22123A
	HP 2058E SCANNER SUBSYSTEM RTE DRIVER (DVR57)	013	22508A	SIO	
	RTE PLOTTER DRIVER (DVR10)	014	20808B	4K SIO BUFFERED TELEPRINTER DRIVER	002 20322A
	HP 7210 PLOTTER DRIVER FOR RTE	014	22473A	8K SIO BUFFERED TELEPRINTER DRIVER	002 20323A
	RTE HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22505A	12K SIO BUFFERED TELEPRINTER DRIVER	002 20329A
	PTE HP 1331C STORAGE SCOPE LIBRARY	014	22506A	16K SIO BUFFERED TELEPRINTER DRIVER	002 20330B
	RTE DISC/DRUM DRIVER (DVR30)	015	20747C	CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER	002 22489A
	RTE HP 2870/7900 MOVING HEAD DISC DRIVER (DVR31)	015	29013C	(LINE PRINTER COMPATIBLE)	
	RTE HP 7970 MAGNETIC TAPE DRIVER (DVR23)	016	13025A	4K SIO TELEPRINTER DRIVER, LINE PRINTER	002 24123A
	RTE HP 3030 MAGNETIC TAPE DRIVER (DVR22)	016	20806D	COMPATIBLE	
	RTE HP 2020 MAGNETIC TAPE DRIVER	016	22181A	8K SIO TELEPRINTER DRIVER, LP-COMPAT	002 24125A
	ON-LINE SYSTEM LOAD FOR MOVING-HEAD RTE	017	22344A	16K SIO TELEPRINTER DRIVER, LP-COMPAT	002 24127A
	ON-LINE MOVING-HEAD RTE BOOTSTRAP FROM DOS-M OR	017	22345A	12K SIO TELEPRINTER DRIVER	002 24299A
	DOS			12K SIO HP 2050A CONSOLE PRINTER DRIVER	002 24300A
	DOS-M BOOTSTRAP PROGRAM FROM RTE	017	22350A	4K SIO SYSTEM DUMP	008 20301C

SYMBOL TABLE

RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	22314A
DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	211	22526A
CROSS-REFERENCE SYMBOL TABLE GENERATOR	211	24109B
DOS CROSS REFERENCE ROUTINE	211	24223R

SYMBOLIC

SYMBOLIC EDITOR	101	20100R
RELOCATABLE MODULE LISTER	108	22381A
SYMBOLIC ALPHANUMERIC GENERATOR	212	22016C
SCOPE SYMBOLIC LISTER	212	22095A
PAPER TAPE TITLER	212	22269A
RTE ALPHANUMERIC TAPE LABEL GENERATOR	212	22524A

SYSTEM LIBRARIES (021)

HP 7004 X-Y RECORDER LIBRARY	014	22390A
BCS PLOTTER LIBRARY	021	20201C
RTE/DOS PLOTTER LIBRARY	021	20810B
SCIENTIFIC SUBROUTINE PACKAGE	021	22329A
STACK ROUTINES	021	22362A
BCS RELOCATABLE LIBRARY, EAU	021	24145B
BCS RELOCATABLE LIBRARY, NON-EAU	021	24146B
4K BCS RELOCATABLE LIBRARY, NON-EAU	021	24147B
4K BCS RELOCATABLE LIBRARY, EAU	021	24148B
BCS FORTRAN IV LIBRARY	021	24149B
RTE/DOS RELOCATABLE LIBRARY, NON-EAU	021	24150B
RTE/DOS RELOCATABLE LIBRARY, EAU	021	24151B
RTE/DOS FORTRAN IV LIBRARY	021	24152C
RTE/DOS FORTRAN FORMATTER	021	24153C
HEWLETT-PACKARD COMMERCIAL SUBROUTINES	021	24245A
RTE/DOS RELOCATABLE LIBRARY - FLOATING POINT	021	24248B
4K BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24249B
BCS RELOCATABLE LIBRARY - FLOATING POINT	021	24250B
WCS I/O UTILITY ROUTINE (WCSIO)	021	24283A
EXTENDED PRECISION ADAPTER FOR BCS	022	22465A
LIBRARIAN	107	20237A
DOS-M LIBRARIAN	107	22282A
FTN IV CORE SAVER	108	22341A
RELOCATABLE OBJECT UTILITY LIBRARIAN	108	22392A
HP 'IDEAL' COMMERCIAL SUBROUTINE LIBRARY	212	22455A

SYSTEM UTILITIES (022)

CREATE DSGEN MAGNETIC TAPE	008	22493A
DOS-M ABSOLUTE BINARY TAPE LOADER	017	22488A
CLEAR JOB BINARY AREA IN DOS/DOS-M	022	22273A
REMOTE HP 2100 ACCESS TO A 3PK DOS	022	22375A
DOS-M DISC INITIALIZE/PROTECT UTILITY	022	22377A
RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING	022	22398A
CREATE DOS-M DIRECTORY ENTRY UNDER PROGRAM CONTROL	022	22416A
RTE TRACK ASSIGNMENT TABLE LOG	022	22445A
MAGNETIC TAPE SYSTEM PROGRAM CATALOG	022	22446A
DEFINE AND FILL FILES FROM DOS-M USER PROGRAM	022	22457A
EXTENDED PRECISION ADAPTER FOR BCS	022	22465A
EXPAND/CONTRACT DOS-M FILES	022	22468A
FLOATING POINT OVERLAY FOR HP BASIC	022	22477A
DOS-M DIRECTORY LISTING PROGRAM WITH MASKING FACILITY	022	22485A

SYSTEMS OF LINEAR EQUATIONS (314)

SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS	314	22033A
SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, BAND-MATRIX	314	22034A
SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, SYMMETRIC MATRIX	314	22035A
SIMULTANEOUS EQUATION SOLVER PROGRAM	314	22122A
SIMULTANEOUS EQUATION SOLVER ROUTINE	314	22123A

TABLE HANDLING (103)

MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC	018	22476A
20392A		
STACK ROUTINES	021	22302A
ZERO	108	22400A

TAPE (SEE MAGNETIC TAPE OR PAPER TAPE)

TELECOMMUNICATIONS EQUIPMENT TEST (217)

HP 12589A AUTOMATIC CALLING UNIT INTERFACE CARD DIAGNOSTIC	217	20290A
TELEPRINTER OFF-LINE TEST	217	20343A
HP 12622 SEND (ONLY) INTERFACE TEST	217	20393A
HP 2115 TELEPRINTER TEST	217	20417C
HP 2115/2114 TELEPRINTER TEST	217	20420B
HP 12587 SEND/RECEIVE INTERFACE TEST	217	20535A
HP 12621 RECEIVE (ONLY) INTERFACE TEST	217	20538A
HP 2620 KEYBOARD-DISPLAY TERMINAL TEST	217	24187C
HP 2100A KEYBOARD-DISPLAY TERMINAL (HP 2600) TEST	217	24200A
HP 2100A AUTO CALL UNIT INTERFACE (HP 12589) TEST	217	24217A
HP 2100A SEND ONLY INTERFACE (HP 12622) TEST	217	24219A
HP 2100A RECEIVE ONLY INTERFACE (HP 12621) TEST	217	24220A
HP 2100A SEND/RECEIVE INTERFACE (HP 12587) TEST	217	24221R
2100A ASYNCHRONOUS MULTIPLEXOR CONTROL TEST	217	24255B
HP 2100A-2605 CONSOLE PRINTER DIAGNOSTIC	217	24263C
HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC	217	29023A
HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC	217	29024A

TELEPRINTER

BCS TELEPRINTER DRIVER D.00	002	20017C
4K SIO BUFFERED TELEPRINTER DRIVER	002	20322A
8K SIO BUFFERED TELEPRINTER DRIVER	002	20323A
12K SIO BUFFERED TELEPRINTER DRIVER	002	20329A
16K SIO BUFFERED TELEPRINTER DRIVER	002	20330B
RTE TELEPRINTER DRIVER (DVR00)	002	20741D
DOS TELEPRINTER DRIVER (DVR00)	002	20985D
TELEPRINTER/LINEPRINTER OUTPUT SELECTOR FOR HP BASIC	002	22237C
DOS-M REMOTE TAPE READER DRIVER	002	22246B
CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER (LINE PRINTER COMPATIBLE)	002	22489A
4K SIO TELEPRINTER DRIVER, LINE PRINTER COMPATIBLE	002	24123A
8K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24125A
16K SIO TELEPRINTER DRIVER, LP-COMPAT	002	24127A
DOS-M SYSTEM TELEPRINTER DRIVER (DVR05)	002	24157B
4K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24256A
8K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24257A
16K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24258A
BCS HP 2605A CONSOLE PRINTER DRIVER (D.25)	002	24259A
DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)	002	24260A
12K SIO TELEPRINTER DRIVER	002	24299A
12K SIO HP 2605A CONSOLE PRINTER DRIVER	002	24300A
RTE MULTIPLE DEVICE SYSTEM CONTROL DRIVER (DVR00)	002	20029A
RUN-TIME DATA INPUT FOR BASIC	009	22044R
HP 2754A PUNCH/LIST IN KT MODE	009	22176A
KEYBOARD TAPE GENERATOR	108	22090A
TELEPRINTER OCTAL INPUT PROGRAM	212	22086A
TABULATION AND FORM-FEED CALLS FOR HP 275A TELEPRINTER	212	22205A
HP 2100A TELEPRINTER TEST	213	24201A
TELEPRINTER OFF-LINE TEST	217	20343A
HP 2116 TELEPRINTER TEST	217	20417C
HP 12504 TELEPRINTER MULTIPLEXOR INTERFACE TEST	218	20439A
HP 2100A PRINTER MULTIPLEXOR TEST	218	24202A
X-Y PLOTTER ON PRINTER	004	22162B
TIME SERIES PLOTTER	004	22163A
HISTOGRAM PLOTTER PROGRAM	004	22164B
HISTOGRAM PLOTTER ROUTINE	004	22182A

TEST (SEE SPECIFIC TYPE OF TEST)

TEST SCORING

MARK SENSE EDUCATIONAL TEST CARD SCORING PROGRAM	720	22266A
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TIME

TIME BASE GENERATOR DRIVER (D.43)	003	20502B
TIME-OF-DAY CLOCK	003	22002A
HP 12539A TIME BASE GENERATOR DRIVER - FORTRAN CALLABLE	003	22071A
HP 12539A TIME BASE GENERATOR DRIVER - BASIC CALLABLE	003	22112A
PROGRAM EXECUTION TIMER	003	22195B
RTE SELF SUSPEND ROUTINE	020	22491A
HP 2115/HP 12539 TIME BASE GENERATOR TEST	218	20412B
HP 2115/2114 HP 12539 TIME BASE GENERATOR TEST	218	20421A
HP 2100A TIME BASE GENERATOR TEST	218	24213B

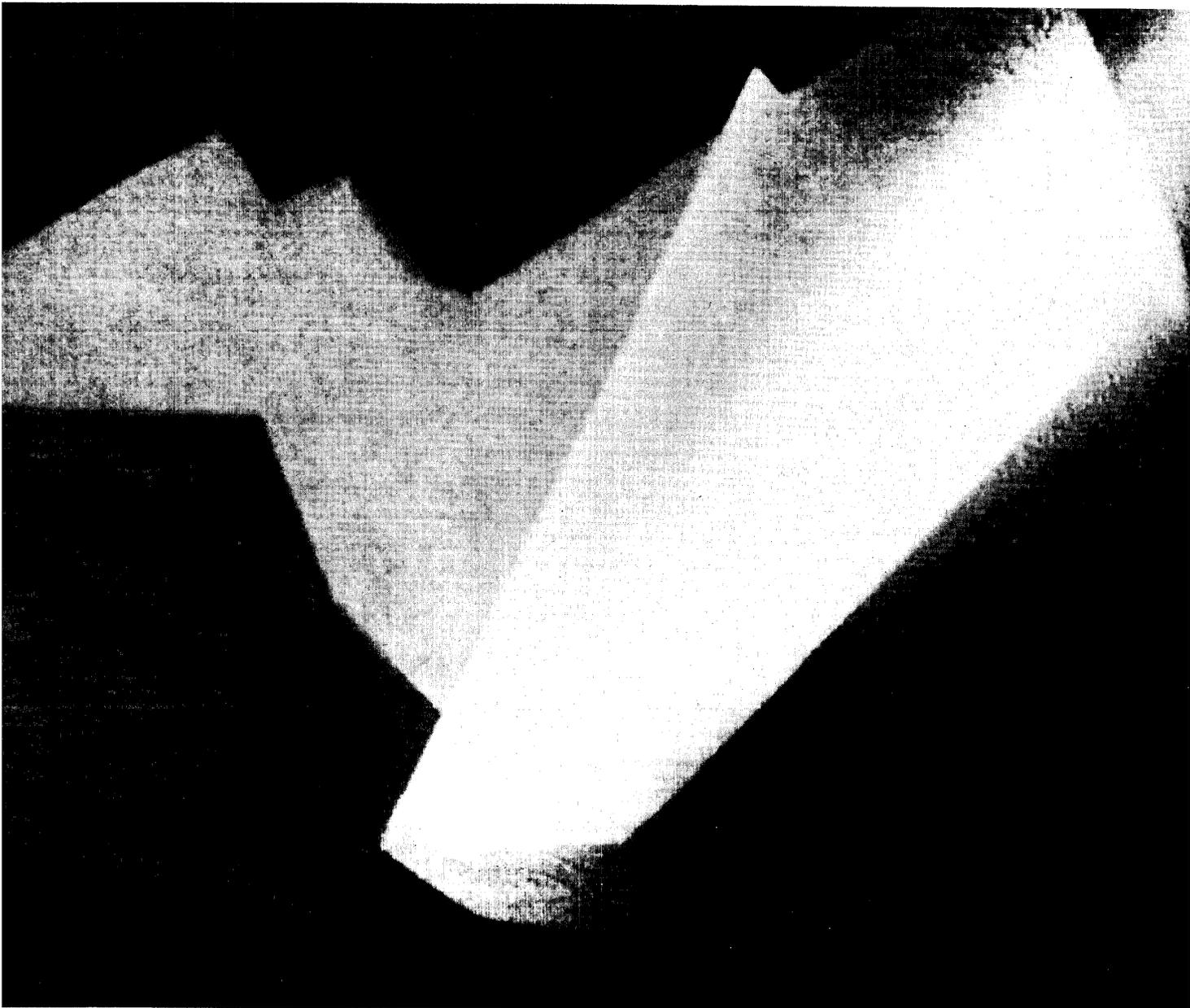
TIME SERIES ANALYSIS (402)

AUTOCORRELATION AND SPECTRAL DENSITY	402	22124A
MOVING AVERAGES	402	22125A
CROSS CORRELATION ANALYSIS	409	22126A

TIME-SHARED OPERATING SYSTEMS (001)

HP 2000A TIME-SHARED BASIC SYSTEM	001	20596F
HP 2000C TIME-SHARED BASIC SYSTEM	001	24230B
HP 2000B/C TIME-SHARED BASIC COMMUNICATIONS PROCESSOR	001	24231A
HP 2000C/F TIME-SHARED BASIC LOADER (HP 2003 DISC)	001	24232B
HP 2000C TIME-SHARED BASIC LOADER (HP 2070 DISC)	001	24233B
HP 2000B TO HP 2000C CONVERSION (HP 2003 DISC)	001	24234B
HP 2000B TO HP 2000C CONVERSION (HP 2070 DISC)	001	24235B
HP 2000C TIME-SHARED BASIC LOADER	001	24238B
HP 2000B TIME-SHARED BASIC SYSTEM	001	24239B
HP 2000C/F TIME-SHARED BASIC LOADER (HP 7900 DISC)	001	24253C
HP 2000B TO HP 2000C CONVERSION (HP 7900 DISC)	001	24254B
HP 2000C HIGH SPEED TIME-SHARED BASIC SYSTEM	001	24261C
HP 2000C HIGH SPEED/F TIME-SHARED BASIC COMMUNICATIONS	001	24262C
HP 2000F TIME-SHARED BASIC SYSTEM	001	24276B
HP 2000E TIME-SHARED BASIC SYSTEM	001	24280B
HP 2000E TIME-SHARED BASIC LOADER/UTILITY	001	24285B
HP 2000E TIME-SHARED BASIC BOOTSTRAP LOADER	001	24286A
HP 2000A TO HP 2000B CONVERSION	008	20078B
CONTINUOUS DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014	22315A
VARIABLE DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE	014	22316A
RTE HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22505A
DOS/DOS-M HP 1331C STORAGE SCOPE LIBRARY	014	22509A
DOS/DOS-M HP 1331C STORAGE SCOPE DRIVER - DVR47	014	22510A
PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM	018	22201D

MSU MULTI-TERMINAL BASIC SYSTEM WITH CARD READER CAPABILITY	018	222550	DOS-M ASSEMBLER	018	241588
DOS-M/HP2000C TIME-SHARE BASIC FILE HANDLER	102	242288	DOS-M FORTRAN	018	241598
DOS-M/HP 2000C TIME-SHARED BASIC FILE INTERFACE PACKAGE	102	24240A	EDUCATIONAL BASIC SYSTEM	018	24160A
TRACING (201)			RTE/DOS FORTRAN IV COMPILER	018	24170C
INTERPRETIVE BINARY SIMULATOR	201	22193A	RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)	018	24177B
TRANSLATORS, LANGUAGE (018)			EXTENDED ASSEMBLER FLOATING POINT	018	24246A
HP 2000A TIME-SHARED BASIC SYSTEM	001	20596F	4K ASSEMBLER FLOATING POINT	018	24247A
HP 2000C TIME-SHARED BASIC SYSTEM	001	24230B	BCS HP 2100 MICRO ASSEMBLER	018	24279A
HP 2000B TIME-SHARED BASIC SYSTEM	001	24239B	TRAPEZOIDAL		
BASIC SYSTEM	018	20392B	TRAPEZOIDAL INTEGRATION ROUTINE	310	22023A
FORTRAN COMPILER	018	20548A	TRAPEZOIDAL INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	310	22024A
4K FORTRAN COMPILER	018	20549A	TRIGONOMETRY		
DOS ASSEMBLER	018	20598C	TRANSFORMATIONS	306	22117A
DOS FORTRAN	018	20599C	UNIVARIATE AND MULTIVARIATE PARAMETRIC STATISTICS (401)		
RTE ASSEMBLER	018	20874D	CONFIDENCE INTERVAL FOR MEAN AND VARIANCE OF A NORMAL DISTRIBUTION	401	22145B
RTE FORTRAN	018	20875E	SAMPLE SIZE DETERMINATION ON THE SAMPLE VARIANCE	401	22146C
INVERSE ASSEMBLER	018	220138	PAIRED T-TEST	401	22156A
FORTRAN TRANSLATOR, IBM 1800 TO HP FORTRAN II	018	22065A	BARTLETT'S HOMOGENEITY OF VARIANCE TEST	401	22157B
PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM	018	22201D	CHI SQUARE GOODNESS-OF-FIT TEST	401	22159B
MSU MULTI-TERMINAL BASIC SYSTEM WITH CARD READER CAPABILITY	018	222550	TESTS OF HYPOTHESIS FOR VARIANCES	401	22160A
MINI-BASIC	018	22261A	TEST OF HYPOTHESIS FOR MEANS	401	22161B
ABSOLUTE OBJECT DECODER	018	22292B	SAMPLE SIZE DETERMINATION TO TEST H0	401	22183A
BCS INTERPRETER FOR FLOATING POINT OPERATIONS	018	22295A	KOLMOGOROV-SMIRNOV GOODNESS-OF-FIT TEST	407	22158B
DOS-M RELOCATABLE BASIC	018	22326A	VECTOR ARITHMETIC (SEE COMPLEX ARITHMETIC)		
SNDBOL COMPILER FOR DOS/DOS-M	018	22327E	VERIFY		
SYMBOLIC MACRO ASSEMBLER FOR THE HP 2100	018	22385A	PAPER TAPE COPY	106	22368A
DOS-M EAU RELOCATABLE BASIC	018	22389A	DOS/DOS-M SOURCE FILE VERIFY PROGRAM	108	22347A
AN HP ASSEMBLER FOR THE IBM 360	018	22396A	VOLTAGE SOURCE		
DOS-M ABSOLUTE OBJECT DECODER	018	22415B	HP 6131B DIGITAL VOLTAGE SOURCE DRIVER - FORTRAN CALLABLE	006	22227A
SUPER BASIC FOR DOS-M	018	22417B	HP 12661A DVS PROGRAM CARD DIAGNOSTIC	202	20436A
DOS-M RELOCATABLE REVERSE ASSEMBLER	018	22438A	COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO CELSIUS DEGREES CONVERSION	505	22325A
8K SID RELOCATABLE REVERSE ASSEMBLER	018	22439A	VOLTMETER (SEE DIGITAL VOLTMETER)		
8K SID ABSOLUTE REVERSE ASSEMBLER	018	22440A	VRC		
DOS/RTE ALGOL COMPILER	018	22443A	HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	203	24207A
TYPE 3 LANGUAGE GENERATOR	018	22449A			
MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC	018	22476A			
20392A					
HAVING EDUCATIONAL BASIC FOR DOS-M	018	22494A			
INTEL 8008 ASSEMBLER FOR HP 2100	018	22529A			
EXTENDED ASSEMBLER NON-EAU	018	24031B			
EXTENDED ASSEMBLER EAU	018	24032B			
4K ASSEMBLER NON-EAU	018	24038B			
4K ASSEMBLER EAU	018	24039B			
ALGOL COMPILER	018	24044B			
RTE/DOS ALGOL COMPILER	018	24129B			



section III summary of programs

This section summarizes contributed and HP supported programs as of August 1973.

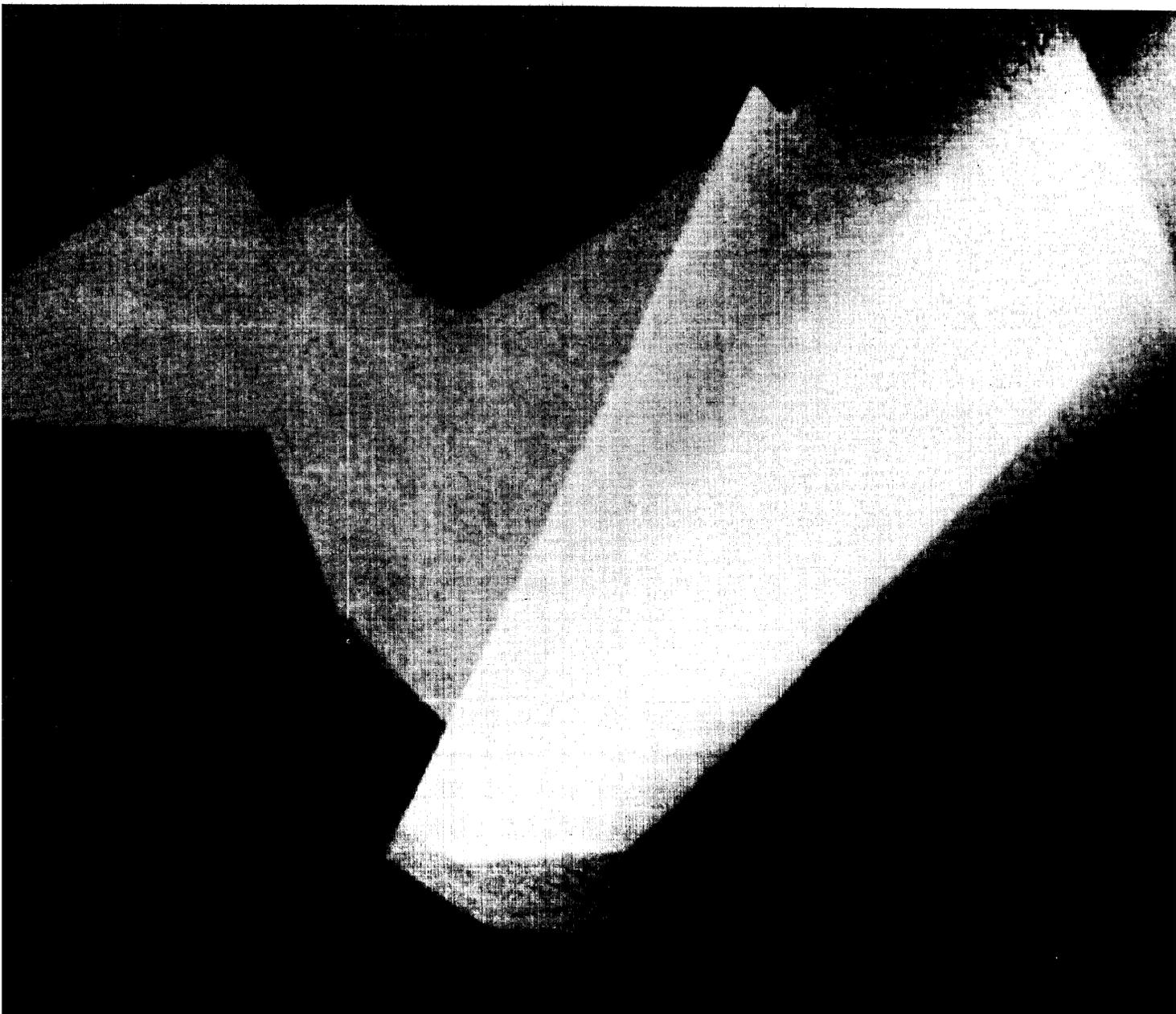
001	20596F	HP 2000A TIME-SHARED BASIC SYSTEM	006	14907A	HP 6940A/6941A RTE DRIVER, DVR61
001	24230B	HP 2000C TIME-SHARED BASIC SYSTEM	006	14909A	HP 6940A DRIVER FOR 20392A BASIC
001	24231A	HP 2000B/C TIME-SHARED BASIC COMMUNICATIONS PROCESSOR	006	14911A	HP 6940A/6941A BASIC CONTROL SYSTEM LIBRARY
001	24232B	HP 2000C/F TIME-SHARED BASIC LOADER (HP 2883 DISC)	006	14913A	HP 6940A/6941A DOS/DOS-M DRIVER (DVR61)
001	24233B	HP 2000C TIME-SHARED BASIC LOADER (HP 2870 DISC)	006	14915A	HP 6940A/6941A DRIVER FOR 20392A BASIC
001	24234B	HP 2000B TO HP 2000C CONVERSION (HP 2883 DISC)	006	20008B	BCS 8-4-2-1 DATA SOURCE INTERFACE DRIVER (D.40)
001	24235B	HP 2000B TO HP 2000C CONVERSION (HP 2870 DISC)	006	20009B	BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41)
001	24236B	HP 2000C TIME-SHARED BASIC LOADER	006	20010C	BCS 8-4-2-1 SCANNER CONTROL DRIVER (D.42)
001	24239B	HP 2000B TIME-SHARED BASIC SYSTEM	006	20011R	BCS 8-4-2-1/4-2-2-1 DATA SOURCE INTERFACE DRIVER (D.40A)
001	24253C	HP 2000C/F TIME-SHARED BASIC LOADER (HP 7900 DISC)	006	20012C	BCS 8-4-2-1/4-2-2-1 SCANNER CONTROL DRIVER (D.42A)
001	24254B	HP 2000B TO HP 2000C CONVERSION (HP 7900 DISC)	006	20024A	BCS DIGITAL VOLTMETER PROGRAM DRIVER (D.41B)
001	24261C	HP 2000C HIGH SPEED TIME-SHARED BASIC SYSTEM	006	20025A	BCS HP 2912 SCANNER CONTROL DRIVER (D.42B)
001	24262C	HP 2000C HIGH SPEED/F TIME-SHARED BASIC COMMUNICATIONS	006	20028B	BCS HP 2323A SUBSYSTEM DRIVER ANALOG SCAN SCN-12 (D.77)
001	24276B	HP 2000F TIME-SHARED BASIC SYSTEM	006	200295A	RTE HP 12604B DATA SOURCE INTERFACE DRIVER (DVR40)
001	24280B	HP 2000E TIME-SHARED BASIC SYSTEM	006	20430B	HP 2402A PROGRAMMER/DATE INTERFERENCE DIAGNOSTIC COUNTER DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE
001	24285B	HP 2000E TIME-SHARED BASIC LOADER/UTILITY	006	22004A	HP 2401C DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE
001	24286A	HP 2000E TIME-SHARED BASIC BOOTSTRAP LOADER	006	22005B	HP 2401C DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE
002	22017C	BCS TELEPRINTER DRIVER D.00	006	22006A	HP 3460A DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE
002	20322A	4K SIO BUFFERED TELEPRINTER DRIVER	006	22008A	HP 3460A/B DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE
002	20323A	8K SIO BUFFERED TELEPRINTER DRIVER	006	22055A	HP 3460A/B DATA SOURCE INTERFACE DRIVER - FORTRAN CALLABLE
002	20329A	12K SIO BUFFERED TELEPRINTER DRIVER	006	22061A	HP 2320 LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE
002	20330B	16K SIO BUFFERED TELEPRINTER DRIVER	006	22062A	HP 2322A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE
002	20741D	RTE TELEPRINTER DRIVER (DVR00)	006	22069A	HP 2323A LOW SPEED A-TO-D SUBSYSTEM DRIVER - FORTRAN CALLABLE
002	20985D	DOS TELEPRINTER DRIVER (DVR00)	006	22075A	HP 5100B FREQUENCY SYNTHESIZER DRIVER - FORTRAN CALLABLE
002	22237C	TELEPRINTER/LINEPRINTER OUTPUT SELECTOR FOR HP BASIC	006	22101B	HP 2911A/B CROSSBAR SCANNER DRIVER - BASIC CALLABLE
002	22244B	16K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM	006	22102B	HP 3460A/B DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE
002	22245A	USER INTERFACE TO BCS TELECOMMUNICATIONS DRIVER D.50	006	22104B	HP 2402A DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE
002	22246B	DOS-M REMOTE TAPE READER DRIVER	006	22106B	COUNTER DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE
002	22311A	BCS POWER FAIL TELEPRINTER DRIVER WITH AUTORESTART OPTION	006	22107B	HP 2912A REED SCANNER DRIVER - BASIC CALLABLE
002	22328C	BCS TELECOMMUNICATIONS DRIVER FOR SYNCHRONOUS AND ASYNCHRONOUS DEVICES	006	22108C	HP 3450A DATA SOURCE INTERFACE DRIVER - BASIC CALLABLE
002	22367A	8K BINARY SYNCHRONOUS CONTROLLED DATA COMMUNICATIONS PROGRAM	006	22200A	WAVETEK BASIC DRIVER
002	22372A	HP 2100 REMOTE BATCH TERMINAL TO A UNIVAC 1100	006	22211A	HP 5100B FREQUENCY SYNTHESIZER DRIVER - BASIC CALLABLE
002	22374A	A BCS ASYNCHRONOUS DATA SET INTERFACE DRIVER	006	22215A	HP 3480A/B DIGITAL VOLTMETER DRIVER - BASIC CALLABLE
002	22387A	D.70 REVERSE CHANNEL TELECOMMUNICATIONS DRIVER	006	22226B	HP 3480A/B DIGITAL VOLTMETER DRIVER - FORTRAN CALLABLE
002	22394A	CORE-SAVING TELEPRINTER I/O DRIVER AND CODE CONVERSION ROUTINE	006	22227A	HP 6131B DIGITAL VOLTAGE SOURCE DRIVER - FORTRAN CALLABLE
002	22453B	HP 2100 REMOTE JOB ENTRY TO IBM MOST CPU	006	22276A	RTE CROSSBAR SCANNER DRIVER & CHANNEL CODE CONVERSION
002	22489A	CORE SIZE INDEPENDENT TELEPRINTER SIO DRIVER (LINE PRINTER COMPATIBLE)	006	22294A	DOS/DOS-M/RTE 3400 DVM DRIVER AND BCD CONVERSION
002	22496A	CDC USER 200 TERMINAL SIMULATOR	006	22305A	HP 2402A DIGITAL VOLTMETER DRIVER - BASIC CALLABLE
002	24123A	4K SIO TELEPRINTER DRIVER, LINE PRINTER COMPATIBLE	006	22317A	RTE HP 2310 ANALOG-TO-DIGITAL CONVERTER DISC STORAGE ROUTINE
002	24125A	8K SIO TELEPRINTER DRIVER, LP-COMPAT	006	22336A	HP 1900 PROGRAMMABLE PULSE GENERATOR - FORTRAN CALLABLE
002	24127A	16K SIO TELEPRINTER DRIVER, LP-COMPAT	006	22337A	HP 1900 PROGRAMMABLE PULSE GENERATOR DRIVER - BASIC CALLABLE
002	24157B	DOS-M SYSTEM TELEPRINTER DRIVER (DVR05)	006	22339A	DOS HP 2320A LOW SPEED ANALOG-TO-DIGITAL SUBSYSTEM DRIVER
002	24256A	4K SIO HP 2605A CONSOLE PRINTER DRIVER	006	22407B	HP 3360A GAS CHROMATOGRAPH SYSTEM DRIVER - BASIC CALLABLE
002	24257A	8K SIO HP 2605A CONSOLE PRINTER DRIVER	006	22412A	RTE MULTIPROGRAMMER DRIVER (DVR61)
002	24258A	16K SIO HP 2605A CONSOLE PRINTER DRIVER	006	22442A	BD.1 BASIC DRIVER FOR HP 8054A REAL TIME ANALYZER
002	24259A	BCS HP 2605A CONSOLE PRINTER DRIVER (D.25)	006	22447A	HP 5360 COMPUTING COUNTER DRIVER
002	24260A	DOS HP 2605A CONSOLE PRINTER DRIVER (DVR25)	006	22450A	PRIVILEGED RTE DRIVER FOR THE HP 8054 AUDIO ANALYZER (DVR75)
002	24299A	12K SIO TELEPRINTER DRIVER	007	20597C	DISC OPERATING SYSTEM (HP 2770 SERIES DISC/DKIM)
002	24300A	12K SIO HP 2605A CONSOLE PRINTER DRIVER	007	24225F	MOVING-HEAD DISC OPERATING SYSTEM
002	29029A	RTE MULTIPLE DEVICE SYSTEM CONTROL DRIVER (DVR00)	008	20591C	PREPARE CONTROL SYSTEM
003	20098C	BCS 40 BIT OUTPUT REGISTER DRIVER D.54	008	20591C	4K SIO SYSTEM DUMP
003	20502B	TIME BASE GENERATOR DRIVER (D.43)	008	20313C	8K SIO SYSTEM DUMP
003	22002A	TIME-OF-DAY CLOCK	008	20335B	16K SIO SYSTEM DUMP
003	22071A	HP 12539A TIME BASE GENERATOR DRIVER - FORTRAN CALLABLE	008	20594B	6K MAGNETIC TAPE SYSTEM
003	22112A	HP 12539A TIME BASE GENERATOR DRIVER - BASIC CALLABLE	008	20595B	16K MAGNETIC TAPE SYSTEM
003	22174A	SYNCHRONOUS HIGH SPEED DATA ACQUISITION PROGRAM	008	20602C	SYSTEM DUMP
003	22195B	PROGRAM EXECUTION TIMER	008	20676B	HP 2000A TO HP 2000B CONVERSION
003	22229B	HP 12551A/B REPLY REGISTER INTERFACE DRIVER - FORTRAN CALLABLE			
003	22313A	HP 12551B REPLY REGISTER INTERFACE DRIVER - BASIC CALLABLE			
003	24277A	HP 12908A WCS BCS DRIVER (D.33)			
003	24278A	HP 12908A WCS DOS DRIVER (DVR33)			
003	24287A	HP 2100 PROM WRITER CONTROL PROGRAM			
003	29001A	COMPUTER SERIAL INTERFACE RTE DRIVER DVR65			
003	29002A	COMPUTER SERIAL INTERFACE BCS DRIVER D.65			
003	29003A	COMPLER SERIAL INTERFACE RTE DRIVER DVR66			
004	22236A	FORTRAN I/O STATUS FUNCTION			
006	14900B	BCS 6936A MULTIPROGRAMMER DRIVER (D.61)			
006	14904B	HP 6940A/6941A BCS DRIVER, D.61			

008	22042C	AN HP 2116-FAMILY SIMULATOR FOR THE IBM 360	012	29004A	COUPLER SERIAL INTERFACE RCS DRIVER 0.66
008	22338A	DISC BASIC EXECUTIVE	012	29007A	BCS NON-DMA DRIVER FOR HP 2313A SUBSYSTEM (D.62)
008	22441A	PSEUDO MULTIPROGRAMMING EXECUTIVE FOR BCS	012	29008A	BCS DMA DRIVER FOR HP 2313A SUBSYSTEM (D.62A)
008	22452A	BCS-FORTRAN/ALGOL MEMORY ALLOCATION ROUTINE	012	29009A	RTE DRIVER DVR62
008	22493A	CREATE DSGEN MAGNETIC TAPE			
008	24016A	PREPARE TAPE SYSTEM	013	14902A	BCS DIGITAL VOLTAGE SOURCE POWER SUPPLY DRIVER
008	24172A	BCS INPUT/OUTPUT CONTROL, BUFFERED			
008	24173A	BCS INPUT/OUTPUT CONTROL	013	20073C	BCS HP 5610A ANALOG TO DIGITAL DRIVER, NON-DMA
008	24298A	12K SIO SYSTEM DUMP			
008	29014B	RTE GENERATOR, MH-RTGEN	013	20074A	FORTTRAN /ALGOL INTERFACE ROUTINE (L5610)
008	29015B	RTE GENERATOR, FH-RTGEN	013	20093C	BCS HP 5610A ANALOG TO DIGITAL DRIVER, DMA,
					(D.56A)
009	20005B	BCS TAPE READER DRIVER D.01	013	20094B	MULTI/MINIVERTEER SCAN ROUTINE SCNMV (D.76)
009	20006B	BCS TAPE PUNCH DRIVER D.02	013	20297D	RTE HP 2310/2311 SUBSYSTEM DRIVER (DVR06)
009	20016A	BCS TAPE PUNCH DRIVER, IBM 8-LEVEL (D.02A)	013	20396A	RTE HP 12564A 10-BIT ANALOG TO DIGITAL CARD
009	20303A	4K SIO TAPE READER DRIVER			DRIVER (DVR57)
009	20304A	4K SIO TAPE PUNCH DRIVER	013	22281A	MINIVERTEER DRIVER
009	20306A	8K SIO TAPE READER DRIVER	013	22304A	HP 5610A ANALOG TO DIGITAL DRIVER - FORTTRAN
009	20307A	8K SIO TAPE PUNCH DRIVER			CALLABLE
009	20316A	8K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL	013	22331A	DOS HP 2322A LOW SPEED ANALOG TO DIGITAL
009	20317A	4K SIO TAPE PUNCH DRIVER, IBM 8-LEVEL			SUBSYSTEM DRIVER
009	20319A	16K SIO TAPE READER DRIVER	013	22466B	HP 2311A SUBSYSTEM DOS-M DRIVER
009	20320A	16K SIO TAPE PUNCH DRIVER	013	22472A	HP 2310/2311 SUBSYSTEM DRIVER FOR DOS-M
009	20327A	12K SIO TAPE READER DRIVER	013	22475A	HP 2311A SUBSYSTEM DRIVER - BASIC CALLABLE
009	20328A	12K SIO TAPE PUNCH DRIVER	013	22507A	CONVERSION ROUTINE FOR HP 2058E SUBSYSTEM RTE
009	20743D	RTE TAPE READER DRIVER (DVR01)			DRIVER
009	20745B	RTE HIGH SPEED PUNCH DRIVER (DVR02)	013	22508A	HP 2058E SCANNER SUBSYSTEM RTE DRIVER (DVR57)
009	20907C	DOS TAPE READER DRIVER (DVR01)			
009	20909B	DOS HIGH SPEED PUNCH DRIVER (DVR02)	014	20014A	BCS PLOTTER DRIVER (D.10)
009	22044B	RUN-TIME DATA INPUT FOR BASIC	014	20581A	DOS PLOTTER DRIVER (DVR10)
009	22078B	HIGH SPEED PUNCH DRIVER - BASIC CALLABLE	014	20808B	RTE PLOTTER DRIVER (DVR10)
009	22082B	BASIC PHOTOREADER DATA INPUT	014	22077B	CALCOMP PLOTTER DRIVER - BASIC CALLABLE
009	22176A	HP 2754A PUNCH/LIST IN KT MODE	014	22080A	HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER - FORTTRAN
009	22247B	FAST DOS/DOS-M PHOTOREADER DRIVER			CALLABLE
009	22264B	TELEX TO ASCII PHOTOREADER DRIVER	014	22217B	HP 2331A X-Y DISPLAY SUBSYSTEM DRIVER - BASIC
009	22353A	DOS/DOS-M PHOTOREADER DRIVER TO READ ABSOLUTE			CALLABLE
		BINARY TAPES	014	22219A	HIGH SPEED CONTINUOUS LINE PLOTTER FOR HP 7004B
009	22490A	COKE SIZE INDEPENDENT PHOTO READER SIO DRIVER	014	22242A	X-Y PLOTTING ROUTINE
009	22491A	CORE SIZE INDEPENDENT PAPER TAPE PUNCH SIO DRIVER	014	22253B	USCILLOSCOPE PLOTTING SUBROUTINE
			014	22263A	PLOT, RELAY, WAIT
			014	22279A	BASIC PLOT SUBROUTINES
010	20019C	BCS CARD READER DRIVER (D.11)	014	22291C	DOS/DOS-M HP 2331 X-Y SCOPE DISPLAY
010	20324B	8K SIO CARD READER DRIVER	014	22315A	CONTINUOUS DISPLAY OF ARRAY DATA ON ANALOG X-Y
010	20332A	16K SIO CARD READER DRIVER			SCOPE
010	20520C	4K SIO MARK SENSE CARD READER DRIVER	014	22316A	VARIABLE DISPLAY OF ARRAY DATA ON ANALOG X-Y SCOPE
010	20521C	8K SIO MARK SENSE CARD READER DRIVER	014	22318A	HP 1331C STORAGE SCOPE DRIVER - BASIC CALLABLE
010	20522C	16K SIO MARK SENSE CARD READER DRIVER	014	22379A	SIO LIST OUTPUT TO A STORAGE SCOPE
010	20617B	BCS MARK SENSE DRIVER, KIT HP 12602A, (D.15)	014	22390A	HP 7004 X-Y RECORDER LIBRARY
010	20819C	BCS MARK SENSE DRIVER, KIT HP 12602B, (D.15)	014	22391A	HP 1331C SIO SCOPE DISPLAY DRIVER
010	20821B	RTE MARK SENSE DRIVER, KIT HP 12602B, (DVR15)	014	22464A	TEKTRONIX 4010 VIDEO DISPLAY UNIT DRIVER-BASIC
010	20823C	DOS MARK SENSE DRIVER, KIT HP 12602B, (DVR15)			CALLABLE
010	24178A	4K SIO HP 2891A CARD READER DRIVER	014	22471A	HP 7210 PLOTTER DRIVER FOR DOS-M
010	24179A	8K SIO HP 2891A CARD READER DRIVER	014	22473A	HP 7210 PLOTTER DRIVER FOR RTE
010	24180A	16K SIO HP 2891A CARD READER DRIVER	014	22505A	RTE HP 1331C STORAGE SCOPE DRIVER - DVR47
010	24181A	BCS HP 2891A CARD READER DRIVER (D.11)	014	22506A	RTE HP 1331C STORAGE SCOPE LIBRARY
010	24182B	DOS HP 2891A CARD READER DRIVER (DVR11)	014	22509A	DOS/DOS-M HP 1331C STORAGE SCOPE LIBRARY
010	24224A	RTE HP 2891A CARD READER DRIVER (DVR11)	014	22510A	DOS/DOS-M HP 1331C STORAGE SCOPE DRIVER - DVR47
010	24264A	4K SIO HP 2892A CARD READER DRIVER	014	23900A	DOS STORAGE SCOPE DRIVER (DVR46, \$E\$50)
010	24265A	8K SIO HP 2892A CARD READER DRIVER			
010	24266A	16K SIO HP 2892A CARD READER DRIVER	015	20079A	8K SIO DISC/DRUM DRIVER
010	24272B	DOS HP 2892A CARD READER DRIVER (DVR11)	015	20081A	16K SIO DISC/DRUM DRIVER
010	24274A	BCS HP 2892A CARD READER DRIVER (D.11)	015	20747C	RTE DISC/DRUM DRIVER (DVR30)
010	29030A	RTE HP 2892A CARD READER DRIVER (DVR11)	015	20995B	DOS DISC/DRUM DRIVER (DVR30)
			015	22063A	HP 2770A/2771A DISC DRIVER - FORTTRAN CALLABLE
011	20527B	4K SIO HP 2778A LINE PRINTER DRIVER	015	22111C	HP 2770A/2771A DISC DRIVER - BASIC CALLABLE
011	20528A	8K SIO HP 2778A LINE PRINTER DRIVER	015	22216B	HP 2870A CARTRIDGE DISC DRIVER - BASIC CALLABLE
011	20529A	16K SIO HP 2778A LINE PRINTER DRIVER	015	22225B	HP 2870A CARTRIDGE DISC DRIVER - FORTTRAN CALLABLE
011	20800C	RTE HP 2778A LINE PRINTER DRIVER (DVR12)	015	22233C	DOS-M PRIVILEGED DISC I/O ROUTINES
011	20991C	DOS HP 2778A LINE PRINTER DRIVER (DVR12)	015	22301A	HP 2870A CARTRIDGE DISC MEMORY DRIVER - FORTTRAN
011	22095A	BASIC HP 2778A LINE PRINTER DRIVER			CALLABLE
011	22258A	HP 2767 LINE PRINTER BASIC DRIVER	015	24156E	DOS-M HP 2870/7900 DISC DRIVE (DVR31)
011	22399A	HP 2778/2767 LINE PRINTER PATCH FOR EDUCATIONAL	015	24226C	DOS-M HP 2883 DISC DRIVER (DVR 31)
		BASIC	015	29013C	RTE HP 2870/7900 MOVING HEAD DISC DRIVER (DVR31)
011	22408A	BASIC CALLABLE LINE PRINTER DRIVER			
011	22409A	EDUCATIONAL BASIC HP 2767 LINE PRINTER DRIVER	016	13021B	8K SIO HP 7970 MAGNETIC TAPE DRIVER
011	22411A	A,B, DICK VIDEOJET SIO LINE PRINTER DRIVER	016	13022B	16K SIO HP 7970 MAGNETIC TAPE DRIVER
011	24164B	4K SIO HP 2767 LINE PRINTER DRIVER	016	13023B	BCS MAGNETIC TAPE DRIVER
011	24165B	8K SIO HP 2767 LINE PRINTER DRIVER	016	13024A	DOS HP 7970 MAGNETIC TAPE DRIVER (DVR23)
011	24166B	16K SIO HP 2767 LINE PRINTER DRIVER	016	13025A	RTE HP 7970 MAGNETIC TAPE DRIVER (DVR23)
011	24167B	BCS HP 2767 LINE PRINTER DRVR. (D.16)	016	13026B	BCS 7 TRACK DRIVER W/O DMA
011	24168C	DOS HP 2767 LINE PRINTER DRIVER (DVR12)	016	13027B	BCS MAGNETIC TAPE DRIVER 7 TRACK DMA
011	24169A	RTE HP 2767 LINE PRINTER DRIVER (DVR12)	016	13029B	8K SIO MAGNETIC TAPE DRIVER 7 TRACK
011	24171B	BCS HP 2778A LINE PRINTER DRVR. (D.12)	016	13030B	16K SIO MAGNETIC TAPE DRIVER 7 TRACK
011	24268A	4K SIO HP 2610A/2614A LINE PRINTER DRIVER	016	20007A	BCS INCREMENTAL MAGNETIC TAPE DRIVER (D.20)
011	24269A	8K SIO HP 2610A/2614A LINE PRINTER DRIVER	016	20013F	BCS HP 2020 MAGNETIC TAPE DRIVER (D.21)
011	24270A	16K SIO HP 2610A/2614A LINE PRINTER DRIVER	016	20022F	BCS HP 3030 MAGNETIC TAPE DRIVER (D.22)
011	24271A	DOS HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	016	20314D	8K SIO HP 2020 MAGNETIC TAPE DRIVER
011	24273A	BCS HP 2610A/2614A LINE PRINTER DRIVER (D.12)	016	20315C	4K SIO HP 2020 MAGNETIC TAPE DRIVER
011	24301A	12K SIO HP 2767 LINE PRINTER DRIVER	016	20321C	16K SIO HP 2020 MAGNETIC TAPE DRIVER
011	24302A	12K SIO HP 2778A LINE PRINTER DRIVER	016	20331C	8K SIO HP MAGNETIC TAPE DRIVER
011	24303A	12K SIO HP 2610A/2614A LINE PRINTER DRIVER	016	20334C	16K SIO HP 3030 MAGNETIC TAPE DRIVER
011	29028A	RTE HP 2610A/2614A LINE PRINTER DRIVER (DVR12)	016	20336B	4K SIO HP 3030 MAGNETIC TAPE DRIVER
			016	20806D	RTE HP 3030 MAGNETIC TAPE DRIVER (DVR22)
012	20076A	BCS HP 2312A DRIVER (D.55)	016	20997C	DOS HP 3030 MAGNETIC TAPE DRIVER (DVR22)
012	20209C	DACE LIBRARY	016	22100A	FILE THREE INPUT FOR MTS ALGOL
012	20235A	RTE HP 2323A SUBSYSTEM DRIVER (DVR77)	016	22181A	RTE HP 2020 MAGNETIC TAPE DRIVER
012	20236A	RTE HP 2320A/2322A SUBSYSTEM DRIVER (DVR76)	016	22208A	HP 3030G MAGNETIC TAPE DRIVER - FORTTRAN CALLABLE
012	20398A	RTE HP 2312A DRIVER (DVR55)	016	22239A	HP 7970 MAGNETIC TAPE DRIVER - BASIC CALLABLE
012	20501E	BCS SCAN-ANALOG 8-4-2-1 SCAN ROUTINE (D.77)	016	22270C	ALGOL OPERATING SYSTEM FOR MTS
012	20517C	BCS SCAN-ANALOG 4-2-2-1 SCAN ROUTINE (D.77)	016	22319A	DOS/DOS-M HP 2020 MAGNETIC TAPE DRIVER
012	20532A	BCS HP 2321A SUBSYSTEM (HP3450/2911A) SCAN	016	22414A	NON-DMA BCS HP 3030 DRIVER
		ROUTINE SCN 34 (D.77)	016	22458B	DOS/DOS-M HP 7970 7-TRACK MAGNETIC TAPE DRIVER
012	22199A	BASIC LANGUAGE DATA ACQUISITION SYSTEM			(DVR24) WITH DMA
012	22361A	DOS-M BINARY FILE DATA ACQUISITION	016	22461A	FILE AND REWIND FOR THE TENNECOMP TP-1371 MNTIDEK
012	22380C	HP BASIC DRIVER SYSTEM WITH BINARY DATA I/O			SYSTEM
012	29006A	RTE HP 2321A SUBSYSTEM DRIVER (DVR74)			

016	22462A	READ/WRITE ROUTINES FOR THE TENNECOMP TP-1371 MINIDEK SYSTEM	022	22446A	MAGNETIC TAPE SYSTEM PROGRAM CATALOG
016	22512A	DOS-M DRIVER PACKAGE FOR ACCESSING FRONT-END MAGNETIC TAPE	022	22457A	DEFINE AND FILL FILES FROM DOS-M USER PROGRAM
016	24304A	12K SIO HP 3036 MAGNETIC TAPE DRIVER	022	22465A	EXTENDED PRECISION ADAPTER FOR BCS
016	24312A	12K SIO HP 7970 MAGNETIC TAPE DRIVER	022	22466A	EXPAND/CONTRACT DOS-M FILES
017	20001D	4K BCS RELOCATING LOADER	022	22477A	FLOATING POINT OVERLAY FOR HP BASIC
017	20018H	BCS RELOCATING LOADER	101	22485A	DOS-M DIRECTORY LISTING PROGRAM WITH MASKING FACILITY
017	20925C	DOS RELOCATING LOADER	101	22100R	SYMBOLIC EDITOR
017	22009B	BOOTSTRAP LOADER GENERATOR	101	20805C	RTE EDITOR
017	22223C	LOADER BOOTSTRAP	101	22114A	REPRODUCE/EDIT PAPER TAPE
017	22297A	OFFLINE RELOCATING LOADER	101	22171A	FORTRAN UNIT REFERENCE NUMBER EDITOR
017	22342A	DOS-M HARDWARE BOOT	101	22285C	CONVERSATIONAL DOS-M DISC FILE EDITOR
017	22344A	ON-LINE SYSTEM LOAD FOR MOVING-HEAD RTE	101	22286A	O H SYMBOLIC EDITOR
017	22345A	ON-LINE MOVING-HEAD RTE BOOTSTRAP FROM DOS-M OR DOS	101	22371A	QUOTATION MARKS CONVERSION IN DOS/DOS-M FILES
017	22349A	DOS-M BOOTSTRAP PROGRAM FOR DOS-M OR DOS	101	22393A	ON-LINE EDITOR
017	22350A	DOS-M BOOTSTRAP PROGRAM FROM RTE	101	22500A	DOS-M RELOCATABLE PROGRAM TAPE EDITOR
017	22357A	MTS BOOT FROM DOS-M	102	22196C	MAGNETIC TAPE STORAGE AND RETRIEVAL PROGRAM
017	22448B	CORE RESIDENT DOS-M BOOTSTRAP	102	22272A	DISC/DRUM UTILITY
017	22488A	DOS-M ABSOLUTE BINARY TAPE LOADER	102	22284A	DOS-M DUMP/RESTORE PROGRAM
017	22519A	DOS-M AUTOLOAD ROUTINE	102	22299A	DOS/DOS-M SOURCE STORAGE AND RETRIEVAL
017	22533A	RESTORE BASIC BINARY LOADER (PBOOT)	102	22356A	PACKED MAGNETIC TAPE STORAGE AND RETRIEVAL FOR DOS-M
017	24155D	DOS-M RELOCATING LOADER	102	22482A	HP 2020R MAGNETIC TAPE STORAGE & RETRIEVAL
017	29022A	RTE RELOCATING LOADER	102	22483B	APPLICATIONS DATA MANAGEMENT PACKAGE (ADM)
018	20392B	BASIC SYSTEM	102	22484A	DOS-M USER FILE DESCRIPTION DIRECTORY
018	20548A	FORTRAN COMPILER	102	24228B	DOS-M/HP2000C TIME-SHARE BASIC FILE HANDLER
018	20549A	4K FORTRAN COMPILER	102	24240A	DOS-M/HP 2000C TIME-SHARED BASIC FILE INTERFACE PACKAGE
018	20598C	DOS ASSEMBLER	104	22081A	BIT OPERATIONS (SET, CLEAR, TEST) - FORTRAN CALLABLE
018	20599C	DOS FORTRAN	104	22204A	DATA BLOCK MOVEMENT
018	20874D	RTE ASSEMBLER	104	22297A	CHARACTER AND BIT STRING PROCEDURES FOR ALGOL
018	20875E	RTE FORTRAN	104	22404A	SPACE SAVING ASCII STORAGE ROUTINES
018	22013B	INVERSE ASSEMBLER	104	22467A	INTEGER EXTRACTION FROM A STRING OF TEXT
018	22265A	FORTRAN TRANSLATOR, IBM 1800 TO HP FORTRAN II	104	22504A	CHARACTER PACKING AND UNPACKING
018	22201D	PACIFIC UNION COLLEGE MULTI-TERMINAL HP BASIC SYSTEM	105	20096A	CONVERSION ROUTINE MCONV
018	22255D	MSU MULTI-TERMINAL BASIC SYSTEM WITH CARD READER CAPABILITY	105	20210A	CONVERSION ROUTINE ICONV
018	22261A	MINI-BASIC	105	20288A	RTE CONVERSION ROUTINE CONVERT
018	22292B	ABSOLUTE OBJECT DECODER	105	20533A	CONVERSION ROUTINE, CONV34
018	22295A	BCS INTERPRETER FOR FLOATING POINT OPERATIONS	105	22086A	EBCDIC TO ASCII TRANSLATOR
018	22326A	DOS-M RELOCATABLE BASIC	105	22093A	ASCII/IBM 8-LEVEL CHARACTER CONVERSION ROUTINE
018	22327E	SYMBOLIC MACRO ASSEMBLER FOR THE HP 2100	105	22214A	CHARACTER CODE TRANSLATOR
018	22385A	DOS-M EAU RELOCATABLE BASIC	105	22274A	4-2-2-1 BCD TO FLOATING POINT CONVERSION FOR RTE
018	22389A	AN HP ASSEMBLER FOR THE IBM 360	105	22433A	ASCII/INTEGER CONVERSION ROUTINE
018	22396A	DOS-M ABSOLUTE OBJECT DECODER	106	20312A	PUNCH/VERIFY ROUTINE
018	22415B	SUPER BASIC FOR DOS-M	106	22041E	PUNCHED TAPE DUPLICATOR
018	22417B	DOS-M RELOCATABLE REVERSE ASSEMBLER	106	22113B	MTS PUNCHED TAPE DUPLICATOR
018	22438A	8K SIO RELOCATABLE REVERSE ASSEMBLER	106	22180C	FAST PUNCH VERIFY
018	22439A	8K SIO RELOCATABLE REVERSE ASSEMBLER	106	22197A	SINGLE DRIVE MAGNETIC TAPE COPY PROGRAM
018	22440A	8K SIO ABSOLUTE REVERSE ASSEMBLER	106	22209C	DRUM BASED MAGNETIC TAPE DUPLICATOR
018	22443A	DOS/RTE ALGOL COMPILER	106	22252A	RTE/DOS DUPLICATOR PROGRAM
018	22449A	TYPE 3 LANGUAGE GENERATOR	106	22366A	DOS-M PAPER TAPE REPRODUCER
018	22476A	MULTI-PURPOSE SUBROUTINE PACKAGE FOR HP BASIC 20392A	106	22368A	PAPER TAPE COPY
018	22494A	HAVERING EDUCATIONAL BASIC FOR DOS-M	106	22535A	MAGNETIC TAPE COPY
018	22529A	INTEL 8008 ASSEMBLER FOR HP 2100	107	20237A	LIBRARIAN
018	24031B	EXTENDED ASSEMBLER NON-EAU	107	22079B	NUMERIC STRING SORT FOR ASCII RECORDS
018	24032B	EXTENDED ASSEMBLER EAU	107	22116A	ORDERING A FLOATING POINT ARRAY
018	24038B	4K ASSEMBLER NON-EAU	107	22167A	ORDERING A FIXED POINT ARRAY
018	24039B	4K ASSEMBLER EAU	107	22168A	RANKING A FLOATING POINT ARRAY
018	24044B	ALGOL COMPILER	107	22169A	ORDERING A FLOATING POINT ARRAY
018	24129B	RTE/DOS ALGOL COMPILER	107	22282A	DOS-M LIBRARIAN
018	24158B	DOS-M ASSEMBLER	107	22343A	FIELDSORT
018	24159B	DOS-M FORTRAN	107	22376A	ASCII DISC FILE FIELD SORT
018	24160A	EDUCATIONAL BASIC SYSTEM	107	22383A	ALPHANUMERIC RECORD SORT
018	24170C	RTE/DOS FORTRAN IV COMPILER	107	22430A	NUMERIC SORT
018	24177B	RTE/DOS FORTRAN IV COMPILER (10K COMPILER AREA)	107	22479A	ALPHANUMERIC DISC FILE SORT
018	24246A	EXTENDED ASSEMBLER FLOATING POINT	108	22096A	KEYBOARD TAPE GENERATOR
018	24247A	4K ASSEMBLER FLOATING POINT	108	22165A	CARD TO MAGNETIC TAPE UTILITY
018	24279A	BCS HP 2100 MICRO ASSEMBLER	108	22166A	MAGNETIC TAPE TO PRINT UTILITY PROGRAM
019	22235A	FORTRAN POWER FAIL LINK	108	22341A	FTN IV CORE SAVER
020	22401A	RTE SELF SUSPEND ROUTINE	108	22347A	DOS/DOS-M SOURCE FILE VERIFY PROGRAM
020	22451A	RELAY TIMEK FOR HP 12551B RFLAY REGISTER INTERFACE	108	22354A	DOS-M STORE ABSOLUTES
020	29016D	REAL-TIME EXECUTIVE OPERATING SYSTEM	108	22355A	DOS-M PAPER TAPE/DISC VERIFY
021	20201C	BCS PLOTTER LIBRARY	108	22358A	EASY MAGNETIC TAPE I/O AND STATUS INFORMATION
021	20816B	RTE/DOS PLOTTER LIBRARY	108	22359A	HANDIO
021	22329A	SCIENTIFIC SUBROUTINE PACKAGE	108	22381A	RELOCATABLE MODULE LISTER
021	22362A	STACK ROUTINES	108	22392A	RELOCATABLE OBJECT UTILITY LIBRARIAN
021	24145B	BCS RELOCATABLE LIBRARY, FAU	108	22400A	ZERO
021	24146B	BCS RELOCATABLE LIBRARY, NON-EAU	108	22495A	FORTRAN FORMATTED READ FROM DOS-M S-TYPE USER FILES
021	24147B	4K BCS RELOCATABLE LIBRARY, NON-EAU	109	22427A	MEDIA CONVERSION
021	24148B	4K BCS RELOCATABLE LIBRARY, EAU	109	24310A	KODAK APPLICATION LIBRARY
021	24149B	BCS FORTRAN IV LIBRARY	110	22277A	DOS-M FILE ACCESS AND STRING LOOKUP
021	24150D	RTE/DOS RELOCATABLE LIBRARY, NON-EAU	110	22330B	PSEUDO REPORT GENERATOR
021	24151D	RTE/DOS RELOCATABLE LIBRARY, FAU	110	22364A	EFMP RECORD READ/WRITE
021	24152C	RTE/DOS FORTRAN IV LIBRARY	110	22369A	DOS-M FILE WRITER
021	24153C	RTE/DOS FORTRAN FORMATTER	110	22373B	ITEMIZED EXTENDED FILE MANAGEMENT PACKAGE
021	24245A	HEWLETT-PACKARD COMMERCIAL SUBROUTINES	110	2429A	EFMP FILE TRANSFER
021	24248B	RTE/DOS RELOCATABLE LIBRARY - FLOATING POINT	110	2432A	EFMP DIRECTORY LISTER
021	24249B	4K BCS RELOCATABLE LIBRARY - FLOATING POINT	110	22486A	EFMP READ/WRITE WITH FORTRAN IV INPUT/OUTPUT LISTS
021	24250B	BCS RELOCATABLE LIBRARY - FLOATING POINT	110	22525A	HEAD/WRITE DOS-M FILES IN RTE ENVIRONMENT
021	24263A	WCS I/O UTILITY ROUTINE (WCSIO)	110	22528A	SERIAL ACCESS TO DOS-M FILES
022	22273A	CLEAR JOB BINARY AREA IN DOS/DOS-M	110	24227D	DOS-M EXTENDED FILE MANAGEMENT PACKAGE
022	22275A	REMOTE HP 2100 ACCESS TO A 32K DOS	110	29033A	REAL-TIME EXECUTIVE FILE MANAGEMENT PACKAGE
022	22377A	DOS-M DISC INITIALIZE/PROTECT UTILITY	112	22172C	IOC - FORTRAN CALLABLE
022	22398A	RTE JOB CONTROL LANGUAGE FOR BATCH PROCESSING			
022	22416A	CREATE DOS-M DIRECTORY ENTRY UNDER PROGRAM CONTROL			
022	22445A	RTE TRACK ASSIGNMENT TABLE LOG			

112	22238A	FORTAN RUN-TIME FORMAT SPECIFICATION	212	22205A	TABULATION AND FORM-FEED CALLS FOR HP 2754 TELEPRINTER
112	22386A	MULTIRECORD FORMATTED OUTPUT LISTER	212	22250A	'EXEC' CALL ADAPTER ROUTINE
112	24305A	MAGNETIC TAPE REFORMATTING SYSTEM	212	22267A	MTS FORTRAN CHAIN
201	22193A	INTERPRETIVE BINARY SIMULATOR	212	22269A	PAPER TAPE TITLER
202	14901B	HP 21XX VERIFICATION AND TEST FOR THE HP 6930A	212	22278A	TAB FOR PREPARING FORTRAN TAPES
202	14905B	HP 6940A/6941A DIAGNOSTIC	212	22287A	CHAIN FROM PHOTOREADER IN HP BASIC
202	20337D	HP 1260B DATA SOURCE INTERFACE DIAGNOSTIC	212	22289A	ALGOL ARRAY TRANSFER FOR SEGMENTATION
202	20348C	HP 12556B POSITIVE TRUE 40-BIT OUTPUT REGISTER DIAGNOSTIC	212	22310A	FORTAN/ALGOL ARRAY TRANSFER ROUTINE
202	20429C	HP 2912A PROGRAMMER CARD DIAGNOSTIC	212	22320A	DOS/DOS-M HP 2020/3030 MAGNETIC TAPE CONTROL PROGRAM
202	20436A	HP 12661A DVS PROGRAM CARD DIAGNOSTIC	212	22346A	DOS/DOS-M ASSEMBLY LANGUAGE COMMENT INSERTER
202	24142A	PROCESSOR INTERCONNECT CABLE DIAGNOSTIC	212	22351A	ASCII STRING SEARCH FROM DISC FILE
202	24196A	HP 2100A GENERAL PURPOSE REGISTER TEST	212	22352A	ASCII STRING SEARCH FROM PHOTOREADER
202	24197A	HP 2100A PROCESSOR INTERCONNECT CABLE TEST	212	22366A	ALGOL SEGMENT RETURN TO MAIN PROGRAM
202	24199A	HP 2100A CONTROLLER MICROCIRCUIT TEST	212	22428A	ASSEMBLER JUSTIFICATION PROGRAM
202	24289A	HP 12939A UNIVERSAL INTERFACE DIAGNOSTIC	212	22431A	DOS-M SEGMENT RETURN TO MAIN
203	13041B	HP 7900/13210 DIAGNOSTIC	212	22444A	COMMENT INSERTER FOR ASSEMBLER PROGRAMS
203	24184B	FIXED HEAD DISC/DRUM DIAGNOSTIC	212	22455A	HP 'IDEAL' COMMERCIAL SUBROUTINE LIBRARY
203	24203A	HP 2100A CARTRIDGE DISC MEMORY DIAGNOSTIC	212	22524A	RTE ALPHANUMERIC TAPE LABEL GENERATOR
203	24204A	HP 2100A DISC FILE (HP 2883) DIAGNOSTIC	212	22901A	HP 2313A DRIVER FORTRAN/ALGOL INTERFACE ROUTINE (L2313)
203	24207A	HP 2100A FIXED HEAD DISC/DRUM DIAGNOSTIC	212	29011A	BINARY INTERFACE ROUTINE R2313 TO DVM62
203	24206A	HP 2883 DISC FILE DIAGNOSTIC	212	29017A	FORTAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.65, L65
203	24237A	CARTRIDGE DISC MEMORY DIAGNOSTIC	212	29018A	LISTEN MODE ASSEMBLER INTERFACE SUBROUTINE FOR BCS DVM, D.65,DIR65
204	13020E	HP 7970/13181A DIAGNOSTIC	212	29019A	LISTEN MODE FORTRAN/ALGOL INTERFACE SUBROUTINE FOR BCS DVM, D.65,DIR65
204	13028E	DIAGNOSTIC FOR HP 7970/13182A MAGNETIC TAPE	212	29020A	FORTAN/ALGOL INTERFACE SUBROUTINE FOR BCS DRIVER D.66, L66
204	13031C	HP 7970E/13183A DIAGNOSTIC	212	29021A	FORTAN/ALGOL INTERFACE SUBROUTINE FOR RTE DRIVER DVM65,DLK65
204	13042B	HP 7970E-215/13184 DIAGNOSTIC	213	20408C	HP 2737 PUNCH TAPE READER TEST
204	20411B	TEST: KENNEDY INCREMENTAL MAGNETIC TAPE UNIT	213	20409C	HP 2753 TAPE PUNCH TEST
204	20433E	HP 3030 MAGNETIC TAPE UNIT DIAGNOSTIC	213	24189B	HP 2100A TAPE READER TEST
204	20516B	HP 2020 MAGNETIC TAPE UNIT DIAGNOSTIC	213	24190A	HP 2100A TAPE PUNCH TEST
205	20490A	HP 12560A PLOTTER DIAGNOSTIC	213	24201A	HP 2100A TELEPRINTER TEST
207	22174A	BCS DUMP IN BBL FORMAT	214	20347B	HP 2761-A007 OPTICAL MARK READER DIAGNOSTIC, HP 12602A KIT
207	22251A	MAGNETIC TAPE TO LINE PRINTER ROUTINE	214	20899B	HP 2761A-007 OPTICAL MARK READER DIAGNOSTIC, HP 12602B KIT
207	22257A	MTS/BCS SYSTEM ABSOLUTE DUMP	214	24174A	HP 2891 CARD READER DIAGNOSTIC
207	22259A	DOS TO MAGNETIC TAPE DUMP	214	24188B	HP 2100A OPTICAL MARK READER TEST (KIT 12602B)
207	22260A	MAGNETIC TAPE TO DOS DUMP	214	24192A	HP 2100A CARD READER (HP 2891/12882) DIAGNOSTIC
207	22280A	ABSOLUTE CORE DUMP ROUTINE	214	24267A	HP 2892/12924 CARD READER DIAGNOSTIC
207	22290A	CORE PUNCH IN BBL FORMAT	214	24297A	HP 3260A/12566B CARD READER/INTERFACE DIAGNOSTIC
207	22300B	QUICK FIXED HEAD DUMP	215	20895C	HP 2778 LINE PRINTER DIAGNOSTIC
207	22322A	ABSOLUTE OCTAL OR DECIMAL CORE DUMP	215	20999A	HP 2767 LINE PRINTER DIAGNOSTIC
207	22340A	360 FORMAT MAGNETIC TAPE DUMP	215	24205A	HP 2100A LINE PRINTER (HP2767) DIAGNOSTIC
207	22454A	QUICK DUMP FOR HP 7900A MOVING HEAD DISC	215	24218C	HP 2100A LINE PRINTER (HP 2778) TEST
207	22463A	HP 7900 DISC TO DISC DUMP	215	24275B	HP 2610/2614 LINE PRINTER DIAGNOSTIC
207	22469A	HP 2070 DISC TO DISC DUMP	216	14903A	HP 21XX VERIFICATION AND TEST FOR DIGITAL VOLTAGE SOURCE
207	22480A	DUMP FROM DOS-M MAGNETIC TAPE STORAGE AND RETRIEVAL (HP 22198) FORMAT	216	20075D	VERIFY HP 5610A ANALOG TO DIGITAL TEST
207	22481B	LOAD DOS-M FROM MAGNETIC TAPE STORAGE & RETRIEVAL (HP 22198) FORMAT	216	20344A	HP 12564A DIAGNOSTIC 10-BIT ANALOG TO DIGITAL CARD
207	22501A	HEXADECIMAL/OCTAL LIST OF ANSI-COMPATIBLE MAGNETIC TAPE (TDUMP)	217	20290A	HP 12589A AUTOMATIC CALLING UNIT INTERFACE CARD DIAGNOSTIC
207	22530A	CHERNACK (HP 22198) MAGNETIC TAPE SOURCE FORMAT TO DOS-M SOURCE FILE	217	20343A	TELEPRINTER OFF-LINE TEST
208	20403A	LOW MEMORY ADDRESS TEST	217	20393A	HP 12622 SEND (ONLY) INTERFACE TEST
208	20404A	HIGH MEMORY ADDRESS TEST	217	20417C	HP 2116 TELEPRINTER TEST
208	20405A	HP 2116A LOW MEMORY CHECKERBOARD TEST	217	20420B	HP 2115/2114 TELEPRINTER TEST
208	20406A	HP 2116A HIGH MEMORY CHECKERBOARD TEST	217	20535A	HP 12587 SEND/RECEIVE INTERFACE TEST
208	20426A	HP 2116B HIGH MEMORY CHECKERBOARD TEST	217	20538A	HP 12621 RECEIVE (ONLY) INTERFACE TEST
208	20427A	HP 2116B LOW MEMORY CHECKERBOARD TEST	217	24187C	HP 2600 KEYBOARD-DISPLAY TERMINAL TEST
208	20512A	HP 2116A/14A HIGH MEMORY CHECKERBOARD TEST	217	24200A	HP 2100A KEYBOARD-DISPLAY TERMINAL (HP 2600) TEST
208	20513A	HP 2115A/14A LOW MEMORY CHECKERBOARD TEST	217	24217A	HP 2100A AUTO CALL UNIT INTERFACE (HP 12589) TEST
208	24161A	HP 2116C LOW MEMORY PATTERN TEST	217	24219A	HP 2100A SEND ONLY INTERFACE (HP 12622) TEST
208	24162A	HP 2116C HIGH MEMORY PATTERN TEST	217	24226A	HP 2100A RECEIVE ONLY INTERFACE (HP 12621) TEST
208	24193A	HP 2100A LOW MEMORY PATTERN TEST	217	24221B	HP 2100A SEND/RECEIVE INTERFACE (HP 12587) TEST
208	24194A	HP 2100A HIGH MEMORY PATTERN TEST	217	24255B	2100A ASYNCHRONOUS MULTIPLEXOR CONTROL TEST
208	24198B	HP 2100A MEMORY PARITY CHECK TEST	217	24263C	HP 2100A-2605 CONSOLE PRINTER DIAGNOSTIC
208	24211A	HP 2100A LOW MEMORY ADDRESS TEST	217	29023A	HP 12772 COUPLER MODEM INTERFACE CARD DIAGNOSTIC
208	24212A	HP 2100A HIGH MEMORY ADDRESS TEST	217	29024A	HP 12773 COMPUTER MODEM INTERFACE CARD DIAGNOSTIC
209	20400A	ALTER-SKIP INSTRUCTION TEST	218	13043A	HP 13185A COM INTERFACE DIAGNOSTIC
209	20401B	MEMORY REFERENCE INSTRUCTION TEST	218	20345A	HP 12598 MEMORY PARITY CHECK DIAGNOSTIC
209	20402D	SHIFT-ROTATE INSTRUCTION TEST	218	20412B	HP 2116/HP 12539 TIME BASE GENERATOR TEST
209	20415A	INTERRUPT DIAGNOSTIC	218	20418D	MEMORY PROTECT DIAGNOSTIC
209	24208A	HP 2100A ALTER-SKIP INSTRUCTION TEST	218	20421A	HP 2115/2114 HP 12539 TIME BASE GENERATOR TEST
209	24209A	HP 2100A MEMORY REF. INSTRUCTION TEST	218	20423B	HP 12551 RELAY REGISTER DIAGNOSTIC
209	24210A	HP 2100A SHIFT-ROTATE INSTRUCTION TEST	218	20428B	HP 12588 POWER FAIL WITH AUTO-RESTART TEST
209	24214A	HP 2100A EXTENDED ARITHMETIC UNIT TEST	218	20434B	HP 2116 POWER FAIL INTERRUPT TEST
209	24215A	HP 2100A INTERRUPT TEST	218	20435A	DMI DIAGNOSTIC
211	20002B	BCS DEBUG ROUTINE	218	20439A	HP 12584 TELEPRINTER MULTIPLEXOR INTERFACE TEST
211	22008A	OCTAL UTILITY SYSTEM (HOCUS)	218	20524A	HP 2114B DMA GENERAL DIAGNOSTIC
211	22190A	ABSOLUTE PROGRAM CONTROL SYSTEM	218	20525A	HP 2114R DMA RATE AND TRANSFER DIAGNOSTIC
211	22293A	OCTAL ASSEMBLY PROCESSOR AND UTILITY SYSTEM	218	20543A	CONTROLLER MICROCIRCUIT DIAGNOSTIC
211	22314A	RTE CROSS-REFERENCE SYMBOL TABLE GENERATOR	218	20546A	HP 2114R/HP 12616 HIGH SPEED I/O CHANNEL TEST
211	22526A	DOS-M FORTRAN IV CROSS REFERENCE TABLE GENERATOR	218	22333A	HP 9300N DISC EXERCISER
211	22527A	DEBUG FOR ABSOLUTE/BCS PROGRAMS	218	24144A	HP 12591 MEMORY PARITY CHECK TEST
211	24109B	CROSS-REFERENCE SYMBOL TABLE GENERATOR	218	24163A	GENERAL PURPOSE REGISTER DIAGNOSTIC
211	24223B	DOS CROSS REFERENCE ROUTINE	218	24175A	HP 12584C TELEPRINTER MULTIPLEXOR TEST
211	24281A	MICRO DEBUG EDITOR	218	24185A	HP 2115/2116 DMA DIAGNOSTIC
212	20078A	BCS HP 2312A DRIVER/FORTAN INTERFACE ROUTINE (L2312)	218	24186B	EXTENDED ARITHMETIC UNIT DIAGNOSTIC
212	22014A	BINARY TAPE EDITOR	218	24191A	HP 2100A PLOTTER (HP 12560) TEST
212	22015B	BASIC LINE RESEQUENCER	218	24195A	HP 2100A DMA DIAGNOSTIC
212	22016C	SYMBOLIC ALPHANUMERIC GENERATOR	218	24202A	HP 2100A PRINTER MULTIPLEXOR TEST
212	22064B	AUTOMATIC TABLING PROGRAM	218	24206B	HP 2100A POWER FAIL DIAGNOSTIC
212	22089A	TELEPRINTER OCTAL INPUT PROGRAM	218	24213B	HP 2100A TIME BASE GENERATOR TEST
212	22096A	SCOPE SYMBOLIC LISTER			
212	22191A	NAME-INT-EXT EDITOR			

218	24216B	HP 2100A RELAY REGISTER TEST	404	22135A	LINEAR REGRESSION WITH REPLICATION
218	24222A	HP 2100A MEMORY PROTECT TEST	404	22136A	NONLINEAR REGRESSION PROGRAM
218	24251A	HP 2100A FLOATING POINT DIAGNOSTIC	404	22184A	POOLING OF GROUPS IN REGRESSION
218	24252A	HP 2100A ASYNCHRONOUS CHANNEL MULTIPLEXOR DIAGNOSTIC	404	22185A	MULTIPLE REGRESSION PROGRAM
218	24282B	HP 12909A PROM WRITER DIAGNOSTIC	404	22187A	NONLINEAR REGRESSION OF A SINGLE-VARIABLE FUNCTION
218	24284A	HP 12908A WRITABLE CONTROL STORE DIAGNOSTIC	404	22186A	NONLINEAR REGRESSION OF AN ARBITRARY FUNCTION
218	29005B	HP 12665 COMPUTER SERIAL INTERFACE CARD DIAGNOSTIC	485	22194A	PSEUDO-RANDOM NUMBER GENERATOR
218	29006A	HP 12813 DIAGNOSTIC	485	22265A	FLOATING POINT RANDOM NUMBER GENERATOR
219	20072C	VERIFICATION: DACE AXEPT	485	22306A	GAUSSIAN RANDOM NUMBER GENERATOR
219	20077B	HP 2312A SUBSYSTEM TEST	485	22413A	RANDOM INTEGER NUMBER GENERATOR
219	20334D	HP 2310C VERIFICATION TEST	485	22434A	RANDOM NUMBER GENERATORS
219	20339B	TEST: HP 2310A/B SUBSYSTEM	406	22137A	CUMULATIVE DISTRIBUTION PROGRAM
219	20341B	TEST: HP 2912 SCANNER/DVM	407	22121A	CROSS-TABULATION PROGRAM
219	20349D	VERIFY HP 2911 SCANNER/DVM TEST	407	22138A	KENDALL'S COEFFICIENT OF CONCORDANCE: K
219	20530D	HP 2321 VERIFICATION VERS4	407	22139A	KENDALL'S COEFFICIENT OF CONCORDANCE
219	20583C	HP 2311 CALIBRATION - TELEPRINTER	407	22140A	KENDALL'S TAU CORRELATION
219	29012A	HP 2313A SUBSYSTEM VERIFICATION TEST	407	22147A	MULTIPLE CORRELATION ROUTINE
301	22021A	LOCATE MAXIMUM-MINIMUM INTEGER	407	22155A	DUNCAN'S MULTIPLE RANGE TEST
301	22084C	INTEGRATED MATH CALCULATOR PROGRAM	407	22156B	KOLMOGOROV-SMIRNOV GOODNESS-OF-FIT TEST
302	22085B	EXTENDED PRECISION CALCULATOR	407	22437A	WILCOXON-MANN-WHITNEY TEST
302	22097C	DOUBLE PRECISION INTEGER LIBRARY	408	22039A	MEAN, DEVIATION, AND CORRELATION COEFFICIENTS ROUTINE
302	22234A	EXTENDED-PRECISION ARITHMETIC LIBRARY	408	22141A	GENERAL STATISTICS PROGRAM
302	22334A	THREE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	408	22142B	GENERAL STATISTICS FOR MULTIPLE GROUPS
302	22335A	FIVE-WORD EXTENDED PRECISION ARITHMETIC ROUTINES	408	22143A	PROBABILITY SUBPROGRAMS
303	22234A	COMPLEX MATH PACKAGE	408	22517A	NORMAL DISTRIBUTION
303	22531A	COMPLEX ARITHMETIC FOR HP BASIC	408	22516A	VARIANCE RATIO DISTRIBUTION
304	22268B	DECIMAL ARITHMETIC AND MOVE/COMPARE ROUTINES	409	22126A	CROSS CORRELATION ANALYSIS
306	22017A	GAMMA FUNCTION ROUTINE	409	22186A	MULTIPLE CORRELATION MATRIX PROGRAM
306	22018A	K BESSEL FUNCTION ROUTINE	410	22148A	COMPLETELY RANDOMIZED DESIGN
306	22019A	I BESSEL FUNCTION ROUTINE	410	22149A	COMPLETELY RANDOMIZED DESIGN WITH SUBSAMPLING
306	22020A	Y BESSEL FUNCTION ROUTINE	410	22150A	RANDOMIZED COMPLETE BLOCK DESIGN
306	22117A	TRANSFORMATIONS	410	22151B	RANDOMIZED COMPLETE BLOCK DESIGN WITH SUBSAMPLING
306	22256A	FRESNEL INTEGRAL EVALUATION	410	22152A	TWO-WAY FACTORIAL DESIGN
306	22511A	INVERSE SIN AND COS ROUTINE	410	22153A	THREE-WAY FACTORIAL DESIGN
309	22022A	SOLUTION OF LINEAR LEAST SQUARES PROBLEMS	410	22154A	ANALYSIS OF VARIANCE INFORMATION GENERATOR
309	22220A	LINEAR LEAST SQUARES PROBLEM SOLVER	413	22397A	COMBINATION GENERATOR
310	22023A	TRAPEZOIDAL INTEGRATION ROUTINE	505	22325A	COPPER-CONSTANTAN THERMOCOUPLE VOLTAGE TO CELSIUS DEGREES CONVERSION
310	22024A	TRAPEZOIDAL INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	506	01530A	ECG INTERPRETIVE SYSTEM
310	22225A	SIMPSON AND NEWTON'S 3/8 INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	506	01532A	HP 1532A ECG DATA COLLECTION SYSTEM
310	22026A	HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE	506	05670A	HP 5670A PATIENT DATA MONITORING SYSTEM
310	22027B	HERMITIAN FOURTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	506	05680A	MEDACE
310	22028A	HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE	506	05690A	COMPUTERIZED CARDIAC CATHETERIZATION LABORATORY SYSTEM
310	22029A	HERMITIAN SIXTH-ORDER INTEGRATION ROUTINE, EQUAL INTERVAL ARGUMENT	506	05693A	HP 5693A ANGIO ANALYZER OPTION
310	22144A	INTEGRATION ROUTINE	506	22221B	HP BIOMEDICAL RESPONSE AVERAGING PROGRAM
311	22030B	COMPLEX ROOTS OF A REAL POLYNOMIAL	506	22222A	BLOOD ACID-BASE VARIABLES DETERMINATION PROGRAM
311	22095A	REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL COEFFICIENTS	506	22240A	LUNG COMPLIANCE AND RESISTANCE MEASUREMENT SYSTEM
312	22031A	ADD ROWS OF MATRICES	515	22487A	CIVIL ENGINEERING COORDINATE GEOMETRY (COGO)
312	22032A	RANK AND BASIS ROUTINE	516	22435A	SECOND VIRIAL COEFFICIENTS
312	22116B	MATRIX INVERSION SUBROUTINES	517	22384A	EFFECTIVE PERCEIVED NOISE LEVEL
312	22119A	MATRIX ARITHMETIC SUBROUTINE	518	22496A	STRUCTURAL ENGINEERING SYSTEM SOLVER (STRESS)
312	22120A	MATRIX ARITHMETIC PROGRAM	607	22460A	CONTINUOUS SYSTEM MODELING PROGRAM (CSMP)
313	22192A	EIGENVALUES OF A SYMMETRIC REAL MATRIX	607	22532A	SYSTEM SIMULATION PROGRAM (SSP)
314	22033A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS	701	22378A	RTE LOGBOOK
314	22034A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, BAND-MATRIX	720	22266A	MARK SENSE EDUCATIONAL TEST CARD SCORING PROGRAM
314	22035A	SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS, SYMMETRIC MATRIX	880	22332A	THE EXECUTIVE GAME
314	22122A	SIMULTANEOUS EQUATION SOLVER PROGRAM	880	22492A	THE EXECUTIVE GAME FOR DOS-M
314	22123A	SIMULTANEOUS EQUATION SOLVER ROUTINE	901	22040A	SCOPE DISPLAY DEMO
316	22036A	REAL FOURIER TRANSFORM	901	22099A	DOS DEMO
316	22037B	COMPLEX FOURIER TRANSFORM	903	22094A	JEU DE MORPIONS (GAME OF TIC-TAC-TOE)
316	22189B	GENERAL FAST FOURIER TRANSFORM	903	22298A	BATTLESHIP
316	22218A	FAST FOURIER TRANSFORM	903	22436A	HANGMAN
318	22038A	SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS	904	22162B	X-Y PLOTTER ON PRINTER
401	22145B	CONFIDENCE INTERVAL FOR MEAN AND VARIANCE OF A NORMAL DISTRIBUTION	904	22163A	TIME SERIES PLOTTER
401	22146C	SAMPLE SIZE DETERMINATION ON THE SAMPLE VARIANCE	904	22164B	HISTOGRAM PLOTTER PROGRAM
401	22156A	PAIRED T-TEST	904	22182A	HISTOGRAM PLOTTER ROUTINE
401	22157B	BARTLETT'S HOMOGENEITY OF VARIANCE TEST	904	22262A	THREE DIMENSIONAL PLOT SUBROUTINE
401	22159B	CHI SQUARE GOODNESS-OF-FIT TEST	904	22348A	X-Y PLOTTER FOR 11 INCH PAGE PRINTER
401	22164A	TESTS OF HYPOTHESIS FOR VARIANCES	904	22425A	THREE DIMENSIONAL TRANSFORMATIONS USING EULER'S ANGLES
401	22161B	TEST OF HYPOTHESIS FOR MEANS	904	22426A	LOGARITHMIC AXIS GENERATOR FOR THE CALCOMP 505
401	22183A	SAMPLE SIZE DETERMINATION TO TEST HP	904	22474A	HP 7210 PLOTTER LIBRARY
402	22124A	AUTOCORRELATION AND SPECTRAL DENSITY	904	72098A	COMPLETE RCS HP 7210A PLOTTER DRIVER DVR.10
402	22125A	MOVING AVERAGES	904	72091A	MINIMUM RCS HP 7210A PLOTTER DRIVER DVR.10
403	22127A	DISCRIMINANT ANALYSIS PROGRAM	904	72092A	HP 7210A DIAGNOSTIC & TEST TAPE
404	22128A	LEAST SQUARES REGRESSION PROGRAM	904	72093A	COMPLETE BASIC CALLABLE HP 7210A PLOTTER DRIVER
404	22129A	LINEAR REGRESSION INTERVAL ESTIMATES	904	72094A	MINIMUM BASIC CALLABLE HP 7210A PLOTTER DRIVER
404	22130A	POLYNOMIAL REGRESSION PROGRAM	904	72096A	COMPLETE DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10
404	22131A	POLYNOMIAL REGRESSION CONFIDENCE INTERVALS	904	72097A	MINIMUM DOS-M, RTE, HP 7210A PLOTTER DRIVER DVR.10
404	22132A	STEPWISE REGRESSION PROGRAM	904	72098A	RTE HP 7210A PLOTTER DRIVER DVR.10
404	22133A	BIOASSAY PROGRAM	904	72099A	KTE HP 7210A PLOTTER DRIVER DVR.10
404	22134A	ORTHOGONAL REGRESSION PROGRAM	905	22515A	PSEUDO-DMA INPUT (MULTI-CHANNEL)
			905	22516A	WORD MOVE (INTERRUPTABLE)



section IV

ordering information

OPTION NUMBERS

Software products are ordered by specifying the program number, together with an option number which indicates the type of product required. The option number consists of a letter followed by two digits, for instance: A02, B01, or L00. The letter indicates the form of product required, and the digits indicate the specific media by means of which it is to be supplied. The form indicated by each letter is listed below.

- a. "B" indicates binary tape or cards. (Documentation is included only for contributed programs.)
- b. "S" indicates source-language tape or cards.
- c. "L" indicates a program listing.
- d. "A" indicates binary tape or cards, source-language tape or cards, and a program listing.
- e. "D" indicates all documentation other than a program listing.
- f. "K" indicates source-language tape or cards, and all documentation other than a program listing.

The digits identifying the specific physical form of a software product have the following significance:

- a. "00" indicates printed material only.
- b. "01" indicates punched paper tape.
- c. "02" indicates punched metallized-Mylar tape.
- d. "11" indicates punched or mark-sense cards.
- e. "20" indicates 7-track magnetic tape.
- f. "21" indicates 9-track magnetic tape.

To take an example, "D00" indicates the documentation for the specified program, other than the program listing. (Documentation is made available separately so the user may examine it to see if the program fits his needs.)

To illustrate further, the following entry appears in the price list:

	A01	B01	D00	K01	K21	L00	S01
20014A (014)	30	10				5	15

To order the program in binary form on punched paper tape, together with a program listing, the order appears as follows:

20014A	B01	\$10
20014A	L00	\$ 5

For the punched metallized-Mylar tape options A02, B02, S02 contact an HP Sales and Service Office for prices. To order contributed programs (22000 Series) which have a K01 option on punched metallized-Mylar tape, use option K02 and double the price shown for K01.

ORDERING PROCEDURE

Orders should be sent to the nearest HP Sales and Service Office. These offices, and their addresses, are listed at the back of this catalog. Shipments normally are by Air Parcel Post. No charge is made for postage.

PRICE LIST

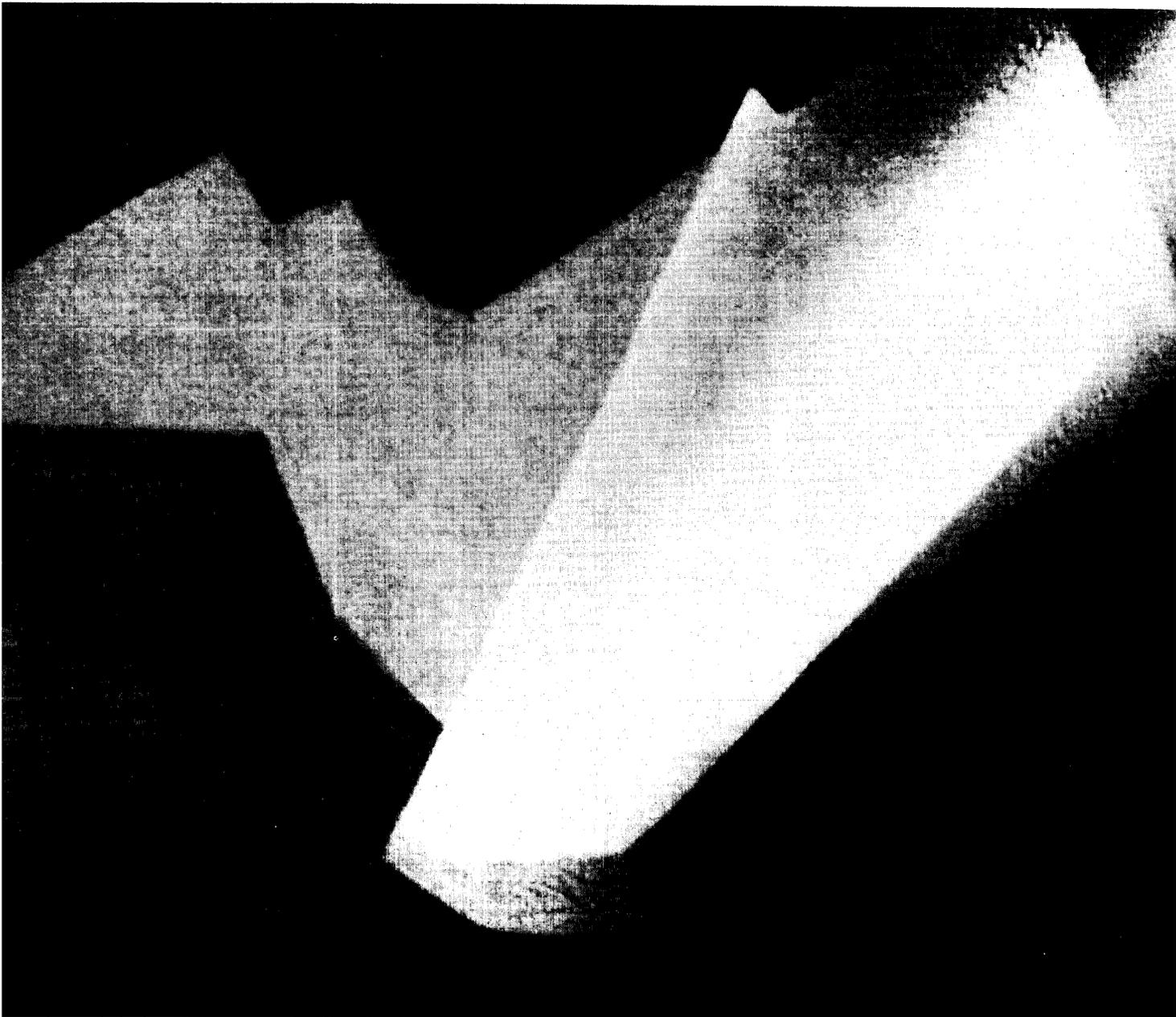
The price list is furnished on the pages which follow. Prices are subject to change. Programs which show an asterisk and no prices, are available to some HP users. For further information please contact an HP Sales and Service Office.

A01	B01	D00	K01	K21	L00	S01	A01	B01	D00	K01	K21	L00	S01
11530A (506)							20339B (219)	35	15			5	15
11532A (50A)	*						20341B (219)	25	10			5	10
115670A (506)	*						20343A (217)		5				
115680A (506)	*						20344A (216)	35	10			5	20
115690A (506)	*						20345A (218)	30	10			35	15
115693A (506)	*						20347B (214)	30	10			5	15
13020E (204)		10			10	60	20348C (202)	30	10			5	15
13021B (016)	35	10			5	20	20349D (219)	30	10			5	15
13022B (016)	35	10			5	20	20390A (205)		10			5	20
13023H (016)	50	10			5	35	20392H (018)	300	25			30	245
13024A (016)	35	10			5	20	20393A (217)	75	15			5	55
13025A (016)	35	10			5	20	20396A (013)	35	15			5	15
13026B (016)	35	10			5	20	20398A (012)	30	15			15	15
13027B (016)	35	10			5	20	20400A (209)	100	15			10	155
13028E (204)	80	10			10	60	20401B (209)	100	15			10	75
13029B (016)	35	10			5	20	20402D (209)	40	10			5	25
13030H (016)	35	10			5	20	20403A (208)	30	10			5	15
13031C (204)	100	10			10	80	20404A (208)	30	10			5	15
13041H (203)	175	15			20	100	20405A (208)	30	10			5	15
13042B (204)	95	10			10	75	20406A (208)	30	10			5	15
13043A (218)	60	10			5	45	20408C (213)	70	10			10	50
14000B (006)	40	20			5	25	20409C (213)	75	15			10	50
14001B (202)	135	20			25	100	20411B (204)	35	10			5	20
14002A (013)	55	20			5	40	20412H (218)	40	10			5	25
14003A (216)	135	20			25	100	20415A (209)	35	10			5	20
14004B (006)	55	20			5	40	20417C (217)	40	10			5	25
14005B (202)	45	20			5	30	20418D (218)	55	10			5	40
14007A (006)	35	10			5	20	20420B (217)	40	10			5	25
14009A (006)	30	10			5	15	20421A (218)	40	10			5	25
14011A (006)	45	20			5	40	20423B (218)	30	10			5	15
14013A (006)	37	12			5	22	20426A (208)	30	10			5	15
14015A (006)	10	40			10	40	20427A (208)	30	10			5	15
200010 (017)	75	10			10	55	20428B (218)	35	10			5	20
20002R (211)	55	10			5	40	20429C (202)	35	10			5	20
20005B (009)	30	10			5	15	20430H (006)	35	10			5	20
20006B (009)	30	10			5	15	20433E (204)	80	10			10	60
20007A (016)	30	10			5	15	20434B (218)	45	10			5	30
20008B (006)	30	15			15	15	20435A (218)	30	10			5	15
20009B (006)	30	15			15	15	20436A (202)	35	10			5	20
20010C (006)	30	15			15	15	20439A (218)	30	10			5	15
20011H (006)	25	10			25	10	20501E (012)	30	10			5	15
20012C (006)	30	15			15	15	20502B (003)	30	15			15	15
20013F (016)	50	10			5	35	20512A (208)	30	10			5	15
20014A (014)	30	10			5	15	20513A (208)	30	10			5	15
20016A (009)	30	10			5	15	20516B (204)	60	10			10	40
20017C (002)	30	10			5	15	20517C (012)	30	10			5	15
20018H (017)	80	10			10	60	20520C (010)	25	10			5	10
20019C (010)	35	10			5	20	20521C (010)	25	10			5	10
20021C (008)	105	10			10	85	20522C (010)	25	10			5	10
20022E (016)	45	10			5	30	20524A (218)	50	10			5	35
20024A (006)	25	10			5	10	20525A (218)	25	10			5	10
20025A (006)	25	10			5	10	20527B (011)	25	10			5	10
20028B (006)	30	10			5	15	20528A (011)	25	10			5	10
20029C (219)	30	10			5	15	20529A (011)	25	10			5	10
20030C (013)	30	10			5	15	20530D (219)	65	15			5	45
20034A (013)	25	10			5	10	20532A (012)	30	10			5	15
20039D (216)	30	10			5	15	20533A (105)	25	10			5	10
200376A (012)	30	15			15	15	20535A (217)	55	10			5	40
200377B (219)	30	15			15	15	20538A (217)	55	10			5	40
200378A (212)	30	15			15	15	20543A (218)		10			5	30
200379A (013)	40	10			5	25	20546A (218)	25	10			5	10
200401A (015)	30	10			5	15	20548A (018)	20	25			30	240
200403C (013)	30	10			5	15	20549A (018)	20	40			40	445
20044H (013)	25	10			5	10	20581A (014)	25	10			5	10
20046A (105)	25	10			5	10	20583C (219)	35	10			5	20
20049C (003)	30	10			5	15	20544B (008)	100	30			15	55
20100F (011)	90	15			5	70	20596F (001)	*					
20201C (021)	100	15			10	70	20597C (007)	525	65			40	420
20209C (012)	75	10			5	60	20598C (018)	300	75			40	185
20210A (105)	25	10			5	10	20599C (018)	460	70			45	345
20235A (012)	25	10			5	10	20741D (002)	35	10			5	20
20237A (107)	25	5			5	15	20743D (009)	30	10			5	15
20288A (105)	25	10			5	10	20745B (009)	25	10			5	10
20294A (217)	40	10			10	20	20707C (015)	30	10			5	15
20295A (006)	25	10			5	10	20804C (011)	30	10			5	15
20297D (013)	115	15			15	85	20807C (008)	50	10			5	35
20301C (008)	30	10			5	15	20805C (001)	60	10			5	45
20303A (009)	30	10			5	15	20806B (015)	35	10			5	20
20304A (009)	30	10			5	15	20808B (014)	25	10			5	10
20306A (009)	30	10			5	15	20810A (021)	100	15			10	80
20307A (009)	30	10			5	15	20817E (010)	30	10			5	15
20312A (106)	30	10			5	15	20819C (010)	35	10			5	20
20313C (008)	30	10			5	15	20821B (010)	35	10			5	20
20314D (016)	35	10			5	20	20823C (010)		10			5	20
20315C (016)	35	10			5	20	20874D (018)	200	75			40	180
20316A (009)	35	10			5	20	20875E (018)	450	70			45	340
20317A (009)	35	10			5	20	20878B (008)	*					
20319A (009)	30	10			5	15	20895C (215)	55	10			10	35
20320A (009)	30	10			5	15	20899H (214)	95	15			10	70
20321C (016)	35	10			5	20	20925C (017)	100	15			10	75
20322A (002)	35	10			5	20	20985D (002)	35	10			5	20
20323A (002)	35	10			5	20	20987C (009)	30	10			5	15
20324B (010)	30	10			5	15	20989B (009)	30	10			5	15
20327A (009)	30	10			5	15	20991C (011)	30	10			5	15
20328A (009)	35	10			10	15	20995B (015)	30	10			5	15
20329A (002)	30	10			5	15	20997C (016)	35	10			5	20
20330H (002)	30	10			5	15	20999A (215)	100	10			20	70
20331C (010)	35	10			5	20	22002A (001)			2	10		
20332A (010)	30	10			5	15	22004A (006)			2	10		
20333C (016)	35	10			5	20	22005B (006)			2	10		
20335B (008)	30	10			5	15	22006A (006)			2	10		
20336B (016)	35	10			5	20	22008A (008)			2	10		
20337D (202)	70	10			5	55	22009B (017)			2	10		
20338D (219)	35	10			5	15	22013B (018)			2	10		

A01	B01	D00	K01	K21	L00	S01	A01	B01	D00	K01	K21	L00	S01
22014A (212)		2	10				22153A (410)		2	10			
22015A (212)		2	10				22154A (410)		2	10			
22016C (212)		2	10				22155A (407)		2	10			
22017A (306)		2	10				22156A (401)		2	10			
22018A (306)		2	10				22157A (401)		2	10			
22019A (306)		2	10				22158B (407)		2	10			
22020A (306)		2	10				22159B (401)		2	10			
22021A (301)		2	10				22160A (401)		2	10			
22022A (309)		2	10				22161B (401)		2	10			
22023A (310)		2	10				22162B (904)		2	10			
22024A (310)		2	10				22163A (904)		2	10			
22025A (310)		2	10				22164B (904)		2	10			
22026A (310)		2	10				22165A (100)		2	10			
22027B (310)		2	10				22166A (100)		2	10			
22028A (310)		2	10				22167A (107)		2	10			
22029A (310)		2	10				22168A (107)		2	10			
22030H (311)		2	10				22169A (107)		2	10			
22031A (312)		2	10				22170A (003)		2	10			
22032A (312)		2	10				22171A (101)		2	10			
22033A (314)		2	10				22172C (112)		2	10			
22034A (314)		2	10				22174A (207)		2	10			
22035A (314)		2	10				22176A (009)		2	10			
22036A (316)		2	10				22180C (106)		2	10			
22037B (316)		2	10				22181A (016)		2	10			
22038A (316)		2	10				22182A (904)		2	10			
22039A (400)		2	10				22183A (401)		2	10			
22040A (901)		2	10				22184A (404)		2	10			
22041E (106)		2	10				22185A (404)		2	10			
22042C (008)		2	10				22186A (409)		2	10			
22044B (009)		2	10				22187A (404)		2	10			
22055A (006)		2	10				22188A (404)		2	10			
22061A (006)		2	10				22189B (300)		2	10			
22062A (006)		2	10				22190A (201)		2	10			
22063A (015)		2	10				22191A (212)		2	10			
22064B (212)		2	10				22192A (313)		2	10			
22065A (018)		2	10				22193A (201)		2	60			
22069A (000)		2	10				22194A (405)		2	10			
22071A (003)		2	10				22195B (003)		2	10			
22075A (000)		2	10				22197A (006)		2	10			
22077B (014)		2	10				22198C (102)		2	20			
22078B (009)		2	10				22199A (012)		10	30			
22079B (107)		2	10				22200A (006)		2	10			
22080A (014)		2	10				22201D (000)		2	20			
22081A (014)		2	10				22204A (014)		2	10			
22082B (000)		2	10				22205A (202)		2	10			
22084C (301)		2	10				22207A (104)		2	10			
22085B (302)		2	10				22208A (016)		2	10			
22086A (105)		2	10				22209C (106)		2	10			
22088A (211)		2	10				22211A (006)		2	10			
22089A (212)		2	10				22214A (105)		2	10			
22089A (300)		2	10				22215A (000)		2	10			
22093A (105)		2	10				22216B (015)		2	10			
22094A (903)		2	10				22217B (014)		2	10			
22095A (011)		2	10				22218A (316)		2	10			
22096A (212)		2	10				22219A (014)		2	10			
22097C (302)		2	10				22220A (300)		2	10			
22099A (001)		2	10				22221A (300)		2	10			
22100A (016)		2	10				22222A (506)		2	10			
22101B (005)		2	10				22223C (017)		2	10			
22102B (006)		2	10				22225B (015)		2	10			
22104B (006)		2	10				22226B (006)		2	10			
22106B (000)		2	10				22227A (006)		2	10			
22107B (006)		2	10				22229B (000)		2	10			
22108C (006)		2	10				22230A (302)		2	10			
22111C (015)		2	10				22233C (015)		2	10			
22112A (003)		2	10				22234A (303)		2	20			
22113B (106)		2	10				22235A (010)		2	10			
22114A (101)		2	10				22236A (004)		2	10			
22116A (107)		2	10				22237C (002)		2	10			
22117A (306)		2	10				22238A (112)		2	10			
22118B (312)		2	10				22239A (016)		2	10			
22119A (312)		2	10				22240A (506)		2	20			
22120A (312)		2	10				22242A (014)		2	10			
22121A (407)		2	10				22245A (002)		2	50			15
22122A (314)		2	10				22246B (002)		2	10			
22123A (314)		2	10				22247B (009)		2	10			
22124A (402)		2	10				22250A (212)		2	10			
22125A (402)		2	10				22251A (207)		2	00			15
22126A (409)		2	10				22252A (005)		2	10			
22127A (400)		2	10				22253B (014)		2	10			
22128A (404)		2	10				22255D (018)		2	10			15
22129A (404)		2	10				22256A (306)		2	10			
22130A (404)		2	10				22257A (207)		2	10			
22131A (404)		2	10				22258A (011)		2	10			
22132A (404)		2	10				22259A (207)		2	10			
22133A (404)		2	10				22260A (207)		2	10			
22134A (404)		2	10				22261A (018)		2	10			
22135A (404)		2	10				22262A (904)		2	10			
22136A (404)		2	10				22263A (014)		2	10			
22137A (406)		2	10				22264B (009)		2	10			
22138A (407)		2	10				22265A (405)		2	10			
22139A (407)		2	10				22266A (200)		2	10			
22140A (407)		2	10				22267A (212)		2	10			
22141A (408)		2	10				22268B (304)		2	30			
22142B (408)		2	10				22269A (212)		2	10			
22143A (408)		2	10				22270C (016)		2	10			
22144A (510)		2	10				22272A (102)		2	10			
22145B (400)		2	10				22273A (022)		2	10			
22146C (401)		2	10				22274A (105)		2	10			
22147A (407)		2	10				22276A (006)		2	10			
22148A (410)		2	10				22277A (110)		2	10			
22149B (410)		2	10				22279A (212)		2	10			
22150A (410)		2	10				22279A (414)		2	10			
22151B (410)		2	10				22280A (207)		2	10			
22152A (410)		2	10				22281A (013)		2	10			

A01	B01	D00	K01	K21	L00	S01	A01	B01	D00	K01	K21	L00	S01
22282A (107)		2	10				22409A (011)		2	10			
22284A (102)		2	10				22410A (006)		2	10			
22285C (101)		2	10				22411A (011)		2	10			
22285A (101)		2	20				22413A (405)		2	10			
22287A (212)		2	10				22414A (010)		2	20			
22289A (212)		2	10				22415B (010)		2	10			
22290A (207)		2	10				22416A (022)		2	10			
22291C (014)		2	20				22417B (010)	10	2	100		15	
22292B (010)		2	20				22425A (904)		2	10			
22293A (211)		2	20				22426A (904)		2	10			
22294A (006)		2	10				22427A (109)		2	10			
22295A (010)		2	20				22428A (212)		2	10			
22297A (017)		2	50				22429A (110)		2	10			
22298A (903)		2	10				22430A (107)		2	10			
22299A (102)		2	10				22431A (212)		2	10			
22300B (207)		2	10				22432A (110)		2	10			
22301A (015)		2	10				22433A (105)		2	10			
22304A (013)		2	10				22434A (405)		2	10			
22305A (006)		2	10				22435A (510)		2	10			
22308A (403)		2	10				22436A (903)		2	10			
22310A (212)		2	10				22437A (407)		2	10			
22311A (002)		2	10				22438A (010)		2	20			
22313A (003)		2	10				22439A (010)		2	20			
22314A (211)		2	10				22440A (010)		2	10			
22315A (014)		2	10				22441A (000)	10	2	90		15	
22316A (014)		2	10				22442A (006)		2	10			
22317A (006)		2	10				22443A (010)	20	2	110		15	
22318A (014)		2	10				22444A (212)		2	10			
22319A (010)		2	10				22445A (022)		2	10			
22320A (212)		2	10				22446A (022)		2	10			
22322A (207)		2	10				22447A (006)		2	10			
22325A (505)		2	10				22448B (017)		2	10			
22326A (010)	10	2	10				22449A (010)		2	30			
22327E (010)		5	150		15		22450A (006)		2	10			
22328C (002)		2	60		15		22451A (020)		2	10			
22329A (021)	30	2	30				22452A (008)		2	10			
22330B (110)		2	20				22453B (002)		2	30			
22331A (013)		2	10				22454A (207)		2	10			
22332A (800)		2	10				22455A (212)		2	40			
22333A (210)		2	10				22457A (022)		2	20			
22334A (302)		2	10				22458B (016)		2	10			
22335A (302)		2	10				22460A (607)		5	50			
22336A (000)		2	20				22461A (016)		2	10			
22337A (000)		2	20				22462A (016)		2	10			
22338A (000)	20	2	60		15		22463A (207)		2	10			
22339A (006)		2	10				22464A (014)		2	10			
22340A (207)		2	30				22465A (022)		2	20			
22341A (100)		2	10				22466B (013)		2	10			
22342A (017)		2	10				22467A (100)		2	10			
22343A (107)		2	10				22468A (022)		2	10			
22344A (017)		2	10				22469A (007)		2	10			
22345A (017)		2	10				22471A (014)		2	10			
22346A (212)		2	10				22472A (013)		2	10			
22347A (100)		2	10				22473A (014)		2	10			
22348A (904)		2	10				22474A (904)		2	30			
22349A (017)		2	10				22475A (013)		2	10			
22350A (017)		2	10				22476A (010)		2	20			
22351A (212)		2	10				22477A (022)		2	10			
22352A (212)		2	10				22479A (107)		2	10			
22353A (009)		2	10				22480A (207)		2	10			
22354A (100)		2	10				22481B (207)		2	10			
22355A (100)		2	10				22482A (100)		2	20			
22356A (102)		2	30				22483C (102)		5		30		
22357A (017)		2	10				22484A (102)		2	10			
22358A (100)		2	10				22485A (022)		2	10			
22359A (100)		2	10				22486A (110)		2	20			
22360A (100)		2	10				22487A (515)		5	80		15	
22361A (012)		2	20				22488A (017)		2	10			
22362A (021)		2	10				22489A (002)		2	10			
22364A (110)		2	10				22490A (009)		2	10			
22366A (212)		2	10				22491A (009)		2	10			
22367A (002)	20	2	50		15		22492A (000)		2	10			
22368A (100)		2	20				22493A (000)		2	10			
22369A (110)		2	10				22494A (010)	10	2	110		15	
22371A (101)		2	10				22495A (100)		2	10			
22372A (002)		2	40		15		22496A (002)		2	40		15	
22373B (110)		2	70				22498A (510)		5		25		
22374A (002)		2	20				22500A (101)		2	10			
22375A (022)		2	30				22501A (207)		2	20			
22376A (107)		2	10				22504A (104)		2	10			
22377A (022)		2	10				22505A (014)		2	10			
22378A (701)		2	20				22506A (014)		2	10			
22379A (014)		2	10				22507A (013)		2	10			
22380C (012)		2	30				22508A (013)		2	10			
22381A (100)		2	10				22509B (010)		2	10			
22383A (107)		2	10				22510A (014)		2	10			
22384A (517)		2	40				22511A (306)		2	10			
22385A (010)	10	2	70		15		22512A (016)		2	20			
22386A (112)		2	10				22515A (005)		2	10			
22387A (002)		2	40		15		22516A (905)		2	10			
22389A (010)	10	2	50		15		22517A (400)		2	10			
22390A (014)		2	10				22518A (400)		2	10			
22391A (014)		2	10				22519A (017)		2	10			
22392A (100)		2	10				22524A (212)		2	10			
22393A (101)		2	10				22525A (110)		2	10			
22394A (002)		2	20				22526A (211)		2	10			
22395A (311)		2	10				22527A (211)		2	10			
22396A (010)		2	25		15		22528A (110)		2	10			
22397A (410)		2	10				22529A (010)		2	20			
22398A (022)		2	10				22530A (207)		2	20			
22399A (011)		2	10				22531A (303)		2	10			
22400A (100)		2	10				22532A (607)		2	30			
22401A (020)		2	10				22533A (017)		2	10			
22404A (104)		2	10				22535A (100)		2	10			
22407B (005)		2	10				22540A (014)	20	2			20	
22408A (011)		2	10				24016A (000)	35	10		5	20	

	A01	B01	D00	K01	K21	L00	S01		A01	B01	D00	K01	K21	L00	S01
240315 (018)	130	15				100		242364 (203)	170	15				20	130
240328 (018)	130	15				100		242374 (203)	170	15				20	130
240368 (018)	100	10				100		242388 (001)	*						
240395 (018)	100	10				100		242390 (001)	*						
240444 (018)	250	15				20	215	242404 (102)	45	10				5	30
241095 (211)	40	10				5	25	242454 (021)	70	30				10	30
241234 (002)	30	10				5	15	242464 (018)	130	15				15	100
241254 (002)	30	10				5	15	242474 (018)	100	10				10	80
241274 (002)	30	10				5	15	242485 (021)	200	20				25	150
241295 (018)	241	30				21	190	242494 (021)	205	20				25	160
241424 (202)	30	10				5	15	242505 (021)	205	20				25	160
241444 (218)	50	10				10	30	242514 (218)	55	10				5	40
241455 (021)	215	20				25	170	242524 (218)	70	10				10	50
241465 (021)	215	20				25	170	242534 (001)	405	20				35	350
241475 (021)	220	20				25	170	242544 (001)	90	10				10	70
241485 (021)	215	20				25	170	242555 (217)	60	10				10	40
241495 (021)	205	20				30	155	242564 (002)	30	10				5	15
241500 (021)	205	20				25	160	242574 (002)	30	10				5	15
241510 (020)	205	20				25	160	242584 (002)	30	10				5	15
241520 (021)	210	20				30	160	242594 (002)	40	10				5	30
241530 (021)	65	10				10	40	242604 (002)	30	10				5	15
241550 (017)	125	15				10	100	242610 (001)	*						
241560 (015)	30	10				5	15	242620 (001)	*						
241570 (002)	30	10				5	15	242630 (217)	45	10				5	30
241585 (018)	205	70				40	100	242644 (001)	30	10				5	15
241595 (018)	400	70				45	345	242654 (010)	30	10				5	15
241604 (018)	250	15				20	225	242664 (218)	30	10				5	15
241614 (208)	30	10				5	15	242674 (214)	115	15				15	85
241624 (208)	30	10				5	15	242684 (011)	25	10				5	10
241634 (218)	30	10				5	15	242694 (011)	25	10				5	10
241644 (010)	25	10				5	10	242704 (010)	25	10				5	10
241654 (010)	25	10				5	10	242714 (010)	30	10				5	15
241664 (011)	25	10				5	10	242724 (010)	35	10				5	15
241674 (011)	35	10				5	20	242734 (011)	30	10				5	15
241684 (011)	30	10				5	15	242744 (010)	35	10				5	20
241694 (011)	30	10				5	15	242754 (215)	45	10				5	30
241704 (010)	570	10				50	400	242764 (001)	*						
241714 (010)	30	10				5	15	242774 (003)	30	10				5	10
241724 (008)	40	10				5	30	242784 (003)	30	10				5	10
241734 (008)	30	10				5	15	242794 (018)	40	15				5	20
241744 (214)	125	15				15	95	242804 (001)	*						
241754 (218)	35	10				5	20	242814 (211)	85	15				10	60
241764 (010)	300	30				25	305	242824 (010)	65	10				10	45
241774 (010)	30	10				5	15	242834 (001)	20	10				5	10
241784 (010)	30	10				5	15	242844 (218)	30	10				5	15
241804 (010)	30	10				5	15	242854 (001)	*						
241814 (010)	35	10				5	20	242864 (001)	*						
241824 (010)	35	10				5	20	242874 (003)	45	10				5	30
241834 (213)	140	10				20	120	242884 (212)	45	10				5	30
241844 (218)	80	10				10	70	242894 (214)	55	10				5	40
241854 (218)	80	10				10	70	242904 (008)	30	10				5	15
241874 (217)	55	10				10	35	242914 (002)	30	10				5	15
241884 (214)	105	15				15	75	243004 (002)	30	10				5	15
241894 (213)	45	10				5	30	243014 (011)	25	10				5	10
241904 (213)	35	10				5	20	243024 (011)	25	10				5	10
241914 (210)	35	10				5	20	243034 (011)	25	10				5	10
241924 (214)	120	10				15	90	243044 (016)	30	10				5	15
241934 (208)	30	10				5	15	243054 (112)	745	135				105	505
241944 (208)	30	10				5	15	243104 (109)	545	75				60	410
241954 (218)	75	10				10	55	243124 (016)	35	10				5	20
241964 (202)	145	10				5	100	243134 (012)	35	10				5	15
241974 (202)	30	10				5	15	243144 (003)	45	10				5	20
241984 (208)	30	10				5	15	243154 (003)	55	10				5	20
241994 (202)	45	10				5	30	243164 (003)	55	10				5	20
242004 (217)	50	10				10	30	243174 (003)	55	10				5	20
242014 (213)	35	10				5	20	290034 (003)	30	10				5	15
242024 (218)	30	10				5	15	290044 (012)	30	10				5	15
242034 (203)	170	15				20	155	290054 (218)	45	20				10	25
242044 (203)	165	15				20	150	290064 (218)	30	10				5	15
242054 (215)	95	10				15	70	290074 (012)						10	20
242064 (218)	30	10				5	15	290084 (012)						10	20
242074 (203)	145	15				20	110	290094 (212)	110	40				10	60
242084 (209)	30	10				5	15	290104 (210)	185	15				10	100
242094 (209)	70	15				15	45	290114 (015)	*						
242104 (208)	45	10				5	30	290124 (008)	*						
242114 (208)	25	10				5	10	290134 (008)	*						
242124 (208)	25	10				5	10	290144 (008)	*						
242134 (218)	75	10				10	55	290154 (008)	*						
242144 (209)	60	10				10	40	290164 (020)	*						
242154 (209)	35	10				5	20	290174 (212)	25	10				5	10
242164 (218)	30	10				5	15	290184 (212)	25	10				5	10
242174 (217)	35	10				5	20	290194 (212)	25	10				5	10
242184 (215)	55	10				10	35	290204 (212)	25	10				5	10
242194 (217)	80	15				10	55	290214 (212)	25	10				5	10
242204 (217)	60	10				10	40	290224 (017)	*						
242214 (217)	60	10				10	40	290234 (217)						10	25
242224 (218)	55	10				10	35	290244 (217)						10	25
242234 (211)	60	10				10	40	290254 (011)	*						
242244 (010)	35	10				5	20	290264 (002)	*						
242254 (007)	625	65				70	490	290274 (010)	*						
242264 (015)	30	10				5	15	290284 (110)	*						
242274 (110)	105	30				20	135	290294 (004)	38	10				8	20
242284 (102)	70	10				5	50	290304 (004)	28	10				8	20
242304 (001)	*							290314 (004)	28	10				8	20
242314 (001)	*							290324 (004)	28	10				8	20
242324 (001)	*							290334 (004)	28	10				8	20
242334 (001)	*							290344 (004)	28	10				8	20
242344 (001)	*							290354 (004)	28	10				8	20
242354 (001)	*							290364 (004)	28	10				8	20



section V

2100 contributors' guide

New contributed programs are welcome for consideration as entries to the HP 2100 Library. It is HP's opportunity to expand communication among users. A new contributor of an accepted program receives a traditional plaque engraved with his name, and the choice of any other contributed program. This guide contains the necessary information for contributing all assembly language, FORTRAN, and ALGOL programs, and also microprograms, which will run on an HP 2100 computer.

The Software Center compiles and/or assembles but does not test or maintain contributed entries. Program maintenance is the responsibility of the person submitting the program because he is the most knowledgeable concerning his entry. The Software Center does assume responsibility, however, for collecting and forwarding any error reports and/or incomplete documentation reports. (A software report form is included at the end of this guide and one is distributed with each program ordered from the Software Center.)

MINIMUM PROGRAM PACKAGE

"Proper documentation" for program acceptance into the Software Center includes: machine readable source tapes, Program Documentation Form (included in this guide), Software Center Disclaimer (included in this guide), and a test case.

Documentation

The Documentation Form becomes the only reference to understanding and using a contributed program; therefore, it is important that the directions be clear and specific. When filling out this form, the contributor may encounter subdivisions requesting information inappropriate to his contributed package. In such instances he should respond with "NONE" or "N/A" (not applicable) to insure that important documentation is not missed. The contributor can easily expand on any section of the Documentation Form by adding plain white 8-1/2" x 11" paper, and copying the section number followed by the word "continued."

NOTE: All documentation, including sample runs, core allocation lists, and flow charts, will be commercially printed. Therefore, all items that cannot be retyped must be submitted dark enough and clear enough to conform to printer standards. This applies especially to all computer output.

Test Case

It is important that the user be able to verify proper functioning of the program he has received (i.e., no punch errors, bugs, etc.). The contributor is asked to provide a

set of test inputs for his program and the corresponding output. This may take the form of a "debug" program, a listing of data values, a data source tape with accompanying output list, or in the case of contributed subroutines and microprograms, any small program that demonstrates its proper function. If this test case policy is not applicable to the program, the contributor may use Section 7.0 of the Documentation Form to discuss how a user should verify that he has received and loaded a program properly.

MAILING PROCEDURES

All program packages submitted to the Hewlett-Packard Software Center should be wrapped securely and sent to:

Hewlett-Packard Software Center
11000 Wolfe Road
Cupertino, California 95014
Attention: Users Library

MAINTENANCE, REVISIONS AND REPLACEMENT

Maintenance

The Hewlett-Packard Software Center approach to program maintenance has found general agreement among users as the only way to keep the quality of contributed programs at a high level of performance. Program maintenance implies correction of program errors, and clarification of program documentation, most often accomplished by revisions to a program. To be effective, the Software Center has to insure the integrity of its programs; therefore, no response to program errors may result in the removal of the program from the library.

Revisions

There are many possible reasons for program revisions, including: clarification of documentation, correction of program "bugs", added versatility to a program, and any minor changes in coding designed to improve program efficiency. Revision must always be accompanied by a new Software Center Disclaimer checked as a revision. Only those items which are changed need be resubmitted.

Replacement

A program replacement differs from a revision in that it is a completely recoded program meant to perform the same or similar function of some previously submitted package. Replacements are handled as new entries and are assigned new program identification numbers. Suggestions for upgrading existing programs are appreciated and will be carefully reviewed by Software Center personnel.

SAMPLE FORMS

INSTRUCTIONS

HEWLETT-PACKARD SOFTWARE CENTER
CONTRIBUTED PROGRAM DOCUMENTATION FORM

1.0 IDENTIFICATION

1.1 Program Title
Decimal Arithmetic Routines

1.2 Program Language(s)

<input type="checkbox"/> FORTRAN II	<input checked="" type="checkbox"/> Relocatable Assembly Language
<input type="checkbox"/> FORTRAN IV	<input type="checkbox"/> Absolute Assembly Language
<input type="checkbox"/> ALGOL	<input type="checkbox"/> Microprocessor Assembly Language

1.3 Program Type

<input type="checkbox"/> Program	<input checked="" type="checkbox"/> Subroutine
<input type="checkbox"/> Driver	<input checked="" type="checkbox"/> Function
<input type="checkbox"/> Other _____	

2.0 PROGRAM DESCRIPTION

This set of subroutines allows an Assembly Language or FORTRAN program to perform decimal arithmetic operations (addition, subtraction, and multiplication) on any pair of character strings. Integer and fixed point real numbers may be mixed without limitation. Interspersed non-numeric characters are ignored. The program is operable in BCS and the calling program can avoid using the formatter by inputting strings without conversion through the MAGTP routine or IOC FORTRAN-CALLABLE, A112-22172A (in BCS).

(Explanations are listed only where necessary)

CONTRIBUTED PROGRAM DOCUMENTATION FORM (2)

3.0 ENVIRONMENT DESCRIPTION

3.1 Supported Software Requirements - Operating System

<input type="checkbox"/> DOS-M	<input type="checkbox"/> SIO System
<input checked="" type="checkbox"/> BCS	<input type="checkbox"/> HP Basic Version _____
<input type="checkbox"/> MTS	<input type="checkbox"/> Self-Contained
<input type="checkbox"/> RTE	<input type="checkbox"/> Other _____

3.2 Contributed Software Requirements

Name and order number of other contributed packages required:
NONE

3.3 Hardware Requirements

4K & Teletype. (EAU greatly decreases multiply execution time.)

Hardware Requirements (3.3)

List any I/O devices, instruments, direct memory access (DMA), extended arithmetic unit (EAU), writable control store (WCS), memory protect, magnetic tape, disc, or other hardware features necessary to execute the program. Simplest description would be "4K and TTY."

CONTRIBUTED PROGRAM DOCUMENTATION FORM (3)

4.0 USER PROCEDURES

4.1 Tape Identification

Account for all physical tapes included in this package.

Tape Number	Contents Programs, tests, data, etc. in order from outside to inside of tape	Control Statement (if any)
1	"STLIB" - Decimal Arithmetic Routines	ASMB,R,B,L,T
2	Continuation of "STLIB" "TEST"	----- ASMB,R,B,L,T

Tape Identification (4.1)

Describe exactly what is on each physical tape. Enough information should be supplied so a user can compile/assemble and load the programs without first listing the tapes. Several routines, separated by feed hole frames, may be strung together on one physical tape.

CONTRIBUTED PROGRAM DOCUMENTATION FORM (4)

4.0 USER PROCEDURES (Cont.)

4.2 Load and Run Instructions

1. Assemble the Decimal Arithmetic Routines. The source exists on two physical tapes.
2. Compile/Assemble the calling program.
3. Load the calling program, Decimal Arithmetic Routines, and the Relocatable Program Library.
4. Press RUN. Set the switch register so as to execute the required subroutine.

SW0 = 0 ADDITION
 SW0 = 1, SW15=1 SUBTRACTION
 SW0 = 1, SW15=0 MULTIPLICATION

Enter two numbers on the TTY, each terminated by a "return" and "linefeed." The result will then be printed and the program will wait for another pair of numbers. (See example program enclosed.)

Load and Run Instructions (4.2)

Describe all unusual procedures necessary to compile/assemble, load, and run. If the user input is mixed with computer output, indicate that the mode of I/O is conversational. List data in order requested by the program, giving device and format.

CONTRIBUTED PROGRAM DOCUMENTATION FORM (6)

4.4 Diagnostic Messages or Additional Exits

On certain errors, calls to .ERRR are made:

1. A null argument string for BCS:
"E-11 NS" is printed and the computer halts.
2. Result string length exceeds 64 characters:
 - a) Add: "E-11 OV" is printed.
 - b) Multiply: "E-12 OV" is printed.

5.0 LITERATURE REFERENCE

NONE

6.0 SPECIAL CONSIDERATIONS

Since the result string replaces the first argument string, ample space must be provided. Therefore, the first argument string should be padded on the right with blanks so that the total length can hold the result string. The length specified in the calling sequence for the first argument string should be the actual length, not including the padding.

The choice of 63 characters maximum was arbitrary and can be increased to any practical number of characters as follows:

EXAMPLE: to increase the maximum number of digits to 256, the following edits are needed:

<u>SOURCE #1</u>	<u>SOURCE #2</u>
/CR,8,21,22	/R,460
256	SIZE EQU 256
/E	/E

Execution times for add and subtract are approximately $(5+0.7*N)$ milliseconds, for N - digit result strings. For multiply, $(4+(N*1.6)/2)$ msec. The times are for a 2.0 microsecond Non-EAU machine.

Diagnostic Messages or Additional Exits (4.4)

Include program - generated diagnostic messages with explanations of the "cause" and "cure". For subprograms include exits which do not return control to the calling program.

SPECIAL CONSIDERATIONS (6.0)

Where pertinent, provide clarification of interrupt status, execution time, and volatile registers (those registers whose contents may be changed, but not saved and restored within a subprogram). Any other information helpful to a user and particular to your program may be clarified here.

CONTRIBUTED PROGRAM DOCUMENTATION FORM (7)

7.0 EXAMPLE INPUT/OUTPUT (Test Case)

Assemble the test program.

Load TEST, decimal arithmetic routines, and the relocatable program library in that order. See 4.0 for user procedures.

TEST results attached.

*RUN

->INDICATES USER INPUT

ADDITION (SW0=0, SW15=0)

```

+1.0
+3.45
  4.45

++99.09
+011
99.101

+$124,968.99
+$      1.01
124970.00

+$1,247.03
+.69
1247.72

+1234567890
+9876543210
11111111100

++32.990
+-.01
 32.980

++35.009
+35.009
.000

+-1,998
+2
-1996
    
```

[continued]

EXAMPLE INPUT/OUTPUT (Test Case) (7.0)

Describe user procedures to verify that your contributed program is working properly. If the sample problem is a source tape, provide operating instructions. If the sample problem is in a conversational mode, distinguish user-input from computer-output by marking a right arrow in the left margin of every user-input line.

**HEWLETT-PACKARD SOFTWARE CENTER
CONTRIBUTED PROGRAM DOCUMENTATION FORM**

1.0 IDENTIFICATION

1.1 Program Title

1.2 Program Language(s)

- | | |
|-------------------------------------|---|
| <input type="checkbox"/> FORTRAN II | <input type="checkbox"/> Relocatable Assembly Language |
| <input type="checkbox"/> FORTRAN IV | <input type="checkbox"/> Absolute Assembly Language |
| <input type="checkbox"/> ALGOL | <input type="checkbox"/> Microprocessor Assembly Language |

1.3 Program Type

- | | |
|--------------------------------------|-------------------------------------|
| <input type="checkbox"/> Program | <input type="checkbox"/> Subroutine |
| <input type="checkbox"/> Driver | <input type="checkbox"/> Function |
| <input type="checkbox"/> Other _____ | |

2.0 PROGRAM DESCRIPTION

CONTRIBUTED PROGRAM DOCUMENTATION FORM (2)

3.0 ENVIRONMENT DESCRIPTION

3.1 Supported Software Requirements - Operating System

DOS-M

SIO System

BCS

HP Basic Version _____

MTS

Self-Contained

RTE

Other _____

3.2 Contributed Software Requirements

Name and order number of other contributed packages required:

3.3 Hardware Requirements

CONTRIBUTED PROGRAM DOCUMENTATION FORM (3)

4.0 USER PROCEDURES

4.1 Tape Identification

Account for all physical tapes included in this package.

Tape Number	Contents Programs, tests, data, etc. in order from outside to inside of tape	Control Statement (if any)

CONTRIBUTED PROGRAM DOCUMENTATION FORM (4)

4.0 USER PROCEDURES (Cont.)

4.2 Load and Run Instructions

CONTRIBUTED PROGRAM DOCUMENTATION FORM (5)

4.0 USER PROCEDURES (Cont.)

4.3 Subroutines or Microprograms

CONTRIBUTED PROGRAM DOCUMENTATION FORM (6)

4.0 USER PROCEDURES (Cont.)

4.4 Diagnostic Messages or Additional Exits

5.0 LITERATURE REFERENCE

6.0 SPECIAL CONSIDERATIONS

CONTRIBUTED PROGRAM DOCUMENTATION FORM (7)

7.0 EXAMPLE INPUT/OUTPUT (Test Case)

HEWLETT-PACKARD SOFTWARE CENTER
CONTRIBUTED PROGRAM DISCLAIMER

INITIAL SUBMISSION

REVISION (PROGRAM NO. _____)

Classification Code*

Errors Corrected

Up to 4 Cross Reference Words**

Documentation Clarified

1. _____ 2. _____

Other reason _____

3. _____ 4. _____

TITLE

CONTRIBUTOR'S NAME

ORGANIZATION

ADDRESS

TELEPHONE

Name and organization to appear in catalog?

yes no

May a user contact you directly?

yes no

MATERIAL SUBMITTED

Documentation

Source Program

Test Case

Other _____

DISCLAIMER:

To the best of my knowledge, this contributed program is free of any proprietary information belonging to any person or organization. I am making this program information available to the HEWLETT-PACKARD SOFTWARE CENTER. I hereby agree that HP may reproduce, publish, and use it, and authorize others to do so without obligations or liability of any kind.

(Signature)

(Date)

* See list on next page

** Select up to four cross reference words from Cross Reference Index

HP 2100 CONTRIBUTED SOFTWARE REPORT

Use the space provided to comment on any problems or modifications on HP 2100 contributed software and enclose any output that may be useful. A copy will be forwarded to the contributor, and a reply will be returned to the person who submits this report. Send completed report to:

Hewlett-Packard Software Center
11000 Wolfe Road
Cupertino, California 95014
Attention: Users Library

Submitted By _____ Date _____

Organization Name _____ Program Name _____

Address _____ Order No. _____

City, State, Zip _____

Phone _____

Has software been modified by user? NO _____ YES _____ (If YES, explain below)

Enclosed References:

TTY Log _____ Listing _____ Corrected Tape _____ Corrected Listing _____

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Printed in U.S.A.

HP 5950-9226