

## APPENDIX A

### PDP-10 Equipment List

	<b>Processor and Processor Options</b>		
KA10	<p><b>ARITHMETIC PROCESSOR:</b> central processing unit for all PDP-10 systems with floating point and byte manipulation instructions and including:</p> <ul style="list-style-type: none"> <li>- 300 character/second photoelectric paper tape reader</li> <li>- 50 cps paper tape punch</li> <li>- 10 cps console teleprinter, LT35A (LT37 furnished when available)</li> <li>- functional operator console</li> <li>- multiplexed Input/Output Processor (IOP) with seven levels of priority interrupt</li> <li>- real time clock</li> </ul>	MD10E	<b>CORE MEMORY EXPANSION MODULE:</b> 32,768 words, 1.80 $\mu$ s cycle time. Up to three may be added to each MD10.
		BS10A	<b>ADDITIONAL MEMORY CABLE SETS:</b> for the MD10.
		DF10	<b>DATA CHANNEL:</b> permits data transfers between high speed devices and core memory. It will service up to eight high speed devices such as RC10, RB10, and RP10.
			<b>Disk Systems</b>
		RC10	<b>SWAPPING DISK CONTROL:</b> provides control for up to 4 RD10 disk files. It connects to the DF10 data channel which provides a direct path to memory and requires at least one RD10.
KM10	<b>FAST REGISTERS:</b> sixteen 36-bit integrated circuit registers used as multiple accumulators and/or index registers and for highly iterative program loops. Replaces the first 16 locations of main core memory.	RD10	<b>SWAPPING DISK FILE:</b> stores 512,000 36-bit words. Average latency time, 17 ms. Transfer rate is 13.3 $\mu$ s per 36-bit word. The RD10 provides high speed swapping of programs directly in and out of core memory in timesharing systems. The RD10 can also be used for user file storage. Up to 4 RD10's can be connected to one RC10 disk control unit.
KT10A	<b>DUAL MEMORY PROTECTION &amp; RELOCATION REGISTERS:</b> provide multiprogramming hardware for automatic protection and relocation of reentrant and non-reentrant code. (Required for time-sharing.)		
	<b>Core Memory</b>		
	<i>Core memories are available in various sizes and speeds. Each memory stores 36 data bits plus a parity bit and each operates asynchronously with respect to the central processor and channel, establishing its own independent timing cycle.</i>		
MA10	<b>CORE MEMORY:</b> 16,384 words, 1.00 $\mu$ s cycle time. Each is supplied with one memory port with cables. Up to three MC10 Additional Memory Access Ports may be added, allowing access to a total of four processors and/or channels.	RB10A	<b>STORAGE DISK FILE (dual positioning):</b> stores from 20,971,520 to 104,857,600 36-bit words in multiples of 8,388,608 words. Average access time is 190 ms. Transfer rate ranges from 22.5 $\mu$ s to 72 $\mu$ s per word depending on zone being accessed. Dual head positioning arms permit overlapping of data transfer and seek operations. Basic unit includes six disks and RA10 Disk Control.
MA10A	<b>CORE MEMORY:</b> 8,192 words, 1.00 $\mu$ s cycle time. Each is supplied with one memory port with cables. Up to three MC10 Additional Memory Access Ports may be added, allowing access to a total of four processors and/or channels.	RB10C	<b>ADDITIONAL DISK:</b> a maximum of 20 disks (each with a capacity of 4,194,304 words) can be added to the basic RB10. (Please specify in even multiples of two RB10C's.)
MC10	<b>ADDITIONAL MEMORY ACCESS PORT:</b> provides the additional cables and logic to connect an additional processor/channel to a MA10, MA10A, or MB10 memory port.	RP10	<b>DISK PACK CONTROL:</b> provides control of up to eight RP02 Disk Pack Drives. Requires the DF10 data channel which provides a direct path to memory. Also requires at least one RP02.
MD10	<b>CORE MEMORY:</b> 32,768 words, 1.80 $\mu$ s cycle time. Supplied with four memory access ports and a memory cable set for one of these ports. Up to three additional BS10A memory cable sets are optional.	RP02	<b>DISK PACK DRIVE:</b> The RP02 provides storage for up to 5,196,800 36-bit words on interchangeable disk packs. Average access time is 62.5 ms, including 12.5 ms average rotational latency. Transfer rate is 15 $\mu$ s/word. Requires RP10 Control. Includes one RP02P pack.
		RP02P	<b>DISK PACK:</b> Pack for RP02 Disk Pack Drive.

## Magnetic Tape Systems

- TD10** DECTape CONTROL: provides control for up to eight TU55 DECTape transports. Requires at least two TU55 transports. (One TD10 control is required with every PDP-10 system.)
- TU55** DECTape UNIT: reads and writes magnetic tape at a 15K characters/second rate. (Tapes are 3½ in. diameter, 260 ft. long and ¾ in. wide.) Tape units are bi-directional and redundantly recorded. Each tape has a directory, allowing random access to user files. (Two DECTape units are required per PDP-10 system.)
- TM10A** MAGNETIC TAPE CONTROL: controls up to eight tape transports. Permits reading either 7 or 9 channel (or combination of both) industry standard tape.† Requires at least one DEC magnetic tape unit of the types shown below. Magnetic tape unit types may be intermixed on a single control.
- TM10B** MAGNETIC TAPE CONTROL: same as TM10A but provides for data channel operation. Requires a DF10 data channel.
- TM10C** TM10B MODIFICATION KIT: provides necessary components for converting a TM10A Magnetic Tape Control to a TM10B.
- TU20A** MAGNETIC TAPE UNIT: reads and writes 9-channel USASI standard† magnetic tape at 45 inches/second and a density of 800 bits/inch.
- TU20B** MAGNETIC TAPE UNIT: reads and writes 7-channel industry standard tape at 45 inches/second and densities of 200, 556, and 800 bits/inch (36K characters/second).
- TU30A** MAGNETIC TAPE UNIT: reads and writes 9-channel USASI standard† magnetic tape at 75 inches/second and density of 800 bits/inch (60K characters/second).
- TU30B** MAGNETIC TAPE UNIT: reads and writes 7-channel industry standard tape at 75 inches/second, and densities of 200, 556 and 800 bits/inch (60K characters/second).

## Input/Output Devices

## Punched Card Equipment

- CR10A** CARD READER: reads 80-column punched cards at 1,000 cards/min (800 cards/min in systems using 50 Hz power). Card Hopper and stacker capacities are 1,000 cards.

†USASI X3.22-1968 Recorded Magnetic Tape for Information Interchange.

- CP10A** CARD PUNCH: punches cards at a rate of 200 cards/min when punching in all 80 columns. A maximum rate of 365 cards/min is possible when only the first 16 columns are punched. Card Hopper and stacker capacities are 1,000 cards.

## Line Printers

		Characters	Lines/ Minute	Columns/ Line
LP10A	LINE PRINTER	64	300	132
LP10C	LINE PRINTER	64	1,000	132
LP10D	LINE PRINTER	96	600	132
LP10E	LINE PRINTER	128	500	132

## Plotters

- XY10.** PLOTTER CONTROL: interface for Cal-Comp 500 and 600 series digital incremental plotters.

**XY10A** PLOTTER AND CONTROL

Cal Comp Plotter Model	Step Size	Speed (Steps/ Minute)	Width (Inches) Paper
XY10(565)	0.01 inches	18,000	12
	0.005 inches	18,000	
	0.1 mm.	18,000	

**XY10B** PLOTTER AND CONTROL

XY10(563)	0.01 inches	12,000	31
	0.005 inches	18,000	
	0.1 mm.	18,000	

## Data Communication Equipment

## Data Line Scanner

*Data Line Scanner provides on-line servicing of up to 64 communication lines. Accommodates any device which uses eight level serial teletype code at speeds up to 100 kilobaud. Full duplex with local copy, and half duplex data modes are available on each line serviced.*

- DC10A** CONTROL UNIT: the scanner and control unit for the DC10 communication controller provides 4 units of cabinet space and power supplies for various combinations of line equipment.
- DC10B** 8-LINE GROUP UNIT: provides teletype interface for up to 8 local lines, full duplex. May be used with duplex or full duplex with local copy data sets. When used with data sets, communications must be established, maintained, and terminated manually, unless DC10E Expanded Data Set Control Units are provided. Requires one unit of cabinet space in a DC10A or DC10F.

- DC10C 8-LINE TELEGRAPH RELAY ASSEMBLY: provides conversion from local to long lines using full or half-duplex facilities. Requires two units of cabinet space in a DC10A or DC10F.
- DC10D TELEGRAPH POWER SUPPLY: the standard line voltage supply used with DC10C (120V dc at 2 amperes). No additional cabinet space required.
- DC10E EXPANDED DATA SET CONTROL: provides expanded control of eight data sets in the DC10 system. Requires two units of cabinet space in a DC10A or DC10F.
- DC10F EXPANDER CABINET: provides eight units of cabinet space and power supplies for expansion beyond capacity of DC10A.

#### 680/I Data Communication System

*680/I Data Communication System provides on-line servicing of up to 63 communication lines. System handles 8 level serial teletype code at speeds of 110, 150, or 300 baud. Terminals may be local or remote via modems (data sets). To configure a 680/I system, determine the number of lines, both local and data set. Add to the basic communication system enough M750 dual serial line adapters for the total line capacity. (The maximum number of lines is 63.) A 680/I system must include one DC68A. If there are any local teletypes, a DC08B is required. If there are more than 48 local teletypes, a second DC08B is required. Each data set line requires one 689LM. If there are 1 to 32 data set lines, one 689AG is required. If there are more than 32 data set lines, a second 689AG is required.*

- DC68A BASIC COMMUNICATION SYSTEM: includes hardware common to any 680/I system for PDP-10 use. Additional options listed below are required to implement a specific number of local or data set lines. The DC68A basic system includes one DA10 PDP-8/PDP-10 interface, one PDP-8/I-D computer (rack mounted with 4K of memory with MP8/I parity option, and an ASR33 teleprinter), one DW08A negative bus adapter, one DL8/I serial line adapter, one DC08A serial line multiplexor, and DC08Y clocks for 110, 150, and 300 baud.
- M750 DUAL SERIAL LINE ADAPTER: implements two full duplex channels in the basic communication system. One unit is required for every two local or data set lines.
- DC08B LOCAL LINE PANEL: accommodates up to 48 local terminals suitable for direct 680/I connection.

- 689AG MODEM INTERFACE: provides control interface and mounting space for up to 32 689LM's.
- 689LM MODEM INTERFACE AND CONTROL: provides complete interfacing to and control of one BELL 100 series modem (data set) or equivalent.

#### Teletypes and Terminals

##### For Local DC10 Use

- LT33A TELEPRINTER: 33TS machine (KSR33, friction feed).
- LT33B TELEPRINTER: 33TY machine (ASR33, sprocket feed, automatic reader control XON/XOFF feature).
- LT35A TELEPRINTER: VSL312HF machine (KSR35, sprocket feed).
- LT37AC TELEPRINTER: KSR37, sprocket feed, 60 Hz Operation only. Also suitable for use with Bell System 103-type data set or equivalent.

##### For Local 680/I Use

- LT33C TELEPRINTER: 33TS machine (KSR33, friction feed).
- LT33H TELEPRINTER: 33TY machine (ASR33, sprocket feed, automatic reader control XON/XOFF feature).
- LT35C TELEPRINTER: VSL312HF machine (KSR35, sprocket feed).

#### Display Systems

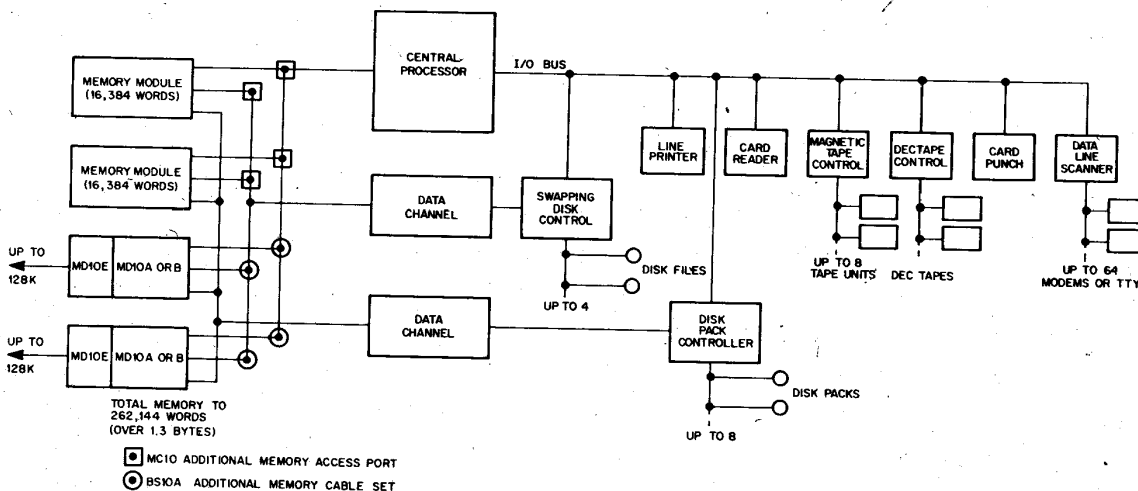
- 346/340B PRECISION INCREMENTAL CRT DISPLAY: plots points, lines, vectors, and characters on a 9 $\frac{3}{8}$  in. square raster of 1,024 points along each axis. 1 $\frac{1}{2}$   $\mu$ s is required per point in vector, increment, and character modes. Random point plotting rate of 35 $\mu$ s. A 370 high-speed Light Pen is included.
- 342B CHARACTER GENERATOR for 346/340B
- 348/VR30 PRECISION POINT PLOTTING DISPLAY: operates at a maximum plotting rate of 20 KC or one point every 50  $\mu$ s on a 9 $\frac{3}{8}$  in. x 9 $\frac{3}{8}$  in. display area. Number of addressable points along each axis is 1024. A 370 high-speed Light Pen is included.
- VP10 POINT PLOTTING DISPLAY CONTROL: operates at either of two maximum plotting rates. Low rate is 10 KC (one point every 100  $\mu$ s). High rate is 50 KC (one point every 20  $\mu$ s). Number of addressable points along each axis is 1024. Control interfaces to a customer supplied oscilloscope (Tektronix Type RM503 or equivalent) or to a CRT display.
- 370 HIGH SPEED LIGHT PEN: for use with VP10.

Miscellaneous

DA10 PDP-8 or PDP-9 to PDP-10 INTERFACE GP10

DK10 PROGRAMMABLE REAL TIME CLOCK:  
unit is supplied with a crystal oscillator which provides a resolution of 10  $\mu$ s.

GENERAL PURPOSE INTERFACE TO PDP-10 I/O BUS: includes cabinet, two 728 power supplies, one 844 power control, indicators, end panels, fan, convenience outlet with fans, and BS10A/15 ft. cable set. Logic provides a status register, device decoding, read-in gating and line buffering.



TYPICAL PDP-10 SYSTEM CONFIGURATION

Appendix B  
PDP-10 Software

Table B-1 shows the DEC-supplied system software (CUSPs) currently available to PDP-10 users.

Table B-1  
PDP-10 Software

Name of CUSP	Comment
AID	See description in PDP-10 User's Bookshelf in Appendix C.
BASIC	See PDP-10 User's Bookshelf in Appendix C.
BATCH	See PDP-10 User's Bookshelf in Appendix C.
BINCOM	Documented in this handbook.
*CHKPNT	Saves current charge file and initiates a new one.
CODE	See PDP-10 User's Bookshelf (supplementary documents) in Appendix C.
*COMPIL	Documented in this handbook.
COPY	See PDP-10 User's Bookshelf (supplementary documents) in Appendix C.
CREF	Documented in this handbook.
*DD10	Loads system to disk from DEctape.
DDT	Documented in this handbook.
*DSKLST	Snapshot of disk.
EDITOR	Documented in this handbook.
*FAILSAFE	Saves the contents of disk on magtape and later restores these contents back onto the disk.

Table B-1. (cont)  
PDP-10 Software

Name of CUSP	Comment
*FILDDT	Debugging aid for the Monitor.
FORTRAN IV (F40)	See PDP-10 User's Bookshelf in Appendix C.
FUDGE2	Documented in this handbook.
GLOB	Documented in this handbook.
*LINED	Documented in this handbook.
LOADER	Documented in this handbook.
*LOGIN	Documented in this handbook.
*LOGOUT	Documented in this handbook.
MACRO	Documented in this handbook.
*MONEY	Lists charges of computer users.
PIP	Documented in this handbook.
PIPL	Documented in this handbook.
*PRINT	Queues files for LPT.
*PRINTR	Prints selected system files.
*REACT	Alters system accounting file (login numbers and codes).
SRCCOM	Documented in this handbook.
*STACK	See PDP-10 User's Bookshelf in Appendix C.
*SYSTAT	Snapshot of time-sharing system.
TECO	Documented in this handbook.
TENDMP	Documented in this handbook.
*Currently available in disk systems only	

# pdp10 user's bookshelf

## A Bibliography of PDP-10 Programming Documents

OCTOBER, 1969

Software documents in this bibliography can be obtained from Digital Sales Offices or by sending a written request (with check or money order) to *Program Library, Digital Equipment Corporation, Maynard, Massachusetts 01754*. The following key, which indicates the current status of software manuals and their relationship to preceding editions, is designed to help the reader determine whether the present content of a given manual meets his needs.

- (1) *New* signifies that the manual is being published for the first time (designated by a box).
- (2) *Major Revision* signifies that new capabilities and/or changed procedures have been incorporated in the manual (designated by an asterisk).
- (3) *Minor Revision* signifies that the manual remains essentially the same as its predecessor.
- (4) Manuals that are unchanged since the last bibliography are shown with only the date of publication after the title.

### **PDP-10 System Reference Manual**

**Minor Revision  
August, 1969**

An indexed programmer's handbook that describes the PDP-10 processor and the basic instruction repertoire. Following an introduction to the PDP-10's central processor structure, general word format, memory characteristics, and assembler source-programming conventions, this manual presents the specific instruction format, mnemonic and octal op codes, functions, timing formulas, and examples of each of the basic instructions. Several helpful appendices, including mnemonic op code tables, algorithms and timing charts, complete the manual.

Order No. DEC-10-HGAC-D \$5.00

### **\*Time-Sharing Monitors:**

**Multiprogramming Monitor (10/40) Major Revision  
Swapping Monitor (10/50) August, 1969**

A complete guide to the use of the PDP-10's two powerful, real-time, multiprogramming, time-sharing Monitors. Both Monitors schedule multiple-user time sharing of the system, allocate facilities to programs, accept input from and direct output to all system I/O devices, and relocate and protect user programs in storage. This manual details user interaction with the Monitors, from both a programming and operating viewpoint, and contains several quick-reference tables of commonly used Monitor commands and parameters, as well as examples of user coding.

Order No. DEC-T9-MTZA-D \$3.00

### **AID (Algebraic Interpretive Dialogue) October, 1968**

A 'hands-on' guide to the use of AID at the Teletype console. AID, a PDP-10 version of JOSS<sup>1</sup>, is an on-line system which provides each user with a personal computing service utilizing a conversational algebraic language. This manual describes the use of the Teletype, the syntax and general rules governing the AID language, and each of the AID commands, with appropriate examples.

Order No. DEC-10-AJBO-D \$3.00

<sup>1</sup>JOSS is a trademark and service mark of the RAND Corporation for its computer program and services using that program.

### **Single-User Monitor Systems**

**November, 1968**

A complete guide to the use of the Single-User Monitor, which performs fast job-to-job sequencing, provides I/O service for all standard devices, and is upward compatible with the Time-Sharing systems. This manual contains the same type of helpful information as the Time-Sharing manual described above. Order No. DEC-10-MKDO-D \$2.00

### **Batch Processor (Batch) and Job Stacker (Stack)**

**May, 1969**

An indexed manual containing all information required to prepare and run user jobs under control of the Batch Processor in either a single-user or time-sharing environment. Batch supervises the sequential execution of a series of jobs with a minimum of operator attention, yet allows the operator to interrupt, skip, repeat, or prematurely terminate one or more of the jobs in the series at any time. Job Stacker is used in conjunction with Batch to (1) transfer job files to the Batch input device and stack them there for subsequent input to Batch, (2) transfer Batch output job files from the Batch output device to some other device, (3) list job file directories, (4) delete job files, and (5) list directories with selective file deletion or transfer.

Order No. DEC-10-MBAC-D \$1.00

### **\*System User's Guide**

**Major Revision, Available  
August, 1969**

A fact-filled operations guide designed for handy reference at the user's Teletype console. Contains the basics of Teletype usage and complete operating procedures for all Commonly Used Service Programs (CUSP'S). Includes complete write-ups on DECTape Editor, Advanced BASIC, LINED, CCL (Concise Command Language), and Linking Loader. A typical chapter includes a brief description of the program, its operating environment, initialization procedures, command string formats, special switches, diagnostic messages, and in-depth examples. The manual is tab-indexed for the user's convenience.

Order No. DEC-10-NGCC-D \$10.00

### **COBOL LANGUAGE**

**August, 1969**

A reference manual designed to aid the user in writing COBOL programs for the PDP-10. Each COBOL language element is accorded a detailed treatment that explains and demonstrates its use in a variety of programming contexts. The four major divisions of a COBOL program and their conventional formats are clearly described and effectively illustrated. Other subjects given extended coverage in this manual are the COBOL library, COBOL reserved words, and the CALL procedure. Each chapter contains numerous examples of the efficient use of the components of a COBOL program. Indexed.

Order No. DEC-10-KC1A-D \$6.00

**TECO (Text Editor and Corrector) Minor Revision, August, 1969**

This programmer's reference manual describes the powerful context editor for the PDP-10. Editing is done on a character, line or variable character string basis. Describes more than 30 commands for inserting, deleting, appending, searching for, and displaying text.

Order No. DEC-10-ETEC-D \$1.50

**FORTRAN IV September, 1968**

This manual describes statements and features of FORTRAN IV on the PDP-10. Includes descriptions of library functions, calling library subroutines from the Science Library, and the FORTRAN IV operating System. An appendix contains language differences for those using the small (5.5K) PDP-10 FORTRAN Compiler.

Order No. DEC-10-AFCO-D \$2.00

**ADVANCED BASIC Minor Revision, August, 1969**

A valuable guide to the BASIC® commands needed for a more efficient expression of scientific, business, and educational problems. The manual contains complete tutorial explanations of these additional features: (1) matrix computations; (2) alphanumeric information handling; (3) program control and storage facilities; (4) program editing capabilities; (5) formatting of Teletype output; and (6) documentation and debugging aids.

Order No. DEC-10-KJZB-D \$3.50

**PIP (Peripheral Interchange Program) November, 1968**

Explains how PIP is used to transfer data files between standard peripheral devices. Shows how command strings are written, describes switches available for optional functions, techniques for handling file directories, error messages and other features.

Order No. DEC-10-PPCO-D \$1.00

**Science Library and Fortran Utility Subprograms**

**October, 1968**

A general reference manual covering Science Library arithmetic function and utility subprograms and FORTRAN IV nonmathematical utility subprograms (e.g., CHAIN, PDUMP, DATE, TIME). A functional description followed by the calling sequence, list of external subprograms called, entry points, and subprogram length, is given for each subprogram. In addition, the type of argument(s) and result, a description of the algorithm used, and a discussion of the accuracy of the algorithm are given for each function. Appendices contain information on error analyses, double-precision format and input conversion, a bibliography, and average run times.

Order No. DEC-10-SFLC-D \$4.00

**MACRO-10 Assembler Minor Revision, October, 1969**

The programmer's reference manual for the PDP-10 assembly system. Explains format of statements, use of pseudo-operations, and coding of macro instructions which make MACRO-10 one of the most powerful assemblers available.

Order No. DEC-10-AMZA-D \$3.00

**PDP-10 Reference Card May, 1968**

A handy pocket-sized guide to instruction mnemonics, hard-

ware and software (Monitor system) word formats, and instruction codes.

Order No. DEC-10-J00 A-D \$0.25

**PDP-10 Interface Manual May, 1968**

A complete guide to the process of interfacing any type of experimental apparatus, special purpose I/O devices, or other user-constructed items to the PDP-10 system. This manual details user time-sharing, I/O bus, console, memory bus, and channel bus requirements and provides other information useful to both the novice experimenter and the advanced logic designer.

Order No. DEC-10-HIFB-D \$10.00

**DDT-10 (Dynamic Debugging Technique) Minor Revision, April 1969**

This reference manual describes the dynamic debugging program used for on-line checkout and testing of MACRO-10 and FORTRAN programs. The commands of DDT are grouped so that they can be used easily and effectively by both the uninitiated user and the experienced programmer. Included in the appendices is an informative summary of all DDT functions.

Order No. DEC-10-CDDC-D \$1.00

The following supplementary documents are also available from the Program Library.

Concise Command Language (CCL) for the PDP-10		
Time-Sharing Monitors	DEC-10-RWDA-D	\$1.00
CHAIN (Reads CHAIN Files into Core and Links Them to Resident Programs)	DEC-10-LOVB-D	1.00
PDP-10 ASCII/BCD Code Conversion Program (CODE)	DEC-10-YNZA-D	1.00
PDP-10 DECTape Copy Program (COPY)	DEC-10-RPTA-D	1.00
FAILSAFE—Disk Save and Restore Program	DEC-10-YPDA-D	1.00
FORTRAN IV Software Maintenance Memos	DEC-10-KF1A-D	1.00
GLOB (Global Symbol Cross-Reference List)	DEC-10-YRZA-D	1.00
LINED—A Line Editor for PDP-10 Disk Files	DEC-10-EZDA-D	1.00
Linking Loader V.27	DEC-10-LLZA-D	1.00
MACRO V.24 Addendum (Supplements MACRO-10 Assembler Manual)	DEC-10-AMBO-DN	No Charge
FORTRAN IV Utility Subprograms (RELEASES, MAGDEN, BUFFER, IFILE, and OFILE)	DEC-10-FIYB-D	1.00
TENDUMP—DECTape Utility Program	DEC-10-LZYC-D	1.00
PDP-8 Scan 680 for PDP-10	DEC-10-RSCB-D	1.00
DCO8A/689AG Data Line Scanner for PDP-10	DEC-10-RWVA-D	1.00
Software Manual Update, August 1969 (Insert Pages for Updating PDP-10 Software Documents)	(No Order No.)	1.00

## MASTER INDEX/GLOSSARY

Page numbers are those which appear in boldface at the top center of each page.

- Absolute address:**  
An address that is permanently assigned by the machine designer to a storage location. See Monitor 354.
- Absolute binary programs, 250**
- Absolute coding:**  
Coding that uses machine instructions with absolute addresses.
- AC, 20**
- Access:**  
See random access, remote access, serial access.
- Access time:**  
(1) The time interval between the instant at which data are called for from a storage device and the instant delivery is started.  
(2) The time interval between the instant at which data are requested to be stored and the instant at which storage is started.  
(3) See page 15
- Accumulator, 9, 15, 354**
- ADD, 17, 45**
- Address:**  
(1) An identification, as represented by a name, label, or number, for a register, location in storage, or any other data source or destination such as the location of a station in a communication network.  
(2) Loosely, any part of an instruction that specifies the location of an operand for the instruction.
- Address assignments, 205-207**  
indexing, 206  
indirect, 206  
literals, 206  
location counter, 205, 361
- Address break, 98, 106, 107**
- Address format:**  
The arrangement of the address parts of an instruction.
- Address mode,**  
absolute, 211  
relocatable, 211
- Addressing, 9, 48**
- AID, 635**
- Algorithm:**  
A prescribed set of well-defined rules or processes for the solution of a problem in a finite number of steps, e.g., a full statement of an arithmetic procedure for evaluating SINX to a stated precision. Contrast with heuristic.  
(1) fixed point, 176-181  
(2) floating point, 181-186
- Allocation:**  
See storage allocation.
- Allocation of devices, 315**
- Alphabet:**  
(1) An ordered set of all the letters and associated marks used in a language.  
(2) An ordered set of letters used in a language, e.g., the 128 characters of the USASCII alphabet.
- Alphanumeric:**  
Pertaining to a character set that contains both letters and digits and usually other characters such as punctuation marks. Synonymous with alphameric.
- AND, 38**  
**ANDCA, 38**  
**ANDCB, 39**  
**ANDCM, 38**  
**AOBJN, 59**  
**AOBJP, 59**  
**AOJ, 62**  
**AOS, 63**  
**APR, 91, 97, 101**  
**AR (address register), 8**
- Argument:**  
An independent variable, e.g., in looking up a quantity in a table, the number, or any of the numbers that identifies the location of the desired value.
- Arithmetic and logical operations, 203**  
shift, 44, 49  
testing, 59-64
- Arithmetic testing, 59-64**
- Array:**  
An arrangement of elements in one or more dimensions.
- AS (address switch register), 7, 8**
- ASCII:**  
Same as USASCII.  
Standard, 220, 240
- ASCIZ, 220**  
**ASH, 42, 59**  
**ASHC, 42, 50**
- Assemble:**

- To prepare a machine language program from a symbolic language program by substituting absolute operation codes for symbolic operation codes and absolute or relocatable addresses for symbolic addresses. See MACRO-10.
- Assembler:**
- (1) A computer program which accepts symbolic code and translates it into machine instructions, item for item. See MACRO-10.
  - (2) evaluation of statements and expressions, 267
  - (3) interpretation of macros, 271
- Assembler statements, 211**
- allocation of storage, 224
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- Assembling TENDMP, 625**
- Assembly**
- listing, 247
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- ASSIGN command, 316, 348**
- ASSIGN SYS command, 348, 425**
- Asynchronous:**
- The PDP-10 hardware does not rely on an internal clock to indicate by signal that one operation has been executed before beginning a second operation.
- ATTACH command, 345, 348**
- B operator (binary shift), 202**
- Background Job Control Commands**
- ATTACH job, 345
- CCONT, 344
- CSTART, 344
- DETACH, 344
- PJOB, 344
- Background processing:**
- The automatic execution of lower priority computer programs when higher priority programs are not using the system resources.
- Base:**
- (1) A reference value.
  - (2) A number that is multiplied by itself as many times as indicated by an exponent.
  - (3) Same as radix.
- Base address:**
- A given address from which an absolute address is derived by combination with a relative address. See memory protect, virtual memory.
- BASIC (Advanced), 636**
- Batch, 635**
- Batch processing:**
- Pertaining to the technique of executing a set of computer programs such that each is completed before the next program of the set is started.
- Loosely, the execution of computer programs serially.
- Bell character:**
- A communication control character intended for use when there is a need to call for human attention. It may activate alarm or other attention devices. Abbreviated BELL.
- Benchmark problem:**
- A problem used to evaluate the performance of computers relative to each other.
- Binary:**
- (1) Pertaining to a characteristic or property involving a selection, choice, or condition in which there are two possibilities.
  - (2) Pertaining to the numeration system with a radix of two.
  - (3) See 89, 111, 112, 116
  - (4) arithmetic, see 10.
- Binary code:**
- A code that makes use of exactly two distinct characters, usually 0 and 1.
- Binary-coded decimal notation:**
- Positional notation in which the individual decimal digits expressing a number in decimal notation are each represented by a binary numeral, e.g., the number twenty-three is represented by 0010 0011 in the 8-4-2-1 type of binary-coded decimal notation and by 10111 in binary notation. Synonymous with BCD.
- Binary Compare, 618-620**
- commands, 618-619
- diagnostic messages, 619-620
- initialization, 618
- on CUSP, 634
- requirements, 618
- Binary digit:**
- In binary notation, either of the characters, 0 or 1. Abbreviated bit.
- Binary program output**
- absolute, 247, 250
- relocatable, 248
- Binary shifting, 201**
- BINCOM, see binary compare**
- Bit:**
- (1) A binary digit.
  - (2) See parity bit.
  - (3) Position determination, see 200.
- Bits, file status, 398**
- BLK1, 88, 190, 193**
- BLK0, 88, 193**
- BLOCK, 221**
- Block:**
- (1) A set of things, such as words, characters, or digits

- handled as a unit.
- (2) A collection of contiguous records recorded as a unit. Blocks are separated by interblock gaps and each block may contain one or more records.
- (3) A group of bits, or binary digits, transmitted as a unit over which an encoding procedure is generally applied for error-control purposes.
- Block gap:**  
An area on a data medium used to indicate the end of a block or record. Synonymous with interblock gap.
- Block I/O,** 88
- Block length:**  
A measure of the size of a block, usually specified in units such as records, words, computer words, or characters.
- Block transfer:**  
The process of transmitting one or more blocks of data where the data are organized in such blocks. See 28.
- Block types,** 249-251
- BLT,** 28
- Boolean,** 35
- Bootstrap:**  
A technique or device designed to bring itself into a desired state by means of its own action, e.g., a machine routine whose first instructions are sufficient to bring the rest of itself into the computer from an input device. See 15.
- BR (buffer register),** 9
- Branch:**
- (1) A set of instructions that are executed between two successive decision instructions.
  - (2) To select a branch as in (1).
  - (3) A direct path joining two nodes of a network or graph.
  - (4) Loosely, a conditional jump.
- Branchpoint:**  
A place in a routine where a branch is selected.
- Breakpoint:**  
A place in a routine specified by an instruction, instruction digit, or other condition, where the routine may be interrupted by external intervention or by a monitor routine. See DDT-10 for use of breakpoints in debugging.
- Buffer:**  
A routine or storage device used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transmitting data from one device to another. See 127, 128.
- Buffer header,** 401
- Buffer structure,** 396
- Buffers**
- Monitor generated, 402
  - user generated, 403
- Bug:**  
A mistake or malfunction.
- Busy (I/O),** 89, 112, 116, 117, 119, 128, 134, 140, 142
- BYTE,** 217
- Byte:**
- (1) An aggregate of bits whose size lies between that of a word and that of a single bit. On the PDP-10 the byte size is controlled by the programmer.
  - (2) manipulation, 33-35
  - (3) size, altering, 217  
size manipulation, 218
  - (4) pointer, 33
  - (5) unpacking subroutine, 257
- Byte interrupt,** 73, 75, 104
- CAI,** 60
- CAL,** 229
- Calculating the logarithm of a complex argument,** 256
- Call:**
- (1) To transfer control to a specified closed subroutine.
  - (2) In communications, the action performed by the calling party, or the operations necessary in making a call, or the effective use made of a connection between two stations.
  - (3) Synonymous with cue.
- CALL and CALLI Monitor operations,** 372
- Calling sequence:**  
A specified arrangement of instructions and data necessary to set up and call a given subroutine.
- Calls, macro (see macro calls)**
- CAM,** 61
- Card codes,** 162
- Card in punch,** 141
- Card punch, 140-144, 442**
- codes, 162-164
  - data modes, 442
  - interrupts, 141, 142
  - operation, 144
  - timing, 143
- Card reader, 136-140, 441**
- card codes, 443
  - codes, 162-164
  - data modes, 441
  - interrupts, 137, 138
  - operation, 139
  - timing, 138
- Carries,** 44
- Carry 0,** 44, 63, 64, 73
- Carry 1** 44, 63, 64, 73
- CCONT command,** 344, 375, 376
- CDP (card punch), 140-142**

- Central processing unit:**  
A unit of a computer that includes the circuits controlling the interpretation and execution of instructions. Synonymous with main frame.
- Central processor, 102-109**  
indicators, 102  
operating keys, 105  
operating switches, 107
- CHAIN, 636**
- Chained list:**  
A list in which the items may be dispersed but in which each item contains an identifier for locating the next item to be considered.
- Chaining search:**  
A search technique in which each item contains an identifier for locating the next item to be considered.
- Changing the local radix, 215**
- Channel:**  
(1) A path along which signals can be sent, e.g., data channel, output channel.  
(2) A partially autonomous portion of the PDP-10 which can overlap I/O transmission while computations proceed simultaneously.
- Character:**  
A letter, digit, or other symbol that is used as part of the organization, control or representation of data. A character is often in the form of a spatial arrangement or adjacent or connected strokes.
- Character(s) (MACRO-10)**  
interpretations, 265  
strings, 198
- Character codes, 48**
- Character handling in macros, 271**
- Character string:**  
A string consisting solely of characters.
- Check bit:**  
A binary check digit, e.g., a parity bit.
- Check character:**  
A character used for the purpose of performing a check.
- Check sum, 114, 115**
- CHKPNT, 634**
- CLEAR (see SETZ), 36**
- Clear:**  
To place one or more storage locations into a prescribed state, usually zero or the space character. Contrast with set.
- Clock:**  
(1) A device that generates periodic signals used for synchronization.  
(2) A device that measures and indicates time.  
(3) A register whose content changes at regular intervals in such a way as to measure time.  
(4) See 98, 107 (interrupt)
- Clock - hardware option programmable, 632**
- CLOG (sample MACRO program), 256**
- CLOSE programmed operator, 418**
- Closed subroutine:**  
A subroutine that can be stored at one place and can be connected to a routine by linkages at one or more locations. Contrast with open subroutine.
- COBOL (COMmon Business Oriented Language):**  
A business data processing language.
- COBOL language manual, 635**
- CODE, ASCII-BCD conversion program, 636**
- Code:**  
(1) A set of unambiguous rules specifying the way in which data may be represented, e.g., the set of correspondences in the standard code for information interchange.  
(2) To represent data or a computer program in a symbolic form that can be accepted by a data processor.
- Code set:**  
A finite and complete set of representations defined by a code.
- Codes**  
error, 241  
text, 269
- Collating sequence:**  
An ordering assigned to a set of items, such that any two sets in that assigned order can be collated.
- Command execution, 313**
- Command format**  
command arguments, 311  
command names, 311
- Command language:**  
A source language consisting primarily of procedural operators, each capable of involving a function to be executed.
- Commands, DDT**  
breakpoints, 544-545, 559-563  
changing output radix, 557  
defining symbols, 566  
deleting symbols, 567  
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- Commands, TECO**  
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- insert text, 510
- I/O; 506
- iteration, 514, 517
- macro, 514, 517
- magnetic tape positioning, 505
- numeric values and arguments, 515
- opening an I/O file, 509
- output data, 510
- pointer positioning, 510
- Q-Register, 513, 517, 518
- read a page, 509
- search, 512, 513, 517
- select I/O device, 503- 04
- termination, 517
- typing text, 511
- Commands, TENDMP, 626
- Comments field, 17, 197
- COMMON (Subroutine), 380
- Communication hardware options
  - control unit, 630
  - data line scanner, 630
  - expanded cabinet, 631
  - expanded data set control, 631
  - telegraph power supply, 631
  - telegraph relay, 631
- Communications system model 680/I
  - basic system, 631
  - dual serial line adapter, 631
  - local line panel, 631
  - modem interface, 631
- Communication with Monitors, 210
- COMPIL, 335, 634
- Compile:
  - To prepare a machine language program from a computer program written in another programming language by making use of the overall logic structure of the program, or generating more than one machine instruction for each symbolic statement, or both, as well as performing the function of an assembler.
- Compiler:
  - A computer program more powerful than an assembler. A compiler accepts symbolic code which it then translates and expands.
  - Examples in PDP-10 systems: FORTRAN and COBOL.
- COMPILE command, 324
- Compile switches, 329
- Complement, 10, 37, 38, 39, 40
- Concatenation:
  - (1) The joining of two strings of characters to produce a longer string often used to create symbols in macro defining. See 237
  - (2) of macros, 272
- Conditional assembly, 222
- Conditional jump:
  - A jump that occurs if specified criteria are met.
- Configuration Table entries, 381
- Configuration for PDP-10, 632
- CONI, 87, 88, 89, 376
- CONO, 86, 89, 90, 92
- Conservation
  - memory, 217
  - storage, 220
- CONSO, 88
- Console,
  - data transfers, 91
  - user's, 309
- CONSZ, 87, 88
- CONT
  - command, 339, 375, 376
  - instruction, 105
- Context switching:
  - The saving of key registers prior to switching between jobs, as in time sharing.
- Control characters, 430
- Control count, 27, 31
- COPY, 636
- CORE command, 317
- Core control, 420
- Core memory hardware options
  - additional access port, 629
  - cable sets, 629
  - data channel, 629
  - expansion module, 629
- Core storage check, 312
- Counter:
  - A device such as a register or storage location used to represent the number of occurrences of an event.
- CPA (see APR), 97
- CPU:
  - Central Processing Unit
- CR (card reader), 136-138
- Create:
  - A file is created when it has been opened for writing, written upon, and closed for the first time.
  - Only one user may be creating the file at a time. A segment is created by the CORE or REMAP UOU.
  - Logically, GET, R, and RUN commands also do core UOU's.
- CREATE command, 321
- Created symbols, 235
- CREF command, 324
- CREF, see cross reference listing
- CRE.TMP, 336
- Cross reference listing, 604-608
  - commands, 605-606
  - diagnostic messages, 607
  - initialization, 605
  - monitor commands, 608
  - requirements, 605
  - switches, 606-607
- CRT display:
  - Cathode ray tube display.
- CSTART command, 344
- CTEST command, 348
- Current address, 17
- CUSP (Commonly Used Systems Programs, e.g., FORTRAN, PIP, etc.)
- CUSP command level, 303, 304

- CUSP I/O level, 303, 304
- Cylinder:  
A disk can be considered to be a set of cylinders with one cylinder corresponding to each position of the disk arms.
- 
- D command, 340
- D switch, 364
- Data bank:  
A comprehensive collection of libraries of data. For example, one line of an invoice may form an item, a complete invoice may form a record, a complete set of such records may form a file, the collection of inventory control files may form a library, and the libraries used by an organization are known as its data bank.  
Synonymous with data base.
- Data blocks, 252
- Data channel, 400
- DATAI, 87, 88, 90
- Data missed, 136, 137, 138
- Data modes  
buffered, 394, 413  
unbuffered, 394, 413
- DATAO, 87-90
- Data ready, 136-138
- Data request, 140-143
- Data transmission, 412
- DAYTIME command, 346
- DDT (Dynamic Debugging Technique):  
A program used for on-line testing and debugging of object programs, 304  
command, 339  
submode, 432
- DDT-10, 537-582  
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type in modes, 543, 553  
type out modes, 541, 552  
upper and lower case, 551
- DD10, 633
- DEASSIGN command, 316
- Debug:  
To detect, locate, and remove mistakes from a routine or malfunctions from a computer. Synonymous with troubleshoot. See 224
- DEBUG, Monitor command, 325
- Debugging CUSPs, 342
- DEC, Macro-10 pseudo-op, 215
- Decimal print routine, 83
- Decision table:  
A table of all contingencies that are to be considered in the description of a problem, together with the actions to be taken. Decision tables are sometimes used in place of flowcharts for problem description and documentation.
- Decode:  
To apply a set of unambiguous rules specifying the way in which data may be restored to a previous representation, i.e., to reverse some previous encoding.
- DEctape:  
A DEC development of convenient, pocket-sized reels of random access magnetic tape.  
block format, 446  
compatibility between DEC computers, 481  
data modes, 445  
directory format, 446  
file format, 448  
programmed operators, 449
- DEctape control, 630
- DEctape Editor, 493-497  
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- DEctape unit, 630
- DEFINE, 233
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- Defining and calling macros, 271
- DELETE command, 324
- Deleted symbols, 199
- Deleting file from tape, 624
- DEPHASE, 213
- DEPOSIT, 106
- DEPOSIT NEXT, 106
- DETACH command, 344
- DETACH dev command, 344, 348
- Device code, 17
- Device dependent functions, 427
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- Devices

- directory, 393
  - non-directory, 393
- Devices, allocation of, 315
- DFN, 55
- Direct addressing, 13, 16
- Direct assignment statements, 199
- DIRECT command, 323
- Directory device:
  - A storage retrieval device such as disk or DECTape which contains a file describing the layout of stored data (programs and other files).
- Directory name:
  - (1) "Project-programmer number" pair which uniquely identifies a directory.
  - (2) The device name in the case of DECTape or magtape.
- Directory, zeroing a, 623
- Disk, 461
  - data modes, 461
  - structure of files, 462
  - user programming, 468
- Disk hardware options
  - additional disk, 629
  - disk pack control, drive, 629
  - storage file, 629
  - swapping control, 629
  - swapping file, 629
- Dismissing an interrupt, 93
- Display system hardware options
  - character generator, 631
  - high-speed light pen, 475, 476, 631
  - precision incremental CRT, 631
  - precision point plotting, 631
- DIV, 47
- Done (I/O), 89, 112, 116, 119, 121, 128, 134
- Dormant segment:
  - Description of a sharable high segment kept on swapping space and possibly core which is in no user's addressing space.
- Double equal sign, 199
- Double length numbers, 11
- Double precision:
  - (1) Pertaining to the use of two computer words to represent a number.
  - (2) floating point, 85
- DPB, 34, 218
- DS (register), 7
- DSKLIST, 634
- Dump:
  - A listing of all variables and their values or a listing of the values of all locations in core.
- Dumping program onto tape, 623
  
- E, effective address, 13, 19
  - Monitor command, 339
- EDDT, see Dynamic Debugging Technique
- EDIT command, 321
- EDITOR, see DECTape Editor
  
- EDS.TMP, 336
- EDT.TMP, 337
- Effective address:
  - (1) The actual address used, that is the specified address as modified by any indexing or indirect addressing rules.
  - (2) see 13, 43, 49, 51, 72, 79, 86, 96
  - (3) MACRO-10, 206
- END, 223, 252
- End block, 250
- End of card, 136-143
- End of file, 137
- End of transmission block character (ETB)
  - A communication control character used to indicate the end of a block of data where data are divided into blocks for transmission purposes.
- Entering data, 214
  - changing local radix, 215
  - two half words, 219
  - under prevailing radix, 214
- ENTER programmed operator, 403
- ENTER (UUO), 318
- ENTRY, 231
- Entry block, 249
- EOT:
  - The end of transmission character.
- EQV, 41
- Error codes (MACRO-10), 241
  - A, D, E, L, 241
  - M, N, O, P, 242
  - Q, R, S, U, V, 243
- Error detection, 241
- Error message:
  - An indication that an error has been detected. See 127, 129
- ETX:
  - The end of text character.
- EXAMINE NEXT, 105
- EXAMINE THIS, 106
- Excess 128 code, 11
- EXCH, 27
- EXECUTE command, 325
- Executive mode, 365
- EXP, 216
- Exponent overflow, underflow, 53-59
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  - relocatable, 245
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- Facility allocation Monitor commands
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  - CORE, 317
  - DEASSIGN, 316
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  - REASSIGN, 316

- RESOURCES, 318  
TALK, 317
- FAD, 56
- FADR, 53
- FAILSAFE, 634, 636
- Fast memory, 9
- FDV, 58
- FDVR, 54
- Field:  
In a record, a specified area used for a particular category of data, e.g., a group of card columns used to represent a wage rate or a set of bit locations in a computer word used to express the address of the operand.
- FILDDT, 634
- File:  
A collection of related records treated as a unit. In the PDP-10, a named or unnamed collection of 36 bit words (instructions and/or data). Length is not restricted by size of core. One of the uses of files is to initialize segments when they are created with instructions and/or data. See 392 owner, 408 protection, 408 protection key, 409 selection, 403 status bits, 398
- File extension:  
1 to 3 alphanumeric characters usually chosen by the program to describe the class of information in file.  
extensions, 319  
list of, 320
- File manipulation Monitor commands  
COMPILE, 324  
CREF, 324  
DEBUG, 325  
DELETE, 324  
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EXECUTE, 325  
LIST, 323  
LOAD, 325  
RENAME, 324  
TYPE, 323
- File, Monitor handling of  
comparison with segments, 307  
created, 306  
names, 306  
superseded, 307  
updated, 307
- Filename:  
1 to 6 alphanumeric characters chosen by the user to identify the file. See 319
- File structured device:  
A device on which data is given names and arranged into files; the device also contains directories of these names.
- File update generator, 597, 603  
commands, 598-599  
diagnostic messages, 602-603  
initialization, 597  
requirements, 597  
switches, 601
- Files (temporary)  
CRE.TMP, 336  
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EDT.TMP, 337  
FOR.TMP, 336  
MAC.TMP, 336  
PIP.TMP, 336  
SVC.TMP, 335
- FINISH command, 317
- Fixed point, 10  
arithmetic, 44-50, 64  
decimal numbers, 202  
double length, 44
- Flag:  
(1) Any of various types of indicators used for identification.  
(2) A character that signals the occurrence of some condition, such as the end of a word.  
(3) restoration, 77
- Flags, 71, 75, 77, 95, 97, 104, 105, 115  
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floating underflow, 51, 52, 53, 56, 74, 104  
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trouble, 136, 137, 140, 141

user, 73, 101  
 user in-out, 74, 86, 96, 98, 104  
 Floating overflow, c.51-58, 73, 98  
 Floating point representation,  
 (1) A numeration system in which each number, as represented by a pair of numerals, equals one of those numerals times a power of an implicit fixed positive integer base where the power is equal to the implicit base raised to the exponent represented by the other numeral. See 11  
 (2) arithmetic, 50-59, 64  
 (3) decimal numbers, 202  
 (4) double length, 12, 85  
 Floating underflow, 51-56, 74, 104  
 FMP, 58  
 FMPR, 54  
 Foreground processing:  
 The automatic execution of high priority programs that have been designed to preempt the use of the computing facilities.  
 Formats, 167  
 Format characters, rules for handling, 327  
 FOR.TMP, 336  
 FORTRAN  
 (FORMula TRANslating system):  
 A language primarily used to express computer programs by arithmetic formulas.  
 FORTRAN IV source programs  
 creating or modifying, 493, 497  
 FSB, 57  
 FSBR, 53  
 FSC, 52  
 FUDGE2, see File Update Generator  
 Full duplex software, 429  
 Full word data transmission, 27-32  
 Functions, device dependent, 427  
 Functions (TENDMP), 621

GET command, 338  
 GLOB, see global symbol cross reference list  
 Global request:  
 Request to the Loader to link a global symbol to a program. A global request points to the last reference in the program at which the global symbol was used. Each reference in the program points to the previous reference to the requested global. Such a chain is terminated by a non-relocatable zero address in the program. Chained globals are restricted to references appearing in the address part of a storage word. Symbolic references to the AC or index fields cannot be chained. Locations containing

global symbol references must not be loaded into twice, as unpredictable loader actions may result.  
 Global symbol:  
 Any symbol accessible to other programs. See 230  
 Global symbol cross reference list:  
 609-612  
 commands, 609, 610  
 diagnostic messages, 612  
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Half word data transmission, 20=27  
 HALT, instruction, 77, 100, 230  
 HALT command, 339, 370  
 Handling bytes, 218  
 Hardcopy equipment, 123-144  
 Hardware:  
 Physical equipment, as opposed to the computer program or method of use, e.g., mechanical, magnetic, electrical, or electronic devices  
 Contrast with software (2).  
 Heuristic:  
 Pertaining to exploratory methods of problem solving in which solutions are discovered by evaluation of the progress made toward the final result. Contrast with algorithm.  
 High segment:  
 (1) In the PDP-10 that segment of the user's core which generally contains pure code and which can be shared by other jobs; usually write protected. (e.g., FORTRAN compiler).  
 (2) Block load into, 249  
 HISEG pseudo-op, 312  
 HISEG statements, 232  
 HLL, 20, 21  
 HLLE, 22  
 HLLO, 22  
 HLLZ, 21  
 HLR, 20, 25  
 HLRE, 26  
 HLRO, 26  
 HLRZ, 26  
 Hollerith:  
 Pertaining to a particular type of code or punched card utilizing 12 rows per column and usually 80 columns per card.  
 HRL, 20, 22  
 HRLE, 23  
 HRLO, 23  
 HRLZ, 23  
 HRR, 20, 24  
 HRRE, 25  
 HRRR, 25  
 HRRZ, 24

H switch (Loader), 361

I, 13

IBP, 34, 218

Identification, 378

IDIV, 47

Idle segment:

A sharable high segment which no users in core are using, however, at least one swapped-out user is using, else it would be a dormant segment.

IDPB, 34, 219

IF, 222

IFDIF, 222

IFIDN, 222

ILDB, 34, 218

Immediate mode addressing:

Process through which the right half of a word gives the operand and not the address.

Impure code:

That code which is modified during the course of a run, e.g., data tables.

Impure segment, 99

IMUL, 46

Indefinite repeat, 237

Indexing, 206, 208

Index registers, 9, 13, 14, 15, 16, 27, 79

Indicators, 102

MEMORY STOP, 104

PI ON, 104

PROGRAM STOP, 104

RUN, 103

USER MODE, 104

Indicator panels, 172

Indirect address:

A single instruction address that is at once the address of another address. The second address is the specific address of the data to be processed. If the second address is also an indirect address, it is known as second-level indirect addressing, and so on to other levels.

Indirect addressing, 3, 14, 16, 49, 51, 77, 206

Information retrieval:

The methods and procedures for recovering specific information from stored data.

INIT (UUO), 368

Initialization,

Buffer, 402

Device, 400, 411

Job, 399

Initialize:

To set counters, switches, and addresses to zero or other starting values at the beginning of, or at prescribed points in, a computer routine.

In-out bit assignments, 170

In-out devices, 156, 170

Input-output, see I/O

Input data word formatting, 217

INPUT (UUO), 368

Instruction:

A statement that specifies an operation and the values or locations of its operands. In this context, the term instruction is preferable to the terms command or order which are sometimes used synonymously.

instructions (illegal), 370

Instructions,

arithmetic testing, 59

byte, 34

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without rounding, 55

with rounding, 53

full word, 27

half word, 21

in-out, 86

jump, 74

logic, 36

logical testing, 66

move, 29

pushdown, 31, 80

shift, 43, 49

rotate, 43

Instruction flow, 106

Instruction formats, 12-14, 207

input-output, 209

primary, 210

Instruction times, 19

Interactive time-sharing:

Denotes response between the computer system such as the PDP-10 time-sharing system in which many users at Teletypes can develop and execute programs simultaneously.

Interface, hardware options,

to PDP-10 interface, 632

to PDP-10 I/O bus, 632

Interleaving:

To insert segments of one program into another program so that the two programs can, in effect, be executed simultaneously; e.g., a technique used in multi-programming.

Interlock, 64

INTERN, 231

Internal request, 250

Internal symbol:

A symbol generating a global definition which can be used to satisfy all global requests for that symbol. See 230

Interpreter:

A routine such as a Command String Interpreter that translates and stores each source language statement before translating and storing the next one.

Interpretive compiler:

A routine which, as the computation progresses, translates a stored

program expressed in some machine-like pseudo code into machine code and performs the indicated operations, by means of subroutines, as they are translated. (e.g., AID)

Interrupt, 91, 96

- (1) A temporary disruption of the normal operation of a routine by a special signal from the computer, e.g., for I/O purposes.
- (2) channel, 117
- (3) dismissing, 93
- (4) instructions, 94
- (5) requests, 92
- (6) starting, 92

Interrupt enabled, 136

I/O device hardware options,

- card punch, 630
- card reader, 630
- line printer, 630
- plotter, 630

I/O (Input/Output),

- (1) Input or output or both.
- (2) See 78, 86-91
- (3) codes, 157-169
- (4) instruction format, 209

I/O instructions, 369

IOR, 39

IOWD, 219

IR (index register), 8

IRP, 237

IRPC, 238

- example, 258

---

JCRY, 75, 230

JCRYO, 75, 230

JCRYL, 75, 230

JEN, 77, 230

JFCL, 75

JFFO, 74

JFOV, 75, 230

**Job:**

A specified group of tasks prescribed as a unit of work for a computer. By extension a job usually includes all necessary computer programs, linkages, files and instructions to the Monitor.

See 299, 309

- attached mode, 309
- detached mode, 309
- number check, 312
- termination Monitor command, KJOB, 345

**Job data area:**

The first 140 octal locations of a user's core area. This area provides storage for items used by both the Monitor and the user program. See page 356

JOBAPR, 358, 376

JOBBLT, 357

JOBCHN, 358

JOBCH6, 357

JOBCHNI, 358, 376

JOBCOR, 358

JOBDA, 359

JOBDDT, 357

JOBERR, 356

JOB41, 356

JOBFF, 358

JOBHRL, 357

JOBOPC, 358

JOBREL, 356

JOBREN, 358

JOBSA, 358

JOBSYM, 357

JOBTPC, 358, 376

JOBUSY, 357

JOBUUO, 356

JOBVER, 358

JOV, 75, 230

JRA, 79

JRST, 76, 77, 230

JSA, 79

JSP, 76, 78

JSR, 75, 78

JUMP, 61

Jump:

A departure from the normal sequence of executing instructions, synonymous with transfer (1).

**Justify:**

- (1) To adjust the printing positions of characters on a page so that the lines have the desired length and that both the left and right hand margins are regular.

- (2) By extension, to shift the contents of a register so that the most or the least significant digit is at some specified position in the register. Contrast with normalize.

**K**

- (1) An abbreviation for the prefix file, i.e., 1000 in decimal notation.
- (2) In automatic data processing, loosely, two to the tenth power, 1024 in decimal notation.

Keys, 105

KJOB command, 345

K switch, 364

---

Labels, 196, 197

LALL, 226

**Latency:**

The time delay while waiting for a rotating memory to reach a given location as desired by the user. The average latency is one half the revolution time.

LDB, 34, 218

**Leader:**

The blank section of tape at the

- beginning of a reel or fanfold of tape.
- Least significant bit, 48
- Library subroutines, 231  
search mode, 248
- Line Editor for Disk, 499-500  
commands, 499  
diagnostic messages, 499  
initialization, 499  
Monitor commands, 500
- LINED  
See Line Editor for Disk
- Line printer:  
A device that prints all characters of a line as a unit.  
Contrast with character printer.
- Line printer, 123-131  
data modes, 440  
instructions, 125  
operation, 129  
output format, 124  
printing speed, 125
- LINK, 248
- Linking Loader:  
This routine loads programs into the user's area of memory, properly relocating each one and adjusting addresses to compensate for relocation. It also links (i.e., provides the main program with the correct address of each referenced subprogram, etc.) internal and external symbols to provide communication between independently assembled programs. It also loads subroutines in library search mode. See 245, 248, 526  
chain feature, 533  
commands, 527-530  
diagnostic messages, 534  
initialization, 527  
Monitor commands, 536  
requirements, 526  
switches, 530-533
- Linking subroutines, 230
- LIST, 226, 247
- LIST command, 323
- List:  
(1) An ordered set of items.  
(2) See chained list, pushdown list, pushup list.  
(3) To printout a listing on the line printer or Teletype.
- Listing control, 225, 226  
suppression, 225
- List processing:  
A method of processing data in the form of lists. Usually, chained lists are used so that the logical order of items can be changed without altering their physical locations.
- LIT, 224
- Literals, 206  
multilined, 207
- nested, 206
- Load:  
In programming, to enter data into storage or working registers.
- LOAD command, 325
- Loader:  
Program which attaches pieces of programs together which may have been created separately previous to the run. See Linking Loader, 360  
completion of loading, 363  
H switch, 361  
loading user programs, 356  
reentrant, 361  
switches, 334
- Loading User Programs, 356
- LOC, 211
- Local radix, 215  
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- Location counter, 205, 208, 311
- Logarithm of a complex argument, 256
- Logic, 35
- Logical device name:  
The name used in ASSIGN commands, 315
- Logical operations, 35-44, 72, 201
- Logical shift, 43, 49, 50
- Logical testing and modification, 65-72
- Logic operator:  
A logic operator each of whose operands and whose result have one of two values.
- Login:  
The number and the process with which a user identifies himself to a system. It then accepts him as a valid user and assigns him appropriate system resources.  
LOGIN, 635. See inside front cover.  
Login check, 312  
LOGIN command, 314  
LOGIN CUSP, 378
- LOGOUT CUSP, 635, 375  
LOGOUT UUU, 375
- LOOKUP (UUU), 368, 403
- Loop:  
A sequence of instructions that is executed repeatedly until a terminal condition prevails.
- Low segment:  
In the PDP-10 that segment of core containing the job data area and I/O buffers, unique and accessible to the user. It is often used to contain the program, but will be used only for data tables, etc. if the user is working with a shared program, such as a system CUSP.
- LPT (line printer), 123, 126
- LSH, 42, 43
- LSHC, 42, 43

MA (memory address), 8  
 Machine language:  
   A language that is used directly  
   by a machine.  
 Machine Mnemonics, 260  
 Macro calls, 234, 271  
   format, 234  
   nested, 239  
 Macro:  
   An instruction in a source lan-  
   guage which is equivalent to a  
   specified sequence of machine  
   instructions.  
 Macros  
   calls, 234, 271  
   concatenation, 272  
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   comments, 197  
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   error codes, 241-243  
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   MTAPE, 455  
   9-channel Magtape, 458  
 Magnetic Tape Hardware Options  
   control, 630  
   modification kit, 630  
   units, 630  
 MAKE command, 321

#### Marginal check:

- (1) A preventive maintenance procedure in which certain operating conditions, such as supply voltage or frequency, are varied about their nominal values in order to detect and locate incipient defective parts.
- (2) Panel, 103

#### Mask:

- (1) A pattern of characters that is used to control the retention or elimination of portions of another pattern of characters.
- (2) A filter.
- (3) 14, C.65-71, 83, 86

#### Mass storage:

Secondary storage with a large capacity. On a PDP-10, usually a large disk.

#### Matrix:

- (1) In mathematics, a two-dimensional rectangular array of quantities. Matrices are manipulated in accordance with the rules of matrix algebra.
- (2) In computers, a logic network in the form of an array of input leads and output leads with logic elements connected at some of their intersections.
- (3) By extension, an array of any number of dimensions.

#### Meddling, 423

#### Memory, 14-15

#### Memory access time, 15

#### Memory allocation, 15

#### Memory conservation, 217

#### Memory protection:

An arrangement for preventing access to certain areas of storage, e.g., Monitor, for purposes of reading or writing. See 97-100 and allocation, 353  
 flag, 354

#### MEMORY STOP, 104

#### Merge:

To combine items from two or more similarly ordered sets into one set that is arranged in the same order.

#### Message:

An arbitrary amount of information whose beginning and end are defined or implied

#### MI (Memory Indicators), 8

#### Mnemonic symbol:

- (1) A symbol chosen to assist the human memory, e.g., an abbreviation such as "mpy" for "multiply". See 16, 147
- (2) Alphabetic, 152
- (3) Derivation, 148
- (4) Device, 156
- (5) Numeric, 149

**Mode:**

- (1) A method of operation, e.g., binary mode, interpretive mode, alphanumeric mode.
- (2) The characteristic of a quantity being suitable for integer or for floating point computation.
- (3) Method of card reading and punching, i.e., Hollerith code, which interprets each column as a six-bit alphanumeric character or transcription mode, which interprets each punch as a binary one (1) and each non-punch as a binary zero (0).

**Modem (MODulator-DEModulator):**

A device that modulates and demodulates signals transmitted over communication facilities.

**Modes, 19**

- arithmetic testing, 59, 60
- fixed point, 45
- floating point, 50, 52, 56
- half word, 21
- logic, 35, 36, 41
- logical testing, 65
- move, 29
- paper tape punch, 89, 115
- readin, 90, 114
- user, 99

**MONEY, 635****Monitor:**

The specific program which schedules and controls the operation of several related or unrelated routines, performs overlapped I/O and allocates resources so that the computer's time is efficiently used. Also provides context switching in 9 time-shared environment. See 99, 101

**Monitor command diagnostic messages, 321, 349****Monitor command interpreter, 311****Monitor commands****extended**

- <> construction, 328
- = construction, 328
- + construction, 327
- @ file, 326

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**Monitor locations, examining, 390****Monitor mode, 310****Monitor operation codes, 371****Monitor UUO's, 367**

restriction in reentrant programs, 368

**Move instructions, 28****MOVE, 29, 32****MOVN, 30****MOVN, 29****MOVS, 29****MQ (multiplier-quotient register), 9****MUL, 46****Multiline literals, 207****Multiprocessing:**

Pertaining to the simultaneous execution of two or more computer programs or sequences of instructions by a computer or computer network. Loosely, parallel processing.

**Multiprogramming:**

(1) A technique which allows scheduling in such a way that more than one job is in an executable state at one time.

(2) Disk Monitor, 295

(3) Non-disk Monitor, 295, 483

**Name block, 250****Negative fixed point numbers, 203****Nesting:**

(1) Including a routine or block of data within a larger routine or block of data.

(2) Macros, 239, 257

(3) Subroutines, 80

**New symbol, 199****No-Divide, 51, 54, 58, 74, 104****Non-Directory device:**

A device such as mag tape or paper tape which does not contain a file describing the layout of stored data (programs and other files).

**Nonexistent memory, 98, 106, 108****Non-Reentrant program**

one segment, 306

two segment, 306, 353

**Non-Reentrant system, 296****Non-Sharable segment:**

A segment for which each user has his own copy. Non-sharable segments never have names even if initialized from a file; they may be created by CORE or REMAP UUO.

**No-Op:**

(1) An instruction that specifically instructs the computer to do nothing, except to proceed to the next instruction in sequence.

(2) 65, 66, 68, 70, 72

**Normalization:**

(1) This term refers to the positioning of data, left justified with respect to the binary point.

(2) 51, 53, 57, 59, 61

**NOSYM, 226****Null character:**

A control character that serves to accomplish media fill or time fill e.g., in USASCII the all zeroes character (not numeric zero).

- Null characters may be inserted into or removed from a sequence of characters without affecting the meaning of the sequence, but control of equipment or the format may be affected. Abbreviated NUL.
- Numbers, 200-205  
 arithmetic and logical operations, 203  
 binary shifting, 201  
 evaluating expressions, 204  
 fixed-point decimal, 202  
 floating-point decimal, 202  
 terms, 204
- Number system, 10-12
- Numeric terms, 204
- NXM STOP, 108
- 
- Object code:  
 (1) Output from a compiler or assembler which is itself executable machine code or is suitable for processing to produce executable machine code.
- Object program:  
 (1) The program which is the output of an automatic coding system, usually in machine language ready for execution.
- OCT, 215
- Octal codes, 260
- Octal-to-Decimal conversion, 83
- Offset:  
 (1) The number of locations toward zero a program must be moved before it can be executed. (See LDRBLT description in the Monitor manual.) See 361, 363
- One's complement:  
 In the binary number system this complement is formed by setting each bit to the opposite value. See 10
- On-Line:  
 (1) Pertaining to equipment or devices under direct control of the central processing unit.  
 (2) Pertaining to a user's ability to interact with a computer.
- OP codes, 259
- OPDEF, 228
- Open subroutine:  
 A subroutine that must be re-located and inserted into a routine at each place it is used. Synonymous with direct insert subroutine. Contrast with closed subroutine.
- OPEN (UO), 368
- Operand:  
 That which is operated upon. An operand is usually identified by an address part of an instruction.
- See 196
- Operating keys, 105  
 CONT, 105  
 DEPOSIT NEXT, 106  
 DEPOST, 106  
 EXAMINE NEXT, 106  
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 FP TRP, 109  
 MA TRP OFFSET, 109  
 MI PROG DIS, 108  
 NXM STOP, 108  
 PAR STOP, 108  
 REPT, 108  
 REPT BYP, 108  
 SHIFT CNTR MAINT, 109  
 SING CYCLE, 107  
 SING INST, 107
- Operation  
 card reader, 139  
 line printer, 129  
 plotter, 135  
 processor, 103  
 punch, 115  
 reader, 111  
 Teletype, 117
- Operation codes, illegal, 369
- Operator:  
 (1) In the description of a process, that which indicates the action to be performed on operands.  
 (2) See unimplemented user operator (UO), programmed operator.  
 (3) User defined, 228
- OR (See IOR), 39
- ORCA, 39
- ORCB, 40
- ORCM, 40
- Order of expression evaluation, 267  
 (TECO), 516
- OUTPUT (UO), 368
- Overflow:  
 That portion of the result of an operation that exceeds the capacity of the intended unit of storage. See 44, 49, 51, 63, 64, 72, 98
- Overlay:  
 The technique of repeatedly using the same blocks of internal storage during different stages of a program. When one routine is no longer needed in storage, another routine can replace all or part of it.

**Pack:**

To compress data in a storage medium by taking advantage of known characteristics of the data in such a way that the original data can be recovered, e.g., to compress data in a storage medium by making use of bit or byte locations that would otherwise go unused.

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Paper tape punch, 115-117, 439

data modes, 439

operation, 116

timing, 116

Paper tape reader, 111-115, 438

data modes, 438

operation, 113

readin mode, 114

timing, 112

Parentheses, 206, 233

Parity bit:

A binary digit appended to an array of bits to make the sum of all the bits always odd or always even.

Parity check:

(1) A check that tests whether the number of ones (or zeroes) in an array of binary digits is odd or even. Synonymous with odd-even check. See 48, 49, 118

Parity error, 94, 107

PAR STOP, 108

Pass:

One cycle of processing a body of data.

PASS2, 224

Password, 313

Patch:

To modify a routine in a rough or expedient way.

PC (program counter), 7, 72

Peripheral equipment:

In a data processing system, any unit of equipment, distinct from the central processing unit, which may provide the system with outside communication.

Peripheral Interchange Program, 585-598

commands, 586

diagnostic messages 592, 593

initialization, 585

Monitor commands, 596

requirements, 585

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Permanent symbols, redefining, 229

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PI, 91-94, 95, 97

PI ON, 104

PIP, See Peripheral Interchange Program

PIP.TMP, 336

PJOB command, 344

Plotter, 131-135, 474

data modes, 474

instructions, 133

operation, 135

timing, 134

PLT (Plotter), 133, 134

POINT, 218

Pointer:

The location containing an address rather than data and which the user plans to use to implement indirect addressing.

(2) Byte, 35

(3) I/O block, 88

POP, 31, 32

POPJ, 81

Postmortem dump:

A static dump used for debugging purposes; performed at the end of a machine run.

Power failure, 97

Powers of two, 174

Prevailing radix, 214

Primary instruction statement, 208

PRINT, 635

Printer, see "line printer".

PRINTR, 635

PRINTX, 227

Priority interrupt:

The interrupt that usurps control of the computer program or system and jumps the sequencing to another device, program, program step, or to the device that generates the interrupt signal. See 15, 28, 33, 35, 51, 86, 88, 113

conditions, 94

dismissing an interrupt, 93

interrupt requests, 92

starting an interrupt, 92

timing, 95

Priority of operations, 204

Processor conditions, 96-98

Processor hardware options

arithmetic processor, 629

dual memory protection, 629

fast registers, 629

relocation registers, 629

Processor modes, 365

Processor (standard), 330

Processor switches, 333

Program:

(1) A series of actions proposed in order to achieve a certain result.

(2) To design, write and test a program as in (1).

Program break:

The length of a program; the first location not used by a program (before relocation); the relocation constant for the following

- program (after relocation). See 247
- Program control, 72-81
- Program library:  
A collection of available computer programs and routines.
- Programmed operators (UO's):  
PDP-10 instructions which instead of doing computation, cause a jump into the Monitor system at a predetermined point. The Monitor interprets these entries as commands from the user to perform specified operations. See 210,366 DECTape, 449
- Programming conventions, 16
- Program origin:  
The location assigned by the Loader to relocatable zero of a program. See 361, 363
- Program starting, 369
- PROGRAM STOP, 104
- Project members, 408
- Project-Programmer numbers, 313
- Protected location:  
A storage location reserved for special purposes in which data cannot be stored without undergoing a screening procedure to establish suitability for storage therein. See 99
- Protection address, 353, 355
- Protection register, 305,354
- Pseudo code:  
A code that requires further translation prior to execution.
- Pseudo-Op:  
(1) An operation that is not part of the computer's operation repertoire as realized by hardware; hence an extension of the set of machine operations.  
(2) In MACRO-10, directions for assembly operations.  
(3) See 211, 259, 261
- PTP (paper tape punch), 115, 116
- PTR (paper tape reader), 111,112
- Punch on, 140-143
- Pure code:  
Code which is never modified in the process of execution. Hence it is possible to let many users share the same copy of a program. This technique is used by many of the CUSP's. See 99
- PURGE, 224
- PUSH, 31, 32
- Pushdown list:  
(1) A list that is constructed and maintained so that the item to be retrieved is the most recently stored item in the list, i.e., last in, first out. See 30, 31  
(2) Subroutines containing, 81,84
- Pushdown overflow, 31, 80, 81, 98, 104!
- PUSHJ, 80, 81
- Pushup list:  
A list that is constructed and maintained so that the next item to be retrieved and removed is the oldest item still in the list, i.e., first in, first out.
- 
- Quantum time, 300
- Queue:  
An ordered line waiting for service. See 299
- 
- Radix:  
In positional representation, that integer, if it exists, by which the significance of the digit place must be multiplied to give the significance of the next higher digit place. For example, in decimal notation, the radix of each place is ten; Synonymous with base. See 200,213
- RADIX, 213
- RADIX Statement, 213
- RADIX50 statement, 216  
Representation, 270
- Random access:  
A device in which the access time is effectively independent of the location of the data. Synonymous with direct access device.
- R Command, 338
- REACT, 635
- READ IN key, 105
- Read-in feature, 25D
- Reading Card, 136, 138
- Readin mode, 90, 114
- Ready to read, 136, 138
- Real time:  
(1) Pertaining to the actual time during which a physical process transpires.  
(2) Pertaining to the performance of a computation during the actual time that the related physical process transpires in order that results of the computation can be used in guiding the physical process.
- REASSIGN command, 316
- Record:  
A collection of related items of data, treated as a unit.
- Redefining macros, 239
- REENTER command, 339
- Reentrant code:  
See pure code.
- Re-entrant program:  
A two-segment program composed of a sharable and non-sharable segment. See 296, 305, 353, 487
- Reentrant System, 296, 361
- Register, 49

**Relative address:**

The number that specifies the difference between the absolute address and the base address.

RELEASE programmed operator, 419

RELOC, 211

Relocatable object program, 245, 248

block formats, 249

conventions, 246

**Relocate:**

In computer programming to move a routine from one portion of storage to another and to adjust the necessary address references so that the routine, in its new location, can be executed. See 99

Relocation address, 353, 355

Relocation before execution, 213

**Relocation constant:**

The number added to every relocatable reference within a program. The relocation constant is the re-located breakpoint of the previous program. See 246

Relocation Register, 296, 305, 354

REMARK, 227

**Remote access:**

Pertaining to communication with a data processing facility by one or more stations that are distant from that facility.

**Remote station or terminal:**

Data terminal equipment for communicating with a data processing system from a location that is time, space, or electrically distant.

RENAME command, 324

RENAME (UUO), 368

REPEAT, 227

Reserving storage, 221

blocks, 221

single location, 221

**Response time:**

The time which elapses between generation of an inquiry at a terminal and the receipt of a response at the terminal.

Restore, 77

REPT, 108

REPT BYP, 108

RESET, 105

RESOURCES command, 318

Result, 50

RIM format, 252

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RIM10B format, 250, 253, 254

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ROTC, 42, 44

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GET, 338

HALT, 339

R, 338

REENTER, 339

RUN, 338

SAVE, 340

SSAVE, 341

START, 339

RUN instruction, 103

SAVE command, 340, 341, 368

Scaling, 51

SCHEDULE command, 348

**Scheduler:**

A section of the Time-Sharing Monitor which determines the sequence of time allotments to users.

Science Library and FORTRAN Utility Subprograms, 636

**Serial access:**

(1) Pertaining to the sequential or consecutive transmission of data to or from storage.

(2) Pertaining to the process of obtaining data from, or placing data into, storage where the time required for such access is dependent upon the location of the data most recently obtained or placed in storage. Contrast with random access.

**Service routine:**

A routine in general support of the operation of a computer, e.g., an input-output, diagnostic, tracing, or monitoring routine. Synonymous with utility routine.

SETA, 36

SETCA, 37

SETCM, 37

SETM, 37

SETO, 36

SETZ, 36

**Sharable segment:**

A segment which can be used by several users at the same time.

**Shared code:**

Pure code residing in the high segment of user's core.

**Shift:**

A movement of data to the right or left.

Shift and rotate, 42, 44, 50, 201

Shuffling, 301

**Sign bit:**

A binary digit occupying the sign position. See 10,49

Significance, 51

**Simulate:**

(1) To represent certain features of

- the behavior of a physical or abstract system by the behavior of another system.
- (2) To represent the functioning of a device, system, or computer program by another, e.g., to represent one computer by another, to represent the behavior of a physical system by the execution of a computer program, to represent a biological system by a mathematical model.
- SIXBIT, 220
- SKIP, 62
- Software:  
A set of computer programs, procedures, rules, and associated documentation concerned with the operation of a data processing system e.g., compilers, monitors, editors, utility programs. Contrast with hardware.
- SOT, 63
- SOS, 64
- Source Compare, 613, 617  
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diagnostic messages, 617  
initialization, 613  
requirements, 613  
switches, 615
- Source language:  
The language from which a statement is translated.
- Source preparation monitor commands  
CREATE, 321  
EDIT, 321  
MAKE, 321  
TECO, 321
- Source program:  
A program written in a symbolic or algebraic language designed for ease of expression.
- Source word, 20
- Square brackets, 206
- SQUOZE, 216  
See RADIX50
- SRCCOM  
See Source Compare
- SSAVE command, 341, 368
- Stack, 635
- START command, 339
- START instruction, 105
- Starting address, 250
- Static dump:  
A dump that is performed at a particular point in time with respect to a machine run, frequently at the end of a run.
- Status bits  
(See entry for individual devices)
- Status checking and setting, 416
- STATUS (UUO), 368
- STOP, 37
- STOP, 105
- STOPI, 238
- Storage device:  
The PDP-10 device used to store named files by the GET, R, or RUN commands. If the file is marked as sharable (extension= "SHR"), the Monitor will give the segment the same name as the file. This is the only way that a segment can be shared.
- Storage  
conserving, 217, 220  
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- Storage allocation (TENDMP), 625
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- SUBTTL, 225
- SVC.TMP, 335
- Swapping:  
The movement of program sections between core and secondary storage.  
I/O channel, 297  
Monitor, 295, 485  
Space, 301  
Storage, 297, 301
- Swapping device:  
Secondary storage suitable for swapping usually a high speed drum or disk.
- Switches, 107  
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- Switches used with monitor commands  
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created, 235  
external, 230  
format for block, 249  
global, 230  
internal, 230
- Symbol table, 198, 208  
(1) A dictionary of names used in a program. For example, see MACRO-10.  
(2) direct assignment, 199
- Symbolic address, 197  
(1) An address expressed in symbols convenient to the programmer.  
(2) data reference, 206  
(3) expressions, 216  
(4) operands, 198  
(5) operators, 198
- Symbolic location name, 17
- SYN, 229
- Syntax:

- (1) The structure of expressions in a language.
  - (2) The rules governing the structure of a language.
  - SYS (Device), 387
  - SYSTAT command, 348
  - SYSTAT CUSP, 380, 635
  - System access monitor command
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    - SCHEDULE, 348
    - SYSTAT, 348
  - System configuration, 632
  - System timing monitor commands
    - DAYTIME, 346
    - TIME, 346
- 
- Table:
    - (1) A collection of data in which each item is uniquely identified by a label, by its position relative to the other items, or by some other means.
    - (2) Search technique, 84.
  - Table numbers (RH of AC), 380
  - Tag:
    - One or more characters attached to an item or record for the purpose of identification.
  - TALK command, 317
  - TAPE, 226
  - Tape, 112, 114
  - TDC, 69
  - TDN, 68
  - TDO, 69
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  - TECO,
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    - diagnostic messages, 520-522
    - initialization, 502
    - monitor commands, 523
    - order of operator evaluation, 516
  - Text input, 220
    - entering characters, 220
    - TIME command, 346
  - Time quantum:
    - That portion of time given to a specific time shared user.
  - Timing,
    - card reader, 138
    - control, 377
    - interrupt, 95
    - line printer, 125
    - plotter, 134
    - punch, 143
    - reader, 112
    - Teletype, 119
  - TITLE, 225
  - TLC, 68
  - TLN, 67
  - TLO, 68
  - TLZ, 67
  - Track:
    - The portion of a moving storage medium, such as a drum, tape, or disk, that is accessible to a given reading head position.
  - Transfer block, 251
  - Trap:
    - An unprogrammed conditional jump to a known location, automatically activated by hardware with the location from which the jump occurrence recorded. See 15
  - Trap offset, 98
  - TRC, 66
  - TRN, 66
  - Trapping, 375
    - console-initiated traps, 376
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  - TSO, 71
  - TSZ, 70
  - TTCALL UO, 433
  - TTY (teletype), 117, 119
  - Two byte unpacking subroutines, 257
  - Two's complement arithmetic:
    - Subtraction is performed by means of adding the two's complement of one number to the number it is to be subtracted from. Two's complement is formed by adding one to the one's complement of the given binary number. See 10, 55, 83, 201
  - TYPE command, 323

UFA, 55

Unary operators, 201

Underflow:

Pertaining to the condition that arises when a machine computation yields a nonzero result that is smaller than the smallest nonzero quantity that the intended unit of storage is capable of storing. Contrast with overflow.

Unimplemented operations, 15, 82

Update:

A file is updated when opened for reading and writing, one or more blocks are rewritten in place, and the file closed. Only one user may be updating the file at a time.

USASCII (USA Standard Code for Information Interchange):

The standard code, using a coded character set consisting of 7-bit coded characters (\* bits including parity check), used for information interchange among data processing communication systems, and associated equipment. The USASCII set consists of control characters and graphic characters. Synonymous with ASCII.

User, 73, 101

User defined operator, 228

User facilities, 1-8, 302

User I/O Mode, 365, 383

User In-out, 74, 86, 96, 98, 100, 101, 104

User Mode:

A hardware defined state of the PDP-10 computed during which all instructions executed normally except that all IO and HALT instructions cause immediate jumps into the Monitor. This makes it possible to prevent the user from interfering with any other user or with the operation of the Monitor. Memory protection and relocation are in effect so that the user can modify only his own area of core. See 104, 310, 353, 365.

User program:

All of the code running under control of the Monitor in an addressing space of its own.

programming, see 100

UUO:

Unimplemented User Operator. See program operator.

Monitor, 367

User, 366

See 15, 82, 304

VAR, 224

Vestigial job data area:

The first 10 octal locations of the high segment used to contain data for initializing certain locations in the job data area. See 362, 343

Virtual core:

That amount of core space which the user appears to be able to use. Usually handled by a program which allows the currently referenced parts of the program to be in core at one time, with additional information being brought off storage as needed. See 302

Word formats, 167

Write protect, 99

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## MONITOR COMMANDS

NAME	ABBREVIATION	ARGUMENTS				
		1	2	3	4	5
ASSIGN	AS	dev	ldev			
ASSIGN SYS		dev				
ATTACH	AT	dev				
ATTACH	AT	job	proj prog			
CCONT	CC					
COMPILE	COM	list				
CONT	CON	lh	rh	adr		
CORE	COR					
CREATE	CREA					
CREF	CREF	dev				
CSTART	CS	list				
CTEST		list				
D(deposit)	D	dev				
DAYTIME	DA	dev				
DDT	DD	adr				
DEASSIGN	DEA	file	ext			
DEBUG	DEB	list				
DELETE	DEL	dev				
DETACH	DET	dev	file	ext	proj prog	core
DIRECT	DI					
E(examine)	E					
EDIT	ED	list				
EXECUTE	EX	list				
FINISH	F					
GET	G	file	ext			
HALT	A C					
KJOB	K	file	ext	core		
LIST	LI	dev	job			
LOAD	LOA					
LOGIN	LOG	arg				
MAKE	M					
PJOB	P	dev	file	ext	proj prog	core
R	R	dev	file	ext	core	
REASSIGN	REA	n				
REENTER	REE	dev	file	ext	core	
RENAME	REN	adr				
RESOURCES	RES					
RUN	RU	core				
SAVE	SA	file	ext			
SCHEDULE	SCH					
SSAVE	SS					
START	ST					
SYSTAT	SYS					
TALK	TA	dev				
TECO	TE	file	ext			
TIME	TI	job				
TYPE	TY	list				

### Key:

adr	octal address	lh rh	octal value of left and right half words
core	decimal number of 1K blocks	proj prog	project-programmer numbers
dev	physical device name	list	a single file specification or a string of file specifications
ldev	logical device name		
ext	filename extension	arg	a pair of file specifications or a string of pairs of file specifications
file	filename		
job	job number assigned by Monitor	n	scheduled use of the system.

See Book 3, Chapter 2 for further explanation of commands.

These abbreviations are accurate and unique as of now, but their accuracy and uniqueness may be changed in the future by the addition of new commands.

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ATTACH	AT	job	proj prog			
CCONT	CC					
COMPILE	COM	list				
CONT	CON	lh	rh	adr		
CORE	COR					
CREATE	CREA					
CREF	CREF	dev				
CSTART	CS	list				
CTEST		list				
D(deposit)	D	dev				
DAYTIME	DA	dev				
DDT	DD	adr				
DEASSIGN	DEA	file	ext			
DEBUG	DEB	list				
DELETE	DEL	dev				
DETACH	DET	dev	file	ext	proj prog	core
DIRECT	DI					
E(examine)	E					
EDIT	ED	list				
EXECUTE	EX	list				
FINISH	F					
GET	G	file	ext			
HALT	A C					
KJOB	K	file	ext	core		
LIST	LI	dev	job			
LOAD	LOA					
LOGIN	LOG	arg				
MAKE	M					
PJOB	P	dev	file	ext	proj prog	core
R	R	dev	file	ext	core	
REASSIGN	REA	n				
REENTER	REE	dev	file	ext	core	
RENAME	REN	adr				
RESOURCES	RES					
RUN	RU	core				
SAVE	SA	file	ext			
SCHEDULE	SCH					
SSAVE	SS					
START	ST					
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