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Software Product Description

PRODUCT NAME: TOPS-10, Version 6.03, DECsystem-10 Operating System   **SPD 7.1.7**

DESCRIPTION:

Under control of TOPS-10, the DECsystem-10 can service a range of job types and response requirements, including any mix of timesharing, batch, remote batch, and real-time. TOPS-10 allocates memory, storage, peripherals, and processing time among system users, and has an installation-adjustable scheduler to control system operation. To service multiple users concurrently, the DECsystem-10 uses multiprogramming and swapping. The monitor (TOPS-10) supports reentrant software; that is, only one copy of a reentrant language processor (or any reentrant program) need be memory resident to serve multiple users simultaneously. The monitor performs all input/output, user communication, resource arbitration, and other necessary services.

TOPS-10 Timesharing:

Depending on system configuration and total computing load, the TOPS-10 system can handle up to 400 terminals attached to 200 active jobs. The terminals can be CRTs and others which operate at speeds from 110 to 9600 baud.

The TOPS-10 command language, file structure, I/O processing, and job scheduling are independent of the applications language used. In addition, standard software interfaces make it easy for a user to develop his own languages or systems. Editors, compilers, and interactive high-level debuggers shorten development time and increase programmer productivity.

DECsystem-10 Batch (GALAXY-10, SPD 7.32.x):

Batch on the DECsystem-10 is designed for ease of use and flexible control over job processing. The command language for batch is an extension of the timesharing language which allows easy movement between batch and interactive processing, and reduces the amount of training necessary to use the system effectively. An interactive user can prepare jobs and enter them into the batch input queue for processing. The user is allowed to specify the characteristics and limits associated with his batch job, and can modify them as necessary. The system operator controls the batch system and specifies all operating parameters. The operator has the power to select or reject jobs, to suspend them, or to remove them from the batch system.

DECsystem-10 Communications:

DECsystem-10 synchronous communication provides error-free high speed paths between the central computer and remote stations or other computer systems. The high-speed synchronous transmission is on a message basis, in contrast with the character-by-character basis of lower-speed asynchronous transmission.

Full-duplex protocol software supplied with the communication front end hardware makes efficient use of the high-speed transmission in both directions simultaneously on a full-duplex line. The communication front end hardware and software handle hardware control, message formatting, and message acknowledgements. The data transmission is "pipelined," a technique that increases line efficiency by fully overlapping the acknowledge-continue signals. Transmission errors are detected using block-oriented techniques, including longitudinal data checks and cyclic redundancy checks (CRC-16). Data errors are corrected through retransmission of the erroneous block.

The DECsystem-10 synchronous communications can be used to extend the capabilities of the DECsystem-10 through the use of remote stations. These remote stations can include a line printer, a card reader, a console terminal, and, depending on the type of remote station, up to 32 asynchronous command terminals. The user interface and facilities available on the remote station are identical with those seen by a local user. The DECsystem-10 allows for simultaneous operation of multiple remote stations and in so doing has provisions to differentiate one remote station from another. By using peripheral devices at various stations, the user is provided with increased capabilities. For example, data can be collected from various remote stations, compiled and processed at the central station, and the results of the processing sent to all contributors of the data.

Remote stations and DECsystem-10s may be connected via simple and/or complex topologies up to a maximum of 63 nodes. The most basic network topology is a point-to-point or star topology. This mode of interconnection is characterized by having only one link or path between computers in the network. Complex topologies are formed using route-through.

Route-through is the ability to send information/data between two computers that are not directly or physically connected to each other, but which are indirectly connected through intermediate computers.

More than one DECsystem-10 may be in a single network. When this occurs, the DECsystem-10s may be connected directly or via a remote station. This allows terminals anywhere in the network to select on an individual basis which DECsystem-10 they wish to be connected to. This concept is known as network virtual terminals.

User Command Language:

Through an easy-to-use command language, the user controls the running of his job. Specifically, he can:

● Compile, execute, and debug programs

● Create and edit files; list, append, and delete files

● Use available resources such as mag tapes, private disk packs, or other peripherals

● Communicate with the system operator and request such services as the mounting and dismounting of disk packs and magnetic tapes

● Start, suspend, or terminate his job

● Spool output to line printer, card punch, paper tape punch, and plotter

● Determine status of the system and the resources available

● Request time and resource accounting of his use of the system

● Send messages to other terminals in the system

Real-time Processing:

Among the features of the real-time software are: fast response, high throughput, and system security. High-priority queues, the ability to lock jobs in memory, disk transfer priority, and direct access to real-time devices are all provided on a privileged basis. Real-time programs can be written in FORTRAN or assembly language.

DECsystem-10 File Handling:

File service for disk packs and drums is designed for convenience and efficiency. RP04/RP06 disk packs can be dual ported for high availability and increased performance. Each user can have as many files as he desires on any of the available file storage devices. The system administrator establishes limits on the total amount of space each user's files can occupy. Each file is referred to by name, so that the user is not required to know where a file is physically located.

File storage is dynamically allocated during program operation, so there is no need to preallocate space before a file is established; however, pre-allocation may be done to guarantee the availability of space at some later time. Files can be shared concurrently (even with different access methods) among specified users through the use of protection codes. Updating a file is performed by either of two methods — superceding or updating in place.

Virtual Memory (KI and KL monitors only. Included with KL10 based systems. Available as an option under a separate license for KI10 based systems.):

On KI10 and KL10 processors, operating system support of virtual memory is provided. Thus the user can run programs with address space greater than the physical memory actually utilized and can take advantage of typical program characteristics to reduce memory demands for a program. A unique feature of DECsystem-10 virtual memory is that it exists as an option. The system administrator decides which users need the facility, and controls are provided to both the user and the administrator to allow them to tune the system to their needs.

Error Handling:

TOPS-10 has extensive error detection, logging, and recovery procedures for virtually all types of peripheral and memory failures. Error recovery provides system continuation and availability. Error logging provides the maintenance engineer and system administrator with valuable information regarding hardware failures, and aids in their diagnosis and correction.

Utilities:

The following is a list of TOPS-10 utility programs:

BACKUP	Disk/Magtape Save/Restore
BATCON	Batch Controller
BOOT11	Loads/Dumps PDP-11 connected through DL10
BOOTS	Disk bootstrap loader
BOOTM	Magtape bootstrap loader
COMPIL	Invokes selected utilities (using Concise Command Language)
CREF	Cross Reference listing generator
DAEMON	Monitor extension utility
DDT	Interactive Debugging Program
DIRECT	Directory Lister
FILCOM	File Compare utility
FILEX	File Exchange utility
HELP	Provides interactive access to information on system facilities and commands
HELPER	Program HELP file subroutine
INITIA	System and terminal line initialization utility
KJOB	Removes a user from the system
LINED	Line-oriented interactive editor
LINK-10	Linkage editor and loader
LOGIN	Verifies and processes log-in procedure
LOGOUT	Removes a user from the system
MACRO-10	Macro Assembler
MAKLIB	Binary file library maintenance utility
MONGEN	System Generation utility
OMOUNT	Processes operator device mount requests
OPSER	Allows multiple programs to be controlled from a single terminal
PIP	File Manipulation utility
QUEUE	Places entries in system queues

REACT	User profile system management utility
SCDSET	Scheduler control utility
SETSRC	Disk search list utility
SPOOL	Output device spooling utility
SPRINT-10	Card reader spooling utility
SYSERR	Generates reports from system error file
SYSINF	Interprocess communications controller
SYSTAT	System status utility
TECO	Interactive text editor
UMOUNT	Processes user device mount requests
WTBOOT	Writes disk bootstraps

The following utilities are distributed with TOPS-10. All have Category C support.

AID	MIC
ALCFIL	MONEY
BLISS-10	MONTST
CHKPNT	MTCOPY
CREDIR	PAL-10
DELFIL	PLEASE
DMPFIL	QUOLST
DSKLST	REATTA
DSKRAT	REDALL
DTBOOT	RUNOFF
DTCOPY	SCRIPT
DUMP	SOS
FACTPR	SOUP
FAILSA	SPACE
FILDAE	STRLIB
FUDGE	SYSDPY
GLOB	SYSERR
GRIPE	TWICE

MINIMUM HARDWARE REQUIRED:
- DECsystem-10 with KA10, KI10, or KL10 central processing unit, console terminal, and 128K words of memory, or KL10E with 256K words of memory
- RP02, RP03, RP04, or RP06 disk pack drive with controller
- 7- or 9-track magnetic tape transport with controller

OPTIONAL HARDWARE:

Multi-Processor Systems:
1055 Dual KA10 Processors
1077 Dual KI10 Processors
1099 Dual KL10 Processors

Memories:
Up to a system total of 256K words memory (KA10) or up to 4 million words memory (KI10 or KL10), as follows:
MA10 Core Memory (KA)
MB10 Core Memory (KA)
MD10 Core Memory (KA)
ME10 Core Memory (KA, KI)
MF10 Core Memory (KA, KI, KL)
MG10 Core Memory (KA, KI, KL)
MH10 Core Memory (KA, KI, KL)

Disk Systems:
- RC10 fixed-head disk controller with RD10 fixed-head disk drives or RM10B drum (KA, KI)
- RP10, RP10C disk pack controller with RP02 or RP03 disk pack drives (KA, KI, KL)
- RH10 MASSBUS controller with RS04 fixed-head disk drives, RP04 or RP06 disk pack (KA, KI, KL)
- RH20 MASSBUS controller with RP04 or RP06 disk pack (KL)

Magnetic Tape Systems:
- TM10A, TM10B controller with TU10, TU20, or TU30 magnetic tape transports (KA, KI)
- TM10B controller with TU40 or TU41 magnetic tape transports (KA, KI, KL)
- TC10C controller with TSU43 magnetic tape transports (KA, KI)
- RH10 MASSBUS controller with TE16 magnetic tape transport (KA, KI, KL)
- RH20 MASSBUS controller with TE16 or TU45 magnetic tape transport (KL)
- TU70, TU71, or TU72 magnetic tape tranports with controllers (KI, KL)
- TD10C DECtape controller with TU55 or TU56 DECtape transports (KA, KI, KL)

Punched Card Equipment:
BA10 hardcopy controller with:
CR10A, B, C, D punched card readers (KA, KI, KL)
CR10E console model reader (KA, KI, KL)
CR10F table model reader (KA, KI, KL)
CP10D card punch (KA, KI, KL)

Line Printers:
BA10 hardcopy controller with:
LP10A, B, C, D, E line printer (KA, KI, KL)
LP10F line printer (KA, KI, KL)
LP10H line printer (KA, KI, KL)
LP100 line printer controller (KA, KI, KL)
LP05 line printer (KA, KI, KL)
LP07 line printer (KA, KI, KL)

Plotters:
BA10 hardcopy controller with XY10 plotter control (KA, KI)
XY10A Calcomp plotter model 565 (KA, KI)
XY10B Calcomp plotter model 563 (KA, KI)

Communications:
DC10A, B, E asynchronous communications controller (KA, KI, KL)
DC10H 2741 controller (KA, KI)
DC76 asynchronous communications front end (KA, KI, KL)
DN87 synchronous/asynchronous front end (KA, KI, KL)
DN87S synchronous/asynchronous front end (KL)
DN85 synchronous front end (KA, KI, KL)
DC75NP synchronous front end (KA, KI, KL)
DN61 IBM 2780/3780 bisync front end (KI, KI)
DN62S IBM 2780/3780 bisync front end (KL)
DN92 remote job entry station
DN80,81,82 remote job entry/terminal concentrator stations (uses DN87, DN85, or DC75NP) (KA, KI, KL)

DC71NP/DC72NP remote job entry/terminal concentrator stations (uses DN87, DN85, or DC75NP) (KA, KI, KL)
DC68 asynchronous communications front-end (KA, KI)

Terminals:
Up to 512 LT33, LT35, LT37, LA30, LA36, LA37, VT05, VT06, VT50, VT52, or 2741 terminals (KA, KI, KL)

Miscellaneous:
DK10 programmable real-time clock (KA, KI, KL)
DF10, DF10C data channel (KA, KI, KL)
DAS33 buffered data channel (KA, KI, KL)
MX10, MX10C memory port multiplexer (KA, KI, KL)
DA28 DMA interface (KA, KI, KL)

PREREQUISITE SOFTWARE:
None

OPTIONAL SOFTWARE:
FORTRAN-10 (with FORDDT)
ALGOL-10
BASIC-10
COBOL 68 DEC-10
KI10 Virtual memory support (included with KL)
GALAXY-10
IQL Interactive Query Language
MCS-10 Message Control System
DBMS-10
SORT-10
APL-BASIC
APL-SF
DECnet-10

TRAINING CREDITS:
THIRTEEN (13) — Applies only to options that include support services. Consult the latest Educational Services Catalog at your local office for the available courses, course requirements, and guidelines.

SUPPORT CATEGORY:
A — Software Support will be provided as stated in the Software Support Categories Addendum to this SPD.

UPDATE POLICY:
Software Updates, if any, released by DIGITAL during the one (1) year period following installation, will be provided to the customer for a media charge (includes no installation). After the first year, updates, if any, will be made available according to then prevailing DIGITAL policies.

ORDERING INFORMATION:
All binary licensed software, including any subsequent updates, is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide in part that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of the DIGITAL copyright notice and any DIGITAL proprietary notices on the software) only for use on such CPU. All source licensed software is furnished only under the terms and conditions of a separate

Software Program Sources Agreement between Purchaser and DIGITAL.

Source and/or listing options are only available after the purchase of at least one binary license and after a source license agreement is in effect.

The following key (F, K, L, M, P, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QS029-EF = sources on 7-track magnetic tape.

F = 7-track Magnetic Tape
K = RP04 Disk Pack
L = RP06 Disk Pack
M = 1600 bpi 9-track Magnetic Tape
P = 800 bpi 9-track Magnetic Tape
Z = No hardware dependency

Standard Options

TOPS-10 is not available as a separate product. The following systems receive TOPS-10 software as indicated:

1050	Single-use license, sources and binaries, documentation, support services for KA10 systems
1070	Single-use license, sources and binaries, documentation, support services for KI10 systems
1080	Single-use license, sources and binaries, documentation, support services for KL10 systems
1090	Single-use license, sources and binaries, documentation, support for KL10B systems

Source/Listing Options

QS029	-E—	Source license, sources, no documentation, no support services (media: K, L)

ADDITIONAL SERVICES:

QS910	-S—	Per Call Consulting Service (media: Z)
QS920	-S—	Monthly Consulting Service (media: Z)
QS922	-S—	6-Month Resident Consulting Service (media: Z)
QS924	-S—	12-Month Resident Consulting Service (media: Z)
QHK01	-K—	Distribution Service (media: F, M, P)
QHK02	-K—	Maintenance Service (media: F, M, P)
QHK04	-K—	TOPS-10, Version 6.03 (For KA10 Sites subcribing to QHK01) (media: F, M, P)
QHK14	-G—	Software Notebook Update Service (requires QHK01 or QHK02) (media: Z)
QHK20	-G—	Software Notebook (requires QHK01 or QHK02) (media: Z)
QHK10	-G—	Additional Bulletin Subscription Service (requires QHK01 or QHK02) (media: Z)
QHK12	-G—	Additional Dispatch Subscription Service (requires QHK02) (media: Z)

ADDENDUM
SOFTWARE SUPPORT CATEGORIES

Each software product (hereinafter 'SOFTWARE') with a designated Support Category A or B in the applicable Software Product Description (SPD) existing at the time of order will be the current release at the time of delivery and will conform to the SPD. DIGITAL's sole obligation shall be to correct defects (nonconformance of the SOFTWARE to the SPD) as described below. Any SOFTWARE with a designated Support Category C will be furnished on an 'as is' basis.

For SOFTWARE with a designated Support Category A or B, DIGITAL will provide the services set forth below without additional charge.

CATEGORY A

1. Upon notification by customer to the nearest DIGITAL office that the computer system, including all required prerequisite hardware and software, is ready for the installation of the SOFTWARE, DIGITAL will install such SOFTWARE in any location within the contiguous forty-eight (48) United States, the District of Columbia, or a country in which DIGITAL or a subsidiary of DIGITAL has a software service facility. The notification must be received by DIGITAL and the system must be ready for installation within thirty (30) days after the delivery of the SOFTWARE to customer or DIGITAL will have no obligation to install. Installation will consist of: (1) verification that all components of the SOFTWARE have been received by customer, (2) loading the SOFTWARE, and (3) executing a DIGITAL sample procedure.

2. During the ninety (90) day period after installation, if the customer encounters a problem with the current unaltered release of the SOFTWARE which DIGITAL determines to be a defect in the SOFTWARE, DIGITAL will provide the following remedial service (on site where necessary): (1) if the SOFTWARE is inoperable, apply a temporary correction (TC) or make a reasonable attempt to develop an emergency by-pass, and (2) assist the customer to prepare a Software Performance Report (SPR) and submit it to DIGITAL.

3. During the one (1) year period following installation, if the customer encounters a problem with the SOFTWARE which his diagnosis indicates is caused by a SOFTWARE defect, the customer may submit an SPR to DIGITAL. DIGITAL will respond to problems reported in SPRs which are caused by defects in the current unaltered release of the SOFTWARE via the Maintenance Periodical for the SOFTWARE, which reports SPRs received, code corrections, temporary corrections, generally useful emergency by-passes and/or notice of the availability of corrected code. Software Updates, if any, released by DIGITAL during the one (1) year period, will be provided to the customer on DIGITAL's standard distribution media as specified in the applicable SPD. The customer will be charged only for the media on which such updates are provided, unless otherwise stated in the applicable SPD, at DIGITAL's then current media prices.

CATEGORY B

During the one (1) year period following delivery, the services provided to the customer will be the same as set forth in 3 above.

CATEGORY C

SOFTWARE is provided on an 'as is' basis. Any software services, if available, will be provided at the then current charges.

DIGITAL shall have the right to make additional charges for any additional effort required to provide services resulting from customer use of other than current unaltered release of the SOFTWARE operated in accordance with the SPD.