digital
Software Product Description

DESCRIPTION:

The TOPS-20AN System Software package is included with each T-Series System. The TOPS-20AN System Software package is a multiuser, multilanguage interactive processing system with multistream batch capabilities. The system supports between 8 and 128 simultaneous interactive users, depending on system load and configuration with concurrent multistream batch processing. The TOPS-20AN System Software package includes:

* the TOPS-20AN operating system
* the RSX-20F operating system
* EXEC, the TOPS-20AN command language executive
* EDIT, the TOPS-20AN editor
* GALAXY, the TOPS-20AN batch system
* the MACRO assembler
* the LINK overlay loader
* system utilities

The TOPS-20AN Operating System supports ARPANET Host Interfaces (local and distant). It includes:

* The Initial Connect Protocol (ICP) to establish a full-duplex connection between the host computer and the network node.
* The Network Control Program (NCP) to establish a host-to-host interface upon which function level protocols are based.
* TELNET (Telecommunications Network) to allow a terminal at one host (or a TIP) to establish a logical connection to a foreign host and look like a local terminal to that host.
* RJE (Remote Job Entry) makes it possible for a host to submit a job for execution at another host.
* The File Transfer Protocol (FTP) to allow transferring files between ARPANET sites.
* A Mail Protocol for both local and network users.

The package optionally supports FORTRAN, COBOL, ALGOL, APL, BASIC, and CPL high-level language processors. The DBMS (Data Base Management System) package is also optionally supported, interfaced to either FORTRAN or COBOL. The SORT program is an additional option which interfaces to COBOL.

The system features:

* Virtual memory system with multiprocess job structure

* Advanced file system
* Optimized, highly reliable system resource allocation
* A front-end operating system for communications and unit record control
* Easy-to-use system command language
* Many system utilities to enhance system use and operation

The TOPS-20AN operating system provides a virtual memory user environment of 256K 36-bit words. This virtual address space is demand-paged in 512-word pages. The user environment is structured to provide a multiprocessing job structure that services complex applications as well as simple ones. Several forms of interprocess communication are provided:

* IPCF — interprocess communication facility used to pass messages between processes
* PSI — pseudo-software interrupts are generated by the system for event posting between processes
* ENQ/DEQ — a resource queuing mechanism for the synchronization of two or more processes, commonly used for record-level interlocks
* Page Sharing — system and user level code and data sharing on a per page basis
* Process Control — direct functional control of an inferior process by its superior; used to implement the TOPS-20AN EXEC and available for user application subsystems

The TOPS-20AN file system is a general purpose named file system that provides:

* Mountable disk structures
* Up to 4,000 user accounts/directories per structure on 2040T or 2050T or 12,000 user accounts/directories per structure on 2060T or 1090T
* Multilevel directory structures
* Interuser security through directory and file access protection mechanisms
* Interuser cooperation specification through the user group definition facility, allowing arbitrary definition of user groups that wish to have common access to files
* Simultaneous update capabilities within a file, allowing two or more cooperating users concurrent update access to a file

- User-level disk space quotas for disk space management
- Automatic space allocation and deallocation during program run time for file creation and deletion
- Automatic optimized file placement and I/O
- Centralized file name parsing and look-up monitor facility, which eliminate the need for file name syntax checking in user programs and provide file naming consistency between programs
- Centralized file operations monitor facilities, which include easy-to-program sequential accessing in byte or string modes

These capabilities are provided to the user through TOPS-20AN system calls.

The TOPS-20AN operating system performs process scheduling, memory management, and file system management. It also provides the environment for the batch system's queuing, job scheduling, job accounting, and device spooling operations. Provisions exist to allow allocation of specific percentages of the central processor to specific jobs.

The TOPS-20AN operating system enhances system efficiency by optimizing system resource utilization. Among these optimizations are disk optimization, tape throughput optimization, demand paging, and easy re-entrant programming facilities. In addition, the TOPS-20AN batch system provides performance and efficiency in the virtual memory environment.

The TOPS-20AN operating system supports hardware error detection and recording in a system disk file. A system error-reporting program is provided which processes this error file to enable DIGITAL service personnel to monitor system performance.

The RSX-20F operating system Version VB12-12 controls the front-end processor and communicates with the T-Series System processor. RSX-20F controls the unit record equipment and the asynchronous terminal lines. The asynchronous terminal lines can be either local or modem controlled (dial-in). Automatic baud rate detection is supported on modem-controlled lines at 110, 150, and 300 baud. RSX-20F also provides the system console facilities.

The TOPS-20AN EXEC implements the system command language for interactive and batch processing. It provides command level facilities for controlling creation, compilation, execution, debugging, and deletion of user programs and their data. Commands exist to allow user assignment of resources, and to provide user/operator and user/terminal communications. The TOPS-20AN EXEC also provides file handling commands, operator level commands, and a number of system information commands. Additional user level system facilities are provided to further aid system use and operation.

TOPS-20AN GALAXY is a high-performance multistream batch system providing:

- The same command language used in timesharing
- Multistream operation with operator control of the number of active streams

- Automatic line printer and card reader spooling with job accounting and control, including special forms scheduling
- Job dependency scheduling allowing creation of multijob batch applications
- Job limits parameters to define a batch job's resource bounds
- Job Control Language error recovery facilities that allow command level recovery from expected or unexpected errors.
- Support of all language processors, application tools, and system utilities
- Capability to request automatic job restart in the event of a system failure during job execution

All TOPS-20AN system facilities are available both interactively and through the batch system.

TOPS-20AN EDIT is the T-Series System file editing program. EDIT is a line-oriented editor with many character-oriented editing facilities. The novice user can choose to edit using simple line replacement, while the more experienced user can perform string searches, string replacements, and other advanced editing operations. EDIT runs on any T-Series System.

TOPS-20AN MACRO is a two-pass symbolic assembler for the T-Series System. It features:

- macro facilities with nesting
- pseudo-operations
- expressions with constant, absolute, or relocatable symbols
- capability to declare symbols available to FORTRAN or COBOL
- conditional assembly
- support for writing re-entrant code
- symbolic debugging facility
- parameter file searching

MACRO runs on any T-Series System.

TOPS-20AN LINK is a linking loader for the T-Series System. In addition to basic loading functions, it provides:

- single region tree-structured overlay facility
- load time defined overlay structure, independent of FORTRAN, COBOL, or ALGOL programs
- a diagrammming facility to portray the program overlay structure
- relocatable overlays

LINK runs on any T-Series System.

TOPS-20AN DUMPER is a highly reliable utility for operational backup and restoration of the file system using tape. The primary facilities are:

- full save or restore
- incremental save by file creation date
- individual user save or restore
- individual file save or restore

DUMPER runs on any T-Series System.

The following is a list of the TOPS-20 System Software Components:

- User-level disk space quotas for disk space management
- Automatic space allocation and deallocation during program run time for file creation and deletion
- Automatic optimized file placement and I/O
- Centralized file name parsing and look-up monitor facility, which eliminate the need for file name syntax checking in user programs and provide file naming consistency between programs
- Centralized file operations monitor facilities, which include easy-to-program sequential accessing in byte or string modes

These capabilities are provided to the user through TOPS-20AN system calls.

The TOPS-20AN operating system performs process scheduling, memory management, and file system management. It also provides the environment for the batch system's queuing, job scheduling, job accounting, and device spooling operations. Provisions exist to allow allocation of specific percentages of the central processor to specific jobs.

The TOPS-20AN operating system enhances system efficiency by optimizing system resource utilization. Among these optimizations are disk optimization, tape throughput optimization, demand paging, and easy re-entrant programming facilities. In addition, the TOPS-20AN batch system provides performance and efficiency in the virtual memory environment.

The TOPS-20AN operating system supports hardware error detection and recording in a system disk file. A system error-reporting program is provided which processes this error file to enable DIGITAL service personnel to monitor system performance.

The RSX-20F operating system Version VB12-12 controls the front-end processor and communicates with the T-Series System processor. RSX-20F controls the unit record equipment and the asynchronous terminal lines. The asynchronous terminal lines can be either local or modem controlled (dial-in). Automatic baud rate detection is supported on modem-controlled lines at 110, 150, and 300 baud. RSX-20F also provides the system console facilities.

The TOPS-20AN EXEC implements the system command language for interactive and batch processing. It provides command level facilities for controlling creation, compilation, execution, debugging, and deletion of user programs and their data. Commands exist to allow user assignment of resources, and to provide user/operator and user/terminal communications. The TOPS-20AN EXEC also provides file handling commands, operator level commands, and a number of system information commands. Additional user level system facilities are provided to further aid system use and operation.

TOPS-20AN GALAXY is a high-performance multistream batch system providing:
- The same command language used in timesharing
- Multistream operation with operator control of the number of active streams

- Automatic line printer and card reader spooling with job accounting and control, including special forms scheduling
- Job dependency scheduling allowing creation of multijob batch applications
- Job limits parameters to define a batch job's resource bounds
- Job Control Language error recovery facilities that allow command level recovery from expected or unexpected errors.
- Support of all language processors, application tools, and system utilities
- Capability to request automatic job restart in the event of a system failure during job execution

All TOPS-20AN system facilities are available both interactively and through the batch system.

TOPS-20AN EDIT is the T-Series System file editing program. EDIT is a line-oriented editor with many character-oriented editing facilities. The novice user can choose to edit using simple line replacement, while the more experienced user can perform string searches, string replacements, and other advanced editing operations. EDIT runs on any T-Series System.

TOPS-20AN MACRO is a two-pass symbolic assembler for the T-Series System. It features:
- macro facilities with nesting
- pseudo-operations
- expressions with constant, absolute, or relocatable symbols
- capability to declare symbols available to FORTRAN or COBOL
- conditional assembly
- support for writing re-entrant code
- symbolic debugging facility
- parameter file searching

MACRO runs on any T-Series System.

TOPS-20AN LINK is a linking loader for the T-Series System. In addition to basic loading functions, it provides:
- single region tree-structured overlay facility
- load time defined overlay structure, independent of FORTRAN, COBOL, or ALGOL programs
- a diagrammming facility to portray the program overlay structure
- relocatable overlays

LINK runs on any T-Series System.

TOPS-20AN DUMPER is a highly reliable utility for operational backup and restoration of the file system using tape. The primary facilities are:
- full save or restore
- incremental save by file creation date
- individual user save or restore
- individual file save or restore

DUMPER runs on any T-Series System.

The following is a list of the TOPS-20 System Software Components:

TOPS-20AN	T-Series Operating System
RSX-20F	Front-End Operating System, Version VB12-12
KL10	Microcode, Version 202
EXEC	Terminal Command Language Executive
GALAXY	Batch System including batch controller, queue manager, line printer spooler, and card reader spooler
MACRO	Symbolic Assembler
LINK	Linking Loader
DDT	Symbolic Debugger
MACSYM, MONSYM	Symbol Parameter Files
EDIT	Text Editor
CREF	Cross Reference Utility
PLEASE	User-to-Operator Communication Utility
MAIL/ RDMAIL	User-to-user Mail Utility
FILCOM	File Comparison Utility
BOOT	Disk/Tape Bootstrap
CHECKD	File System Maintenance Utility
DUMPER	File System Backup-to-Tape Utility
PTYCON	Multiple Job Control Utility
SYSJOB	System Utility
INFO	System Utility
CHKPNT	Accounting Utility
MAILER	System Mailing Utility
OPLEAS	Operator Please Utility
DLUSER	User Creation/Deletion
WATCH	Performance Monitoring Utility
SYSERR	System Error Reporting Utility
ULIST	User Listing
MAKRAM	Translation RAM file generator for LP05
MAKVFU	VFU file generator for LP05
NMAILER	Network Mailing Server
NETSER	TELNET Protocol Server
NETSTAT	Network Status Utility
TELNET	TELNET Protocol Utility
FTP	Network file handling utility
FTPSER/ FTSCTL	Network file transfer and mail servers
SNDMSG	User-to-user or Network user mail system utility
CONV20	Usage file to fact file converter
ACTGEN	Account Generation Utility
DX20LD	DX20 Microcode loader
VERIFY	Installation verifier
UETP	User Environmental test package

The following are distributed with TOPS-20 as a Category C product:

ACCT20	Accounting Utility for FACT.BIN
USAG20	Accounting Utility for USAGE.OUT

MINIMUM HARDWARE REQUIRED:

DECsystem 2040T, 2050T or 2060T with KL10-E CPU, or a DECsystem 1090T with a KL10-D CPU.
Tape system with minimum of 1 9TR 1600 bpi tape driver.

OPTIONAL HARDWARE:
- Additional memory up to:
  1. 384K words on 2040T
  2. 512K words on 2050T
  3. 1280K words on 2060T
  4. 4096K words on 1090T
- Additional single port RP04 or RP06 drives up to a total of 32, on up to 6 MASSBUS controllers
- TU40 or TU72 magnetic tape system with up to 8 drives
- TU45 magnetic tape system with a total of up to 16 tape drives, with a maximum of two magnetic tape controllers
- Up to two LP20 line printers
- One CD20 card reader
- Up to 128 asynchronous terminal lines:
  1. DC20-A or -D on 2040T, 2050T, and 2060T
  2. DC200-A or -E on 1090T
- Up to 128 LA36, LA37, VT50, or VT52 terminals

PREREQUISITE SOFTWARE:
None

OPTIONAL SOFTWARE:
COBOL-20
SORT/MERGE
FORTRAN-20
BASIC-20
APL-BASIC
APLSF
CPL-20
ALGOL-20
DBMS-20
BASIC-PLUS-2
IQL-20
TRAFFIC-20

TRAINING CREDITS:
Ten (10) on 2040T, 2050T and 2060T; Thirteen (13) on 1090T — 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 without additional 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 supported license and after a source license agreement is in effect.

The following key (K, L, M, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QT032-EM = TOPS-20AN Monitor sources on 9-track magnetic tape.

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

Standard Options

TOPS-20AN is not available as a separate product. The following systems receive TOPS-20AN software as indicated.

1090T	DECsystem 1090T, single-use license, binaries on magnetic tape, documentation, support services
2040T	DECsystem 2040T, single-use license, binaries on magnetic tape, documentation, support services
2050T	DECsystem 2050T, single-use license, binaries on magnetic tape, documentation, support services
2060T	DECsystem 2060T, single-use license, binaries on magnetic tape, documentation, support services

Source/Listing Options

QT032	-E—	Monitor sources (media: M)
QT032	-U—	Monitor sources, Government Marking Instructions (media: M)
QT033	-E—	Front-end sources (media: K, L)
QT034	-E—	Command decoder sources (media: M)
QT034	-U—	Command decoder sources, Government Marking Instructions (media: M)
QT039	-E—	Combined Sources package (media: K, L)

ADDITIONAL SERVICES:

QS922	-S—	Consulting Resident (media: Z)
QS924	-S—	Consulting Resident (media: Z)
QS926	-S—	Orientation Services (media: Z)
QT031	-3—	Binary Program Update Service (media: M)
QT032	-4—	Monitor Source Program Update Service (media: M)
QT032	-Z—	Monitor Source Program Update Service, Government Marking Instructions (media: M)
QT033	-4—	Front-end Source Program Update Service (media: K, L)
QT034	-4—	Command Decoder Source Program Update Service (media: M)
QT034	-Z—	Command Decorder Source Program Update Service, Government Marking Instructions (media: M)
QT035	-3—	Documentation Maintenance Service (media: Z)
QT035	-G—	Pre-delivery kit (media: Z)
QT035	-U—	Pre-delivery kit, Government Marking Instructions (media: Z)
QT035	-Z—	Documentation maintenance service, Government Marking Instructions (media: Z)
QT039	-4—	Combined Sources Program Update Service (media: K, L, M)

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.