

# digital

## Software Product Description

**PRODUCT NAME: TOPS-10 LIR for DECsystem-1091S,  
Version 7.01**

**SPD 7.13.0**

### **DESCRIPTION:**

The TOPS-10 LIR for DECsystem-1091S Operating System services a range of simultaneous job types and response requirements, including timesharing, batch, remote batch, and real-time. TOPS-10 allocates memory, storage, peripherals, and processing time among system users, and has a scheduler that is adjustable at installation. To service multiple users concurrently, the DECsystem-10 uses multiprogramming, virtual memory and swapping. The TOPS-10 monitor supports reentrant software; that is, one copy of a reentrant language processor or program in memory can serve multiple users simultaneously. The monitor performs all input/output, user communication, resource arbitration, and other necessary services.

#### *TOPS-10 Timesharing*

Depending on configuration and total computing load, up to 512 terminals can be attached to up to 120 active jobs. See the terminal capacity section of this SPD. CRTs or hardcopy terminals operating at 110 to 9600 baud may be used. TOPS-10 supports automatic answering modems and baud rate detection at speeds of 110, 150, 300 and 1200 baud as described in the configuration section of this SPD.

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

#### *TOPS-10 Batch Processing with GALAXY*

GALAXY 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. GALAXY software is included with TOPS-10, Version 7.01 and is further described in the GALAXY-10, Version 2 (7.32) SPD.

#### *Network Communications*

TOPS-10 synchronous communication provides error-correcting high speed paths among TOPS-10 systems and remote stations. The high-speed synchronous transmission is on a message basis, in contrast with the character-by-character basis of lower-speed asynchronous transmission.

When combined with the appropriate hardware, the software supplied with TOPS-10 provides efficient use of the high-speed transmission in both directions simultaneously on a full-duplex line. The software handles device control-message formatting and message acknowledgements. The data transmission is "pipelined", a technique that increases line efficiency by overlapping messages and acknowledgements. Transmission errors are detected using cyclic redundancy checks (CRC-16). Data errors are corrected by retransmission.

The TOPS-10 synchronous communications can be used to extend the capabilities of the DECsystem-10 through the use of remote stations. Each remote station 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 TOPS-10 monitor 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 can be sent to all contributors of the data.

More than one DECsystem-10 can be in a single network. DECsystem-10 systems can be connected directly or through a remote station. A user at a terminal anywhere in the network can select which DECsystem-10 to use. TOPS-10 supports up to 63 nodes.

TOPS-10 provides communications with IBM systems and remote stations using 2780 and 3780 protocols. 2780/3780 is a separate software product, which requires a license and is described in a separate SPD.

#### *User Command Language*

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

- Compile, execute, and debug programs
- Create, edit, list, append, and delete files
- Use available resources such as magnetic 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 a 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 utilization data
- Send messages to other terminals in the system

#### *Real-Time Processing*

TOPS-10 real-time software features fast response, high throughput, system security, high-priority queues, the ability to lock jobs in memory, and disk transfer priorities. Direct access to real-time devices is available. The system administrator controls access to real-time features. Real-time programs can be written in FORTRAN or assembly language.

#### *TOPS-10 File Handling*

File service for disk storage is designed for convenience and efficiency. RP04/RP06 disk drives can be dual ported for high availability and increased performance. Each user can have as many files as desired 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 on the disk.

File storage is dynamically allocated during program operation, so there is no need to preallocate space before a file is established; however, preallocation can be done to guarantee the availability of space at some later time.

Updating files is performed by either of two methods—superseding or updating-in-place. Files can be shared concurrently (even with different access methods) among specified users. Access is controlled through the use of protection codes. Additionally, TOPS-10 provides features that allow installation of more extensive file security and access-logging software.

#### *Virtual Memory*

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. A unique feature of TOPS-10 virtual memory is that its use is optional. The system administrator decides which users may access the facility. 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 failure. Error recovery provides system continuation and availability. Error logging provides Field Service and the system administrator with valuable information regarding hardware failures, and aids in their diagnosis and correction.

#### *Utilities*

The following is a list of the TOPS-10 System Software components:

BACKUP	Saves/restores disk files to/from magnetic tape
BOOTM	Bootstrap load memory from magnetic tape storage
BOOTS	Bootstrap load/dump memory from/to disk storage
COMPIL	Interprets commands including: COMPILE, LOAD, EXECUTE
CREF	Produces cross-reference listings from MACRO and FORTRAN output
CRSCPY	Automatically copies system dump to permanent storage
DAEMON	Provides services including error logging, utilization logging and dumping job images
DDT	Provides on-line interactive debugging for MACRO assembly programs
DIRECT	Produces file directory listings
DTELDR	Loads/dumps PDP-11 memory across DTE interface
FILCOM	Compares source or binary files to highlight differences
FILDDT	Examines/patches disk files
HELP	Types HELP files on user terminal
INITIA	Initializes terminal line characteristics
LINK-10	Merges relocatable modules into object modules
LOGIN	Validates system access
LOGOUT	Terminates system access
MACRO-10	MACRO assembler for TOPS-10
MONGEN	System generator program for configuration dependent software
MAKLIB	Manipulates relocatable library files
NETLDR	Loads/dumps remote nodes across synchronous interface
OMOUNT	Provides operator interface to mount/dismount removable media

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OPSER Controls multiple operator subjobs  
 PFH Manages programs working set  
 PIP Copies, deletes, and renames files  
 QUOLST Lists disk quotas  
 REACT Maintains system access files  
 SCDSET Maintains scheduler class files  
 SETSRC Manipulates job/system search lists  
 SYSINF Provides interprocess communications control  
 SYSTAT Displays system parameters  
 TECO Text editor  
 TGHA Detects and records MOS memory errors  
 UMOUNT User interface to mount/dismount removable media  
 WTBOOT Writes bootstrap to disk

The following utility programs are DIGITAL Supported for the stated conditions only; and are Customer Supported for any other kind of use.

AVAIL  
 Availability report program  
 Condition: Reports from AVAIL file

CREDIR  
 Create user file directories and subfile directories  
 Condition: Used by operator to create UFDs

DELFIL  
 Delete files without deallocating space  
 Condition: Used by operator on files with RIB errors

DSKLST  
 List contents of disk structure and compute statistics  
 Condition: Stand-alone system (not timesharing)

DSKRAT  
 Report on integrity of file structure  
 Condition: Stand-alone system (not timesharing)

FE  
 Front-end device interface (RSX-20F to TOPS-10)  
 Condition: Installation or update of DIGITAL Supported software

FEFILE  
 Allocate front-end file system (FE.SYS)  
 Condition: Installation or update of DIGITAL Supported software

FILDAE  
 Mediate file access based on complex user specification  
 Condition: For examples in DIGITAL manuals

GLOB  
 Create global cross-reference file  
 Condition: For DIGITAL Supported software

HELPER  
 Module to type HELP files  
 Condition: For DIGITAL Supported software

MACDLX  
 Cross-assembler for PDP-11 code  
 Condition: Installation or update of DIGITAL Supported software

MAKVFU  
 Create VFU files for line printers  
 Condition: For DIGITAL Supported software

PAL-10  
 Cross-assembler for PDP-8/PAL programs  
 Condition: Installation or update of DIGITAL Supported software

RUNOFF  
 Text formatting program  
 Condition: For DIGITAL supplied documentation files

SCAN  
 Commands parsing subroutine  
 Condition: For DIGITAL Supported software

SOUP  
 Source update package  
 Condition: With DIGITAL supplied correction files

SYSDPY  
 Repetitive on-line statistics display program  
 Condition: With VT50 or VT52 terminals

SYSERR  
 System-error report program  
 Condition: Reports of DIGITAL supplied hardware

WILD  
 Subroutine to scan file directories  
 Condition: For DIGITAL Supported software

#### MINIMUM HARDWARE REQUIRED:

KL10-E central processing unit, 256K words of memory, console terminal, RP04 or RP06 disk drive with controller, and at least one 1600 BPI magnetic tape transport with controller

#### OPTIONAL HARDWARE:

##### Memories

A total of up to 3 million words of memory as follows:

MEM. TYPE	MAX. SIZE
MA20 CORE	256 KW
MB20 CORE	512 KW
MF20 MOS	3072 KW

##### Disk Systems

RH20 Massbus controller with RP04 or RP06 disk drives

##### Magnetic Tape Systems

TD10C DEctape controller with TU55 or TU56 tape transports

RH20:DX20:TX02 controller with TU70/71/72 tape transports

RH20:TM02/3 controller with TU45/77 tape transports

##### Punched Card Equipment

BA10 with CR10E or CR10F card reader

CD20 with CR10E or CR10F card reader

CP10D card punch

##### Line Printers

LP100 controller with LP05, LP07, LP14 line printer

BA10 controller with LP10F, LP10H line printer

LP20 controller with LP05, LP14 line printer

LP200 controller with LP07 line printer

*Plotters*

BA10 controller with XY10 plotter control  
 XY10A Calcomp plotter model 565  
 XY10B Calcomp plotter model 563

*Communications*

DTE:DN20 synchronous/asynchronous front-end  
 DTE:DN87S synchronous/asynchronous front-end  
 DC20 asynchronous console front-end  
 DN80, 81, 82 remote job entry/terminal concentrator station  
 DN200 remote job entry/terminal concentrator station

*Terminals*

VT100, VT52, VT50, VT05, LA120, LA38, LA37, LA36, LA30, VT37, LT35, and LT33

In addition, 2741 terminals are supported on DN87S front-ends.

*Miscellaneous*

DK10 programmable real-time clock  
 DIB20 I/O Bus Interface (1091 only)

The optional hardware described above is supported on configurations as noted in the following table.

**Autobaud Detect and Modem Control Support**

	DN200	DC20	DN87S	DN82	DN20	DN92
Autobaud Detect	X	X	X	X	X	
Modem Control	X	X	X	X	X	X

**PREREQUISITE SOFTWARE:**

None

**OPTIONAL SOFTWARE:**

ALGOL-10  
 APL-BASIC  
 APL-SF  
 BASIC-10  
 COBOL-74 with SORT/MERGE  
 CPL-10  
 DBMS-10  
 FORTRAN-10  
 IQL-10 Extended  
 SORT/MERGE  
 DECsystem-10 2780/3780 ET

**TRAINING CREDITS:**

TEN (10) — Applies only to options that include support services. Consult the latest Educational Services Catalog at your local DIGITAL office for the available courses, course requirements, and guidelines.

**SUPPORT CATEGORY:**

DIGITAL SUPPORTED  
 TOPS-10 LIR for DECsystem-1091S is a DIGITAL Supported Software Product.

**SOFTWARE INSTALLATION:**

DIGITAL INSTALLED  
 DIGITAL installation is required for Software Product Support. There is no charge for installation if performed at the time of system installation. DIGITAL installed software products, except for operating systems, are subject to an add-on installation fee when purchased subsequent to system installation.

**SOFTWARE PRODUCT SUPPORT:**

TOPS-10 LIR for DECsystem-1091S includes standard warranty services as defined in the Software Support Categories Addendum of this SPD.

**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 License Agreement between Purchaser and DIGITAL.

This software is available only on 9-track 1600 BPI Magtape (PE).

TOPS-10 LIR for DECsystem-1091S is available with the following system as indicated.

1091S	Single-use license, sources and binaries, documentation, support services for KL10E systems
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**ADDITIONAL SERVICES:**

Post-warranty Software Product Services are available for licensed customers. Customers should contact their local DIGITAL office for additional information.