

UNIVERSITY OF QUEENSLAND

Computer Centre

NEWSLETTER

authorization: Director of the Computer Centre

1 NEW MONITOR FOR THE PDP-10

- 1.1 A new operating system will be installed on the PDP-10 in the next few days. This will be a program designated: 5S07 #1 (i.e. 5-series version 7, U.Q. version 1). It will replace 5S06B #5.

There are a number of significant enhancements in 5S07 mostly concerned with providing "multi-tasking" operation within the framework of the PDP-10 timesharing system. The new features are summarised below.

The new monitor has been constructed assuming the availability of two CPU's (CPU0 and CPU1) in anticipation that the second processor will be ready for service in a month or two. It is not anticipated that this feature should cause any problems to the users - now, or when CPU1 comes online.

Every effort is being made to ensure that 5S07 is installed in a strictly upward compatible manner. However, with a program of this size and complexity (57K), it is not possible to undertake anything approaching complete testing or a formal correctness proof. Users are therefore requested to make some allowances over the transitional period for any "bugs" that may be encountered, and to report any erroneous behaviour to the Centre promptly, accompanied by example print-outs.

One area in which the standard 5S07 is not upward compatible with previous U.Q. monitors is in regard to the names of so called ersatz devices, i.e. mnemonics such as: PLOT:, LANG:, MATHS:, etc. 5S07 insists on a maximum of three characters for such devices. (The monitor actually translates these names into a particular ppn's area on the DSK:, e.g. PLOT: is actually DSKB:[5,106] at the moment).

This is because the fourth letter now has a special significance to 5S07, i.e.

PLO:	means	DSK:[5,106]
PLOA:	"	DSKA:[5,106]
PLOB:	"	DSKB:[5,106]
PLOT:	"	DSKT:[5,106], but DSKT:

does not exist so this would cause an error.

To ease the transition, 5S07 #1 (the U.Q. version) will contain a modification to the effect that:

PLOX: will be truncated to PLO: if DSKX does not exist.

Therefore, PLOT: will be equivalent to PLO:, but PLOA: will not work because the plotting directory is DSKB:[5,106].

This modification is to assist users during the transition period but as it is a non-standard, it will be removed by January 1975. Users are therefore advised to convert existing software and .CTL files to use the three character names.

All the old ersatz devices are still present, represented by their first three characters, i.e. HLP, ALL, LIB, BAS, COB, MXI, ALG, BCI, FOR, MAC, UNV, PUB, DEC, STD, XPN, FFA, MFD, UMD, TED, REL, RNO, SNO, DOC, FAI, MUS, MAT, LAN, GAM, SIM, STA, PLO, TUT, OPS, UTI, FIN, RTP.

N.B. MAT = MATRIX U MATHS

## 1.2 New LOGIN

A new version of LOGIN will be installed. The commands to LOGIN are upward compatible with the old version and there are many enhancements. Users interested in the new features may use the /HELP and /HELP:SWITCH switches to obtain documentation.

There follows a summary of enhancements provided by 5S07. No detailed documentation is generally available at this stage, but users with specific requirements may apply to the Computer Centre for information on a particular topic.

## 1.3 Introduction

The 5S07 release of the TOPS10 monitor contains many important new features and improvements. This document presents an overview of these enhancements to TOPS10. Section 1.4 offers an overview of the items of interest to all users of the system. Section 1.5 summarizes the new features which are of interest primarily to programmers. Section 1.6 discussed the items of concern to operators. Section 1.7 offers a description of the new features to system maintainers. More detailed information is available in the DECsystem-10 Operating System Commands Manual, the DECsystem-10 Monitor Calls Manual and other documents in the DECsystem-10 Software Notebooks.

## 1.4 Items of Interest to All Users

This section discusses the new features of the 5S07 monitor that are of interest to all users of the system. These features provide new conveniences for the terminal user along with additional information about errors encountered during the reading and writing of magnetic tape.

#### 1.4.1 ↑R Terminal Feature

While typing a line of input at a terminal, the user may send a ↑R. The monitor will respond by typing a carriage return-line feed followed by the current content of the input line. This feature is useful whenever the user becomes confused about the content of a line as a result of the use of RUBOUTs. In other words, ↑R causes the system to retype the current state of input line so that the user can be certain of its content. The ↑R character is not passed to the program except when bit 29 is set in the status word for the terminal. In order to avoid problems with existing programs which expect to receive the ↑R character, the user may employ the new SET TTY RTCOMPATIBILITY, obtaining treatment of the ↑R character compatible with the 5S06 monitor. (Note that this command also affects the ↑T character whose behaviour is described in the next section.)

#### 1.4.2 ↑T Terminal Feature

The user at a terminal may type ↑T at any time. The monitor will respond by typing a line containing status information about the user's job. The information includes the current job state (e.g. running, waiting for I/O, etc.), the real time since the last use of ↑T, the CPU time since the last ↑T, the amount of core being used, the name of the current program, and several other useful items. The ↑T character is not passed to the program. In order to avoid problems with existing programs which expect to receive the ↑T character, the user may employ the new SET TTY RTCOMPATIBILITY command in order to obtain treatment of the ↑T character which is compatible with the 5S06 monitor. (Note that this command also affects the treatment of the ↑R character as described in the paragraph above.)

#### 1.4.3 Magnetic Tape Error Reporting

Information about errors encountered in reading and writing magnetic tape can be displayed at a user terminal. This feature can be enabled or disabled by using the new SET WATCH MTA command. If enabled when the user UNLOADs a magnetic tape, the monitor will type on the user's terminal the number of words read and/or written along with the number of soft (i.e. recoverable) and hard errors encountered. The same information along with additional useful data is recorded in the system error file, ERROR.SYS, in order to assist field service. The normal default is set so that users will receive magnetic tape error statistics unless they explicitly disable the feature. Since it is important to be able to associate errors with a specific reel of tape, installations should assign a unique

six-character REELID to each tape which is used at the site. Users inform the system of the REELID of a tape with the REELID switch of the MOUNT command.

There also have been improvements in the performance and error recovery capability of magtape service. Spacing operations have been improved to permit swapping out a job during spacing. Improved error recovery procedures have been implemented.

#### 1.4.4 Ersatz Devices

The 5S07 monitor supports a large number of new ersatz devices. A complete list of these devices is contained in the DECsystem-10 Operating System Command Manual.

### 1.5 Items of Interest to Programmers

This section contains a description of new features of the 5S07 monitor which are of interest primarily to users writing their own programs. The first four features provide the basic tools for implementing transaction processing applications in a simple, convenient and efficient manner. The next two are useful in improving the efficiency of certain programs. The last feature provides a new aid for debugging programs.

#### 1.5.1 Interprocess Communication Facility (IPCF)

The Interprocess Communication Facility (IPCF) introduces a capability for communicating between independent jobs on the system. Every communication has a sender's address, a receiver's address and data (i.e. the message). IPCF has no interest in the content of messages. It simply transmits a message from one job to another. Normally, a communication is composed of several 36 bit words. The maximum number of words in a single message is a parameter established by the installation. (On systems with the virtual memory option, IPCF can transfer entire pages from one job to another). As an aid to establishing communication, IPCF has a special facility known as [SYSTEM] INFO which permits jobs to declare symbolic names by which they will be known. Once a job has a name, it can utilize the three new IPCF UWO's in order to send and receive messages and to check on the content of the job's "mailbox". The job also may request a software interrupt (see section 1.5.4) whenever a communication is placed in its "mailbox". Since IPCF utilizes monitor free core to store messages, the system administrator is given control of the amount of free core that a user may "tie up".

### 1.5.2 MPX Channel

The 5S06 monitor restricted user programs to 16 simultaneously active I/O channels. Although this number is sufficient for most applications, there are some special purpose tasks which require an unusually large number of devices to be in use at the same time. For example, some applications need to support a large number of active terminals. The new MPX channel feature does not increase the number of simultaneously active I/O channels. Instead, it makes available a new type of pseudo-device, the MPX channel. After OPENING device MPX, a user job "connects" an unrestricted number of devices to the MPX channel. (Only certain types of devices can be connected to an MPX channel as indicated by the DEVTYP UUO). The job then can perform buffered mode I/O to or from the devices connected to the MPX channel in a fashion which is quite similar to ordinary buffered mode I/O. The major difference is that a fourth word has been added to the buffer ring header. It contains a UDX, a universal device index, to indicate the specific device from which input has been received or to which output is to be sent. The UDX for a device is obtained from the IONDX. UUO. Additional UUO's permit user programs to recover from error conditions associated with devices on an MPX channel. Thus, the MPX channel provides a simple, efficient method for multiplexing a large number of devices (such as terminals) on a single I/O channel.

### 1.5.3 Non-Blocking I/O

A new option to buffered mode I/O can be used in order to prevent a job from blocking (i.e. going into I/O wait) when no buffers are available for input or output. When an IN UUO or an OUT UUO ordinarily would force a job to block, the error return for the UUO is taken instead. The user job can distinguish this non-blocking return from a regular error return by checking the status bits for the device. A non-blocking return sets no error bits. The non-blocking I/O capability is very important for programs handling a large number of independent devices (e.g. devices connected to an MPX channel) and asynchronous conditions.

### 1.5.4 Generalized Software Interrupt Facility

A new software interrupt mechanism has been added to the 5S07 monitor. It is a generalization of the interrupt mechanism normally associated with computer hardware. This new feature makes it possible for a program to recover from virtually all error conditions and to respond to a wide variety of asynchronous events (especially I/O events) in an orderly and efficient manner. The new mechanism dominates the old APR

and .JBINT interrupt facilities. It permits interrupts for such device-related events as input done, output done, end of file, input error, output error, device offline, device full, and quota exceeded. Non-device-related events for which interrupts can be enabled include time limit exceeded, control-C, execution of any UUO, illegal UUO, illegal memory reference, address check, pushdown list overflow, NXM, APR clock, floating point overflow, and KSYS warning.

#### 1.5.5 Optional Inhibit of Buffer Zeroing

The 5S07 monitor contains a new option to buffered mode I/O to suppress the monitor's normal zeroing of I/O buffers. This feature is intended for sophisticated application programs which are "smart enough" to function properly without the overhead from this standard monitor service. This feature is recommended only for knowledgeable programmers writing applications involving complex manipulation of I/O buffers.

#### 1.5.6 Optional Fail on Supersede for ENTER UUO

A new option has been added to the ENTER UUO so that it will fail when there is an existing file of the same name. A program that needs to generate a file with a unique name can use this feature instead of employing LOOKUP UUO's followed by an ENTER UUO. The resulting code is more efficient.

### 1.6 Items of Interest to Operators

This section discusses several features which impact the activities of the system operator. They help in providing superior service for users at a DECsystem-10 installation.

#### 1.6.1 Auto Reload

After most crashes, the system will take a crash dump and then reload a fresh copy of the monitor. The usual start-up dialog questions will be asked. But if no one is around to answer them, the monitor will wait for one minute and then start itself using default assumptions for the answers. This feature may prove helpful at sites where unattended operation is required late in the evening or over the weekend.

#### 1.6.2 Magnetic Tape Error Reporting

The new magtape error reporting capability requires that there be a method for associating media errors with a specific tape. It is strongly recommended that all DECsystem-10 installations assign unique six-character reel identifiers to each reel of magnetic tape in use at their site. By requiring that users specify this REELID with a MOUNT command whenever a tape is

to be utilized, the installation can obtain media error reports, from SYSERR. In addition to the SYSERR report, the operator at his terminal will receive information about magnetic tape errors. If this data is not desired, it can be silenced by using the SET NOMESSAGE MTA command.

## 1.7 Items of Interest to System Maintainers

This section presents several new features which may be of interest to system maintainers. They include performance improvements and enhancements to increase the maintainability of the system.

### 1.7.1 UUO's on Second Processor

The 5S06 monitor restricted execution of all UUO's to the master processor in dual processor configurations. Jobs executing on the slave processor had to be rescheduled to the master processor in order to execute a UUO. This restriction has been relaxed in the 5S07 monitor; certain UUO's now execute on the slave processor. This feature reduces unnecessary rescheduling and improves performance on dual processor configurations.

### 1.7.2 GETSEG Improvements and Logical Name Search Speedup

The 5S07 monitor contains several miscellaneous performance improvements. Among the more notable are a significant speedup in the method for searching for logical names and performance improvements for the GETSEG UUO (especially when executed for device SYS.)

## 2 NEW CHARGE RATES FOR HUMAN SUPPORT

The following new charge rates have been approved: INTERNAL -

- (i) Programming and Systems Work for projects involving 25 hours or less of continuous work or for projects not of a continuous nature:- \$12.00 per hour
- (ii) Programming and Systems work for projects of a continuous nature greater than 25 hours:- The actual salary costs of the staff involved (based on a 230 day year) plus a 15% management fee.

EXTERNAL - Programming and Systems work: \$20-25 per hour  
Advanced Programming and Systems work: \$25-30 per hour

3 BMD MANUALS

A further supply of BMD manuals has arrived. These are available from the Computer Centre for \$8.50 each.

4 TALENT SCOUT FOR COMPUTER ART

Australia 75, the first Festival of Creative Arts and Sciences is sending out a talent scout to find artists working with computers and electronics. He is Doug Richardson of the University of Sydney.

Mr Richardson is co-ordinator of an exhibition of computer and electronic arts which will form part of the Australia 75 Festival. It will take place in Canberra during March of next year. The exhibition will bring art and technology together in the form of reactive sculptures, computer graphics, biofeed-back systems, electronic music, computer films and video tapes. It will also include performances of an electronic dance.

Mr Richardson has expressed his aims in the following way:

"We are looking for creative people who can work with today's technology. These people are hard to find. They have to be tracked down by word of mouth because there is no single focus for this sort of activity. The Australia 75 Festival will provide the first opportunity for these brilliant individuals to get together. The result will be an exciting fusion of art and technology."

People wishing to contact Mr Richardson may do so via the headquarters for Australia 75 at Room 141, First Floor, North Building, Civic Offices, London Circuit, Canberra City.

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