ON THE LEVEL 6

January 7, 1977 No. 26

SUBJECT: New Level 6 Software Announcements

- A new more powerful disk/diskette based operating system.
- File management and communications facilities in a multi-programming environment.
- Real-time or data communication in one or more online streams with a concurrent batch stream
- Communications support includes file transmission between L6 and L66 systems. Support for VIP 7100 and 7700 terminals plus ASR 33/35, KSR33 and BSC.
- ISAM, sequential and direct addressing methods
- A sort which will operate in the online or batch modes
- 9 track tape support
- An enhanced Fortran which supports the scientific instruction set.
- An extended L66 upward compatible COBOL which supports ISAM, and 9 track tapes
- A new RPG II Compiler
- And finally a BES 2 sort

Please call me with your questions and comments regarding the new software offering.

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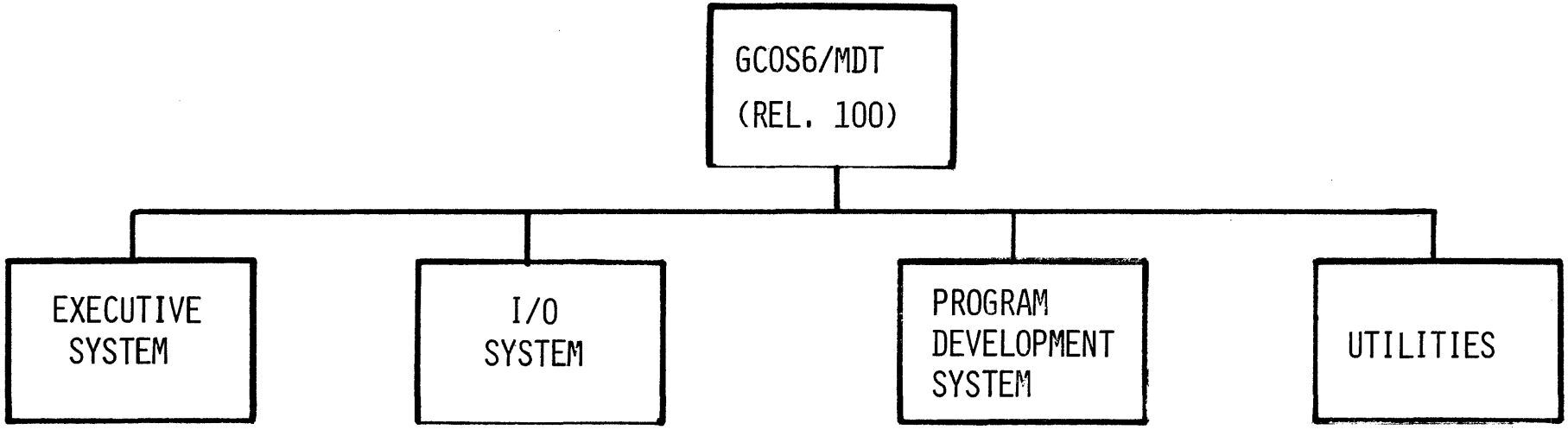
LEVEL 6

GCOS6/MDT FUNCTIONS SCHEMATIC



- RESIDENT MONITOR
  - TASK MANAGER
  - CLOCK MANAGER
  - MEMORY MANAGER
  - LOADERS
  - TRAP MANAGER
- COMMUNICATIONS SUPERVISOR

- FILE MANAGEMENT
  - SEQUENTIAL ACCESS
  - DIRECT ACCESS
  - INDEXED SQUENTIAL
- PHYSICAL I/O
  - PERIPHERAL DRIVERS
  - OPERATOR CONSOLE MANAGER
- EXECUTION CONTROL LANGUAGE (ECL)
- OPERATORS CONTROL LANGUAGE (OCL)

- PROG. DEV. TOOLS
  - EDITOR
  - LINKER
- ASSEMBLY LANGUAGE
  - MACRO PREPROCESSOR
- COBOL COMPILER
- FORTRAN COMPILER
- RPG II

- DISK UTILITIES
- MAG. TAPE UTILITIES
- CONFIGURATION LOAD MANAGER
- SCIENTIFIC INSTR. PROCESSOR SUPPORT
- COMMUNICATIONS SUPPORT
  - VIP 7100 DRIVERS
  - VIP 7700R DRIVERS
  - POLLED/NON-POLLED SUPPORT
  - BSC 2780
- FILE TRANSMISSION (L6-L66)
- DISK SORT

GCOS6/MDT REL. 100

GENERAL DESCRIPTION

The Level 6 GCOS Multi-Dimensional Tasking (MDT) Operating System Rel. 100 is a disk/diskette based operating system that provides executive, file management and communications facilities designed to support multitasking real-time or data communications applications in one or more on-line streams. In addition, program development or other batch type applications can be performed concurrently in a single batch stream.

The GCOS6/MDT Executive supports the execution of user application tasks and provides a set of system services which offer the user the means of controlling the execution of individual tasks and the synchronization of multiple tasks with one another and with time related events. It controls the loading of user programs and manages requests for available memory. It provides standard system trap handling routines for responding to exception conditions and also allows the user to provide his own trap handling routines for user caused trap conditions.

The GCOS6/MDT Rel. 100 File Manager offers the user an extensive set of logical I/O access methods. It provides device independent access to any device for sequential files, and direct and indexed access to direct access mass storage files. In addition, the File Manager automatically manages the space utilization of mounted mass storage volumes thus allowing the user to create and expand mass storage files as dictated by the requirements of his on-line applications.

The GCOS6/MDT Rel. 100 Operating System offers two levels of communications interface to the user. Remote/Local Terminals may be accessed through the sequential file interface of the File Manager, or the user can exercise a more direct controlof his communications environment by using the systems physical I/O interface.

The GCOS6/MDT Operating System provides a batch Program Development capability that can run concurrently with on-line real-time application programs. This is a major enhancement over the BES1 / BES2 software which consisted of an off-line Program Development environment which was run separately from the on-line application execution environment. GCOS 6 major enhancements include:

- On-line dimension capable of handling variable multiple real time application programs running in a cooperative environment.
- Batch dimension capable of doing program development in a sequential single stream that can be rolled out when required by an on-line need for additional memory.
- Expanded file management over BES2 in support of variable sequential and indexed mass storage files (UFAS) and magnetic tape supported at the UFAS equivalent of ANSI Level 3 (less multifile-multivolume).

- Run minimum on-line and program development batch in a 32K level 6/30 or 6/40 processor with 1 million bytes of on-line disk storage for system files.

- Accommodation mode supporting BES2 applications.

- Enhanced Fortran and Cobol compilers.

- RPG II Compiler which is Series 60 Level 62/64 subset compatible, and also compatible with the IBM System 3 and System 32 RPG II Compiler.

- Sort Utility is added which will operate in either batch or on-line modes. It will accept parameters from CRT, card reader, or disk files.

- Communications support includes file transmission between Level 6 and Level 66 systems. Asynchronous communications support for the VIP 7100 and ASR 33/35 type terminals. Synchronous support for polled/non-polled VIP 7700, 7700R, and 7760-60 terminals, as well as BSC.

Hardware Supported

All previously announced Level 6 hardware including mass storage devices is supported by GCOS6/MDT (Rel. 100) plus:

6/40 Central Processor (Optional)

- Scientific Instruction Processor

- Long Address Form (Executive, Input/Output and Communications only - this environment allows execution of user written assembly language program in LAF mode.

Magnetic Tape Data Files

Terminals (Poll/Select)

7700R (7700 Mode)
7760-60 (7700 Mode)

Executive

Task Manager

The task manager is responsible for task requesting, termination, waiting, and posting. It maintains the request queues for the various tasks. It activates tasks which are dormant when requests or posts are issued to them. It removes a task from the level (to unblock it) when a wait is issued. When a terminate is issued, the task manager will reactivate the task if other requests are queued for it, otherwise it will unblock the level to allow other tasks to run.

The task manager is the only agency in the system which is allowed to manipulate the task and request queues.

Clock Manager

The clock manager accepts clock requests from a task (via the task management request structure) and performs the specified clock function. The clock manager maintains the current date/time, and time intervals. It may either reactivate a waiting task or schedule a task: a) after an interval, b) repeatedly at a set interval, or c) at an explicit date/time.

Memory Manager

The use of memory is dynamically controlled by the memory management functions. Memory is managed on the basis of "memory pools". Memory pools are contiguous areas of memory which are defined at system configuration time, and may overlap. There is one batch pool which must be adjacent to high memory, and one pool defined as usable by the system which must not overlap background. Each on-line task group is assigned a memory pool when it is created and all memory allocated by it or on it's behalf is allocated from that pool.

A task may request allocation of any size block, but the space is actually allocated in multiple of 32 word blocks. When a block is returned, the memory manager verifies that the block is allocated to this task group.

When space is not available for allocation, it is the caller's option to wait for it, or to receive an error status. If an area to be allocated to an on-line task group that has batch preememption rights is not available from its own pool, the system is invoked to initiate batch roll-out. When a on-line area is returned, and no other space is required by an on-line task group from the batch area, roll-in is initiated if necessary.

For compatibility, the BES2 buffer manager may optionally be included in a GCOS 6 system, however, the user is responsible for initializing the Pool Parameter Tables (PPTs).

Loader

GCOS 6 includes a capability to load disk resident procedures (root segments and overlays). The loader is designed to load a load unit in a single I/O transfer if it contains no relocatable or unresolved IMA addresses.

Trap Manager

Certain user oriented traps must be handled on a task group specific basis while other traps must be handled by the system itself. The trap manager allows a task group to connect its own trap routines for the specific user class traps. For any user class traps for which there is no user routine, and for fatal system class traps, the trap manager will cause the task to be aborted. For user class traps which are connected, control is passed to the connected trap procedure in the privilege mode appropriate to the user and specific trap.

Input/Output Subsystem

File Management

The file management package provides the support of three access methods on different media. This includes sequential access on all devices (mass storage, printer, magnetic tape, communications, card reader and console), relative and indexed on mass storage. Files are cataloged to a tree-like structure. Three classes of files exist: disk files on a logically non-dismountable (system) pack, disk and tape files on a logically dismountable volumes and all unit-record devices.

All devices in the system are either in the on-line pool or the batch pool. A file on a mass storage device cannot be referenced from the batch environment unless it is shareable. A file can also be declared read only (write protect).

A file is only assigned to a task group when the file is OPENed. At this time a concurrency level is specified. If the requested level of concurrency cannot be given, the task is stalled until it can have the file OPENed. File management locks a given file when required so multiple users can serially write on the same file.

Physical I/O System

The I/O System is built on the task/request structure of GCOS 6. It is responsible for controlling the various devices and for controlling the I/O flow to the system console.

Device Drivers

Within the I/O system, there are tasks running at dedicated (non-shared) levels which control I/O devices. These are called "drivers". The drivers each are able to control one or more specific device types. They are reentrant and run at a different level for each device they control (but only one copy of any driver used is necessary as it may run at several levels concurrently). All system drivers are referenced using a standard data structure called the I/O request block (IORB).

A new magnetic tape driver is provided with this operating system release.

Operator Console Manager

All input and output to the operator console is managed by this module. It guarantees consistency of input and output spacing to prevent overprint of messages. It also manages input requests so they may not tie up the system console (preventing possible critical messages from being printed promptly) except when the operator explicitly states that he is ready to answer an input request.

Execution Control Language Processor

The Execution Control Language Processor enables a user to dynamically configure and load a task-group. The ECL processor is a procedure that runs as the main task of the user's task-group if the ECL processor is specified in the CREATE-GROUP which initiated the task-group.

The ECL processor reads commands (E.C. statements) from a sequential input file and spawns a task to execute the function specified by the commands. The code for the various functions is resident on disk with a pathname corresponding to the name of the command. A spawn-task is used by the ECL processor to execute each function with the command name being the pathname. When a function is completed, the ECL processor reads and executes the next command from the sequential input file.

The batch must use the ECL processor. When the batch taskgroup is requested, the ECL processor is spawned as the main task of the task-group. The ECL processor reads the ECL file specified by the EFN in the parameter list in the first RB in the batch queue. The batch process is configured, loaded, and run under control of the ECL processor. When the batch process terminates, if there is another RB on the batch queue, the ECL processor will be spawned again and repeat the above using the EFN specified in the new RB for controlling the new batch process. (RB = Request block).

Operator Control Language Processor

The Operator Control Language Processor is a special invocation of the ECL processor from the system task group. It is used to process operator system control commands. Operator commands are a logical subset of the ECL language and therefore are verified and executed as ECL commands by the system.

Program Development

Assembler Enhancements

The Assembler is enhanced to run on-line under the GCOS 6 Executive, add support of 6/40 op codes and generate long address form object text.

COBOL Enhancements

The COBOL compiler is enhanced to run on-line under the GCOS 6 Executive and supports indexed files, signed 16 bit binary data, 9-track magnetic tape data files and variable length records.

FORTRAN Enhancements

The FORTRAN compiler is enhanced to run on-line under the GCOS 6 Executive and has the following added functionality:

- Double Integer Data Type (INTEGER*4)
- Generation of code executable on Scientific Instruction Processor. (6/43 Option)
- Double precision data type.
- The extended I/O edit capabilities; i.e., column tabbing.
- The ability to extract a substring of character variables.
- The alternate RETURN statement.
- The ability to equivalence two unequal length character variables.
- Magnetic tape data files.

RPG II

The Level 6 Report Program Generator (RPG) is an efficient, commercially oriented, problem solving high-level language. Level 6 RPG provides a comprehensive RPG compilation capability which, in the absence of an industry wide RPG Standard, is comparable to, and a proper language subset of, that provided by other Series 60 compilers, as well as IBM SYSTEM 3 and SYSTEM 32 RPG II. Exceptions are principally confined to RPG language elements for which system architecture between Level 62/64 and Level 6 preclude compatibility, and to "older" RPG features representing support of the earlier RPG I language.

The major language omissions from the initial RPG release are concerned with the processing of files via Record Address files, Inverted Print, File Translation, SPECIAL Collating Sequence, Forms Positioning, and magnetic tape support.

Editor Enhancements

The Editor is enhanced to provide direct access text editing that allows unlimited forward and backward scanning of files. Concurrency of program preparation with compilation can be achieved by configuring the editor as an on-line task and scheduling its output for later compilation in the batch environment.

Linker Enhancements

The Linker is enhanced to support the GCOS 6 load text format.

Utilities

Sort (Release 0101)

The Sort runs as a non-called utility within the 32K batch system utilizing up to 64K of available memory. Primary features of the sort are:

- Up to 8 keys consisting of character strings.
- The output sequence can be based upon Ascending/Descending ranking per key.
- The Collating sequence is ASCII.
- The input file is a single sequential file on disk (or diskette).
- The output file is a sequential file on disk (or diskette).
- Work file is on disk (or diskette) and needs to be approximately equal in size to the input file.

Communications Enhancements

- The hard copy option on the VIP7700, 7700R and 7760-60 are supported. In addition, both polled and non-polled environments are now supported.

- File transmission to H-6000/Level 66 - This capability consists of a GCOS III utility program and a Level 6 utility program and has the following functionality:

  - Level 6 files supported consist of any files that can be read/written sequentially.
  - GCOS III files will be written in Systems Standard Format (SSF) and will be read sequentially.
  - Files must be in ASCII format and are sent/received using a VIP non-polled protocol.
  - Sequence numbers checking is performed.

Configuration Load Manager

The system generation procedure provided with the Configuration Load Manager is designed to tailor the system to meet individual requirements and to load and begin execution of the system. A partial list of system elements effected by the configuration follows:

System disks (logically non-dismountable)
Other devices
Memory pools
Use of SIP (for context area)
Presence of SIP simulator
Central processor type
User-supplied system extension modules
Initialization OCL file
Size of system overlay pool
Permanently resident overlays
Date and Time

Scientific Instruction Processor Simulator Enhancements

The SIP Simulator will be enhanced to support double precision data and more than one scientific register.

Minimum Configuration

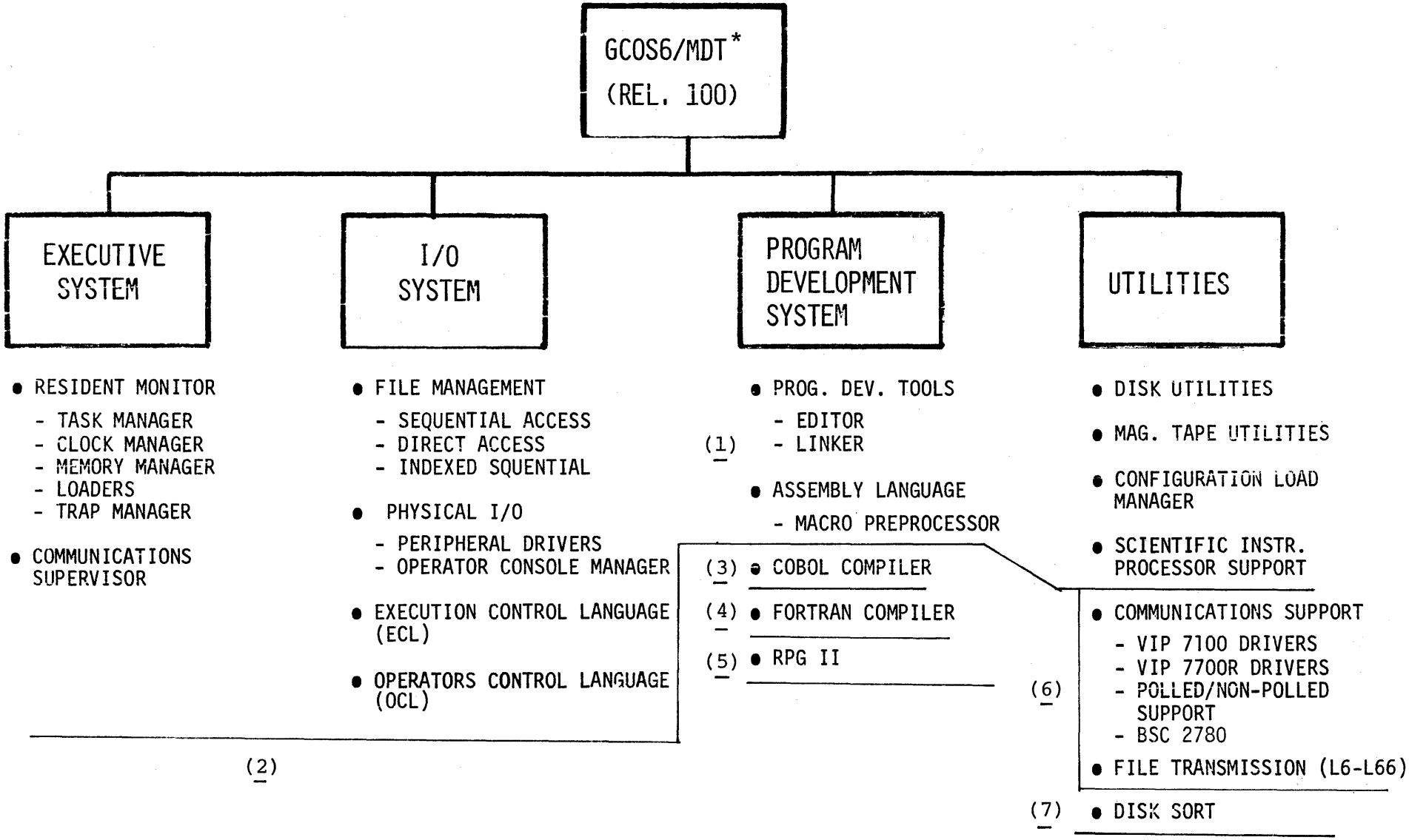
On-line/batch with Program Development

6/36 or 6/43 C.P. with full control panel
32K words of memory
Any supported console
One million bytes mass storage:

2 - DIU 9102 Dual Diskette or
1 - CDU 9101 Cartridge Disk

LEVEL 6

GCOS6/MDT FUNCTIONS SCHEMATIC



* SEPARATELY PRICED SOFTWARE PACKAGING GUIDE

PRICING GUIDE (U.S. ONLY)

1)	Program Development System (Includes Executive System)	$1600
2)	Executive and I/O Systems - Only	$ 800
3)	COBOL Language Compiler	$3300
4)	FORTRAN Language Compiler	$ 600
5)	RPG II	$2200
6)	Communications Support	$ 200
7)	Disk Sort	$ 200

AVAILABILITY

General Availability - May, 1977