

OS4 TECHNICAL BULLETIN

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C0	Dec. 1978	OS4 C0 Engineering Release.
C1	Feb. 1979	OS4 C1 Production Release.
D0	Aug. 1979	OS4 D0 Production Release.
E0	Mar. 1980	OS4 E0 Production Release.
E4	May 1980	OS4 E4 Production Release. Information in the manual corresponds to the software released at revision level E4.
F0	May 1981	OS4 F0 Production Release. Information herein corresponds to software release F000.

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The F0 release of OS4 incorporates a number of modifications to the system. This bulletin summarizes those modifications. In addition to the functional changes described below, many REAs were fixed. Refer to the F000 Engineering Notice for a list of these REAs.

SECTION 1. CONTENTS OF STANDARD MEDIA

The complete OS4 system consists of the following two subsystems:

- RTX4/IOS4/SFM4
- OS4 and utilities

These subsystems must be ordered as separate items. Together they make up seven diskettes. The contents of these diskettes have changed since the last OS4 release. The F000 diskette contents are:

- RTX4/IOS4/SFM4:

RTX4 Libraries Diskette, #84-93410-01F000

RTX4 library	RTX.LIB
RTX4 library (check version)	RTXD.LIB
IOS4 library	IOS.LIB
IOS4 library (check version)	IOSD.LIB
SFM4 library	SFM.LIB
SFM4 library (check version)	SFMD.LIB
Instruction Emulator library	EMLTR.LIB
Analog Handler library	ADA.LIB
Extended I/O Interface library	EII.LIB
Mini Debug 4 Object file	DEBUGM.OBJ
Mini Debug 4 Binary file	DEBUGM.BIN
Standard Debug 4 Object file	DEBUGS.OBJ
Standard Debug 4 Binary file	DEBUGS.BIN
Extended Debug 4 Object file	DEBUGX.OBJ
Extended Debug 4 Binary file	DEBUGX.BIN

Macros/Demos Diskette, #84-93420-04F000

General Purpose Macro file	GEN.MAC
RTX4 User Macro file	RTX.MAC
RTX4 Development Macro file	RTXD.MAC
IOS4 User Macro file	IOS.MAC
IOS4 Development Macro file	IOSD.MAC
SFM4 User Macro file	SFM.MAC
SFM4 Development Macro file	SFMD.MAC
Analog Handler Macro file	ADA.MAC
RTX4 Demo Program Source file	RTXDEMO.ASM
RTX4 Demo Program DO file	RTXDEMO.JCL
SFM4 Demo Program Source file	SFMDemo.ASM
SFM4 Demo Program DO file	SFMDemo.JCL
BiSync Pico Driver Macro File	BSC.MAC

- OS4 and Utilities:

OS4/Utilities Diskette #1, #84-93460-01F000

OS4 Memory Resident System	OS:..SYS
OS4 Executive	EXEC:..SYS
SCOUT Memory Resident System	OS:..SCT
Source Editor	EDIT.SYS
Macro Assembler	MACRO.SYS
Object Program Patch Utility	PATCH.SYS
OS4-Linked Extended Debug	DEBUG.SYS
Label Utility	LABEL.SYS
General Purpose Macro file	GEN.MAC
RTX4 User Macro file	RTX.MAC
IOS4 User Macro file	IOS.MAC
IOS4 Development Macro File	IOSD.MAC
SFM4 User Macro file	SFM.MAC
OS4 Macro file	OS4.MAC

OS4/Utilities Diskette #2, #84-93460-05F000

Executive	EXEC:..SYS
Line Editor	OLE.SYS
Concordance	CNC.SYS
Disk Conversion Utility	D2D.SYS
Help Utility	HELP.SYS
Help Help file	HELP.HLP
Commands Help File	COMMANDS.HLP
Downline Load Utility	DOWNLOAD.SYS
ROM Generation Utility	ROMGEN.SYS
ISOLITE ROM Formatter	AUTOGEN.SYS
Object Code Listing Utility	TCDUMP.SYS
Sort Utility	SORT.SYS
Merge Utility	MERGE.SYS
COBOL Sort Utility	COBOLSORT.SYS
Sort/Merge Library file	SORT.LIB
Sort/Merge Macros	SORT.MAC
IOS DIB/CIB Source	IOSDIBCIB.ASM
Label Utility	LABEL.SYS
Mag Tape Executive	MTEX:..SYS

OS4 System Generation Diskette, #84-93460-02F000

Bootstrap Relocator Module	BOOT3.BIN
Sysgen Root Source file	OS4CONFIG.ASM
Sysgen Assembly D0 file	OS4GEN.JCL
Sysgen Link D0 file	OS4GENLINK.JCL
Dual Floppy Sysgen Link D0 file	OS4GENFLINK.JCL
Primary System library	OS4SYS.LIB
Auxiliary System library	OS4AUX.LIB
IOS4 Development Macro file	IOSD.MAC
SCOUT Configuration Source file	SCTCONFIG.ASM
SCOUT Sysgen Assembly D0 file	OS4SGEN.JCL
SCOUT Sysgen Link D0 file	OS4SGENLNK.JCL
SCOUT Floppy Sysgen Link D0	OS4SGENFLNK.JCL

OS4 Linker Diskette, #84-93460-04F000
 OS4 Executive
 Linker/OS4 Interface
 Linker overlays

EXEC:::SYS
 LINK.SYS
 OS4NEWLINK.POB
 LNKPASS1.POB
 LNKPASS2.POB
 LNKPASS3.POB
 LNKNSMAP.POB
 LNKPASS3S.POB
 LNKSMAP.POB
 LNKXREF.POB
 LNKDEBUG.POB
 OVMERGE.SYS
 OS4.LIB
 ROMINIT.OBJ

Overlay File Merge Utility
 OS4 System Library
 ROMINIT Object file

• Multi-Terminal Editor (MULTED):

MULTED System Diskette, #84-93470-01F000
 Sysgen Root Source file
 MULTED Interface
 MULTED System Module
 Batch Processor Module
 Editor Module
 Sysgen Assembly JCL
 Sysgen Link JCL

MTECONFIG.ASM
 OSMTE.SYS
 MULTED.SYS
 BATCH.SYS
 MTE.SYS
 MTEGEN.JCL
 MTEGENLINK.JCL

SECTION 2. RTX/IOS/SFM MODIFICATIONS

1. The file manager has been updated to support multilevel directories on disk and diskette. This means that files can be manipulated in groups within a directory and that directories can exist within other directories in a tree hierarchy. Except for the root directory, which is equivalent to the single directory on a disk in previous versions of the system, each directory is named with the extension DIR. For additional details, refer to Topic 2.5.1 of the OS4 System Reference Manual. The full name of a file on a multidirectoried disk is represented as a path-name consisting of the device or logical unit, one or more directory names, the filename, and the file extension. The slash (/) is used to separate these parts, except that a period is used to separate the filename and extension. For this release, a period can still be used to separate the device or logical unit name from the filename, but this may be changed in future releases. For example:

DMO/DIR1/DIR2/FILE.EXT

In addition, E:GFN treats a leading slash as meaning the root directory of the device containing the logical unit used to begin the search. This is normally the device containing UF or SF, but it can be modified by the new parameter in the E:GFN call (see Section 3, item 1 in this document). Note that the executive (EXEC and MTEX) will strip up to two leading slashes from the first filename in a JCL command.

OS4 and all of the utilities and language processors (except COBOL) now recognize and support the multidirectory syntax.

Logical units may be assigned to directories. For example:

```
//ASSIGN SF=DMO/SYSTEMFILES/
```

Filename searches begin in the named subdirectory.

2. A new I/O handler has been added to IOS to support floppy disk interfaced through a SCOUT controller.
3. An expanded version of EII (Extended I/O Interface) has been included in F000. New features are discussed in the Extended I/O Interface (EII) Reference Manual.
4. An input via IOS of the character string "/"* will be treated as an end of file only if the input count is exactly two characters. Thus, if a comment or other data follow in the same record, EOF is not assumed. This is to allow slash-asterisk to be used as a comment delimiter, as it is so considered in some high-level languages.
5. The "characters per line" value contained in the standard line printer DIBs has been standardized to include the carriage control character. (E.g., count is now 81, not 80).
6. IOSD.MAC has been modified to reduce its size and facilitate SCOUT disks. In addition, the DIBs for LP, TV, and the asynchronous multiplexer (AC) have been combined. The DIB:DF macro no longer assumes that the corresponding CIB is external, and a CIB:DF macro has been added. Users who do not use the standard configuration files may have to update their own. Refer to the Input/Output Subsystem IOS4 Reference Manual or the OS4CONFIG file for changes.

SECTION 3. OS4/UTILITIES MODIFICATIONS

1. The OS4 macro E:GFN (get filename) now supports two additional optional parameters. Parameter 1, as before, represents the label of the file portion of the parameter block. Parameter 2 specifies the logical unit from which to get the filename and should be assigned a directory (or directoried device). If the parameter is omitted, UF is assumed. Parameter 3 represents the logical unit to use as a temporary lun during the pathname search. If the parameter is omitted, OV is used. Also, additional error returns have been added to E:GFN. See the OS4 System Reference Manual, Section 6.2.4, for a full description of the E:GFN service.
2. A CREATE command has been added to the Executive to allow the user to create a file or an additional directory on a disk or diskette. See OS4 System Reference Manual, Section 4.4.1, for details.
3. The VIEW command processor has been updated to support multiple directories:
 - A. A VIEW with no options of a disk containing multiple directories lists all files on the disk. This implies that a tree search is done of all directories on the disk. The view begins in the root directory. Each filename is listed with its attributes, as in previous versions of VIEW. When a filename is encountered with the extension DIR, the listing of the current directory is interrupted, and the filenames in the subdirectory are listed. Then the view returns to the previous directory and continues the listing of the remaining files. If a subdirectory is found to contain a sub-subdirectory, it is also interrupted in its listing, as described above. Each time a directory view is interrupted to begin a view of a subdirectory, the subdirectory's name and attributes are listed, followed by a row of ">" symbols, indicating the dropping down to the next directory level on the view listing. When the listing of the subdirectory is completed, a row of "<" symbols is printed, indicating a return to the listing of the interrupted higher-level directory. The beginning of the lines of arrows contains spaces to indicate the tree depth involved.

Except for the root directory, directories always contain two special entries, which show as "." and ".." on the view listing. The "." entry represents the directory itself. The ".." entry is a pointer to the next higher directory in the tree; this is to facilitate a reverse tree walk to determine the full pathname. The root directory is a special case; being the highest level directory in all paths, it has no ".." entry.

- B. Additional VIEW options are:

NOTREE views the specified directory only (i.e., no recursive descent)

DIRONLY views directory names only

SUMMARY lists only the view summary (last four lines of standard view listing).

- C. On previous releases, VIEW would directly access the F-List, bypassing the Standard File Manager. This occasionally caused discrepancies between the "logical" state of the disk and its physical state. VIEW now goes through the Standard File Manager, but as a result it runs slower than on previous releases.
4. The PRINT command now accepts an optional parenthesized value indicating the number of copies to be printed for the specified file. See OS4 System Reference Manual, Section 4.3.2 for a full discussion of the PRINT command. In addition, the interface to OS4 has been streamlined so that fewer free pool blocks are required in the OS4 configurations.
5. IDIR (single or double slash) does not delete subdirectory names (files with the DIR extension) from the directory being initialized.
6. A facility exists for automatic initialization at OS4 bootstrap time, to make special device assignments, etc., prior to OS4 announcing itself. The user may invoke this service by creating a file on the SF disk named INITIAL::.JCL containing the initialization commands desired. During loading, if a file with that name exists, CI is assigned to it at startup.
7. The following special configuration files are present on the standard distribution diskettes for users who want a configuration including SCOUT floppy drives:

SCTCONFIG.ASM
OS4SGEN.JCL
OS4SGENLNK.JCL
OS4SGENFLNK.JCL
OS:..SCT

These files make it possible to configure an OS4 system to execute on a SCOUT processor. The SCOUT AutoLoad attempts first to load a file named OS:..SCT. If no such file is found, it then looks for OS:..SYS.

For users on floppy-based systems, it may be necessary to delete the unneeded files from their working copies of the diskettes in order to have enough room to compile, assemble, and link.

It is also strongly recommended that these users label their development floppies with fewer than the default number of files (20 is suggested). This reduces the size of the FLIST and root directory and increases the space available for user data.

The standard OS4 release configuration (including non-SCOUT systems) now defines DM00 and DM01 as 10-megabyte drives instead of 5 megabytes. DM02 and DM03 are now 5-megabyte drives in the standard configuration.

8. LABEL has been updated to support SCOUT diskette formatting and labeling.

9. The macro assembler (MACRO) contains two additional directives:

A. (Label) ASMDATE (no parameters)

This directive causes a 14-byte character string to be output as absolute data, containing the current date and time in R:GATD format (see Real-Time Executive (RTX4) Reference Manual) as of the time that the assembler encounters the ASMDATE directive.

B. (Label) LINKDATE (no parameters)

This directive causes the assembler to include a special object type code (:41) in the object output and to reserve a block of seven words, similar to a RES 7 directive. Later, when the assembler output is processed by LINK, the ASCII date and time (same format as ASMDATE) are stored into the reserved locations in the link output.

The macro assembler now emits a :6D type code giving the name and revision of the translator.

10. The Multi-Terminal Editor (MULTED) has been updated to include the latest version of EDIT.
11. ROMGEN has been updated to include a check sum to the output tape at the end of each program. This check sum consists of a simple summation of each tape frame into a 16-bit word, ignoring overflow. After the last frame of the program is punched into the tape, two blank frames are output, followed by two frames of check sum (high order eight bits first). During the verify pass, the value is recalculated and compared to the punched check sum value. This change enables these tapes to be read by Model XIX PROM programmers, while still being compatible with Model V. A rubout character was also added to the tip of the arrow to allow Model XIX PROM programmer to detect beginning of input.
12. CNC has been updated to add the op codes and directives that have been added to the assembler. The INCLUDE directive is recognized, but the named files are not incorporated in the concordance listing.
13. The F000 versions of the executive and magnetic tape executive (EXEC::SYS and MTEX::SYS) will not work with previous releases of OS4, nor will E400 versions of the executives work with F000 OS4. Please update any additional floppies you have (FORTRAN, COBOL, etc.) with the latest EXEC.
14. COPY and COPYALL have been modified so that they change the created and modified dates only when the copied file is reformatted (mode option is selected) or the output file is a concatenation of input files. Thus, the modified and creation dates are retained if the file is physically duplicated but not modified.
15. The date and time used when OS4 is booted in are now set to the values extant when the system was linked. Any user who requires the date to be 76/03/01 should set the date to that value prior to doing his system generation of OS4.

16. The LINKer has modified to allow a greater number of symbols to be accommodated. In the earlier version (E400 OS4 release), a maximum of 829 symbols (NAMs, etc.) was possible. This maximum value is now 1066.
17. LABEL has been modified to enable the relabeling of disks containing non-standard (old) volume names. However, the switch that enables old volume names to be ignored must be set manually using DEBUG. The location to modify is :2BC relative to the start of LABEL. Change the value there from 0 to 1. When set, LABEL outputs a message asking if the user wants to override the old volume name.

SECTION 4. PROBLEMS OUTSTANDING

1. Currently, SORT/MERGE cannot be used in a real-time (RTX rather than OS4) application. Filenames used as input or output files to SORT/MERGE should not be in the new multilevel format.
2. Due to the multiple directory implementation, it is possible to delete a directory using the DELETE command. Not only does this cause a loss of access to all files and subdirectories in the deleted directory, but also the disk space is lost to use until the disk is relabeled.
3. FORTRAN.SYS and the three overlay files must all reside in the disk's root directory to permit correct operation.
4. When formatting a SCOUT diskette, always ensure that the floppy unit is not write-protected. LABEL does not react correctly to a write-protect condition.
5. LINKer performance has not been improved for this release. We are examining a number of ways to speed it up. However, there are some things users can do to improve its performance on the F000 release:
 - a. Increase the number of system buffers (BUF:N in the configuration file) from 3 to 6.
 - b. Inhibit automatic mount on file open. (Set the flag word (offset 1) in each disk DIB to 2.)
 - c. Assign the XX logical unit, to which the scratch files are written, to a different drive (this reduces head movement) from where the object and library files are located. It will not help, however, to change XX from a medium or high capacity disk to a floppy.
 - d. Combine the files to be used, using COPY commands, into two libraries. The first should contain modules to be unconditionally included (UL) and the second containing modules potentially loaded from libraries (LL).
 - e. Explicitly provide extensions for Link input files, avoiding unnecessary searches for missing .LIB files when the .OBJ versions are to be used.

6. There is an intermittent (nonrepeatable) bug in the MACRO assembler which causes its output to generate "NONEXISTENT SEGMENT" messages at link time. Generally, recompilation or an AutoLoad followed by recompilation makes the problem disappear.
7. The TOPLOAD feature in the LINKer is not yet fully implemented. Its use and syntax are subject to slight changes in future releases. The LINKer binary itself has been specially modified to use the new capability in I:LOAD in order to achieve its extended symbol table space.

