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NOTES
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COMMENTS

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SCOPE 3.1.6 SPECIAL EDITION

On September 15, 1969, the operating system and most of the application package software associated with the CDC 6600 computer will be changed. This changeover is being made to improve system throughput and to provide new system features.

These notes represent comments on areas which differ considerably from their counterparts in our present system. Although we have made every effort to cover all areas, I am certain that some information deserving mention has been omitted from these notes. I apologize now for any such omission.

In an attempt to keep this document to a reasonable length, mention of many new features has been omitted completely while coverage of others has been introductory only. Complete documentation on all new features as well as other differences between this system and SCOPE 3.1 will be available soon. The UCC consultants, as well as myself, are available for assistance during this transition period.

In several sections the reader is referred to various areas of a SCOPE reference manual for complete documentation. Copies of this manual are available at each of the consultants' desks and at the terminal sites. When the manual for the new system is available from the manufacturer, copies will be ordered for sale in the bookstores and the information will be published in the UCC Newsletter. Manuals for applications packages such as COBOL, FORTRAN, ALGOL, etc., remain valid.

Although software validation tests were conducted by both the manufacturer and UCC staff members, I am sure that errors remain in the system. This is inevitable considering the magnitude of the software effort involved. We would appreciate receiving notice of any and all software errors detected. They may be reported to any consultant or UCC staff member. As soon as they are found, correction.

will be made.

Virtually all of the packages available on the system are new versions. We have noted particularly good improvements in the COBOL, KWIC, MIMIC, and SORT/MERGE packages. New packages such as OPTIMA and an experimental version of the COMPASS assembler are also now available.

The use of the package, BUFF, and others using the tape driver LTR deserves special mention. We are finding that there is a direct conflict between use of LTR and use of the Extended Core Storage unit. The problem is especially noticable when tapes are written using LTR. Several solutions are being considered. In order to ascertain the magnitude of the problem, I would much appreciate hearing from any persons using the LTR facility.

Although the operating system changeover may cause some inconvenience now, we feel that better and faster service can be provided with this new system.

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NOTES ON DIFFERENCES BETWEEN UOFM SCOPE 3 AND UOFM SCOPE 3.1.6

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1. JOBCARD

The same format is retained as for SCOPE 3.1, with an additional optional ECS field length specification:

NAME7, CMi, ECj, Tk, Pm.	ACCOUNT NUMBER, n	comments
i_8		cells of central memory, < 153000 ₈
$j_8 \times 1000_8$		cells of ECS (direct access, see item 11) <i>< 370000, 370,</i>
k_{2-10}		seconds of CPU time - <i>decimal</i>
m_8		priority (system ignores), $1 \leq l_8 \leq 3_8$
n		number of tape drives used simultaneously

alternatives noted

JOBCARD.ACCOUNT NUMBER

produces default values of:

CM=43000₈

EC=0

T=20

(priority is based on CPU time, CM field length and tape drives)

NOTE: The account number must be directly preceded by the period and immediately followed by at least one delimiter, where a delimiter is any of the following characters: blank, (,) , . , or comma.

2. SITENUM CONTROL CARD

The SITENUM card has been changed to a BIN card. This was done to shorten the code necessary to process this card. For example,

SITENUM.LADXXXX

should be replaced by

BIN.LADXXXX

3. SPECIAL CONTROL CARDS

"special" cards, such as MODE, SWITCH, etc. must have a delimiter. In general, all arguments on control cards are separated by delimiters. Examples:

Replace MODE0. By MODE,0. or MODE(0)

Replace SWITCH1. By SWITCH,1. or SWITCH(1)

4. RESERVED NAMES

The following list of names, as well as system program names (e.g. RUN, FTN, COPYBR), should not be used as executable file names since these names are specially detected by the system and are uniquely interpreted by it. Thus none of the following names should be used as a control card to load and execute the file LGO. The list is:

ATTACH	EXECUTE	MAP	REQUEST
BIN	EXTEND	MODE	SNAP
CATALOG	LOADER	NOGO	SWITCH
COMMENT	LOAD	PURGE	TRACE

5. UOFM MATH LIBRARY

Virtually all UOFM routines (including UMST's) have been recompiled. If you suspect an error in any of these routines, or if any has been inadvertently omitted, please report it to Mike Frisch, Bill Franta, or Dennis Lienke.

6. CARRIAGE CONTROL CHARACTERS

Character 1 of the print line has been made into a carriage control character exclusively. Previous characters and their effects

lH1=eject
lH0=double space
lH+= no space

still hold but many other characters have special meaning. (See SCOPE ref. manual, Appendix M.) A line may consist of 137 characters; the first character in the line is for carriage control and is not printed. Characters 2 through 137 are then printed in columns 1 through 136 on the page.

7. LOADERS

Currently two (and soon three) loaders are available on SCOPE 3.1.6 and the programmer may select the one he desires by a control card. The old loader as used on UOFM SCOPE 3 is now designated the PPLOADR; all relocation is done by the PPU program LDR. The new, faster loader is designated CPLOADR and does relocation with a CPU program. To select a particular loader, the job must include either the
LOADR,PPLOADR.

or

LOADR,CPLOADR.

control card. If a job does not select a loader, the system selects CPLOADR by default.

[The CPLOADR, while faster, requires slightly more field length than the PPLOADR. This field length is used to hold an

additional system table (external reference table, ERT) to minimize disk references. In addition, CPLOADR uses a special reading function for full-file loads from disk.

8. CHIPPEWA (QXX PROGRAM) CAPABILITY

All chippewa (STITCH,QXX) capability has been removed from the system, i.e. control card sequences such as:

QXX,CATALOG,FILE.

QXX,SETCORE.

QXX,KWIC.

etc.

are no longer available.

9. MAP CARD (LOADER CORE MAP)

The programmer may select one of the following options for loader core map printout on file loading:

MAP,ON. full map

MAP,PART. only "program" section, extended references
are omitted

MAP,OFF. no map

The system will select MAP,PART. as default.

NOTE: The former value on previous systems at the UOFM was equivalent to MAP,ON.

10. FTN (FORTRAN EXTENDED Ver. 2.0)

Some significant changes have been made in the FTN compiler and we suggest that old binary decks not be used on the new system. Re-compilation and punching of new binary decks should be done.

a) All programs using

EOF.

IOCHEK.

must be recompiled and will not run from FTN version 1.0.

b) File names are now given a (\equiv) character instead of a (.).

c) COMPASS is only used for an R listing, otherwise, a faster (internal) assembler is used.

d) Each routine is assembled immediately after compilation.

11. ECS (EXTENDED CORE STORAGE) USAGE
ECS is available to the user in two ways:

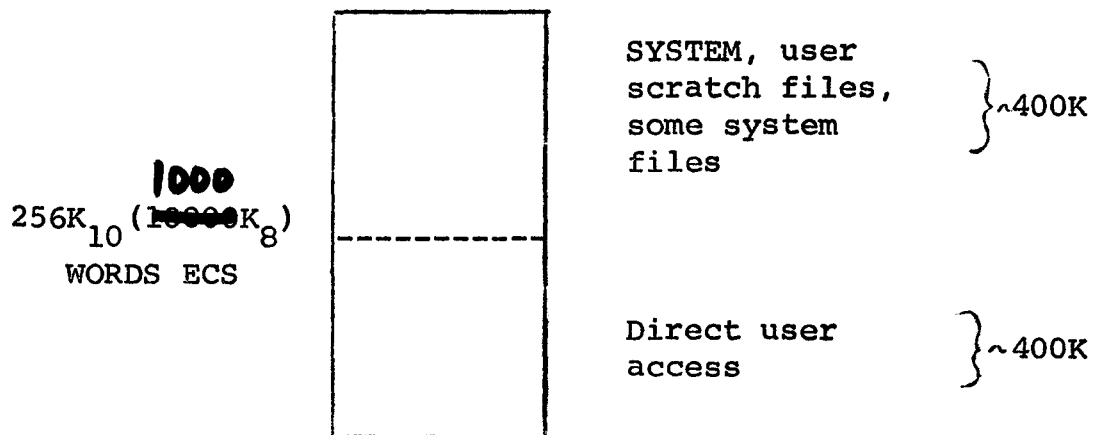
a) Direct Reference:

This method requires that the programmer make an EC specification on his job card. Then, by use of hand-written COMPASS routines or RUN or FTN supplied subroutines READDEC,WRITEC, the programmer may access ECS. He should remember that the CPU handles transmission, so that with each access, the largest amount of information possible should be transferred to minimize CPU time.

b) System Directed Files:

This method makes a portion of ECS appear to the programmer as a disk file. Files may be opened in such a manner as to force their residence to ECS. Certain files of systems programs are automatically directed to ECS by the system. Virtually any operation which may be performed on a disk-based or tape-based file may also be performed on an ECS-based file. The amount of time involved in systems-ECS transfer is placed on the dayfile under the statistic
EC XX.XXX SEC.

Since this is, in effect, CPU time it is charged at CPU rates. It should be noted that the two methods are independent of each other. The direct access user does not necessarily have system-directed files on ECS, nor does the programmer who has ECS files necessarily have direct access. The partition of ECS for direct access and system-directed files is diagrammed below:



The actual number of words in each section will probably change as experience in the use of ECS is acquired.

12. DAYFILE MESSAGES

- a) A limit of 200_{10} dayfile messages (issued from CPU programs via MSG) has been imposed. Any job attempting to issue more than this limit is aborted.
- b) The FL reduced message has been eliminated due to a completely new method of field length reduction (see section 18).

13. NEW UTILITY ROUTINES

- a) COMBINE(F1,F2,N) takes out N decimal record marks in copying from file F1 to file F2.
- b) DMPECS(X,Y,f,FILE) dumps contents of user-directed ECS area address X through Y to FILE (OUTPUT is the default value if omitted) according to format f:
 - f=0 or 1 4 words/line in octal (full word) and display code (DPC)
 - f=2 2 words/line, octal parcels (15 bits), DPC
 - f=3 2 words/line, octal bytes (12 bits), DPC
 - f=4 2 words/line, octal (full word), DPC
- c) The new routines GETEXT, CCP, OUTERLY, EXT2INT are reported elsewhere in this document. A series of new copy utilities originally intended to appear in this document, remain unfinished and will be reported later.
- d) SKIPF(F1,NUMBER,L1) skips NUMBER records on the file F1 of level L. If, for example, $L1=15_{10}=17_8$ end of files are skipped.

14. MAGNETIC TAPES

- a) Four data formats are recognized:
 - X tapes created under SCOPE 2.0
 - S tapes "stranger" tapes (i.e. non-SCOPE tapes)
 - L tapes "long-record" stranger tapes
 - INTERNAL tapes created under SCOPE 3
- b) Label formats may be
 - unlabeled
 - E or N SCOPE standard labels
 - Y CDC 3000 standard labels

The density of tape is always given by the programmer on his request card: LO=200BPI, HI=556BPI (default), HY=800BPI, e.g. REQUEST,TAPE. implies 556 BPI by default.

NOTE: The operator cannot set or change the density settings; they must appear on the request card. See SCOPE RM, Appendix L.

15. NEW CDC FORTRAN SUBROUTINES

- a) READEC,WRITEC are routines for reading and writing user-directed ECS information. Calling sequence:

RUN-FUN CALL READEC(a,b,n)
 CALL WRITEC(a,b,n)

 a = CM address
 b = ECS address relative to user ECS RA
 n = integer variable or constant indicating
 number of words to transfer

FTN CALL READEC(a,b,n)
 CALL WRITEC(a,b,n)

 a = same as RUN-FUN
 b = variable in ECS common block
 n = same as RUN-FUN

(See Fortran and Fortran Extended reference manuals)

- b) READMS,WRITMS are random disk file I/O routines and are available with both RUN and FTN. (See Fortran Extended manual, Chapter 5.)
- c) FTNBIN is the binary blocking routine and is available with both RUN-FUN and FTN.

The current binary blocking scheme will eventually be replaced by a more suitable scheme. Although the current version can save much CP and PP time for intermediate I/O, we do not suggest that permanent tape files be created using this feature as parity error handling is non-existent. It should also be pointed out that systems other than Fortran (i.e., such as COBOL) can neither read or create blocked binary files.

16. CATLOG (OLD CATALOG)

The name of the catalog routine has been changed to CATLOG. Note that CATALOG is now a reserved name for control cards pertaining to permanent files.

17. KWIC

KWIC has been recompiled, converted to FTN, and modified to use binary blocking on scratch files. A line limit need not be given.

18. FIELD LENGTH REDUCTION

The method for field length reduction in UOFM SCOPE 3.1.6 is internally very much different from that of SCOPE 3. Externally, the difference noticeable by the user will be:

- a) No dayfile message is issued indicating the field length reduction.
- b) The field length on the job card is reclaimed between successive system loads (e.g., jobs having multiple compilations and executions do not need NOREDUCE cards).
- c) Field length reduction will not apply to the loading of overlays nor to any program called from the system library.
- d) The PPU program RFL has been modified so that when the requested field length is not available a field length of 200 will be requested and a periodic check will be made to obtain the requested amount of memory.
- e) ALGOL, SIMSCRIPT and other programs that use dynamic storage schemes still need NOREDUCE cards.
- f) All request cards trigger a FL reduction to 200B, thus, it is recommended that programmers group their request cards at the beginning of the control card decks if possible.

NOTE: The new FL reduction scheme is completely automatic from the programmer's point of view, and was designated to help system throughput while not inconveniencing the programmer. The FL reduction will probably go unnoticed by the programmer, but his field length will fluctuate many times during a multiple load job.

It will be more advantageous for the system for request cards to be grouped together as much as possible. We furthermore recommend that the control card RFL be used with caution, as in most instances its use is no longer necessary. Internal calls to RFL should not be used.

19. TRACE AND SNAP

Program tracing, snapshot dumping, and change dumping capabilities are now available. These facilities allow debugging of programs without recompilations or reassembly, but do require additional control cards. Dumping capabilities include register dumps (A,B,X), memory dumps in octal, mnemonic, integer, floating, double precision, and display formats.

Those desiring further information are directed to the SCOPE reference manual, Chapter 11, "Debugging Aids".

20. SYSTEM DEFAULTS

JOB CARD defaults are:

CPU time = 20 seconds
CM FL = 43000B
EC FL = 0
Loader = CPLOADR
MAP = PART

21. GETTEXT

GETTEXT is a new control card callable routine used to satisfy externals for routines not on the system library. Complete documentation is available upon request to W. Franta, ext. 7744. This routine is only the preliminary version of a still more general routine now being designed. Some of the objectives of the present as well as the future versions of this routine are as follows:

- a) Allows a file of the UOFM subroutine library for FTN.
- b) Allows central memory to be freed by removing little used or extremely long routines from the system library.
- c) Allows permanent files to be used as sub-libraries with multiple concurrent reads from these files.

22. OUTERLY

A new routine to release partial files to the output queue prior to job termination. Complete documentation can be had by contacting W. Franta.

23. LABOUT

Often, time consuming uses of the copy utilities can be eliminated if a disk scratch file is given a disposition code of print. The file will then be printed together with the OUTPUT file at job completion. A request of the form

REQUEST,TAPE1,PR,*AA.

accomplishes the task and requires no operator action. In order to properly label these files for dissemination, the routine LABOUT or one of its variations should be used. The routine can also be used for other labeling tasks. Complete information can be had by contacting W. Franta.

24. CCP

This PP program allows the user to build control card packs of up to 36 predetermined control cards via a single control card reference to CCP. A list of available control cards and complete documentation will be published soon. See W. Franta (X7744).

25. EXT2INT

A CP program designed to translate external coded tapes to internal coded tapes rapidly. For a 2400 foot reel at 556 BPI, the following comparisons were made:

<u>Program</u>	<u>CM</u>	<u>CP time</u>	<u>PP time</u>	<u>Real time</u>	<u>Cost</u>
Fortran	21000 ₈	122.5 sec.	626.6 sec.	11.5 min.	42
EXT2INT	21000 ₈	14.2 sec.	464.5 sec.	7.5 min.	14

Although changes are still being made in this program, complete documentation can be obtained by contacting R. Franta, 214 Exp. Eng.

26. PERMANENT FILES

We will shortly discontinue the use of common files in favor of a more suitable scheme. Before this can be done, all groups who currently have common files loaded at deadstart time should contact W. Franta (extension 7744).

27. REMOTE TERMINALS

For a short time, we will continue to use the same package for remote terminal linkage as on our present system. As soon as possible, a new, highly improved package will be placed in service. For the present, therefore, the DIVERT feature will remain as on our existing system. The changeover will not be noticeable to the programmer but will facilitate improved systems throughout.

28. AVAILABLE PACKAGES NOT ON SYSTEM LIBRARY

The following applications packages are available on the indicated tapes:

	<u>SN No.</u>	<u>PACKAGE</u>
SNS	\$80	MIMIC
"	\$79	PERT/TIME
"	\$78	OPTIMA
	\$77	LISP
	\$76	SLIP
	\$75	SCALLOP
	\$74	SYMBOL
	\$73	
	\$72	TRIAL
	\$71	L6
	\$70	

The control card sequences necessary to reference these packages can be obtained from the consultant.

29. NULL FILE OPTION

The file name NULL is now truly a null file option. I/O is not done to or from this file and no file name table entry will exist for the file. Reads from the file result in an end of file indication and on writes to the file, no transfer of information is done.

30. OVERLAYS

Binary of overlays generated on SCOPE 3.1 will not load correctly on SCOPE 3.1.6. All affected programs should be recompiled and the overlays regenerated.