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COMPUTER SYSTEM

COSY
REFERENCE MANUAL

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PREFACE

This reference manual describes the COmpressed SYmbolic (COSY) task for maintaining and updating source decks in compressed symbolic format in the MP-60 MPX Operating System.

The user's familiarity with the MPX Operating System is assumed.

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TABLES

INTRODUCTION 1

The MP-60 COmpressed SYmbolic (COSY) program provides a means for compressing information in a source deck by inserting special ASCII characters to represent two or more consecutive blanks on a card. COSY may be used with any source language which does not contain any of the COSY control statements. Input and output may be in COSY and/or ASCII format.

With COSY control statements the user may update and revise a COSY library and copy a COSY library from one file to another. Additionally, the user can process COSY data prepared in CONTROL DATA® 3300 format. Optional log and revision listings may be specified for the output of a COSY run.

COSY FILES 2

COSY LIBRARY

A COSY library on tape or on mass storage consists of COSY decks in blocks of 1920 characters (480 words). A COSY deck is a series of binary card images preceded by an ASCII COSY deck identifier. COSY deck identifier descriptions appear in Section 3 of this document.

On a COSY library tape, the COSY decks are separated by end-of-file marks; the library terminates with a double end-of-file mark. The MPX UTILITY program must be used to transform unblocked tapes to the acceptable blocked format (refer to the MP-60 Systems Utility Manual, Control Data publication No. 14063800).

The UTILITY program is not used for mass storage files; COSY prepares all mass storage files.

In mass storage use, a COSY library consists of a COSY-prepared directory followed by COSY decks.

The directory is a 1920-character block containing a three-word entry for each COSY deck on file. Each entry consists of an eight-character (left justified, blank filled) deck name and the number of the block in which the deck identifier appears. The directory block holds up to 160 entries. If one block is insufficient, COSY links another block with the first.

ASCII INPUT LIBRARY

An ASCII input library may be on tape, mass storage, or cards. An ASCII library also must be blocked in 1920 characters.

On tape, an ASCII input library consists of a group of ASCII source decks, each separated by an end-of-file mark. A double end-of-file mark terminates the library.

This library must be on a nonstandard logical unit number. No searching is done on an ASCII file; therefore, it must be positioned prior to entrance to COSY.

COSY accepts only one ASCII deck per mass storage file. A deck terminates with the last block written.

ASCII OUTPUT FILE

An ASCII output file is a series of ASCII source decks. When COSY encounters ENDCOSY/, it writes an end-of-file on the ASCII output file specified on the last DECK/ card. COSY then rewinds the file or positions it to block 1, ready for subsequent assembly or compilation.

COSY SCRATCH FILE

Logical units 56 (SHC) and 59 (SC2) are the scratch files used by COSY. The user should exercise care when using scratch in a job process which calls COSY.

COSY CONTROL CARDS 3

The processing of input and output under COSY is directed by the six user-prepared control cards. If the user requests COSY output, the COSY program prepares a deck identifier card (COSY/) as the first card of the output decks.

When the deck name is used, it begins in column 1; the card name may begin in any column between columns 10 and 17, and parameter fields may begin in any column between columns 20 and 29.

Certain control cards have a shortened form (e.g., I/ is the shortened form of INSERT/).

DECK/

This card identifies the COSY deck and specifies the actions to be taken. A revision deck for the named COSY deck may precede the DECK/ card.

	10	20
DECKNAME	DECK/	$P_1,..,P_n$

DECKNAME — Names the COSY or ASCII deck to be processed. A COSY deck may be on tape or on mass storage file or may follow the DECK/ card on INP. An ASCII deck may be on tape or mass storage or may follow the DECK/ on INP. Tape must be positioned to the beginning of the ASCII deck. COSY accepts only one ASCII deck for each mass storage file.

$P_1,\ldots,P_n$ — The control parameters, P_1, specify COSY operations. All parameters are optional, may appear in any order on the card, and are separated by commas. Parameters are character strings, beginning with I, L, R, A, C, D, or E. The length of a string is limited to the number of card columns available.

I...=lun — Specifies the logical unit containing the input deck. If the parameter is absent, or just I... is specified, COSY assumes input is on the standard input unit INP.

If I...=lun, COSY assumes the deck is on the named lun. If lun is not INP and the first card image on the input medium is not a COSY deck identifier card, the image is assumed to be the first card of an ASCII deck. The ASCII deck must be terminated with a tape end-of-file, COSY control card (INP), or the last block written on a mass storage file.

For tape, if lun is not INP and the first card image is a COSY deck identifier, a forward search is made for the deck name, beginning with this deck identifier. If a double end-of-file is encountered without the deck name being found, the tape is rewound and searched again. If the deck name is still missing, COSY prints an error message on the standard output unit, OUT, and reads the next control card.

For mass storage, if the file is not positioned to the deck sought, COSY reads the file directory and positions the file. If the deck name does not appear in the directory, an error message is printed on OUT and COSY reads the next control card.

L... Specifies that there is list output of the expanded ASCII records on OUT (refer to Section 5 for listing format). If the parameter is absent, there is no list output. L may not be assigned to a lun. Specifying L...=lun produces the diagnostic, R/L EQUATED TO LUN.

R... Designates that revisions, inserted or deleted records, are to be listed on OUT. If the parameter is absent, there is no revision listing. R may not be assigned to a lun. Specifying R...=lun produces the diagnostic, R/L EQUATED TO LUN.

A...=lun Specifies lun to receive ASCII output (refer to Section 5 for ASCII record description).

If the parameter is absent, there is no ASCII output.

If A...=lun, output is on the named logical unit. COSY assumes the output medium is equipped/open and positioned.

If A...=56 or if just A... appears, COSY ASCII output is to the standard ASCII unit, 56 (SHC).

C...=lun — Specifies the lun to receive COSY output.

If the parameter is absent, there is no COSY output.

If just C... appears, COSY output is to the standard punch unit, PUN.

If C...=lun, output is to the named logical unit.

D...=deck name — Specifies a new COSY output deck name. Deck name is one through eight alphanumeric characters.

If the parameter is absent, COSY assigns the input deck name to the output deck.

If D... is present but deck name is absent, COSY produces the diagnostic, ILLEGAL PARAMETER.

E...=edno — Specifies the edition number of a new COSY output deck. Edno is numeric characters.

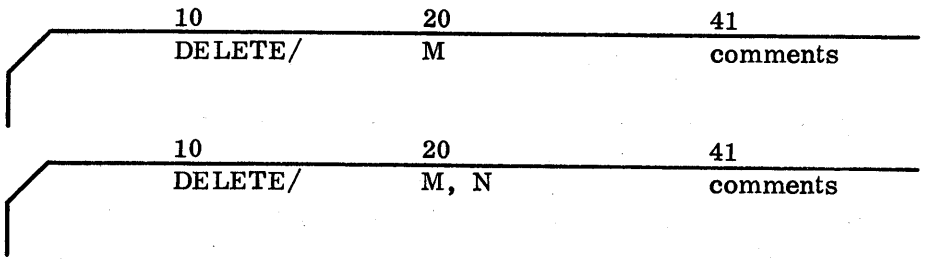
If E is absent and revisions were inputted, COSY increases the edition number of the inputted COSY deck by one (modulo 100) and inserts the new edition number in the deck identifier card of the output COSY deck.

If E is absent and the input deck has no edition number, the edition number on the COSY output deck identifier is 01.

If E...=n, the output deck identifier card has edition number n.

DELETE/ OR D/

COSY deletes a specified number of cards and replaces them by any ASCII cards immediately following a DELETE/ card. A DELETE/ card has two forms:

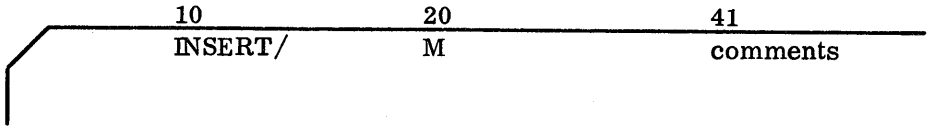


In the first format, card M is deleted. In the second format, cards M through N are deleted. The unsigned decimal numbers M and N are the sequence numbers in columns 88 through 92 of the ASCII records.

The number of ASCII cards following a DELETE/need not equal the number of cards deleted. Comments may appear in columns 41 through 80.

INSERT/ OR I/

COSY inserts into the new ASCII or COSY deck the ASCII cards immediately following an INSERT/ card:



The ASCII cards are inserted after sequence number M, the unsigned decimal integer in columns 88 through 92. Comments may appear in columns 41 through 80.

COPY/ OR C/

COSY transfers the COSY library from file lun_1 to file lun_2, beginning at the current position of the COSY library and continuing up to but not including the named deck:

	10	20	41
DECKNAME	COPY/	lun_1, lun_2	comments

lun_1 - logical unit number of COSY input library.

lun_2 - logical unit number of COSY output library.

If no deck name is present, the entire COSY library is copied, beginning from its current position.

The user must use MPX control cards for all file definition functions.

VERSION/ OR V/

COSY inserts version into columns 82 through 85 of the following revision cards when they are outputted to an ASCII file or COSY file:

	10	20	41
	VERSION/	V	comments

V - one through four alphanumeric characters

The version is inserted into every revision card following VERSION/ until the next VERSION/ or DECK/ control card.

ENDCOSY/ OR E/

An ENDCOSY/ card marks the end of a COSY run. Any output file/unit referenced on the last DECK/ card is rewound:

	10	41
	ENDCOSY/	comments

COSY DECK IDENTIFIER

When COSY output is requested on the DECK/ card, COSY generates a deck identifier card as the first card of the COSY output deck:

	10	20	40
DECKNAME	COSY/	EDNO	FORMAT

DECKNAME — Begins in column 1.

EDNO — Edition number. This is the number specified by the edition parameter on the DECK/ card.

FORMAT — A, the output deck has been prepared in MP-60 COSY format.

M, the output deck has been prepared in CDC 3300 COSY format.

COSY PROCESS DECK STRUCTURE 4

MPX CONTROL CARDS

The COSY program is loaded and put into execution whenever the MPX operating system encounters a *COSY control card in an input deck. All files used by COSY must have been previously opened or equipped. A discussion of the control cards necessary for opening and equipping files is found in the MPX/RT Reference Manual, Control Data publication No. 14062300.

*COSY

COSY is loaded and put into execution whenever the MPX operating system encounters this control card in an input deck. There are two forms for this control card:

*COSY

*COSY (P_1,...,P_n)

The parameters, P_1, specify execution options for this run of COSY. All parameters are optional, may appear in any order, and are separated by commas. Parameters are alphanumeric character strings that begin with the letters I, C, A, N, or S. Length of a string is limited to the number of card columns available.

The execution options are:

I...=lun	Instructs COSY from which logical unit to read the COSY control cards. If I is omitted, the logical unit is the standard input unit, INP.
C...=lun	Sets the default value for COSY output. If C is omitted, the default logical unit is the standard punch unit, PUN.
A...=lun	Sets the default value for ASCII output. If A is omitted, the default logical unit is the standard ASCII unit, 56(SHC).

N	Instructs COSY that a listing of all control cards, except DECK/, and revision details is to be suppressed. If N is omitted, all control cards and revision detail cards are listed.
S	Instructs COSY that if a revision card sequence error is encountered, the job is to be aborted when the ENDCOSY/ card is encountered (job abortion occurs only when ASCII output is defined). If S is omitted, processing continues after ENDCOSY/ regardless of error.

SAMPLE DECK STRUCTURES

To generate a COSY deck from an ASCII source deck, ASCII input is from the standard input unit, INP. COSY output is on the standard punch unit, PUN. (N) on the *COSY card suppresses the log. The deck name of the output COSY deck is COSYDECK.

```
*JOB (...)

*SCHED(...)

*COSY(N)

COSYDECK DECK/          I,C

     (ASCII source deck)

          ENDCOSY/

*EOJ
```

To update a COSY deck and place it on tape, the COSY input deck, beginning with the COSY deck identifier card, is on the standard input unit, INP. COSY output is on magnetic tape having logical unit number 20. ASCII cards are inserted after cards 15 and 250; cards 400 through 420 are deleted, and revisions are inserted in their places. If sequence numbers are not in order, COSY sorts the revision cards by sequence number. Both the COSY log and revisions are listed on the standard output unit, OUT.

```
*JOB(...)

*SCHED(...)

*EQUIP(20=MT)

*COSY

        INSERT/    15

    (ASCII revision cards)

        DELETE/  400, 420

    (ASCII revision cards)

        I/         250

    (ASCII revision cards)

COSYDECK DECK/  C=20, R

     (COSY input deck)

        E/

*EOJ
```

To copy a COSY file updating a deck on the COSY file, copy the COSY file from logical unit 20 to logical unit 30 up to but not including the COSY deck with deckname COSYDECK. Replace cards with sequence numbers 400 through 500 with ASCII revision cards, and insert version number 1.1 into each revision card. List the updated deck and its revisions on the standard output unit, OUT. Then copy the rest of the COSY file from logical unit 20 to logical unit 30.

```
*JOB(...)
*SCHED(...)
*EQUIP(20=MT,30=MT)
*COSY
COSYDECK COPY/      20,30
         V/         1.1
         D/         400,500
    (ASCII revision cards)
COSYDECK DECK/      I=20,C=30,L,R
         C/         20,30
         E/
*EOJ
```

To convert a COSY deck on mass storage to an ASCII deck and use the ASCII deck as input to COMPASS, input the COSY input deck with the deck name COSYDECK from logical unit 20. ASCII output is to logical unit 39. COMPASS inputs ASCII source cards from logical unit 39 for assembly.

```
*JOB(...)

*SCHED(...)

*EQUIP(39=MT)

*OPEN(20,...)

*COSY

COSYDECK DECK/       I=20,A=39

         ENDCOSY/

*CMP(I=39,...)

*EOJ
```

COSY BINARY CARDS

MP-60 COSY accepts input data packed in CDC 3300 COSY format or MP-60 COSY format. MP-60 COSY outputs packed data only in MP-60 COSY format.

CDC 3300 FORMAT

The CDC 3300 COSY format used under MASTER makes all BCD characters available to the user. COSY compresses a card image by inserting a special BCD character and value for two or more sequential blanks. The system operates internally as follows:

- 12_8 Special BCD character
- 1200_8 BCD character 12_8
- 1275_8 End of card character
- 1276_8 End of deck character
- 1277_8 End of revision set character
- $12XX_8$ xx consecutive blanks, $02 \leq xx \leq 75$

The format of a CDC 3300 COSY binary card is as follows:

Card Column(s)	Content
1	12, 11, 7, 9 punches, plus a 3 punch for the last card of the deck The high order digit of a five-octal-digit card sequence number (rows 4 through 6)
2	Four low order digits of the five-octal-digit card sequence number
3-4	24-bit checksum, one's complement
5-80	152 characters of BCD compressed symbolic

MP-60 FORMAT

The MP-60 COSY format used under MPX makes all ASCII characters available to the user. COSY compresses a card image by inserting a special ASCII character and value for two or more sequential blanks.

The system operates internally as follows:

- 80_{16} Special ASCII character
- 8000_{16} ASCII character 80_{16}
- 8081_{16} End of card character
- 8082_{16} End of deck characters
- 8083_{16} End of revision set character
- $80XX_{16}$ xx consecutive blanks, $02 \leq xx \leq 83$

The format of an MP-60 COSY binary card is as follows:

Card Column(s)	Content
1	12, 11, 7, 9 punches, plus a 3 punch for the last card of the deck
2 3 rows 12,11,0-5	5-hex-digit card sequence number
3 rows 6-9 4 5 6 rows 12,11,0,1	32-bit complemented checksum, two's complement
6 rows 2-9 7-80	112 characters of ASCII compressed symbolic

COSY LISTING FORMATS

Listings and revision listings, specified by L and R on the DECK/ control card, both follow the COSY log on the OUT file in the following general format:

Printer Columns	Content
5-84	Image of card
86-89	Version
92-96	Sequence number
100-106 or 100-107	DELETED INSERTED

INSERTED and DELETED appear if R is specified.

If R is not specified, there is no printed record of deleted card images.

Revised COSY sequence numbers for inserted entries appear only if C... is specified on the DECK/ control card; entries marked DELETED are printed with old COSY sequence numbers.

If R but not C... is specified, *** replaces the sequence numbers for inserted cards.

ASCII RECORDS

ASCII records output from COSY follow this format:

Character	Content
1-80	Card data
82-85	Version
88-92	Sequence number

If A but not C... is specified, *** replaces the sequence number for inserted records.

COSY DIAGNOSTICS 6

All diagnostics for COSY are written to the standard output unit, OUT, and have the format: ******CCID message. In this example, CCID is one through eight alphanumeric characters identifying the control card which was being processed when the error occurred.

The diagnostic messages COSY outputs are listed in Table 6-1.

TABLE 6-1. COSY DIAGNOSTICS

Message	Cause	Action
ASCII CARD READ FROM XX WHEN BINARY WAS EXPECTED		Processing continues with next COSY control card on the COSY input unit.
BINARY CARD READ FROM XX WHEN ASCII WAS EXPECTED		Processing continues with next COSY control card on the COSY input unit.
C LUN EQUAL TO A LUN		Processing continues with next COSY control card on the COSY input unit.
CHECKSUM ERROR ON CARD XXXXX		COSY continues checking sequence and checksums for the remaining cards in the deck. The deck is not processed.
COMPRESSED CARD XXXXX EXPANDS TO TOO MANY ASCII CHARACTERS	ASCII record of more than 84 characters is contained on compressed card.	Processing continues with next COSY control card on the COSY input unit.
{I C} COSY DIRECTORY ILLEGAL FORMAT	Directory block read was not a COSY directory block.	Processing continues with next COSY control card on the COSY input unit.
COSY SEQUENCE ERROR, LAST CARD XXXXX CURRENT CARD XXXXX		COSY continues checking sequence and checksums for the remaining cards in the deck. The deck is not processed.

TABLE 6-1. COSY DIAGNOSTICS (Cont.)

Message	Cause	Action
COSY LIBRARY ERROR ON XX	COSY file on logical unit XX is not a COSY library file.	Processing continues with next COSY control card on the COSY input unit.
DECKNAME XXXXXXXX NOT ON I		Processing continues with next COSY control card on COSY input unit.
EDITION NUMBER NOT NUMERIC		Processing continues with next COSY control card on COSY input unit.
I LUN EQUAL TO C OR A LUN		Processing continues with next COSY control card on COSY input unit.
ILLEGAL PARAMETER	Illegal parameter appears on *COSY or DECK/ card.	If *COSY card, job aborts. If DECK/ card, processing continues with next COSY control card on the COSY input unit.
INVALID CONTROL CARD		Processing continues with next COSY control card on the COSY input unit.
{I, C, A} ILLEGAL DEVICE		Processing continues with next COSY control card on the COSY input unit.
{I, C, A} LUN INVALID		Processing continues with next COSY control card on the COSY input unit.
LUN XX NOT EQUIPPED OR OPEN		Processing continues with next COSY control card on the COSY input unit.
MORE THAN ONE SEQUENCE NUMBER ON INSERT		Processing continues with next COSY control card on the COSY input unit.
NO ENDCOSY	End-of-file read before ENDCOSY.	COSY terminates normally.

TABLE 6-1. COSY DIAGNOSTICS (Cont.)

Message	Cause	Action
{ PACK / PACKD } ERR ON XX STATUS = XXXXXXXX		Job aborts.
PARAMETER APPEARS TWICE		Processing continues with next COSY control card on the COSY input unit.
{ PICK / PICKD / PICKI } ERR ON XX STATUS = XXXXXXXX		Job aborts.
PROGRAM ERROR OCCURRED AT XXXX	Unexplained condition occurred in the COSY program at address XXXX.	Job aborts.
READLU ERR ON XX STATUS = XXXXXXXX		Job aborts.
REVISION CARD SEQUENCE ERROR	Two separate revision cards referred to the same sequence number.	Processing continues.
R/L EQUATED TO LUN		Processing continues with next COSY control card on the COSY input unit.
SEQUENCE NUMBER MORE THAN FIVE CHARACTERS		Processing continues with next COSY control card on the COSY input unit.
SEQUENCE NUMBER NOT NUMERIC		Processing continues with next COSY control card on the COSY input unit.
SEQUENCE NUMBER TWO LESS THAN SEQUENCE NUMBER ONE		Processing continues with next COSY control card on the COSY input unit.

TABLE 6-1. COSY DIAGNOSTICS (Cont.)

Message	Cause	Action
SEQUENCE NUMBER ZERO OR BLANK		Processing continues with next COSY control card on the COSY input unit.
UNEXPECTED END-OF-FILE ON XX	Logical unit XX was positioned at end-of-file when data was expected.	Processing continues with next COSY control card on the COSY input unit.
WRITLU ERR ON XX STATUS = XXXXXXXX		Job aborts.

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COMMENT SHEET

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