CONTROL DATA
CORPORATION

CONTROL DATA®
1700 COMPUTER SYSTEM

COSY VERSION 2
REFERENCE MANUAL

REVISION RECORD

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PREFACE

This manual describes the use of Version 2.0 of the COmpressed SYmbolic (COSY) library program. COSY runs under Version 4.0 of the 1700 Mass Storage Operating System (MSOS) and a knowledge of the MSOS is required to understand and use COSY 2.0. The user should also have the following manuals available for reference.

Control Data Publications	Pub. No.
1700 Mass Storage Operating System Reference Manual	60361500
1700 Macro Assembler Reference Manual	60361900
1700 Mass Storage FORTRAN Reference Manual	60362000
1700 Mass Storage Operating System Diagnostic Handbook	60361800

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INTRODUCTION 1

The 1700 COSY program provides a means of compressing information in source decks by replacing three or more blanks on a card with two special ASCII characters. COSY compresses Hollerith source decks and converts the Hollerith code to ASCII code. The resulting deck, called a COSY deck, is in COSY format (section 3.1). COSY reduces average deck size by about 60 percent.

A COSY library consists of a group of COSY decks. Each COSY deck is preceded with a COSY deck identifier card and terminated with an end of deck character. The COSY library may be written on paper tape, magnetic tape, or punched cards, and is terminated with an END/card followed by an end of file mark.

The COSY program is called from mass storage by typing *COSY and pressing RETURN at the teletypewriter console or with a *COSY punched card. There are no parameters for the teletypewriter call to COSY or for the *COSY card.

A COSY revision deck follows the call to COSY. COSY revision decks (section 3.4) allow the user to prepare, revise, or copy COSY decks, and to prepare, update, or copy COSY libraries. COSY may be used with any source language that does not use COSY control statements. COSY output may be in Hollerith or COSY (compressed ASCII) format and may be listed, punched, or sent to a compiler or assembler.

CONTROL CARDS 2

2.1 COSY CARDS

COSY revision decks are comprised of COSY control cards and new source cards. There are seven COSY control cards (MRG/, DCK/, CPY/, DEL/, INS/, REM/, and END/) and two deck identifier cards (HOL/ and CSY/). The fields for all COSY control and identifier cards (except DEL/ and INS/) are in the following standard format.

1	8	13	73
deckname	cardname	parameters	comments id

deckname — Columns 1 through 6. The name of a deck in a COSY library that is to be modified or copied. Deckname is used only on DCK/, CPY/, HOL/, and CST/ cards. The field is blank on all other COSY cards.

cardname — Columns 8 through 11. Name of COSY control card.

parameters — Start in column 13. Parameters are terminated by a space.

comments — Can start in any column after the terminating space for parameters. Comments may run through column 72 and are optional.

id — Columns 73 through 75. A three-character deck name identifier. Used only on DCK/, HOL/, and CSY/ cards.

The control card fields for DEL/ and INS/ cards are in the following format.

1	8	13		66	72
	cardname	parameters	comments	change record	

The cardname, parameter, and comment fields are the same as for the standard card above, except that the comment field ends in column 65. A change record field is added to these cards to add change identification information.

The change record field is a seven-character field (columns 66 through 72) used to identify the type, nature, or date of a change. COSY writes an asterisk in column 73 and the contents of the change record field in columns 74 through 80 of each new source card following the INS/ or DEL/ card. This provides a means of identifying new or changed source cards when a COSY deck is listed. Adding change record information on an INS/ or DEL/ card is a user option. It is not required input to COSY.

2.1.1 MRG/CARD

An MRG/card directs COSY to merge two revision decks (section 3.4).

1	8	13
	MRG/	a,b,c

a,b,c — Specifies actions to be taken. This card directs COSY to merge the revisions deck on logical unit a with the revisions deck on logical unit b and write a merged revisions deck on logical unit c.

If revisions between a and b conflict, revisions from a are used. The conflicting revisions from b are listed with asterisks in columns 2 through 5 on the standard print device and not on unit c.

If either a or b is missing or zero, COSY assumes the decks are on the standard input device. If c is missing or zero, the standard output device is used.

If a and b are the same logical unit, the first revisions deck is written onto mass storage and then merged with the second revisions deck on the logical unit. Revisions on mass storage have priority if conflicts occur.

The DCK/ card in the merged deck is the DCK/ card from unit a. The merge terminates when the END/ card on both decks is read.

COSY locates a DCK/ card on unit a and searches unit b until the deck names match. If COSY reaches the end of the revisions deck on unit b before obtaining a match, it treats all the remaining decks on unit a as new decks and inserts them at the end of the merged deck. If revisions are to be input from different input devices, logical units must be specified on the MRG/ control card.

2.1.2 DCK/CARD

A DCK/ card identifies the COSY or Hollerith deck to be updated or created and specifies the actions to be taken with the new deck.

1	8	13	73
deckname	DCK/	$P_1,\ldots,P_n$	id

deckname — Names the COSY or Hollerith deck to be processed.

$P_1,\ldots,P_n$ — Specifies the actions to be taken. All parameters are optional, can be in any order, and are separated by commas. Blanks are not allowed within the parameter field. Parameters have the form

p, or p = lu, or D = deckname

where p is I, C, H, or L, and lu is the logical unit on which input or output occurs. Deckname specifies a new deckname for the COSY output.

I Parameter (Input)

I = lu or I — I specifies the logical unit containing the COSY or Hollerith source deck(s) to be updated or created. If the parameter is absent or just I, COSY assumes the source deck is on the COSY standard input device. †

If I = lu is used and lu is the system standard input unit, COSY assumes a new deck is being added to the COSY library. If the first card after the DCK/ card is a source deck identifier, COSY assumes it is a new deck to be added to the COSY library. COSY will process the deck until an END/ card is read. Additional new source decks may follow.

Each new deck must begin with a source deck identifier card and end with an END/ card. The card following the END/ card must be a DCK/ card, MRG/ card, or another END/ card to mark the end of the revision deck.

If the first card after the DCK/ card is not a COSY or Hollerith source deck identifier card, COSY assumes that the cards following the DCK/ card are revision cards and the COSY source deck will follow the revision cards. COSY reads the revision cards and places them on the mass storage scratch area until an END/ card is read. Then COSY reads the new COSY source deck (which must follow the revision cards) and modifies the new deck according to the revision cards.

If I = lu is used and lu is not the system standard input, COSY reads the revision cards from the system standard input unit and the source deck specified by the DCK/ card from unit lu. Then COSY updates the source deck according to the revision cards.

C Parameter (COSY Output)

C = lu or C — Specifies the device to receive COSY output. If C is absent, there is no COSY output. If just C is used, COSY output is on the COSY standard output device. C cannot be equated to the unit containing the current COSY library.

H Parameter (Hollerith Output)

H = lu or H — Specifies the device receiving Hollerith output. If H is absent, there is no Hollerith output. If just H is used, Hollerith output is on the COSY standard output device.

D Parameter (Deckname)

D = name — Changes the name of the COSY or Hollerith deck. COSY uses the six characters (including blanks and commas) following D = for the new deckname.

NOTE

If name is fewer than six characters and an I, C, or H parameter follows it, COSY misinterprets name.

†Refer to the MSOS Reference Manual Version 4.0 for a description of the COSY standard input, output, and list units.

id Parameter

id — Three-character field for changing the COSY or Hollerith deck identifier. If id is blank, the old deck identifier on the HOL/ or CSY/ card is used.

L Parameter (List)

L = lu or L — Specifies that a listing (in decompressed Hollerith form) of the deck be made on logical unit lu. If just L is used, the listing is on the COSY standard list device.

2.1.3 DEL/CARD

COSY deletes a specified number of cards from a previously defined input deck and inserts any Hollerith source cards immediately following the DEL/ card up to the next COSY control card. A DEL/ card has two forms:

1	8	13	66	72
	DEL/	m	change record	

1	8	13	66	72
	DEL/	m,n	change record	

In the first form, card m is deleted; in the second, cards m through n are deleted. The unsigned decimal numbers m and n are the sequence numbers in columns 76 through 80 of the Hollerith source cards. Sequence number m must be less than n.

The number of Hollerith cards following a DEL/card need not equal the number of cards being deleted.

2.1.4 INS/CARD

COSY inserts the Hollerith source cards immediately following an INS/ card into the new COSY or Hollerith deck.

1	8	13	66	72
	INS/	m	change record	

The Hollerith source cards are inserted after sequence number m, found in columns 76 through 80 of the Hollerith source cards.

2.1.5 REM/CARD

The REM/ card is used to remove the DEL/ or INS/ card and all Hollerith source cards following. This operation occurs only when merging two revisions decks. A REM/ card has two forms:

1	8	13
	REM/	m

1	8	13
	REM/	m,n

The sequence numbers m and n must match the sequence numbers on DEL/ or INS/ control cards in the revisions deck that is being merged.

A REM/ card detected when COSY is not merging is ignored.

2.1.6 CPY/CARD

The CPY/ card causes the COSY library to be copied onto a logical output unit. The CPY/ card has two forms:

1	8	13
	CPY/	P_1, P_2

1	8	13
deckname	CPY/	p_1, p_2

The first form, without the deckname, causes the COSY library to be copied from its current position to the end of the library. The second form, with a deckname specified, causes the COSY library to be copied from its current position through the named deck. COPY places an END/ card at the end of the new library, followed by an end of file mark.

The COSY library can be positioned to the beginning of any deck by the use of a CPY/ card on which only the deckname and the I parameter are specified. This card positions the COSY library to the beginning of the deck which immediately follows the named deck.

The p parameters specify the logical I/O units used to copy the COSY library. These parameters can occur in any order and are in the form p = lu where:

p = I or C

lu = a logical I/O unit

I = lu or I — I specifies the logical unit, lu, from which the COSY library is copied. If the I parameter is omitted or just I is used, the COSY library is copied from the COSY standard input device.

C = lu or C — C specifies the logical unit, lu, to which the COSY library is copied. If just C is used, the COSY library is copied onto the COSY standard output device. If C is omitted, there is no COSY output.

As each COSY deck is read from input unit I and copied on output unit C, the deckname is listed on the COSY standard print device. For example:

```
Deckname   CSY/    *COPIED*
```

For each deck that is read but not copied, the *COPIED* notation is omitted. For example:

```
Deck 1   CSY/    *COPIED*
Deck 2   CSY/    *COPIED*
  .        .         .
  .        .         .
  .        .         .
Deck 9   CSY/    *COPIED*
Deck 10  CSY/
  .        .                  } Decks 10 through 14 were
  .        .                  } read but not copied.
  .        .                  }
Deck 14  CSY/
Deck 15  CSY/    *COPIED*
Deck 16  CSY/    *COPIED*
  .        .         .
  .        .         .
  .        .         .
```

2.1.7 END/CARD

The END/ card terminates Hollerith input decks, COSY libraries, Hollerith input libraries, and revisions decks.

```
1                  8
/                  END/
```

2.1.8 HOL/CARD

When a Hollerith deck is input, the first card must be a Hollerith deck identifier.

```
1                  8                                                  73
/deckname          HOL/                                               id
```

deckname	Names the Hollerith deck being processed
id	Three-character deck identifier

A Hollerith deck identifier is not produced for a Hollerith output deck.

2.1.9 CSY/CARD

When COSY output is requested on the DCK/ card, COSY generates a COSY deck identifier card as the first card of the COSY output deck. COSY deck identifiers must also precede COSY DECKS on input.

1	8	73
deckname	CSY/	id

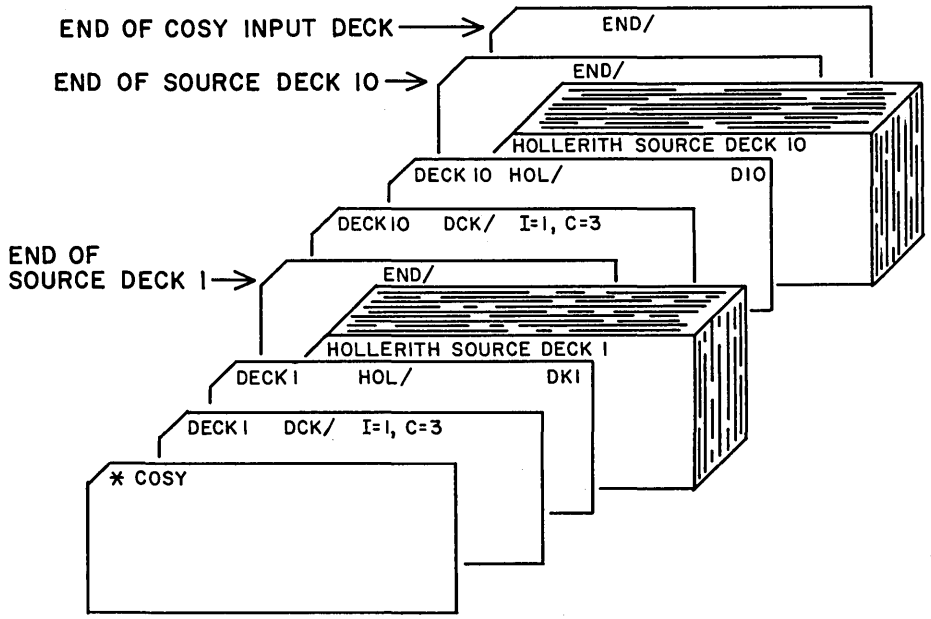
deckname	Names the COSY deck being processed
id	Three-character deck identifier of original deck

2.2 SAMPLE COSY REVISION DECKS

The following sample COSY revision decks illustrate the use of COSY control cards.

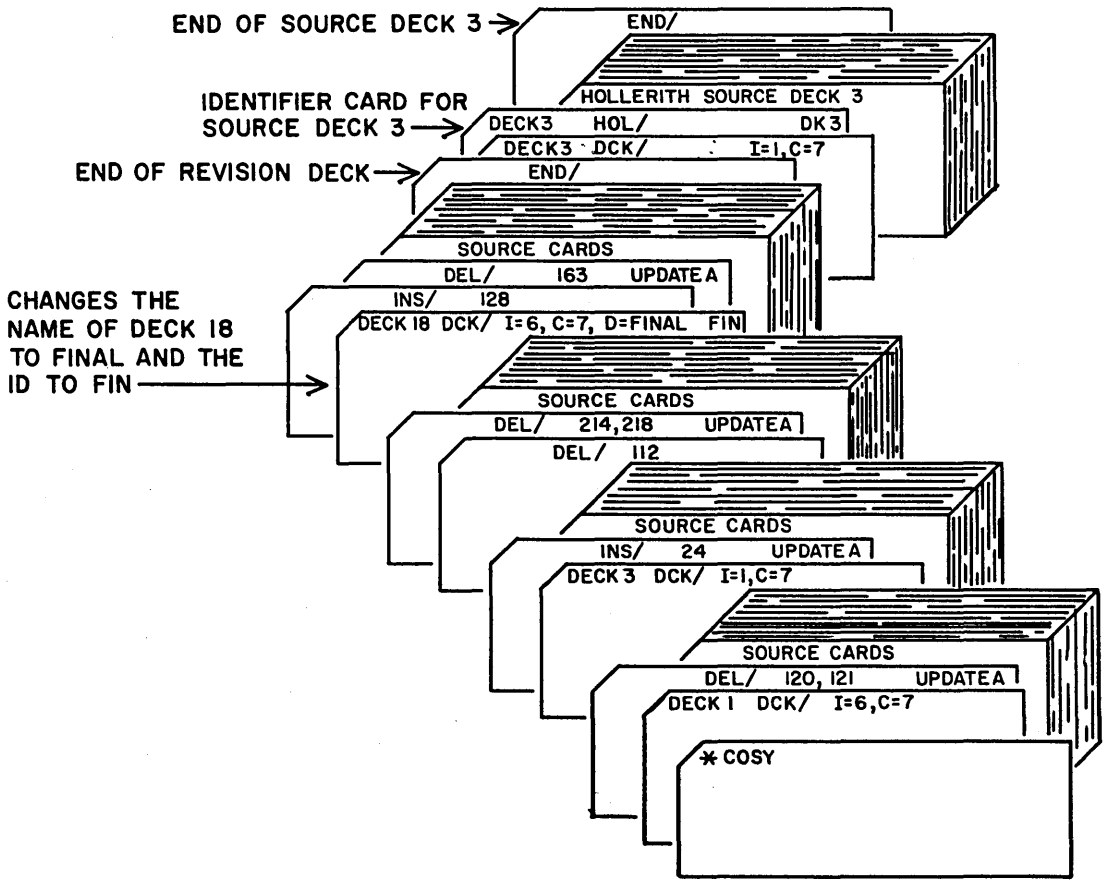
2.2.1 GENERATING A COSY LIBRARY

The following example generates a COSY library from two Hollerith source decks and places the library on output unit 3. The system standard input unit (card reader) is unit 1.



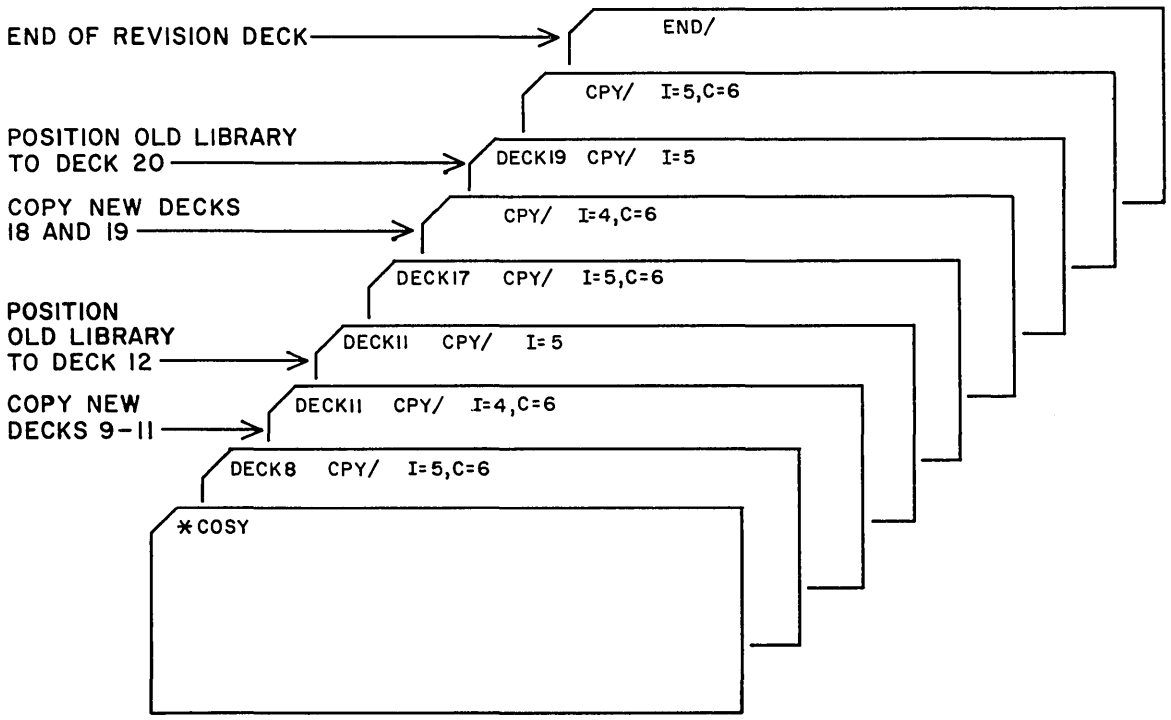
2.2.2 UPDATING COSY DECKS

The following example updates three COSY decks and places the updated decks on logical unit 7. Two of the COSY decks are on logical unit 6 and the third deck (deck 3) is input following the revision decks. The system standard input unit (card reader) is unit 1.



2.2.3 USING THE CPY/CARD TO UPDATE A COSY LIBRARY

The following is an example of updating a COSY library by using the CPY/ card to replace five old COSY decks with five new COSY decks. Logical unit 5 contains the old COSY library (decks 1 through 24) and logical unit 4 contains four replacement decks. The new COSY library is output on logical unit 6.

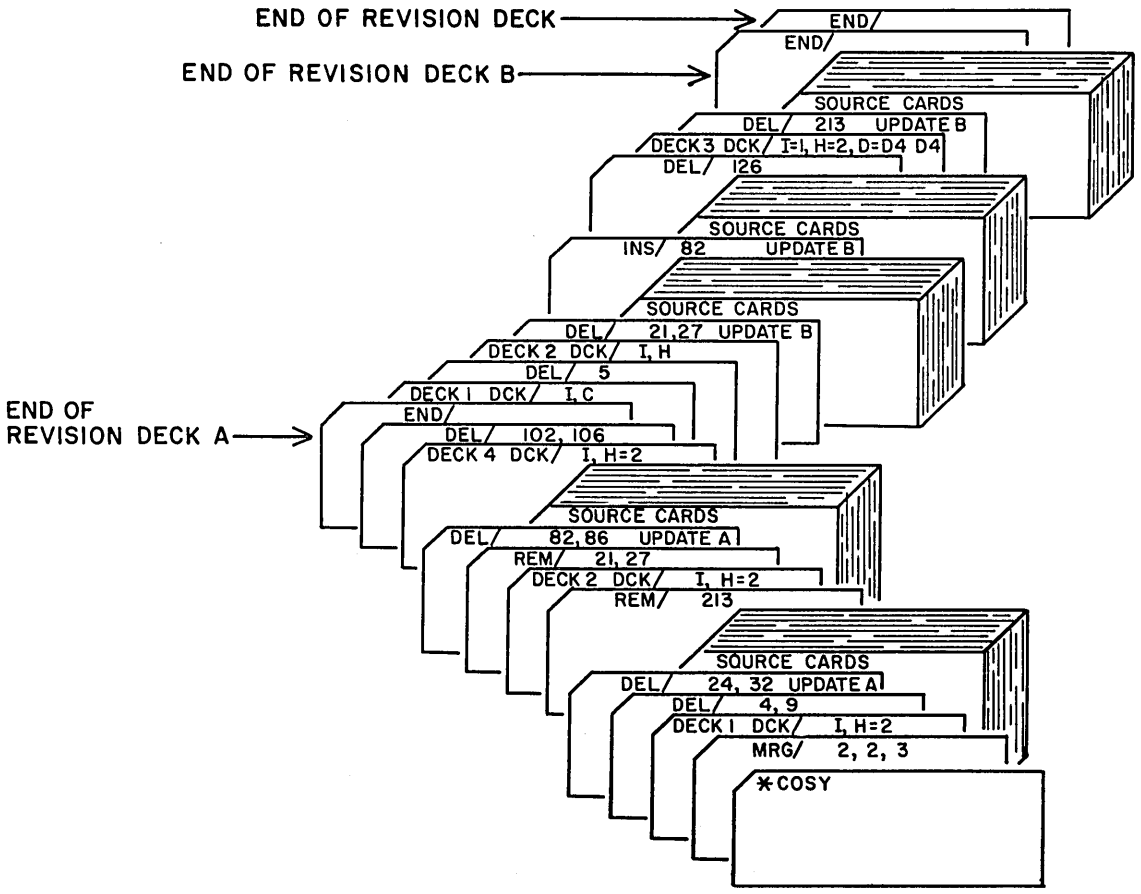


2.2.4 MERGING TWO REVISION DECKS

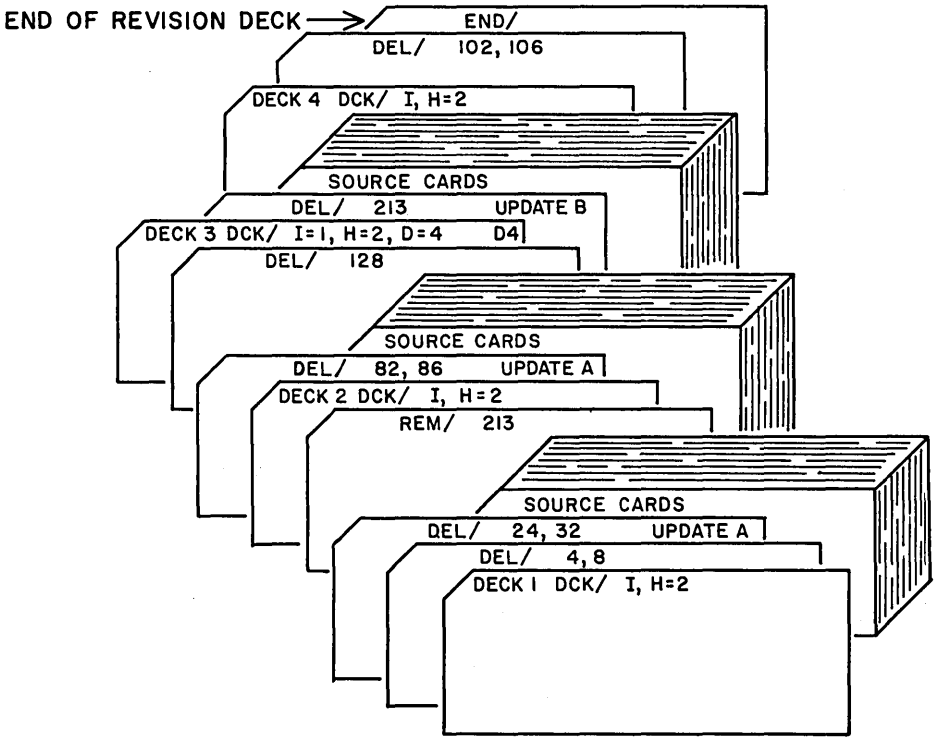
The following are two examples of merging revision decks. Example 1 merges two decks which both appear on the same input unit. Example 2 merges two decks that appear on different input units.

Example 1

This job merges two revision decks (a and b) which appear on logical unit 2 (card reader) and writes the merged output as a revision deck in Hollerith format on logical unit 3.

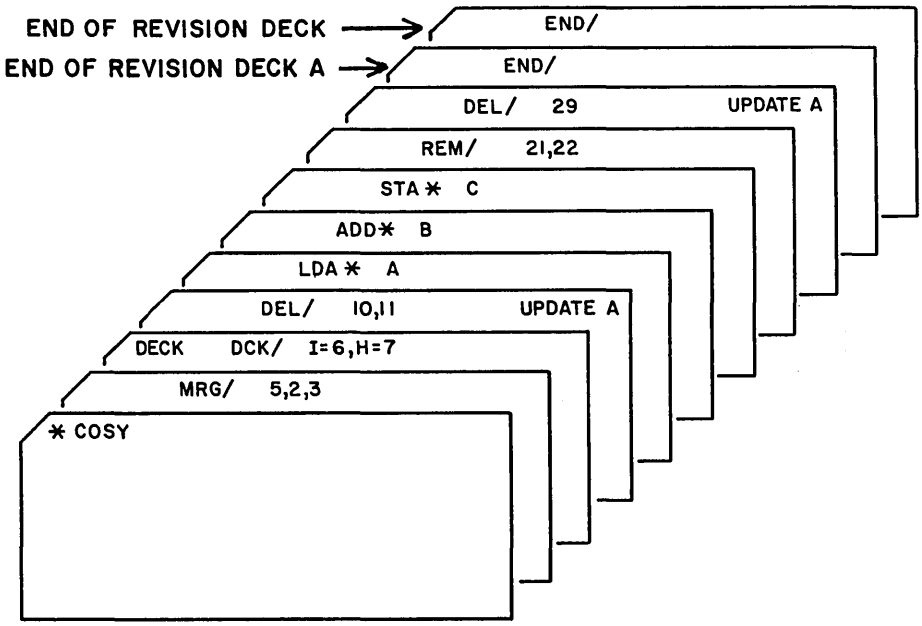


The following is the new (merged) revision deck.



Example 2

This job merges two revision decks (a and b) and writes the merged revision deck on logical unit 3 (magnetic tape). Revision deck a is on logical unit 5 (card reader) and revision deck b is on logical unit 2 (punched paper tape).



Revision Deck B (Input From Punch Tape)

```
DECKA   DCK/   I=6,H=7
        DEL/   10,11          update B
        LDA*   A
        SUB*   B
        STA*   C
        DEL/   21,22          update B
(source cards for insertion between COSY cards 20 and 23)
        END/                  (end of revision deck B)
```

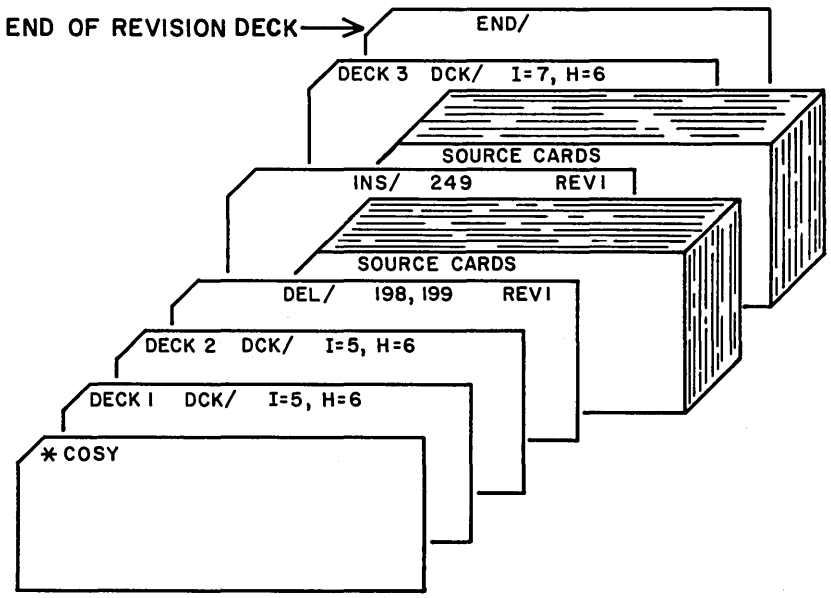
Merged Revision Deck (Output on Magnetic Tape)

```
DECKA   DCK/   I=6,H=7
        DEL/   10,11          update A
        LDA*   A
        ADD*   B
        STA*   C
        DEL/   29
        END/                  (end of merged revision deck)
```

Since DECKA was the primary deck, the DEL/ 10,11 card and insert cards following it in DECKA take precedence over the DEL/ 10,11 card and insert cards in DECKB. Also, the REM/ 21,22 card in DECKA removes the DEL/ 21,22 card and the following source cards from DECKE. The DEL/ 29 card from DECKA is added to the merged revision deck.

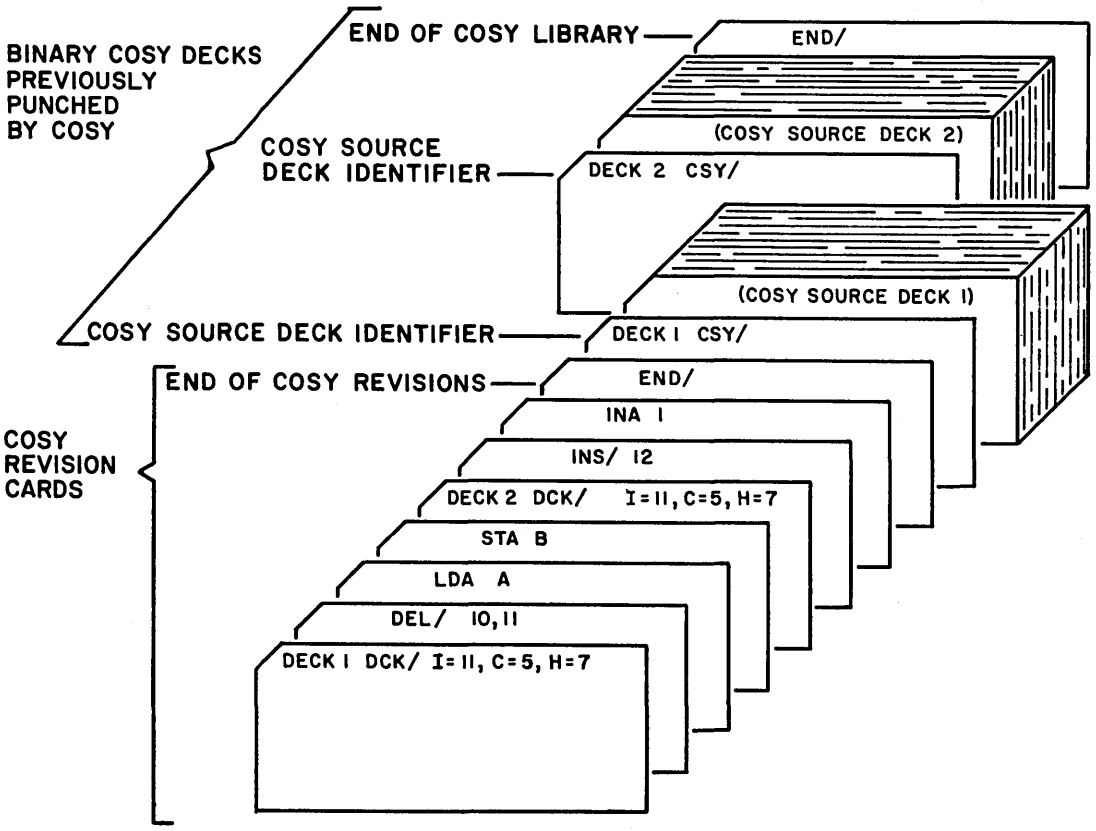
2.2.5 CONVERTING COSY DECKS TO A HOLLERITH LIBRARY

The following is an example of a job that converts three COSY decks into a Hollerith library and writes the Hollerith library on logical unit 6. COSY decks 1 and 2 are on logical unit 5 and COSY deck 3 is on logical unit 7.



2.2.6 UPDATING A COSY LIBRARY KEPT ON PUNCHED CARDS

The following is an example of updating a two-deck COSY library which is kept on punched cards. Logical unit 11 is a card reader and logical unit 5 would be a card punch if an updated COSY library on punched cards is required. Logical unit 7 may be a temporary file on which Hollerith output is stored for reassembly or recompiling.



In the above example, COSY reads the revision cards, places them on a scratch file, and then reads and updates the source decks. COSY reads the source decks in the same order as the DCK/ cards. If the source decks are out of order, COSY skips over the first decks until it finds the deck corresponding to the first DCK/ card. Then COSY looks for the deck corresponding to the second DCK/ card. If COSY has not read all the source decks in the correct order when it reaches the END/ card, COSY sends a rewind message to the operator which is a request to rewind COSY source decks in the card reader. COSY rereads the source decks until all decks have been read in the correct order.

COSY INPUT/OUTPUT 3

3.1 COSY LIBRARY

The COSY library is one or more COSY decks terminated with an END/ card. The COSY deck is a series of compressed source statements written in ASCII format. Each COSY deck begins with a COSY deck identifier and ends with an end of deck character followed by an end of file mark.

COSY compresses a card image by inserting a special ASCII character and value for three or more sequential blanks.

$5F_{16}$	Special ASCII character indicating compression
$5Fxx_{16}$	Indicates 3 to 62 consecutive blanks where $21_{16} \leq xx \leq 5D_{16}$ except 26_{16}
$5F5E_{16}$	End of card image
$5F5F_{16}$	End of deck

The format allows COSY to process all ASCII characters on paper tape that are valid for the device. Illegal paper tape characters are 00, 7F, 09, 0A, 0B, 0C, and 0D. However, on magnetic tape the only valid ASCII characters are $20_{16} \leq xx \leq 5F_{16}$ (except 26_{16}). This set includes all capital letters and all numbers. ASCII characters 00_{16} through $1F_{16}$ and 60_{16} through $7F_{16}$ are illegal because they cannot be written on magnetic tape in BCD mode. The character 26_{16} is illegal because it produces blank tape in BCD mode.

The COSY library may be written on paper tape, magnetic tape, or punched cards. When the library is on paper or magnetic tape, the block size is 192 words and all blocks are completely filled. Card images may be split across blocks. When the library is on punched cards, there are four cards per block and the last card in the block is not completely filled. Card images may be split across blocks.

3.2 HOLLERITH INPUT

A Hollerith input library is a group of (one or more) Hollerith source decks which is terminated by an END/ card. Each Hollerith source deck begins with a Hollerith deck identifier card and ends with an END/ card. The Hollerith input decks may be input from cards, paper tape, magnetic tape, or teletypewriter.

3.3 HOLLERITH OUTPUT

Hollerith output consists of source decks in uncompressed Hollerith code produced from COSY decks. Columns 73 through 75 of the source cards contain a deck identifier. Asterisks appear in this field if the source card was inserted by a revision deck.

Columns 76 through 80 of the Hollerith source cards contain a decimal sequence number. If new source cards are inserted with a revision deck containing DEL/ or INS/ cards, COSY writes an asterisk in column 73 of each new source card and writes the change record field (contents of columns 66 through 72 on the DEL/ or INS/ card) in columns 74 through 80 of the new source cards. If the change record field was blank on the INS/ or DEL/ cards, COSY will fill columns 73 through 80 with asterisks.

Hollerith output may be on punched cards, punched paper tape, or magnetic tape, and is terminated with an end of file mark. If the COSY output is on magnetic tape, COSY writes an end of file mark and rewinds the tape upon completion of the COSY run.

3.4 REVISION DECK

A revision deck is a group of COSY control cards and new source cards which are used to update or revise an existing COSY library. The first card of a revision deck must be a DCK/, MRG/, or CPY/ control card and the last card must be an END/ control card. The new source cards, if used, must follow an INS/ or a DEL/ control card. The control cards are described in section 2.1, paragraphs 2.1.1 through 2.1.9. All cards are in Hollerith code.

The revision deck is input to COSY on the system standard input device. If the source deck to be revised is on the system standard input device, COSY stores the revision deck on mass storage scratch until the source deck has been read. The revision deck is stored as card images with 40 words per sector.

3.5 LISTINGS

Under normal operation, COSY lists revisions from the revisions deck as they occur on input. However, when merging two revisions decks, COSY lists the final merged revisions deck on the standard print device. Asterisks in columns 2 through 5 indicate the card was not used in the COSY operation. Columns 6 through 85 contain the revision input card.

If the L parameter is not present on the DCK/ card and revision cards follow the DCK/ card, the revision cards are listed.

3.6 MESSAGES

COSY error messages are written on the COSY standard list device.

The format is

COSY Cxx

xx indicates the error code. Refer to the 1700 MSOS Diagnostic Handbook to interpret COSY error messages.

At the end of a COSY job, the message

xx ERRORS.

is written on the COSY standard list device (only if errors exist). xx is a decimal count of errors in the COSY job.

At various times during a COSY job, the message

REWIND LU xx

may be written on the system standard comment device. xx (decimal) indicates the logical unit to be rewound. The operator must enter any value through the system standard input comment device after rewinding the unit to tell COSY that the unit has been rewound.

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Reference Manual

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