

3 1 0 0  
3 2 0 0  
3 3 0 0  
3 5 0 0

COMPUTER SYSTEMS  
COSY/MSOS/RTS

REFERENCE MANUAL

**CONTROL DATA**  
CORPORATION

3 1 0 0  
3 2 0 0  
3 3 0 0  
3 5 0 0

COMPUTER SYSTEMS  
COSY/MSOS/RTS  
REFERENCE MANUAL

**CONTROL DATA**  
CORPORATION



## PREFACE

---

This manual describes the COSY (compressed symbolic) library program for transforming Hollerith source decks into a compressed symbolic format, for maintaining and updating the compressed decks, and for expanding decks to their original format. COSY/MSOS and COSY/RTS execute as batch processing jobs under the Mass Storage Operating System (MSOS) and Real-time SCOPE Operating System (RTS) respectively on CONTROL DATA® 3100/3200/3300/3500 Computer Systems. The reader's familiarity with MSOS and RTS is assumed.

This manual was formerly 3100/3200/3300/3500 COSY/MSOS Reference Manual.



# CONTENTS

---

CHAPTER 1	INTRODUCTION	1-1
CHAPTER 2	CONTROL CARDS	2-1
2.1	COSY	2-1
2.1.1	DECK/	2-1
2.1.2	DELETE/	2-5
2.1.3	INSERT/	2-5
2.1.4	COPY/	2-5
2.1.5	ENDCOSY/	2-6
2.1.6	COSY/	2-6
2.2	Operating System	2-7
2.2.1	SEQUENCE	2-7
2.2.2	JOB	2-8
2.2.3	EQUIP	2-8
2.2.4	COSY	2-9
2.2.5	FET	2-10
2.2.6	ALLOCATE	2-10
2.2.7	OPEN	2-11
2.2.8	CLOSE	2-11
2.2.9	End-of-File	2-12
2.2.10	Control Card Table	2-12
2.3	Sample Deck Structures	2-12
2.3.1	Hollerith-to-COSY	2-13
2.3.2	COSY-to-COSY and Hollerith	2-14
2.3.3	One Job with Two COSY Runs	2-15
2.3.4	COSY on Mass Storage	2-16
CHAPTER 3	INPUT/OUTPUT FORMATS	3-1
3.1	Hollerith Input	3-1
3.2	Hollerith Output	3-1
3.3	COSY Decks	3-1
3.4	COSY Binary Cards	3-2
3.4.1	3200 Format	3-3
3.4.2	3300/3500 Format	3-4

CHAPTER 4	LISTABLE OUTPUT	4-1
4.1	COSY Log	4-1
4.2	Listings	4-1
4.3	Messages	4-2
4.3.1	COSY Messages	4-2
4.3.2	I/O Error Recovery	4-2
4.3.3	Terminate COSY	4-3
4.3.4	Message Listing	4-4

---

COSY/MSOS/RTS provides a means of compressing information in a source deck by replacing three or more consecutive blanks on a card by special BCD characters. The resulting deck, called a COSY (compressed symbolic) deck, is in COSY format (section 3.4). Compressing decks into COSY format reduces storage space required for cards or secondary storage required for files.

COSY may be used for any source language that does not contain any of the COSY control statements. Input and output may be in COSY and/or Hollerith format.

With COSY control statements, the user directs the updating of a COSY library and the copying of a COSY library from one file to another. Because 3300/3500 COSY accepts 3200 COSY format, the user can process COSY tapes prepared in the earlier 3200 format. 3300/3500 COSY decks cannot be used as input to systems requiring the older format. Optional log and revision listings may be specified for the output of a COSY run.





---

Execution of COSY requires certain COSY and operating system control cards.

## 2.1 COSY

COSY processing is directed by five user-prepared control cards (DECK/, DELETE/, INSERT/, COPY/, and ENDCOSY/) and one COSY-generated card (COSY/).

When the deckname is used, it begins in column 1, the card name begins in column 10, and parameter fields begin in column 20.

### 2.1.1 DECK/

A DECK/ card names an input deck and specifies actions to be taken. A revision deck may precede the COSY DECK/ card.

1	10	20
deckname	DECK/	P <sub>1</sub> , . . . , P <sub>n</sub>

deckname Names the COSY or Hollerith input deck

P<sub>1</sub>, . . . , P<sub>n</sub> Parameters specifying actions to be taken. All parameters are optional and may appear in any order. Parameters have the form:

symbol = xx or symbol

Symbols are character strings beginning with I, L, R, H, C, E, D, or T. The first character of the string specifies the action to be taken. Subsequent characters are ignored. xx is a logical unit number or a file ordinal. For parameters T, D, and E, xx is not a logical unit or file ordinal.

#### Input Parameter

- I Specifies COSY or Hollerith input from logical unit xx or file ordinal xx. Hollerith input on tape must be in unblocked 80 character records, or if on mass storage files must be in universal format terminated by an end-of-file mark in universal format. If either I or xx is absent, COSY assumes input on INP.<sup>†</sup> COSY determines whether input is COSY or Hollerith by inspecting the first card of the file.

#### List Parameter

- L Specifies source listing on OUT. The form L=xx is not allowed and produces the diagnostic:

I COSY 025 R/L EQUATED

The listing appears on OUT.

#### Revisions Parameter

- R Specifies that revision cards will appear on OUT. The form R=xx is not allowed and produces the diagnostic:

I COSY 025 R/L EQUATED

The listing appears on OUT.

#### Hollerith Parameter

- H Specifies Hollerith output on logical unit xx or file ordinal xx. If xx is absent, COSY assigns 54.

#### COSY Output Parameter

- C Specifies COSY output on logical unit xx or file ordinal xx. If xx is absent, COSY assigns 62 (PUN).

#### Edition Parameter

- E Specifies COSY output edition number xx. If E is absent, the output edition number is obtained by incrementing the input edition number by 1 modulo 100. If E is absent and the input deck has no edition number, the output edition number is 1.

---

<sup>†</sup> In this discussion, INP and OUT are mnemonics for the standard input unit (LUN60) and the standard output unit (LUN61).

#### Deckname Parameter

- D Specifies COSY output deckname. The required form is:

D = deckname

If D is absent, COSY assigns the input deckname to the output deck. If D is present but deckname is missing, COSY produces the diagnostic:

I COSY 020 NO DECK NAME ON DECK CARD

#### Terminal Column Parameter

- T Specifies terminal column for significant information on input. If either T or xx is absent, COSY assigns 72. Interpretation of T is shown by Table 2-1, Input/Output Formats.

When Hollerith, but not COSY, output is requested, no identification and sequence numbers are inserted in columns 73-80 of revisions cards; \*\*\* is inserted in columns 73-75 of these cards. If COSY output is requested, identification and updated sequence numbers are placed on revision cards.

Hollerith input cards may or may not contain the most significant digits of the sequence numbers. If numbers are present, the user must ensure that they are in sequence.

Input and output must not be assigned to the same file ordinal or logical unit. If they are, COSY terminates the DECK/ or COPY/ function and writes an error message on the output file.

COSY or Hollerith output must not be assigned to OUT if L or R is desired. Listing and revisions listing have lower priority than COSY or Hollerith output and will be suppressed. Log, L, and R may all be specified if COSY and Hollerith are not requested on OUT. If COSY and Hollerith output are specified for the same file ordinal or logical unit, the Hollerith output is suppressed.

The COSY log precedes any other type of output (C, H, R, or L).

Table 2-1. Input/Output Formats

Input Format	Output Format	T ≤ 72	T > 72
Hollerith	COSY	T columns of information are compressed. COSY generates a sequence number. Columns 73-75 of the first card of the Hollerith deck are written on the COSY/ card in columns 73-75.	T columns of information are compressed. Any part of a sequence number or identification number beyond column T on an input card will not appear in the output deck. †
COSY	COSY	T columns of information are processed.	T columns of information are processed.
COSY	Hollerith	80 columns of information are on output card. Output card is formed by decompressing T columns of COSY card. Identification from columns 73-75 of COSY/ control card is placed in columns 73-75 of output card. Sequence number modulus $10^5$ is generated and placed in columns 76-80 of Hollerith card.	80 columns of information are on output card. Output card is formed by decompressing T columns of COSY card. No identification is placed in columns 73-75 of Hollerith card. Sequence number having modulus $10^{80-T}$ is placed in columns T+1 to 80 of Hollerith output card.
Hollerith	Hollerith	T is the number of columns of significant information in Hollerith input deck. Columns 73-75 of new Hollerith deck are set equal to columns 73-75 of the first card of the Hollerith input deck. Sequence number having modulus $10^5$ is generated and placed in columns 76-80 of each Hollerith card after it has been read from the Hollerith input file.	T is the number of columns of significant information in Hollerith input deck. No identification is placed in columns 73-75 of the Hollerith output cards. Sequence number having modulus $10^{80-T}$ is inserted beginning in column T+1 of the Hollerith output cards. †

† It is the user's responsibility to ensure that the leading portion, if any, of the five-digit sequence number supplied on the original Hollerith cards is numerical and in sequence.

**2.1.2**  
**DELETE/**

COSY deletes a specified number of cards and replaces them by any Hollerith cards immediately following a DELETE/ card up to the next COSY control card. A DELETE/ card has one of two forms:

10	20	41
DELETE/	m	Comments
10	20	41
DELETE/	m, n	Comments

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 76-80 of the Hollerith cards being deleted.

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

**2.1.3**  
**INSERT/**

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

10	20	41
INSERT/	r	Comments

The Hollerith cards are inserted after the card with the Hollerith sequence number r in columns 76-80.

**2.1.4**  
**COPY/**

COPY/ transfers the COSY library from the file identified by q<sub>1</sub> to the file identified by q<sub>2</sub>. Transfer begins at the current file position and continues to, but does not include, the named deck.

1	10	20
deckname	COPY/	q <sub>1</sub> , q <sub>2</sub>

- q<sub>1</sub> File ordinal or logical unit number specifying input file (current COSY library)
- q<sub>2</sub> File ordinal or logical unit number specifying output file (new COSY library)

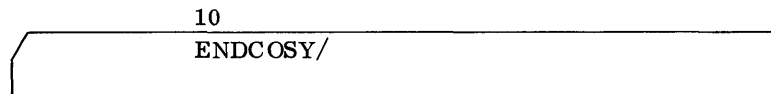
q<sub>1</sub> and q<sub>2</sub> may not be assigned to standard system units or to the same units.

If no deckname is present, the remainder of the COSY library is copied, beginning from the current position.

COSY can copy tapes in the old format. The COPY/ command transforms the old format into the new format.

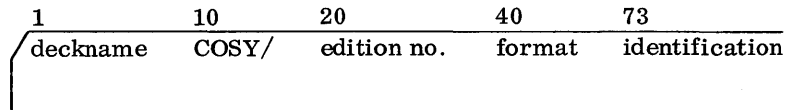
### 2.1.5 ENDCOSY/

An ENDCOSY/ card marks the end of a COSY run. COSY completes processing, rewinds the last nonstandard output unit referenced in the last DECK/ card, repositions all mass storage output files (but does not close them), and returns control to MSOS or RTS.



### 2.1.6 COSY/

When the DECK/ card specifies COSY output, COSY generates a deck identifier card as the first card of the COSY output deck.



- deckname Begins in column 1
- edition no. Begins in column 20. The edition number is taken from the edition parameter on the DECK/ card.

format	A character in column 40 designates that the COSY deck has been prepared in the new 3300/3500 COSY format. When the COSY deck was prepared by 3200 COSY, column 40 is blank. When the COSY deck is decompressed, COSY checks column 40 and decompresses the deck according to the format indicated.
identification	The value inserted into columns 73-75 is determined by the T parameter on the DECK/ card. If T is omitted or if $T \leq 72$ , identification is the sequence number taken from columns 73-75 of the input Hollerith deck or from the identification field of the COSY/ card of the input COSY deck.

## 2.2 OPERATING SYSTEM

An input COSY deck may require certain system control cards in order to load and execute the COSY library program. The control cards listed below will generally be part of the input deck. Other control cards may be used as described in the particular operating system reference manual. The control cards have rows 7 and 9 punched in column one. An end-of-file card is 7 and 8 punched in columns one and two.

### 2.2.1 SEQUENCE

```

7
9SEQUENCE, j

```

j 1- to 3-digit job sequence number must be present

The SEQUENCE statement separates stacked jobs on INP. A SEQUENCE card is placed in front of every job except a batch job immediately following a priority job.

SEQUENCE notifies MSOS or RTS of the beginning of a new job. MSOS or RTS releases all batch units and, if OUT is a tape, writes an end-of-file. If OUT is a printer, the operating system causes a page eject. The operating system then produces a copy of the SEQUENCE card on CTO and OUT and enters j in the accounting table.



### 2.2.2 JOB

The JOB statement identifies a batch job to MSOS or RTS. It must follow either a SEQUENCE card or the last priority job MSOS or RTS control card.

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\} \text{JOB, c, i, t, NP, ND}$

- c Account number, 0-8 characters
- i Programmer identification, any length
- t Estimated running time, 0-999 minutes
- NP No system unit protection; when NP is omitted, protection is in effect.
- ND No dump; when omitted, recovery dump is taken on abnormal termination.

If the c, i, or t fields are blank, a comma must delineate each blank field or the job is terminated. The JOB statement is copied on OUT, CTO, and PUN if it is assigned.

### 2.2.3 EQUIP

EQUIP statements refer to mass storage devices only before they are entered in the mass storage directory. The user may not specify a file ordinal in an EQUIP statement.

Any tape used in the COSY run must be equipped as a logical unit through use of an EQUIP statement before COSY is called. EQUIP statements are placed after the JOB statement and before the COSY statement.

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\} \text{EQUIP, } u_1=d_1, \dots, u_n=d_n$

$u_i=d_i$  can be in one of the following forms, any or all of which may appear on a single EQUIP statement:

$$u_i = MT$$

$$u_i = MTCxEyUzz$$

$$u_i = u_m$$

When  $u_i = MT$ , MSOS or RTS assigns an available magnetic tape to  $u_i$  and logs the assignment on the CTO.

When  $u_i = MTCxEyUzz$  (where  $x$ ,  $y$ , and  $zz$  are the connect code for a specific magnetic tape unit), MSOS or RTS assigns  $u_i$  to a specified unit, if available. Otherwise, the operating system issues a diagnostic.

When  $u_i = u_m$ , the logical unit number on the right of the equal sign must have been previously assigned. The operating system assigns  $u_i$  to the same unit assigned to  $u_m$ . If the logical unit on the left has been previously assigned, the physical unit is released and the new assignment is made.

#### 2.2.4 COSY

The COSY library name card directs MSOS or RTS to load COSY from the library and execute it as a batch program. There are three card forms:

$$\begin{array}{|l} \hline 7 \\ \hline 9 \text{COSY} \\ \hline \end{array}$$
$$\begin{array}{|l} \hline 7 \\ \hline 9 \text{COSY, I=lun} \\ \hline \end{array}$$
$$\begin{array}{|l} \hline 7 \\ \hline 9 \text{COSY, N, S, *} \\ \hline \end{array}$$

The optional parameters are separated by commas and may appear in any order.

- I Tells COSY from which lun (MSOS logical unit number) the COSY control cards are to read. If I is omitted, then  $lun = 60$ .
- N Tells COSY to suppress the listing of control cards and revision detail cards. If N is omitted, all control cards and revision detail cards are listed.
- S Tells COSY to suppress job at the ENDCOSY/ card if there is a revision card sequence error. (This occurs only when Hollerith is defined). If S is omitted, processing continues at ENDCOSY/ time.

- \* Tells COSY to recognize \* control cards instead of / control cards. Normally COSY recognizes COSY/; DECK/; INSERT/; DELETE/; COPY/; and ENDCOSY/ as control cards. However, COSY\* recognizes \* rather than / control card images. This feature allows COSY\* to accept COSY control cards as data, and place them on the COSY\* tape. The COSY\* control cards are:

DELETE\*

INSERT\*

DECK\*

END\*

COPY\*

The \* must be used in place of the / on COSY control cards. These cards permit the addition of revision cards ahead of existing revisions by referencing COSY sequence number 1. COSY\* also provides a dummy control card, 'INSERT/ 0' for each deck. (That is, each deck on the COSY\* tape has at least one COSY control card, 'INSERT/ 0', having COSY sequence number 1). This feature allows COSY corrections to be placed in the deck preceding any other COSY corrections for that deck (available with L (list) option selection on the deck card).

COSY\* tapes generated in this manner can be used as input to COSY; however, and ENDCOSY/ card is required. This is accomplished by inserting a special card as the last DECK\* control card. This DECK\* control card will output the required ENDCOSY/ control card needed to terminate the regular COSY job.

When I is not followed by an equal sign an error message is printed and the scan of the <sup>7</sup> COSY card for parameters is stopped. All parameters previously defined <sup>9</sup> continue to be defined and all subsequent parameters are ignored. The error message is:

I COSY 28 ILLEGAL USE OF I ON COSY CARD.

When S is used and a revision card sequence error is encountered, the following message is printed:

D COSY 27 ASSEMBLY SUPPRESSED-REVISION CARD SEQUENCE ERROR

COSY\* functions in the same manner as COSY with the following exceptions:

The \* must be used in place of the / on COSY control cards.

An END\* control card, rather than an ENDCOSY/ card, terminates a COSY run. END\* must begin in column 10.

The dummy control card (INSERT/ 0) appears on listings when the L parameter, list function, is selected on a DECK/ card. The (INSERT/ 0) has COSY sequence number of one. This permits the addition of revision cards ahead of cards not listed. To add these revision cards the user references COSY sequence number one. The new COSY ignores this card when a Hollerith revision tape is used as input.

COSY\* output may be used as input to COSY. An ENDCOSY/ control card used to terminate this COSY run is obtained on the COSY\* output by inserting as the last DECK\* card the following:

```
ENDCOSY/      DECK*      L=xx,H=yy
```

This DECK\* card will output an ENDCOSY/ control card.

An example of COSY\* follows.

The initial COSY\* file is created using the following job structure:

```
7SEQUENCE,001  
9
```

```
7JOB,,,,  
9
```

```
7EQUIP,03=MT  
9
```

```
7COSY,*  
9
```

```
DECK1          DECK*          I,C=03  
                INSERT/ 0
```

Desired Revision Cards

```
DECK1          DECK/          I=01,H=02  
ENDCOSY/      DECK*          I,C=03  
                ENDCOSY/  
                END*
```

```
77  
88
```

A listing of the COSY\* file is obtained by use of a DECK\* control card for each routine on the COSY\* file. The following is an example of the deck structure:

```
7
9SEQUENCE,001
```

```
7
9JOB,.,.,
```

```
7
9EQUIP,03=MT
```

```
DECKNAME          DECK*          I=03, L
                  END*
```

```
77
88
```

COSY corrections may be added to the COSY\* file by INSERT\* and DELETE\* control cards, used in the same manner as the INSERT/ and DELETE/ control cards, but referencing the COSY\* sequence numbers. As an example, the following represents an existing COSY\* file:

```
DECK1              DECK*              I, C=03
                  INSERT/ 0          001
*                  comment card 1    002
*                  comment card 2    003
*                  comment card 4    004
DECK1              DECK/              I=01, H=02
```

The following is a sample job sequence including COSY\* operations against the existing COSY\* file:

```
7
9SEQUENCE,002
```

```
7
9JOB,.,.,
```

```
7
9EQUIP,03=MT,04=MT
```

```

7COSY,*
9
          INSERT*           3
*
          comment card 3
DECK1    DECK*             I=03, C=04
          END*
77
88

```

The resulting COSY\* file can be represented as follows:

```

DECK1    DECK*             I, C=03
          INSERT/           0           001
*
          comment card     1           002
*
          comment card     2           003
*
          comment card     3           004
*
          comment card     4           005
DECK 1    DECK/

```

Assemblies can be performed using COSY\*. For example:

```

7SEQUENCE,003
9
7JOB,, ,
9
7EQUIP,01=MT,02=MT,03=MT,04=MT
9
7CTO,01=COSY TAPE, 02=Hollerith tape
9
7CTO,03=COSY star file, 04=input to COSY (output from COSY star)
9
7COSY,*
9
          INSERT*           4
*
          comment card     5

```



DECK1

DECK\*

I=03, H=04

END\*

<sup>7</sup><sub>9</sub>COSY, I=04

<sup>7</sup><sub>9</sub>REWIND, 02

<sup>7</sup><sub>9</sub>COMPASS, I=02, L, R, P

77  
88



**2.2.5**  
FET

The FET parameters are used by MSOS (not RTS) to construct a file label for an unallocated file. For an existing file, the FET statement is used to identify the file referenced by a following OPEN, CLOSE, EXPAND, RELEASE, or MODIFY statement.

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\}$  FET, owner, name, blksize, edition, accpr, modpr

owner	8-character identification; if less than 8 characters, the field is blank filled on the right.
name	30-character mass storage file name; if less than 30 characters, the field is blank filled on the right. Imbedded blanks in the name are not permitted.
blksize	Number of characters in each data block, not exceeding $131071_{10}$
edition	Edition number, two decimal digits; set to zero if omitted
accpr	4-character access privacy code; if omitted, the field is blank filled. If less than 4 characters, the field is blank filled on the right.
modpr	4-character modification privacy code; blank filled if omitted; if less than 4 characters, the field is blank filled on the right.

**2.2.6**  
ALLOCATE

The ALLOCATE statement (MSOS only) allocates space for a mass storage file, creates a file label, and enters the label in the file label directory (FLD).

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\}$  ALLOCATE, n, exp, mode, NOSEG, dt

n	Number of mass storage tracks to allocate for the file; a positive integer not exceeding $262144_{10}$
exp	Expiration date to be inserted in the file label, a 6-digit decimal integer in the form yymmdd; if omitted, the current date is used

mode	Recording mode for mass storage file. S in this field specifies sector mode. Any other symbol is interpreted as a request for track mode.
NOSEG	Specifies contiguous allocation. Any other term or value indicates the file may be segmented.
dt	Specifies the type of mass storage device; if omitted, 852 is assumed

If the combined parameters owner, file name, and edition number duplicate those of a previous ALLOCATE statement, the job is terminated.

### 2.2.7 OPEN

With the OPEN statement (for MSOS only), previously reserved mass storage space is prepared for I/O processing. Parameter values are passed to routines which locate the file label, check device labels to ensure that correct mass storage devices are on-line, and initialize mass storage tables.

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\} \text{OPEN, fo, use}$

fo	Unique file ordinal (1-59 for batch, 1-63 for priority) supplied by the user; referenced by subsequent I/O requests to this file.
use	I specifies a read-only file while it is open. Any other symbol indicates file is available for reading and writing.

### 2.2.8 CLOSE

With the CLOSE statement (for MSOS only), mass storage tables may be released and file labels updated after I/O processing. A CLOSE statement follows the last data card of a run which opens and processes a mass storage file. COSY does not automatically close any files.

$\left. \begin{array}{l} 7 \\ 9 \end{array} \right\} \text{CLOSE, fo}$

fo	File ordinal assigned when file was opened
----	--

### 2.2.9

#### END-OF-FILE

A job is terminated with an end-of-file card defined by 7, 8 punches in columns one and two.

### 2.2.10

#### CONTROL CARD TABLE

The following table indicates which cards are applicable to the particular operating system.

CARD	RTS	MSOS
SEQUENCE	X	X
JOB	X	X
EQUIP	X	X
COSY	X	X
FET		X
ALLOCATE		X
OPEN		X
CLOSE		X
end-of-file	X	X

### 2.3

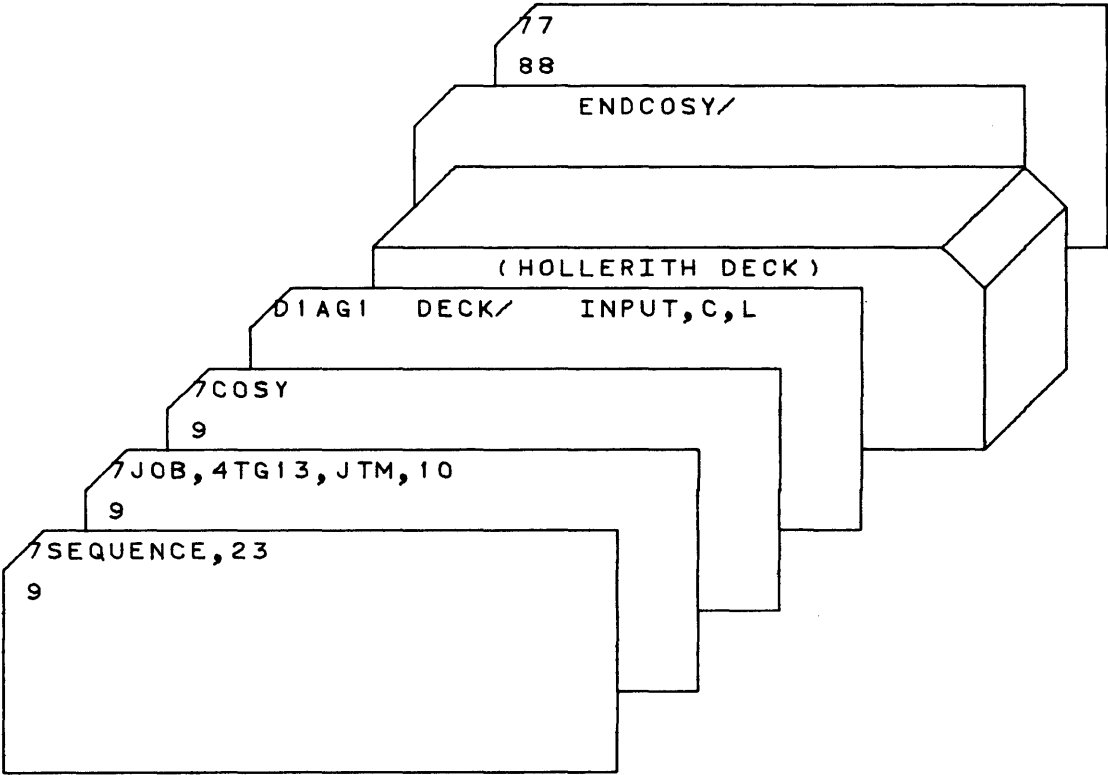
#### SAMPLE DECK STRUCTURES

The following deck structures illustrate the use of COSY and MSOS or RTS control cards in the job deck. Notice that all revision cards (DELETE/, INSERT/, and their accompanying cards) appear in ascending order of sequence (m, n, r) for each deck.

The user must equip or allocate and open all needed nonstandard files except 54 or 55). COSY uses unit 55 as a scratch unit for corrections. This file is used only if the number of update cards causes internal table overflow. The user should not use unit 55 for any other file. 54 is default unit for Hollerith output.

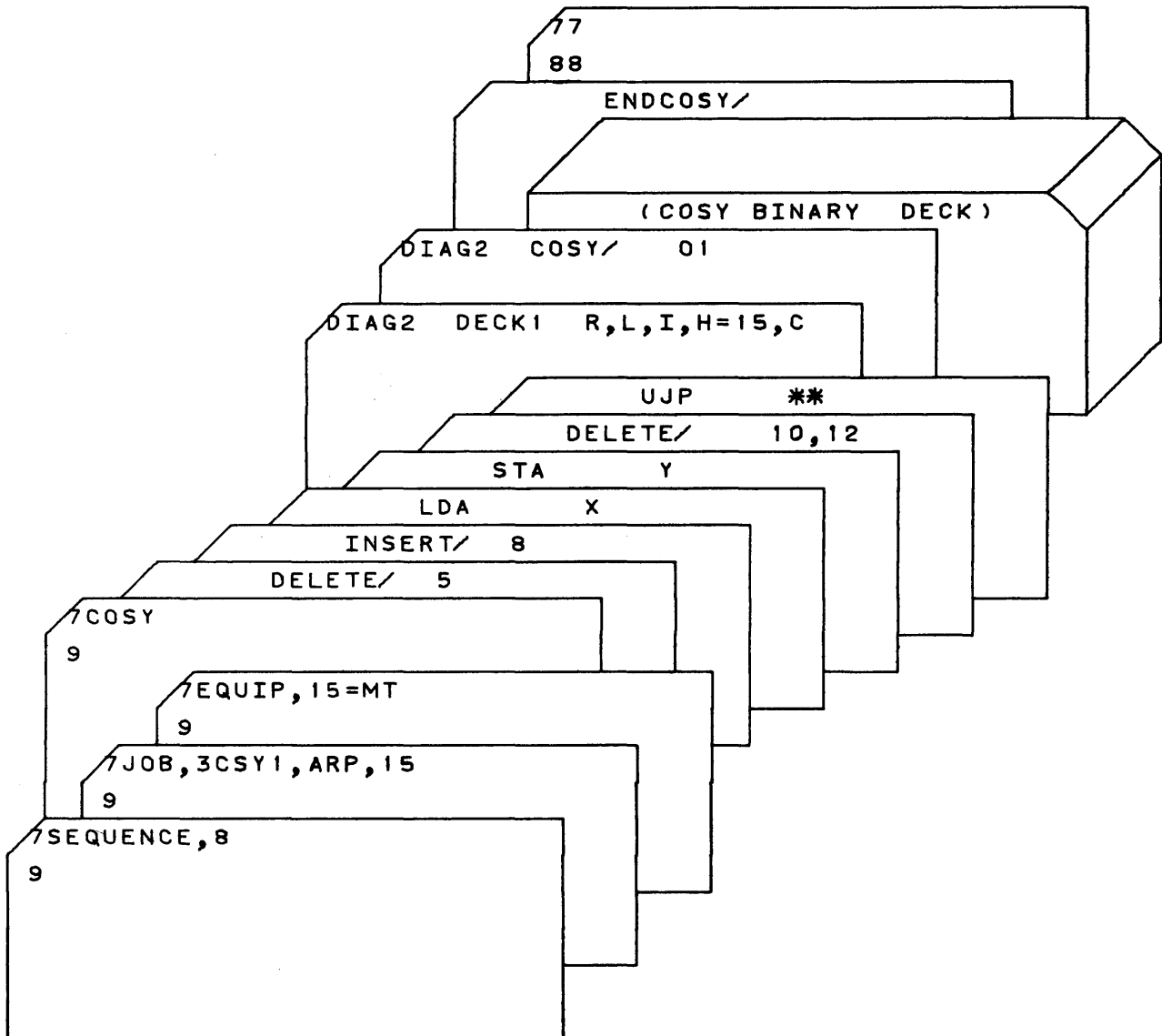
**2.3.1**  
HOLLERITH-  
TO-COSY

Generate COSY deck from a Hollerith source deck.



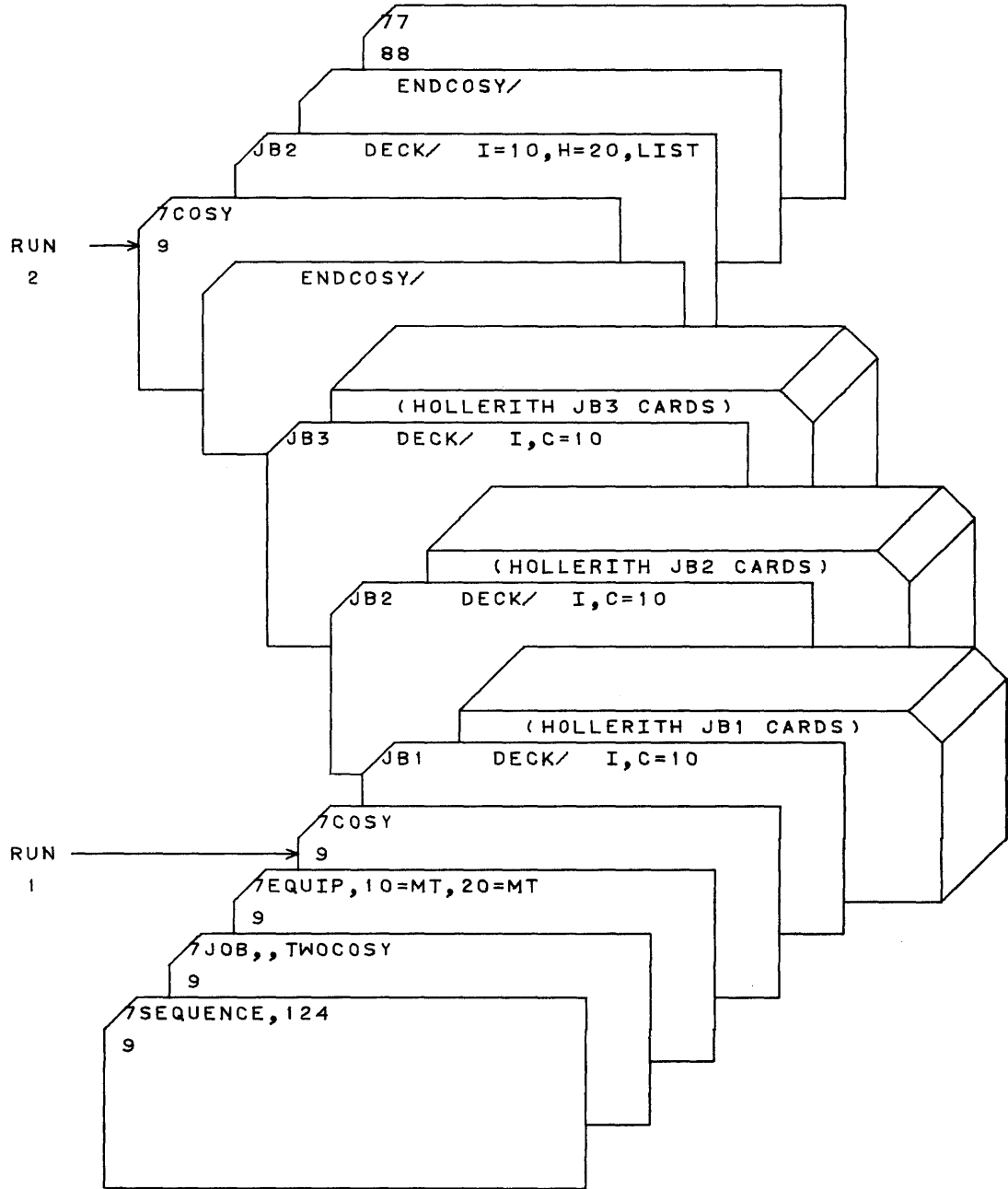
2.3.2  
COSY-TO-COSY  
AND HOLLERITH

Update COSY deck, punch it, and generate Hollerith deck on tape.



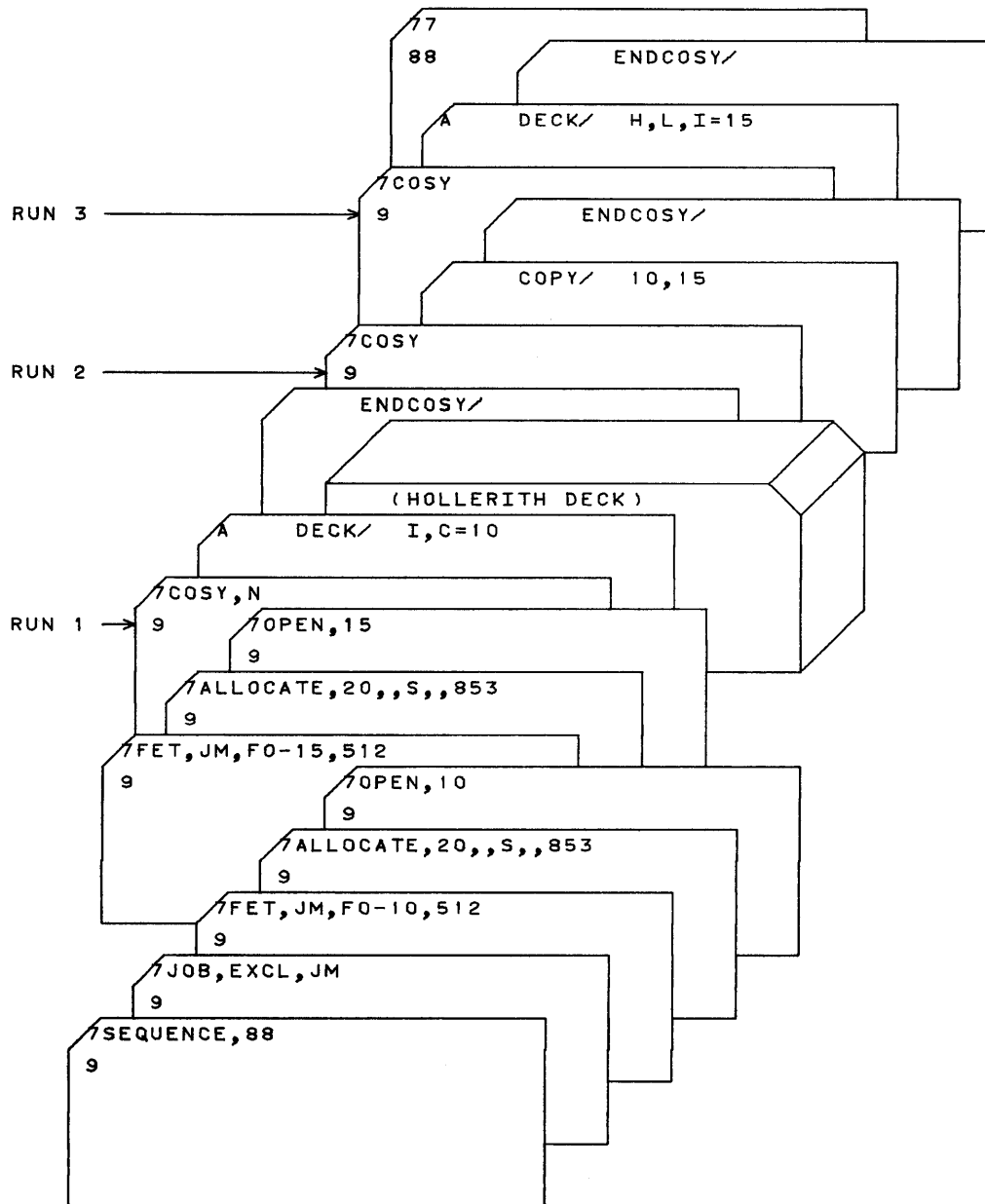
**2.3.3**  
**ONE JOB WITH**  
**TWO COSY RUNS**

Call COSY twice in the same job. In the first run, generate three COSY decks on tape. In the second run, generate Hollerith decks on tape.



**2.3.4  
 COSY ON  
 MASS STORAGE**

Call COSY three times in the same job. In the first run, generate a COSY library on mass storage from a Hollerith input deck. In the second run, copy the library onto a second mass storage file. In the third run, write a Hollerith deck onto file ordinal 54. This is COSY/MSOS only.



---

## 3.1 HOLLERITH INPUT

Hollerith input may be on tape, mass storage (MSOS only), or cards. On tape, Hollerith input consists of a group of Hollerith source decks, each separated by an end-of-file mark. Two consecutive end-of-file marks terminate the library. The tape must be in unblocked 80-character records. No searching is done on Hollerith files; therefore, the tape must be positioned prior to the COSY run.

COSY accepts only one Hollerith deck per mass storage file. The file must be in universal block format (512 characters per block). A file terminates with an end-of-file block.

## 3.2 HOLLERITH OUTPUT

Hollerith output is a series of Hollerith source decks produced from Hollerith source decks or from decompressed COSY decks. When COSY encounters the control card ENDCOSY/ in the input deck, it writes FINIS and end-of-file records on the Hollerith output file specified on the last DECK/ card. The file is rewound or positioned to block one. If Hollerith output is on unit 54, COSY locates it to block one at the first reference in a COSY run. COSY assumes that any other output file is correctly positioned.

Hollerith output is blocked in universal format if written on mass storage; otherwise, it is written in unblocked 80 character records.

## 3.3 COSY DECKS

When COSY output is specified, COSY produces a COSY deck, which is a COSY deck identifier card followed by a series of binary card images in COSY format. COSY output is usable as COSY input for subsequent COSY runs in which COSY decks are updated, decompressed, or copied.

COSY accepts input COSY tapes blocked in standard universal format or in unblocked 3200 COSY format.

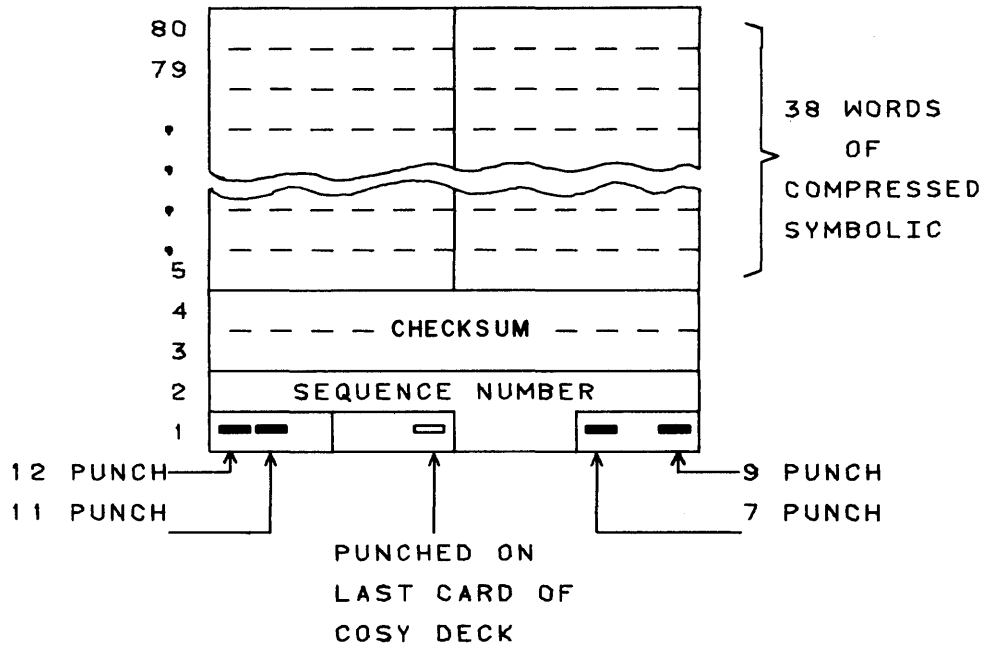
COSY output on tape or on mass storage (MSOS only) consists of a group of COSY binary decks in blocks of 512 characters (128 words). The COSY decks are separated by end-of-file marks; the output terminates with two consecutive end-of-file marks.



On mass storage, COSY output consists of a COSY-prepared directory followed by COSY decks. COSY output on mass storage can be generated only by COSY/MSOS. The directory is a 512-character block containing a three-word entry for each COSY deck on the 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. Each directory block holds 40 entries. If more than one block is required for the directory, COSY links the succeeding blocks with the previous blocks.

**3.4  
COSY  
BINARY CARDS**

A COSY binary card, illustrated below, is identified by rows 7, 9, 11 and 12 punched in column one (w=60 in binary notation of card identification). A card contains all or part of the information compressed from one or more Hollerith cards. Compressed information is continued serially from card to card in columns 5-80. Information from Hollerith cards is separated by an end-of-card character. The degree of compression depends on the number of contiguous spaces on the Hollerith cards.



<u>Card Column</u>	<u>Rows</u>	<u>Content</u>
1	12, 11, 7, 9	Identifies card as part of COSY deck
	3	Indicates last card of deck (w = 61)
	4-6	High-order digit of five-octal-digit COSY card sequence number
2	all	Four low-order digits of five-octal-digit COSY card sequence number
3, 4	all	24-bit checksum
5-80	all	38 words of compressed symbolic

COSY compression symbols vary slightly according to format, 3200 or 3300/3500. The 3200 format restricts the BCD character set available to the user; the 3300/3500 format does not. To allow use of existing COSY libraries, COSY accepts COSY tape input in 3200 BCD format.

When COSY processes input in COSY format, it decompresses the input into Hollerith card images according to whether the input is in 3200 or 3300/3500 format and regenerates Hollerith identification and sequence numbers in columns 73-80 according to the T parameter on the DECK/ card. These Hollerith card images are revised according to DELETE/ and INSERT/ cards that refer to them by the sequence number in columns 76-80. Hollerith output, if requested, is generated directly from these images.

COSY output, if requested, is always in 3300/3500 format and requires a recompression of the Hollerith cards. The deck identification reflects the value of the DECK/ card T parameter. The COSY binary cards are re-sequenced starting with sequence number 00001.

### 3.4.1 3200 FORMAT

COSY/MSOS and COSY/RTS accepts, as input, decks which were compressed into 3200 COSY BCD format. 3200 COSY compressed Hollerith cards by inserting special BCD characters for two or more sequential blanks. Octal numbers 16, 17, 35, 36, 37, 55, 56, and 57 represent two through nine consecutive blanks. If the card contained more than nine consecutive blanks, 3200 COSY inserted 76xx<sub>8</sub>, where xx is 10 (decimal) less than the number of blanks.

If the card contained more than 73 blanks, 3200 COSY inserted 7677<sub>8</sub> with one of the above special octal numbers. The character 12<sub>8</sub> indicates the end of a compressed Hollerith card. If the user employed any of the special characters, 3200 COSY replaced it by 15<sub>8</sub>, thus restricting the character set available to the 3200 COSY user.

**3.4.2**  
**3300/3500**  
**FORMAT**

The 3300/3500 COSY format used under MSOS and RTS makes all BCD characters available to the user. COSY/MSOS and COSY/RTS compress a card image by inserting a special BCD character ( $12_8$ ) and value ( $03-75_8$ ) for three or more sequential blanks.

Character	Value
$1200_8$	BCD character $12_8$
$12xx_8$	xx consecutive blanks ( $02 < xx \leq 75$ )
$1275_8$	End-of-card character
$1276_8$	End-of-deck character
$1277_8$	End-of-revision-set character

Listable output from COSY includes the COSY log, listings and revision listings, and diagnostic messages. In addition, COSY types messages on the console typewriter (CTO).

## 4.1 COSY LOG

When log is requested through the absence of the n parameter on the COSY library name card, COSY lists all control cards and revision detail cards as it reads them.

## 4.2 LISTINGS

Listings and revision listings, specified by L and R on the DECK/ card, both follow the COSY log on the standard output file. COSY list output begins with a heading followed by cards in the general column format shown below.

1	5		77	80	84	88	95	
	-COSY-3300	MSOS Vx.	DATE					Head- ing
	Image of columns 1 - 72		Identi- fier	Seq. No. (decimal)		DELETED or INSERTED		

Combinations of L, R, T, and C parameters on the DECK/ card determine which fields are present on any print line.

INSERTED or DELETED appears if R is specified.

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

Identification and revised COSY sequence numbers for inserted entities appear only if C... is specified; entries marked DELETED are printed with old COSY sequence numbers.

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

When T < 72, identification and sequence numbers are truncated accordingly.

### 4.3 MESSAGES

#### 4.3.1 COSY MESSAGES

COSY lists various messages and diagnostics.

Messages generated by COSY because of abnormal I/O conditions use the following format:

```
i COSY nnn UNIT xx rout REJECT error code
```

i                   Identifies message

                  A - Action message; operator must take some action  
                  I - Informative  
                  D - Destructive; destructive error occurred

nnn                Message number

UNIT xx           File ordinal or logical unit number where error occurred

rout               Identifies I/O system (MSIO, CIO, or SUMS) where  
                  error occurred

error code        Optional

#### 4.3.2 I/O ERROR RECOVERY

COSY used the RTS/MSOS ERROR RECOVERY ROUTINES to recover from I/O errors on logical units.

An action message is typed on the console and the operator can institute one of three procedures: abandon, down, or retry.

Message format of I/O error recovery routines is:

```
A I/O nnn pgm UNIT c e u error condition program name
```

A                   Action message; operator must reply with one of  
                  the following:

                  A Abandon further recover attempts  
                  D Down equipment  
                  R Retry recovery

nnn                Message number

pgm                Batch or priority

UNIT               Unit where error occurred

c e u                    Specifies which channel, equipment, and unit error occurred.

error condition

program name

One of the following messages is typed when an error is detected and the operator has downed the unit and abandoned recovery.

UNIT DOWNED                    Job terminates

ABANDONED	<u>Unit</u>	<u>Action</u>
	Card reader	Job terminates
	Card punch	Job terminates
	Printer	Processing continues
	Input magnetic tape	Record ignored
	Output magnetic tape	Job terminates

### 4.3.3

#### TERMINATE COSY

To terminate COSY because of an error condition, the operator must:

Press MANUAL INTERRUPT

Type TERM, F, ND

Press MANUAL INTERRUPT

The last comma and ND are optional. If not used, a core dump results.

4.3.4  
MESSAGE LISTING

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION						
D	COSY	001	UNIT no. MSIO REJECT ec	CTO OUT	00	Octal MSIO error code MSIO hardware reject						
					01	LOCATE request specified an illegal control value; y ≠ 0, 1, or 2						
					02	New block number less than 1						
					03	Mass storage file limits exceeded on LOCATE request						
					04	LOCATE request specified an illegal control value; x ≠ 0 or 1						
					05	READ request attempted beyond highest block number written						
					06	File limits were exceeded on a READ, WRITE, or WRITE CHECK						
					07	WRITE requested on a read-only file						
					10	Illegal function code						
					12	Irrecoverable I/O error on request for READ or WRITE with standard error recovery						
					13	Illegal file ordinal						
					14	Irrecoverable I/O error						
					D	COSY	002	UNIT no. SUMS REJECT ec	CTO OUT	00	Octal SUMS error code SUMS hardware reject	
										01	User selected interrupt in CALL	
02	Illegal function code in CALL											
03	Illegal mode request											
04	Mode error											

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
D	COSY	003	UNIT no. CIO REJECT ec 00 01 02 04	CTO OUT	Octal CIO error code CIO hardware reject Illegal function code Illegal unit Mode error	
I	COSY	004	UNIT no. READ ERROR	CTO OUT	Irrecoverable READ error on specified unit.	
D	COSY	005	UNIT no. WRITE ERROR	CTO OUT	Irrecoverable WRITE error on specified unit	
D	COSY	006	UNIT no. DOWNED	CTO OUT	Operator downed specified unit	
A	COSY	007	UNIT no. NOT READY	CTO	The mass storage device which contains the file specified by UNIT no. is not ready.	1. Ready unit 2. Press MANUAL INTERRUPT 3. Type / 4. Press MANUAL INTERRUPT
A	COSY	008	UNIT no. MOUNT NEXT REEL	CTO		1. Mount next reel 2. Press MANUAL INTERRUPT 3. Type / 4. Press MANUAL INTERRUPT
D	COSY	009	CANNOT FIND COSY DECK NAMED deckname	OUT	Named COSY deck could not be located on input media specified by preceding DECK/ card.	COPY function terminates; processing resumes with next COSY control card.
D	COSY	010	ERROR ON COPY CARD.	OUT	COPY/ card contains illegal value or $q_1 = q_2$ .	COPY function terminates; processing resumes with next COSY control card.
D	COSY	011	FIRST RECORD NOT COSY I.D.	OUT	Input file not positioned at beginning of COSY file prior to COPY/ function.	COPY function terminates; processing resumes with next COSY control card.
D	COSY	012	ILLEGAL VALUE FOR PARAMETER parameter	OUT	Illegal value for named parameter is specified on DECK/ card; e.g., T=80, LUN/FO $\neq$ 2 numeric characters.	Error prohibits further processing; job terminates.



TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
D	COSY	013	STANDARD UNIT USED ON COPY CARD	OUT	Unit specified for $q_1$ , $q_2$ is standard system file.	COPY function terminates; processing resumes with next COSY control card.
I	COSY	014	CONTROL CARD SEQUENCE ERROR	OUT	Control card not in acceptable order; e.g., COSY/ after DELETE/.	If card in error is COPY/, processing continues with COPY function; if not, processing resumes with next COSY control card.
I	COSY	015	deckname COPIED	OUT	Named deck has been copied.	Processing continues
I	COSY	016	CHECKSUM ERROR deckname CSN=no. COMPUTED CHECKSUM=mmmmm CARD CHECKSUM=nnnnn	OUT	CHECKSUM error on specified COSY record.	Processing continues as normal but end results are unpredictable.
I	COSY	017	DECK CARD PARAMETER CONFLICT x=y	OUT	Parameters x and y are assigned to same unit.	Lower priority parameter is suppressed; processing continues.
I	COSY	018	ILLEGAL PARAMETER ON DECK CARD	OUT	Initial letter of parameter on DECK/ card not I, C, H, L, R, T, E, or D	Remaining parameters on card ignored. If I is not defined, it is set to unit 60; processing continues.
I	COSY	019	INPUT SEQUENCE ERROR	OUT	Input file out of sequence; error detected while attempting revision.	Processing resumes with next COSY control card.
I	COSY	020	NO DECK NAME ON DECK CARD	OUT	Deckname on DECK/ card is missing from columns 1-8 or after D=parameter.	If D=name is missing, processing continues ignoring parameter; if not, processing resumes with next COSY control card.
I	COSY	021	NO INPUT SEQUENCE NUMBER no.	OUT	Specified sequence number is not on input file. Revisions attempted past logical end-of-file.	Processing continues but results are unpredictable.
I	COSY	022	NO PARAMETERS ON DECK CARD	OUT	DECK/ card contains no identifiable parameters.	Processing resumes with next COSY control card.
I	COSY	023	READ END OF FILE ON I	OUT	File mark read before logical end-of-file.	If I=60, processing terminates; if not, processing resumes with next COSY control card.

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
I	COSY	024	REVISION CARD SEQUENCE ERROR	OUT	Sequence error on INSERT/, DELETE/ cards m or n parameters. m = 0, m = n, or m < previous m or n. Subsequent INSERT/, DELETE/ cards are sequence checked, but revisions do not update output.	Processing continues
I	COSY	025	R/L EQUATED	OUT	Parameter revision (R) or list (L) on DECK/ card is equated to unit or followed by equal sign. Parameter is set to unit 61.	Processing continues
I	COSY	026	SEQUENCE ERROR deckname CSN = csn PSN = psn	OUT	COSY record out of sequence. COSY file is skipped. csn Sequence number on error record psn Previous sequence number	Processing resumes with next COSY control card.
D	COSY	027	ASSEMBLY SUPPRESSED- REVISION CARD SEQUENCE ERROR	CTO	Revision card sequence error found when processing revision and parameter is specified on task card.	No recovery

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
A	I/O	001	B P LUN no. c e u REPEAT	CTO	Reply to message pertaining to specified logical unit c e u not R, A, or D.	Repeat reply
A	I/O	002	B P LUN no. c e u CRFF programe	CTO	Feed failure occurred on card reader assigned to specified logical unit c e u.	Do not press RELOAD MEMORY on buffered card reader. 1. Take corrective action 2. Press MANUAL INTERRUPT 3. Type ' for batch ! for priority 4. Type R, A, or D 5. Press MANUAL INTERRUPT
A	I/O	003	B P LUN no. c e u CRHE programe	CTO	Hopper empty on card reader assigned to specified logical unit c e u.	1. Take corrective action 2. Press MANUAL INTERRUPT 3. Type ' for batch ! for priority 4. Type R, A, or D 5. Press MANUAL INTERRUPT
A	I/O	004	B P LUN no. c e u CPFF programe	CTO	Feed failure occurred on card punch assigned to specified logical unit c e u.	1. Take corrective action 2. Press MANUAL INTERRUPT 3. Type ' for batch ! for priority 4. Type R, A, or D 5. Press MANUAL INTERRUPT
A	I/O	005	B P LUN no. c e u PROP programe	CTO	Printer assigned to specified logical unit c e u out of paper.	1. Take necessary corrective action 2. Press MANUAL INTERRUPT 3. Type ' for batch ! for priority 4. Type R, A, or D 5. Press MANUAL INTERRUPT

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
A	I/O	006	B P LUN no. c e u UNNR programe	CTO	Not ready condition exists on unit assigned to specified logical unit c e u. It is not feed failure, hopper empty, or out of paper.	<ol style="list-style-type: none"> <li>1. Take necessary corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	007	B P LUN no. c e u WRMT programe	CTO	Write ring missing on magnetic tape reel on unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Take necessary corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	008	B P LUN no. c e u MTWP programe	CTO	Error recovery routine could not recover from WRITE parity error on unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	009	B P LUN no. c e u MTRP programe	CTO	Recovery routine could not recover from READ parity error on magnetic tape unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	010	B P LUN no. c e u MTWL programe	CTO	Recovery routine could not recover from WRITE lost data error on magnetic tape unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
A	I/O	011	B P LUN no. c e u MTRL progname	CTO	Error recovery routine could not recover from READ lost data error on magnetic tape unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	012	B P LUN no. c e u MTWC progname	CTO	Error recovery routine could not recover from channel parity error in output buffer to magnetic tape unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	013	B P LUN no. c e u MTRC progname	CTO	Error recovery routine could not recover from channel parity error in input buffer from magnetic tape unit assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	014	B P LUN no. c e u CRCE progname	CTO	Preread or compare error occurred on card reader assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Move last card from output bin to first card in input bin</li> <li>2. Ready unit</li> <li>3. Press MANUAL INTERRUPT</li> <li>4. Type ' for batch ! for priority</li> <li>5. Type R, A, or D</li> <li>6. Press MANUAL INTERRUPT</li> </ol>

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
A	I/O	015	B P LUN no. c e u CRRC programe	CTO	Error recovery routine could not recover from channel parity error in input buffer from card reader assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Buffered card reader: Move last two cards from output bin to first two cards in input bin.</li>   <li>Unbuffered card reader: Move last card from output bin to first card in input bin.</li> <li>2. Press RELOAD MEMORY if buffered</li> <li>3. Ready unit</li> <li>4. Press MANUAL INTERRUPT</li> <li>5. Type ' for batch ! for priority</li> <li>6. Type R, A, or D</li> <li>7. Press MANUAL INTERRUPT</li> </ol>
A	I/O	016	B P LUN no. c e u PRWC programe	CTO	Error recovery routine could not recover from channel parity error in output buffer to printer assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Take necessary corrective action</li> <li>2. To reprint line: <ol style="list-style-type: none"> <li>a. Go to printer</li> <li>b. Press STOP</li> <li>c. Press START</li> </ol> </li> <li>3. Press MANUAL INTERRUPT</li> <li>4. Type ' for batch ! for priority</li> <li>5. Type R, A, or D</li> <li>6. Press MANUAL INTERRUPT</li> </ol>
A	I/O	017	B P LUN no. c e u CPCE programe	CTO	Compare error occurred on card punch assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Remove and dispose of last two cards in output bin.</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>

TYPE	SOURCE	NO.	MESSAGE	UNIT	SIGNIFICANCE	RESULT/ACTION
A	I/O	018	B LUN no. c e u CPWC P progname	CTO	Channel parity error occurred on card punch assigned to specified logical unit c e u.	<ol style="list-style-type: none"> <li>1. Remove and dispose of last card in output bin</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	019	B LUN no. c e u CRSC P progname	CTO	A card (or cards) passed the read station without being read; there is no way to determine the number of cards not read.	<ol style="list-style-type: none"> <li>1. Take necessary corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>
A	I/O	020	B LUN no. c e u MTEP P progname	CTO	A parity error was detected on an ERASE magnetic tape operation. Recommended reply is D since no action can guarantee recovery; reply R ignores parity error on ERASE; reply A abandons recovery but logical recovery by the using program may occur. When job is complete repair or replace tape.	<ol style="list-style-type: none"> <li>1. Press MANUAL INTERRUPT</li> <li>2. Type ' for batch ! for priority</li> <li>3. Type R, A, or D (see significance column)</li> <li>4. Press MANUAL INTERRUPT</li> </ol>
A	I/O	021	B LUN no. c e u MTCK P progname	CTO	Recovery routine is unable to reposition correctly while attempting recovery on magnetic tape WRITE parity error.	<ol style="list-style-type: none"> <li>1. If necessary, take corrective action</li> <li>2. Press MANUAL INTERRUPT</li> <li>3. Type ' for batch ! for priority</li> <li>4. Type R, A, or D</li> <li>5. Press MANUAL INTERRUPT</li> </ol>

**CONTROL DATA**

**CORPORATION**

**COMMENT AND EVALUATION SHEET**  
3100/3200/3300/3500  
COSY/MSOS/RTS Reference Manual

Pub. No. 60207300C

June 1970

THIS FORM IS NOT INTENDED TO BE USED AS AN ORDER BLANK. YOUR EVALUATION OF THIS MANUAL WILL BE WELCOMED BY CONTROL DATA CORPORATION. ANY ERRORS, SUGGESTED ADDITIONS OR DELETIONS, OR GENERAL COMMENTS MAY BE MADE BELOW. PLEASE INCLUDE PAGE NUMBER REFERENCE.

CUT ALONG LINE

PRINTED IN U.S.A.

**FROM** NAME : \_\_\_\_\_

BUSINESS ADDRESS : \_\_\_\_\_

**NO POSTAGE STAMP NECESSARY IF MAILED IN U. S. A.**

FOLD ON DOTTED LINES AND STAPLE



STAPLE

STAPLE

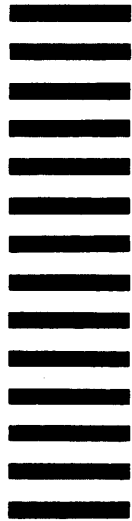
FOLD

FOLD

FIRST CLASS  
 PERMIT NO. 8241  
 MINNEAPOLIS, MINN.

**BUSINESS REPLY MAIL**  
 NO POSTAGE STAMP NECESSARY IF MAILED IN U.S.A.

POSTAGE WILL BE PAID BY  
**CONTROL DATA CORPORATION**  
 Software Documentation  
 4201 North Lexington Avenue  
 St. Paul, Minnesota 55112



CUT ALONG LINE

MD248

FOLD

FOLD

STAPLE

STAPLE





**CORPORATE HEADQUARTERS, 8100 34th AVE. SO., MINNEAPOLIS, MINN, 55440  
SALES OFFICES AND SERVICE CENTERS IN MAJOR CITIES THROUGHOUT THE WORLD**