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FN *M. Blauer*
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PROGRAM DESIGN SPECIFICATION FOR
THE SYSTEM TAPE LOADING PROGRAM (JMSTZ)
A SUB-PROGRAM OF THE JOVIAL INTERPRETER SYSTEM



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PROGRAM DESIGN SPECIFICATION FOR
THE SYSTEM TAPE LOADING PROGRAM (JMSTZ) --
A SUB-PROGRAM OF THE JOVIAL INTERPRETER SYSTEM

INTRODUCTION

The System Tape Loading Program (hereinafter referred to as JMSTZ) is designed to load system tapes for use by the JOVIAL Interpreter System. Operation of the program is initiated by the recognition of a Master Control Card in the card reader by the Test Control Program which then reads JMSTZ into its specified core location and transfers control to it. The Master Control Card supplies JMSTZ with certain environment variables such as the output identification code, the number of output tapes desired, and I/O allocation changes. Immediately following the Master Control Card is a series of Input Control Cards which are also read from the card reader. These cards are checked for content, logic, and sequence errors and, if found to be correct, are used to establish a sequential table of input control data to be used for the production of the output tapes. The order in which files will appear on the output tapes is determined by the sequence of the Input Control Cards.

JMSTZ will produce output tapes by combining files selected from three input sources, which can be in the form of:

- A. Absolute binary cards (7 ϕ 4 or 7 ϕ 9 format), through the on-line card reader or prestored tape.
- B. Files on binary tapes.

The input sources may include previously made system master tapes, new or revised system programs, or non-program tabular data, such as a new Master Compool. The output tapes (maximum of three) are always identical binary tapes.

Upon successful completion of tape production, JMSTZ prints a new Master Tape Table of Contents for use in control and administration of the new tapes.

ENVIRONMENT

Operation of JMSTZ requires:

A. An Entry Parameter

1. The address containing the location of the first of 12 registers of a packed BCD Master Control Card image.
2. Sign, if minus, indicating an error in the operation of the Assemble Master Compool Program, in which case JMSTZ would not produce output tapes.

B. The following system subroutines located in permanent core:

1. Print on- and off-line from a packed BCD image.
2. Read symbolic cards.
3. Search and position tapes by file identification.
4. Perform input/output transmission operations.

INPUT

There are two functional categories of input to JMSTZ: Program Control Input which controls the output tape-making operation, and Data Input which is the material from which the output tapes are made.

A. Program Control Input is always in the form of Hollerith-coded symbolic cards which are read on-line. The Program Control Deck always has the following sequence of cards:

1. Master Control Card (See Figure 1.)

Columns 1-3 The letters "MST" found in the first three columns indicate to the Test Control Program (JTCPZ) to read JMSTZ into core from tape and to transfer control to it.

The remaining columns of the card are used only when changes to the following preset environment variables are desired:

Columns 4-6 Identification code of the output tapes = $\phi\phi\phi$.
(The preset code is changed by inserting any three alpha-numeric identification characters in these columns.)

Columns 7-42 Input and output hardware assignments and their form are as shown in the chart on the following page.

Column 43 Three output tapes will be made.
(The preset number is changed by inserting the number desired in the column. Any number greater than three will be interpreted as three.)

Column 44 The identification number found in columns 4, 5 and 6 will be written on output tapes.
(The number will be omitted from the output tape if a 1 is placed in the column.)

Column 48 A "load-tape-into-core" record will be the first record to be written on the output tapes.
(The record will be omitted if the letter N is placed in the column.)

Changes in the preset input/output scheme are made by entering the name of the hardware desired in the appropriate six-column field indicated in the last column of the chart.

The first column indicates the form of input:

- B = Absolute binary tape
- D = Binary-coded decimal tape
- Blank = Absolute binary cards

The second and third columns name a specific tape unit such as A₁, or the card reader with the letters RD. The last three columns are unused and must remain blank. Any field left completely blank will indicate that the preset hardware should be used.

Name of I/O Source	Preset Hardware Assignments		Card Columns
	I/O Unit	Form	
Input 1	Tape Unit A ₁	Binary Tape	7-12
Input 2	Tape Unit A ₄	Binary Cards	13-18
Input 3	Tape Unit A ₃	Binary Tape	19-24
Output 1	Tape Unit B ₃	Binary Tape	25-30
Output 2	Tape Unit C ₃	Binary Tape	31-36
Output 3	Tape Unit D ₃	Binary Tape	37-42

The following restrictions are made on possible hardware assignments:

1. The card reader can only be used as Input 2.
2. All inputs must be on the same DSC.
3. All outputs must be on different DSC's and must be different from the input channel.

	Input			Output							
	1	2	3	1	2	3					
	1	4	7	13	19	25	31	37	43	48	Column
MST	0	1	BA3		BA2	BBI	BCI		2	N	

Figure 1

Sample Master Control Card

The following changes in preset environment variables are indicated:

1. Output identification code ~~00~~1.
2. Hardware assignments for Input 1, Input 3, Output 1, and Output 2 are changed to BA3 (binary tape on drive A3), BA2, BBI and BCI respectively. Input 2 and Output 3 remain as preset.
3. Two output tapes are to be made.
4. The "load-tape-into-core" record will be omitted from the output tapes.

2. Data Control Cards (See Figures 2 and 3.)

There are five possible command words which can appear in columns 1 through 6 of any Data Control Card:

DUPE - Reproduces from a binary tape.

MAKE - Reproduces from binary card (loaded directly or prestored).

POS - Positions a tape to the beginning of the indicated file.

POS ID - Searches a tape for the file bearing the indicated identification tag, and positions the tape to the beginning of that file.

FINISH - Indicates End of Data Control Cards.

Procedure: In order to reproduce any section (number of files) from an input source, the Data Control Cards must indicate for that section:

- a. The input source (Input 1, 2 or 3) to be reproduced.
- b. The location of the first file to be reproduced.
- c. The number of files to be reproduced.

The input source is indicated by making an entry in the appropriate six-column I/O source field to the right of the command word. Columns 7 through 12, 13 through 18, 19 through 24, and 25 through 30 correspond to Input 1, Input 2, Input 3 and Outputs respectively. There is only one field for the three possible output tapes, since they are always identical. All command words and entries in I/O source fields must be left-justified.

The location of the first file and the number of files to be reproduced are indicated by:

a. One of the following three Data Control Card sequences:

1) A position card (POS or POS ID) followed by a DUPE card.

<u>Example:</u>	Command <u>Word</u>	Appropriate I/O Source <u>Field</u>	<u>Explanation</u>
	POS	5	Position input tape to beginning of file #5. Reproduce files #5, 6 and 7.
	DUPE	3	
<u>Example:</u>	POS ID	JAMCZ	Position input tape to beginning of file with ID JAMCZ.
	DUPE	3	Reproduce files JAMCZ, JAMCZ+1 and JAMCZ+2.

2) A single production card with an ordinal number in the I/O source field, indicating the number of the one file to be reproduced.

Example: MAKE 8 Reproduce file #8.

Example: DUPE 827 Reproduce file #827.

3) A multiple-entry production card which indicates the first and last files to be reproduced, separated by a slash.

Example: DUPE 8/12 Reproduce files #8, #9, #10, #11, and #12.

Limitations:

The maximum number of files that can be input by any one of the above Data Control Card sequences is 1023 decimal. Any number greater than this will result in a "content" error. (See MESSAGE PRINTOUTS.)

Example: POS 8
DUPE 1024

The above is an illegal sequence. One possible correct sequence might be:

POS 8
DUPE 1
POS 9
DUPE 1023

Example: DUPE 1/1025

The above is an illegal sequence. A correct one would be:

DUPE 1/1023
DUPE 1024
DUPE 1025

- b. A Position Outputs Card. This might be used, for example, when the tape-making operation is interrupted and it is desired that the output tape be positioned to the beginning of the last file written, in order to continue from there. In such a case, a position card with an entry in the outputs columns (25 through 30) would be used and no production card would necessarily follow it. A position outputs card, however, must be the first Data Control Card following the Master Control Card.
 - c. A MAKE or DUPE ALL Card. The letters ALL in a source field result in the reproduction of all files remaining on that source. In the case of a DUPE ALL, this would mean all of the files beyond the reader head, and for a MAKE ALL, all of the cards still in the card reader (or all of the prestored files beyond the reader head). It should be noted that the ALL card can be used to make duplicate tapes if it is the only Data Control Card.
3. The End of Data Control Cards is indicated to JMSTZ by three cards: a FINISH Card, followed by two completely blank cards. Any card following the second blank card will be interpreted by JMSTZ as a Data Input Card.

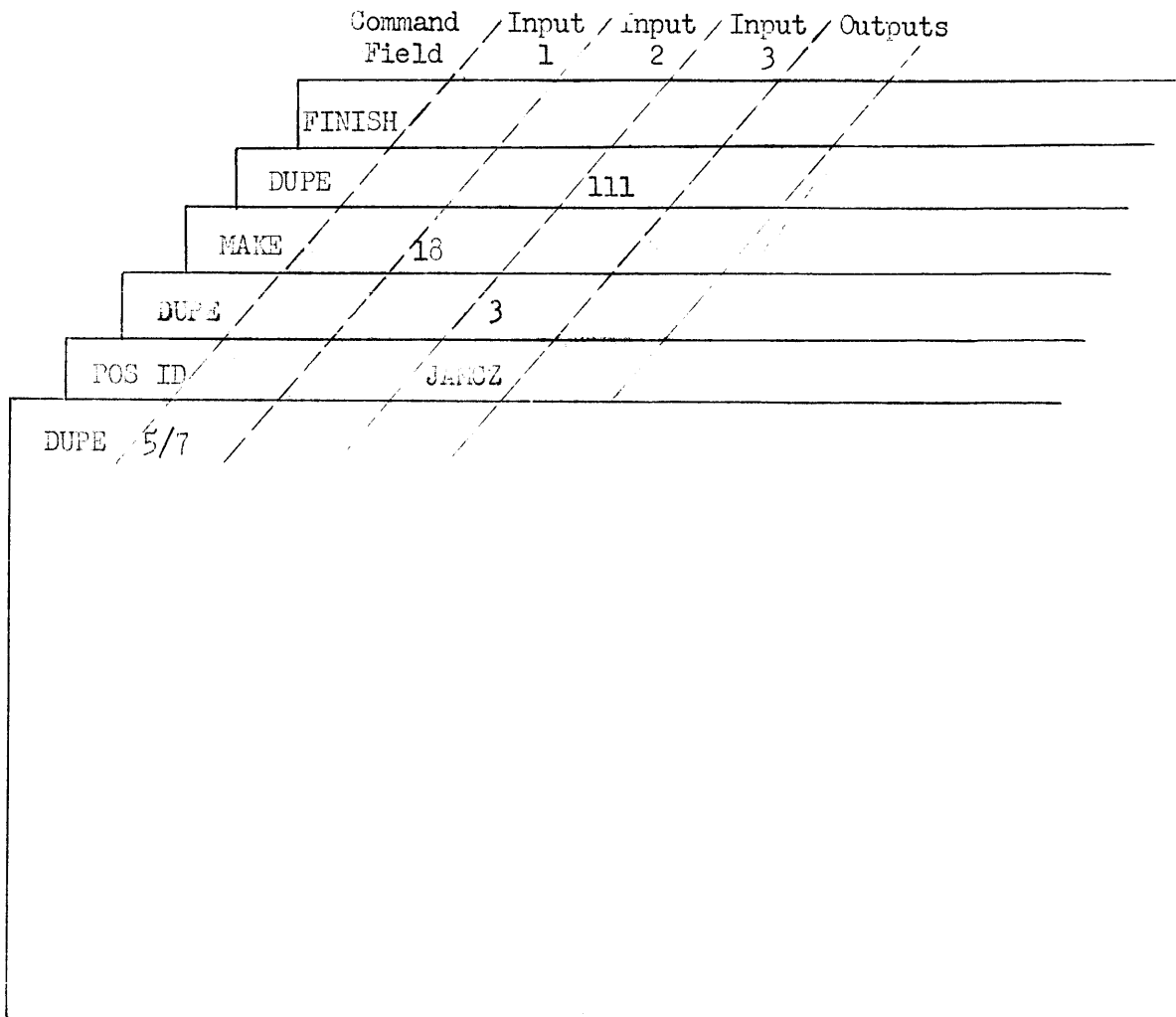


Figure 2

Sample Data Control Cards

The following operations are indicated:

1. Reproduce file #5, #6 and #7 from Input 1.
2. Reproduce files JAMCZ, JAMCZ+1 and JAMCZ+2 from Input 3.
3. Reproduce file #18 from Input 2.
4. Reproduce file #111 from Input 3.

B. Data Input (See Figure 3.)

1. Absolute Binary Cards (7 ϕ 4 or 7 ϕ 9 format, row or column binary)* can be input directly via the on-line card reader or from pre-stored tape. If the Data Input Cards are out of order, they will be sorted according to their card address. If there are any cards with the same address in a given input file, the last of these conflicting cards to be read in will be the only one to appear on the output tapes. The Data Input Cards must have the following deck structure:

a. A symbolic identification card using standard Hollerith code and in the following format:

Columns 1-5 IDENT

Column 6 The number 4 if the data cards following the identification card are in 7 ϕ 4 format, or a blank if they are in 7 ϕ 9 format.

Columns 7-12 The identification tag (six letters or less, left-justified, with no imbedded blanks) of the binary cards that follow the identification card.

b. One completely blank card.

c. The deck of binary cards.

d. An "end-of-file" card which is completely blank except for:

Column 1 A 7 and 9 punch for a column binary input deck.

Column 1 ϕ & 12 A 9 punch for a row binary input deck.

This group of cards (identification card, blank card, binary cards, and an "end-of-file" card) represent a one-file input deck. Any additional input decks (files) that are to be used as data input should follow in the order in which they will be used by JMSTZ.

Restrictions: If the output tape is to contain the "load-tape-into-core" routine, the first file to be written on the output tape should not have commands occupying core locations greater than 77736 octal. Only column binary cards can be prestored on tape.

*The usual sources of these formats are as follows:

SOS "punch absolute" on-line gives 7 ϕ 9 row.

SOS "punch absolute" off-line gives 7 ϕ 9 column.

SE9AP gives 7 ϕ 4 row.

SCRAM RB mode gives 7 ϕ 4 row.

SCRAM normal mode gives 7 ϕ 4 column.

(Every SCRAM compilation results in a two-part binary deck: the first of which is a symbolic table and the second, the actual binary program. It is the second part of this deck which is used with JMSTZ.)

2. Files on Binary Tape

There are two sources of binary data tape inputs:

- a. "Old" master tapes that were previously made by JMSTZ.
- b. Output of the Assemble Master Compool Program (JAMCZ).

FUNCTIONS

- A. Read Input Control Cards from the on-line card reader.
- B. Check Master Control Card for content validity.
- C. Check Data Control Cards for content, logic and sequence validity.
- D. Begin master tape-making operation if:
 - 1. All new Master Compoles are correct.
 - 2. All Input Control Cards are correct.
- E. Write a "load-tape-into-core" routine as the first record of the output tapes if requested.
- F. From absolute binary cards and binary tapes, make up binary output tapes whose files are self-loading.
- G. Write a "logical end-of-tape" file as the last file on the completed output tapes.
- H. Print off-line:
 - 1. Program information which will indicate errors in Input Control Cards and the current status of the tape-making operation.
 - 2. A new Master Tape Table of Contents for control and administration of new tapes.

OUTPUT

Files on Binary Tape (See Figure 4.)

The primary function of JMSTZ is the production of new master binary tapes. The number of output tapes produced is determined by the number (1, 2 or 3) in column 43 of the Master Control Card. If one tape is desired, output will appear on tape unit B3, two tapes on B3 and C3, and three tapes on B3, C3 and D3.

Output tapes will have the following format:

1. A "load-tape-into-core" record which enables a system tape to "load itself" into core. Output tapes containing this record must be operated from tape drive A1 by pressing the "Load-From-Tape" Switch on the 709 console. This will result in:
 - a. The reading into core of the Test Control Program (JTCPZ).
 - b. The transfer of control to JTCPZ.

The "load-tape-into-core" record can be omitted from the output tape if the letter N is placed in column 48 of the Master Control Card, in which case loading of the output tape into core must be done by some other means. For the JOVIAL Interpreter System, the "load-tape-into-core" record is required. In any event, the record can appear only once and only at the beginning of a tape.

2. An "end-of-record" gap. This is omitted also if there is an N in column 48 of the Master Control Card.
3. A two-word header record whose first word contains the identification tag of the data records which follow it. The second word contains the DSC command IORP L,Ø,C where C is the number of words in the data record which follows it, and L is the starting location of that data record.
4. An "end-of-record" gap.
5. The data record whose identification tag appears in the first word of the preceding header record.
6. An "end-of-record" gap (caused by a symbolic TCD card or by an END card).

7. Any number of additional data records, within the physical limitations of the tape, followed by an "end-of-record" gap as just described in 5 and 6.
8. An "end-of-file" record which indicates the end of one program.
9. An "end-of-record" gap.
10. Any number of files, within the physical limitations of the tape, each of which consists of: the header record, an "end-of-record" gap, data records (each with its appropriate "end-of-record" gap), an "end-of-file" record, and an "end-of-record" gap as just described in 3, 4, 5, 6, 7, 8, and 9.
11. A Logical End of Tape which consists of:
 - a. A two-word record containing the BCD registers of YYYYYY and 777777, respectively.
 - b. An "end-of-record" gap.
 - c. An "end-of-file" record.

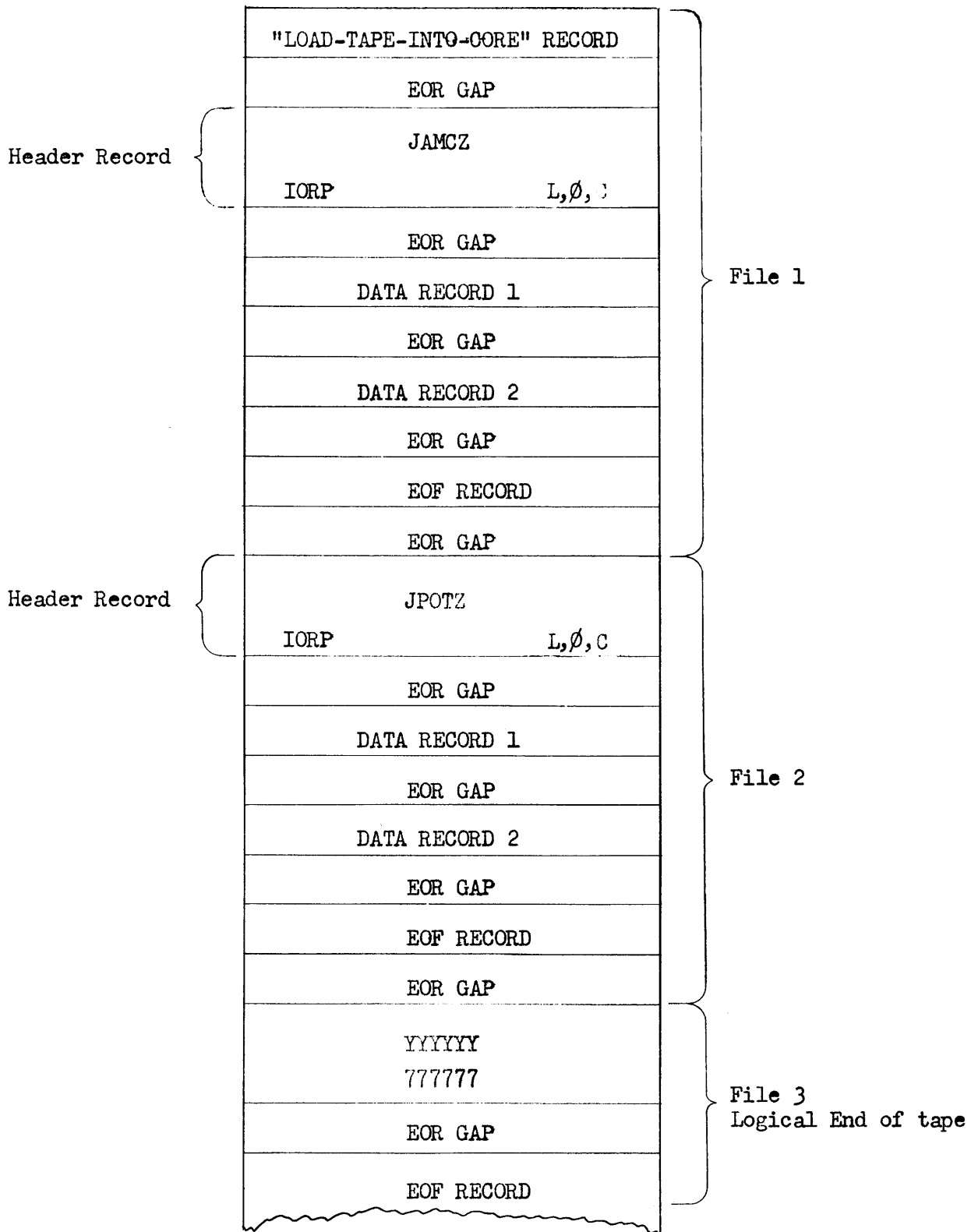


Figure 4 - Sample Format of an Output Tape

The tape shown contains file JAMCZ with the "load-tape-into-core" record, file JPOTZ, and the logical end-of-tape file.

MESSAGE PRINTOUTS

During the operation of JMSTZ, on- and off-line statements are printed which are needed to control the program as well as indicate the current status of the operation.

- A. If the card reader is not loaded with the Program Control Cards and made "ready," the console operator is asked to do so with the words:

CD RDR NOT READY * * READY AND HIT STRT.

- B. The contents of all Program Control Cards (excluding blanks) will be listed in the order in which they are read.

Example: MSTZ001
POS 5
DUPE 2
MAKE 3
FINISH

- C. If there are any errors in the control cards, one of the following statements will appear to the right of the incorrect card's printout:

HAS CONTNT ERROR
HAS LOGIC ERROR
HAS SEQUTL ERROR

- D. If any errors are found in the control cards or in the Compool (prior to the operation of JMSTZ), one of the following statements will appear:

MSTER COMPOOL HAS ERRORS MOST WILL NOT MAKE TAPE.
CNTROL CARDS HAVE ERRORS MOST WILL NOT MAKE TAPE.
MSTER COMPOOL AND CONTROL CARDS HAVE ERRORS MOST WILL NOT MAKE TAPE.

- E. If any trouble is encountered during the execution of a read/write or input/output operation, an appropriate statement stating the operation in difficulty will appear.

CANT { START { READ
FINISH { WRITE OF { TAPF (a).
POSTN { READER.

Where (a) is the name of the specific tape unit.

- F. The Table of Contents of new Master Tapes will be printed as each file is written on the output tapes. Every file will be identified in the following manner:

FILE (a) (b) (c) ON OUTPUT TAPES

Where

- (a) is the ordinal number of the file on the output tapes.
- (b) is the identification tag of the file.
- (c) is the modification or version number of the file (program).

- G. Completion of a successful tape-making operation will be signaled by the words:

LOGICAL END OF TAPE ON OUTPUT TAPES
SAVE TAPES (a) (b) (c) AND LABEL AS FOLLOWS
(d) VERSION (e)

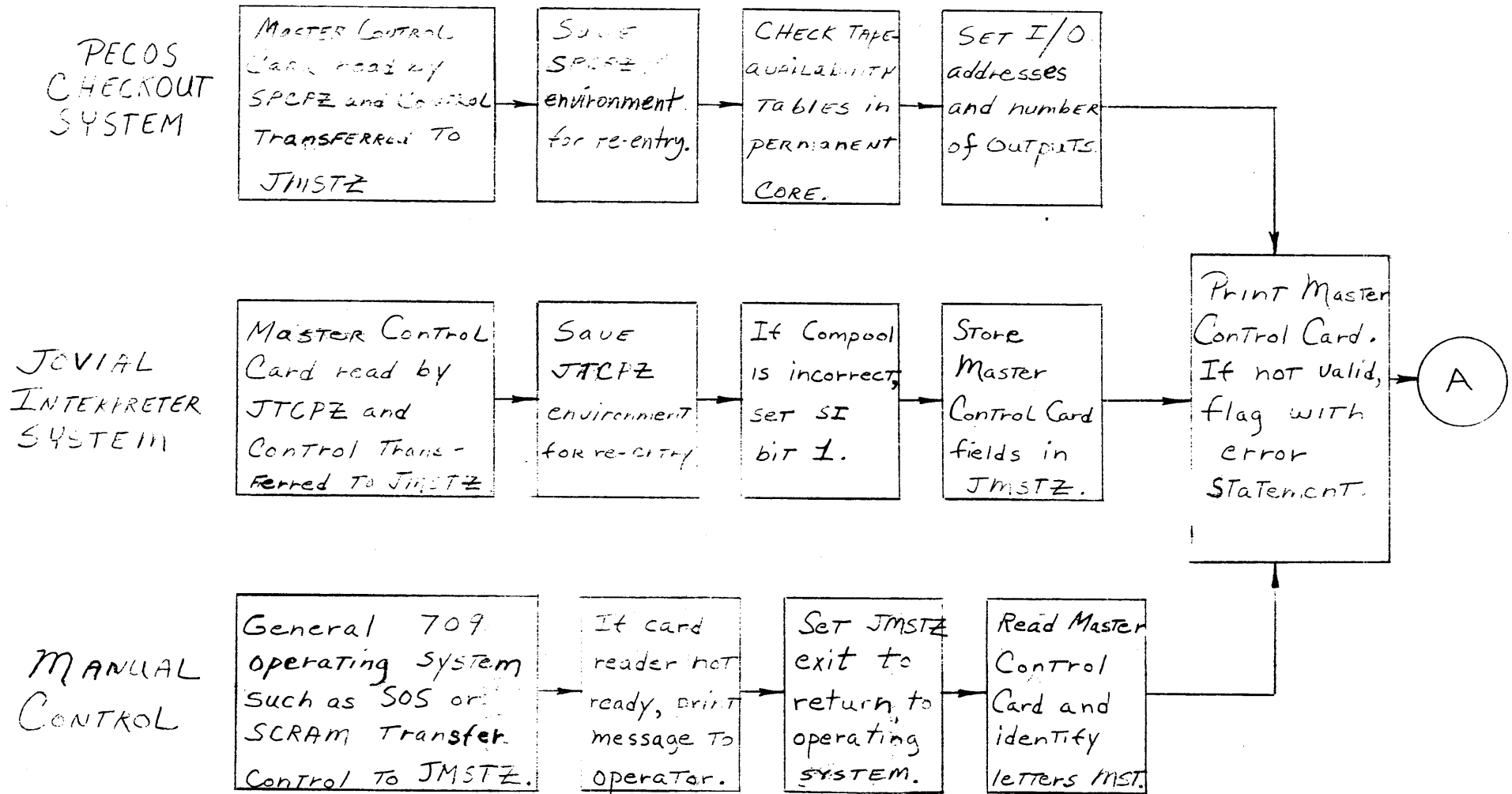
Where

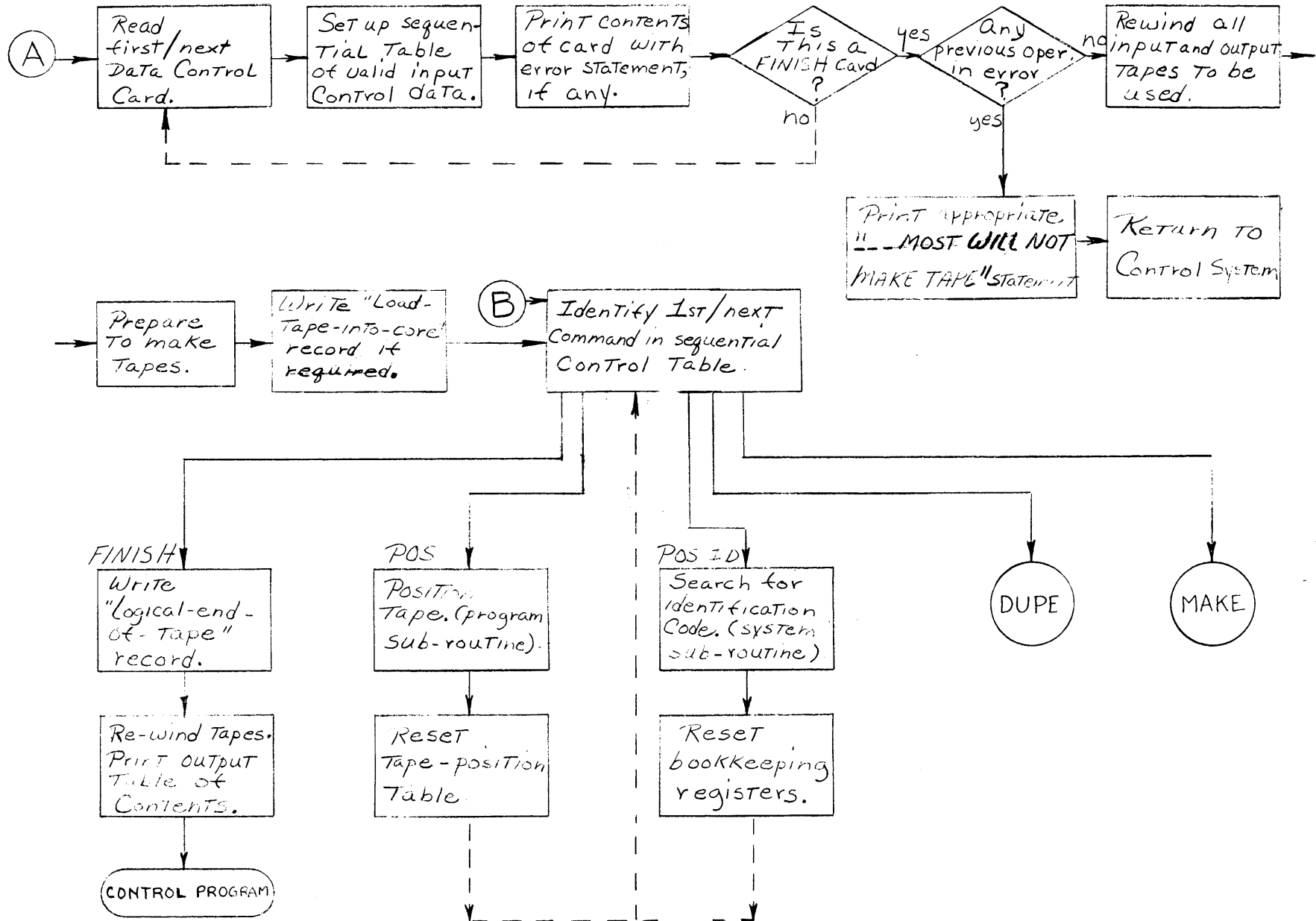
- (a), (b), and (c) are the names of the output tape units.
- (d) contains the letters:

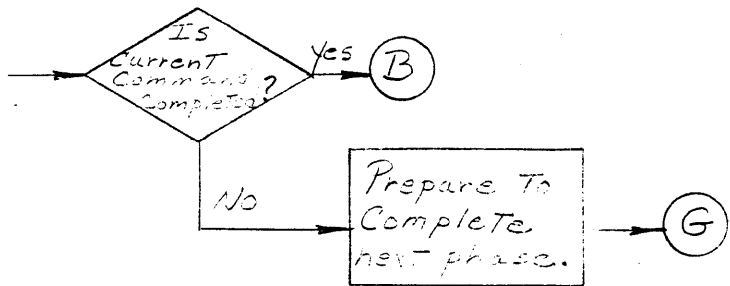
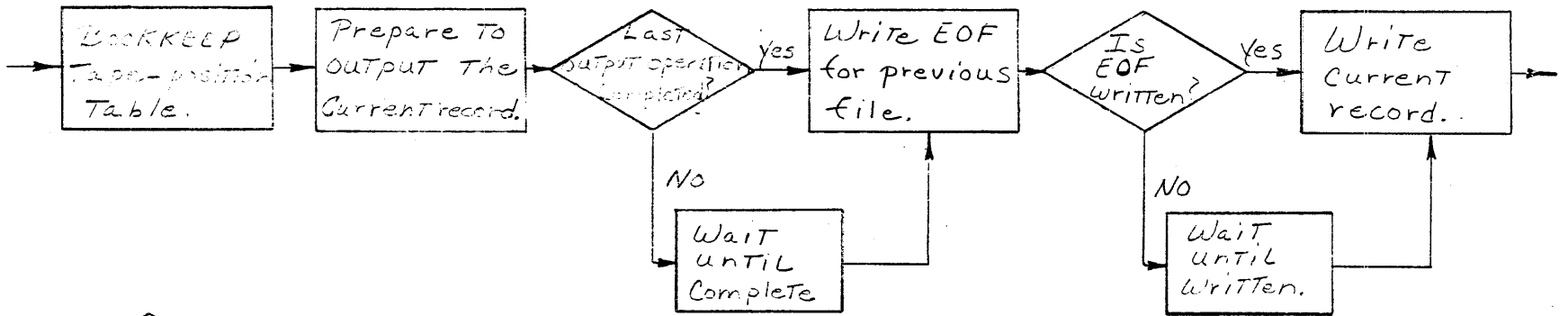
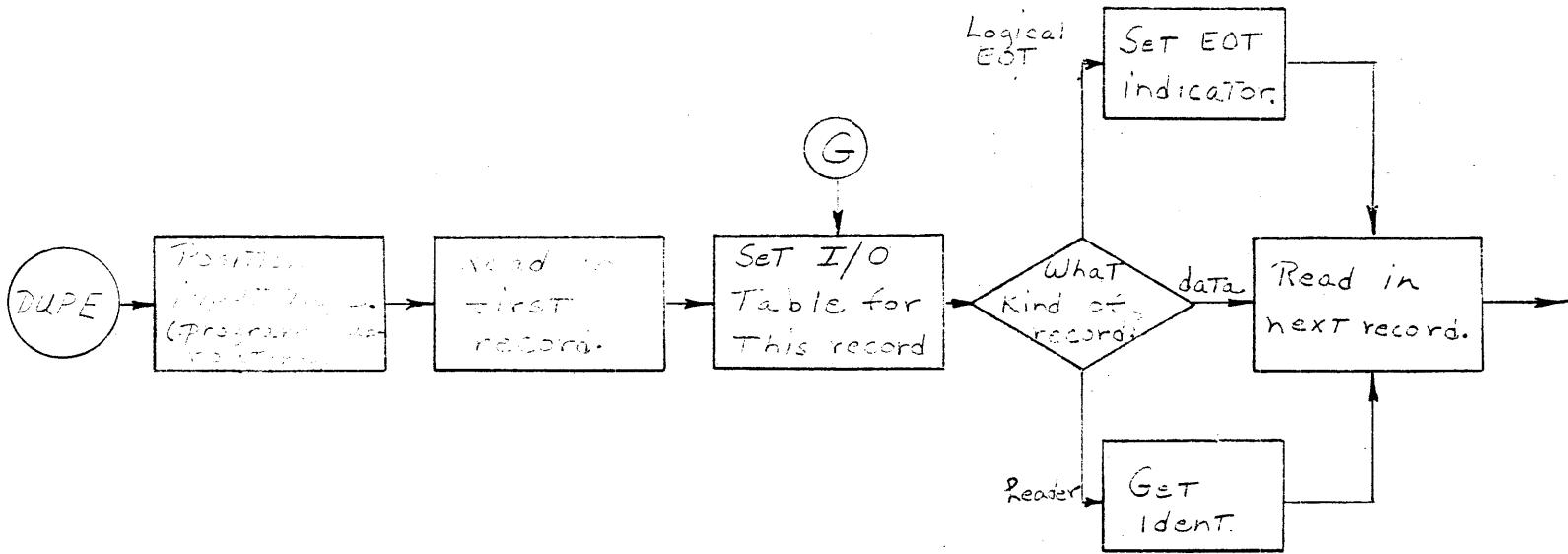
IM for JOVIAL Interpreter System Master Tapes, or
PM for PECOS Master Tapes.

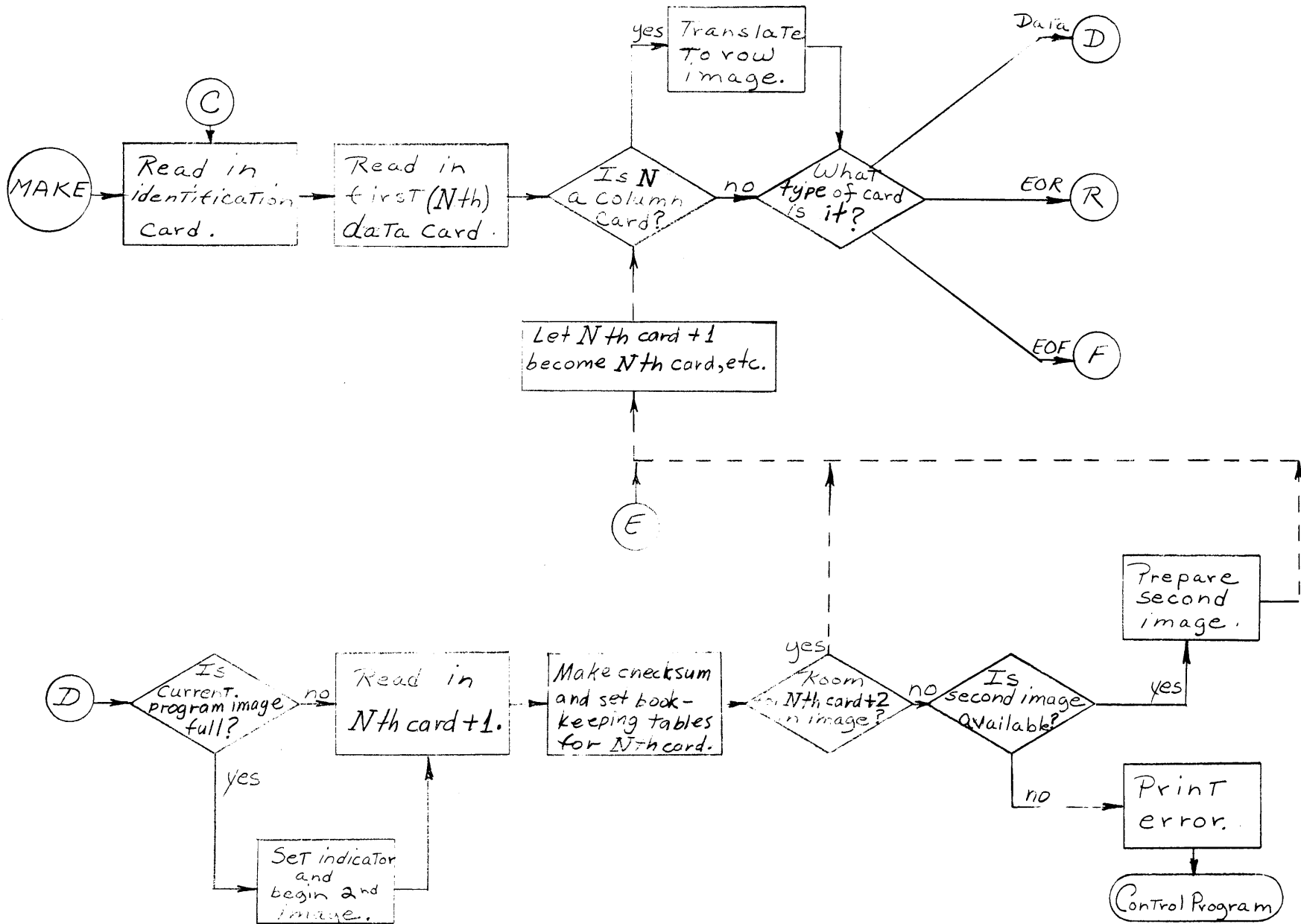
- (e) contains the output tape identification code.

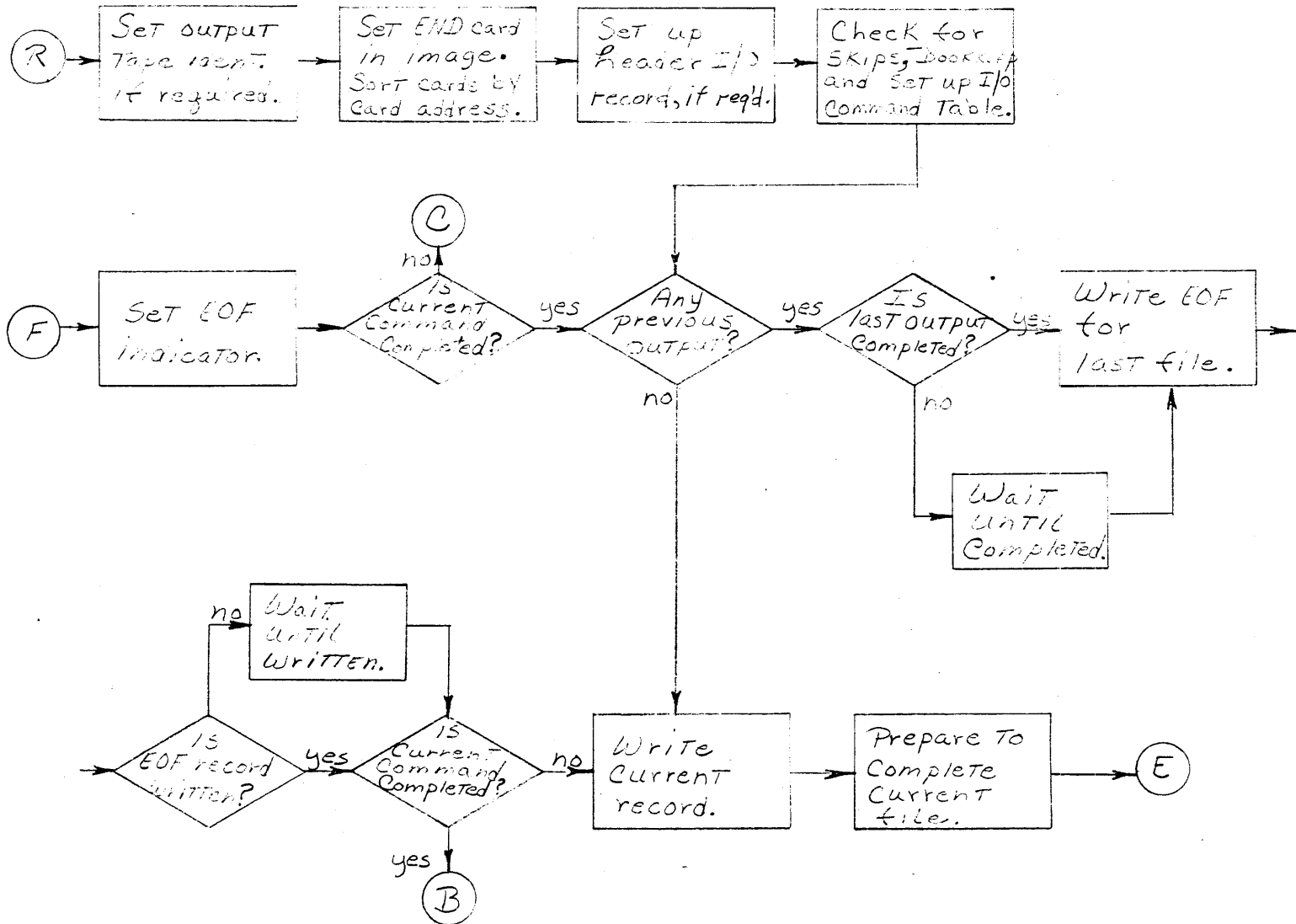
FLOW DIAGRAM











A listing of the program symbolic deck will be issued as the first supplement to this document (FN-LO-207, S-1).

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