FINSYS-2:
Subsystem EDIT-2

by Joseph E. Barnard and J. David Born

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ABSTRACT

A computer software package for the editing of resource inventory data is described. The flexibility of the system in performing user-designated editing functions also is described. Full instructions for the operation of the system are included.

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PREFACE

Since publications of the original version of FINSYS in 1967, many people have modified the system programs and documentation to make the general system more flexible and easier to use. This major revision includes the changes that make FINSYS available to a wider range of users.

The initial revision of the system programs was made by Dr. Warren E. Frayer, Colorado State University, in cooperation with the Forest Service. He was aided by a committee of Forest Service specialists including the authors; David A Neebe, Washington Office; and John Berger, Pacific Northwest Forest and Range Experiment Station.

The Renewable Resources Evaluation unit at the Intermountain Forest and Range Experiment Station further modified the system programs and documentation. Contributions were made by Terrence S. Throssell, programs and text; Jack W. Homeyer and Donald L. Johnson, programs, and Gary L. Carroll and Shirley H. Waters, text.

The Finsys-2 programs may be requested from either of the two addresses below. The preferred method of distributing program files is by a user-supplied computer tape. Requests should specify the computer to be used and program file specifications.

A supplement entitled, "FINSYS-2 EXAMPLES" is also available showing example cases for the system. The examples may be obtained with control card decks or files for use as test data for new users.

Renewable Resources Evaluation, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, Pennsylvania, 19008, Phone (215)596-1645.

or

Renewable Resources Evaluation, Intermountain Forest and Range Experiment Station, 507 - 25th Street, Ogden, Utah, 84401; Phone (801)399-6351.

The computer program described in this publication is available on request with the understanding that the U.S. Department of Agriculture cannot assure its accuracy, completeness, reliability, or suitability for any other purpose than that reported. The recipient may not assert any proprietary rights thereto nor represent it to anyone as other than a Government-produced computer program. For cost information, please write: Renewable Resources Evaluation, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, Pennsylvania, 19008

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I. INTRODUCTION

EDIT-2 is an independent editing and file-updating subsystem of FINSYS-2. It is designed to apply a specific set of data checks and cross checks, record by record, to a file. The subsystem also can generate new information and develop one-dimensional tables of outputs. As the subsystem executes, individual inventory records are compared to the criteria established by the user, and new data fields are incorporated as part of the unit record.

Possible errors are flagged and correct records may be written on the desired output medium. Correction of flagged records must be accomplished outside the subsystem. The corrected records can be passed through EDIT-2 separately. Data-file regrouping can be accomplished by standard techniques. All input and output records must be of fixed length. The output records do not have to be the same length or format as the input records. Format of the records is free and must be established by the user for the particular edit job. A generalized logic flow of EDIT-2 is shown in figure 1.

A decade ago, the initial version of EDIT was made available by the Northeastern Forest Experiment Station.[1] Since that time, a third generation of computers, including the IBM systems 360 and 370, the CDC Cyber systems, and the UNIVAC 1100 series, have replaced the IBM 7094 and similar second-generation equipment at most computer installations. Since EDIT does have some hardware-specific operations, considerable systems modification on source decks has been required to compile the program on third-generation systems.

The EDIT-2 Subsystem incorporates revisions that allow the program to operate on all of the computer systems mentioned, and with minor modifications, most other third-generation computers can be used. Additional changes in the arrangement and format of instructions make the control setup much easier for the user.

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[1]Wilson, R. W., and R. C. Peters. 1967. The Northeastern Forest Inventory Data Processing System. U.S. For. Serv. Res. Pap. NE-61 and NE-70 to 78.

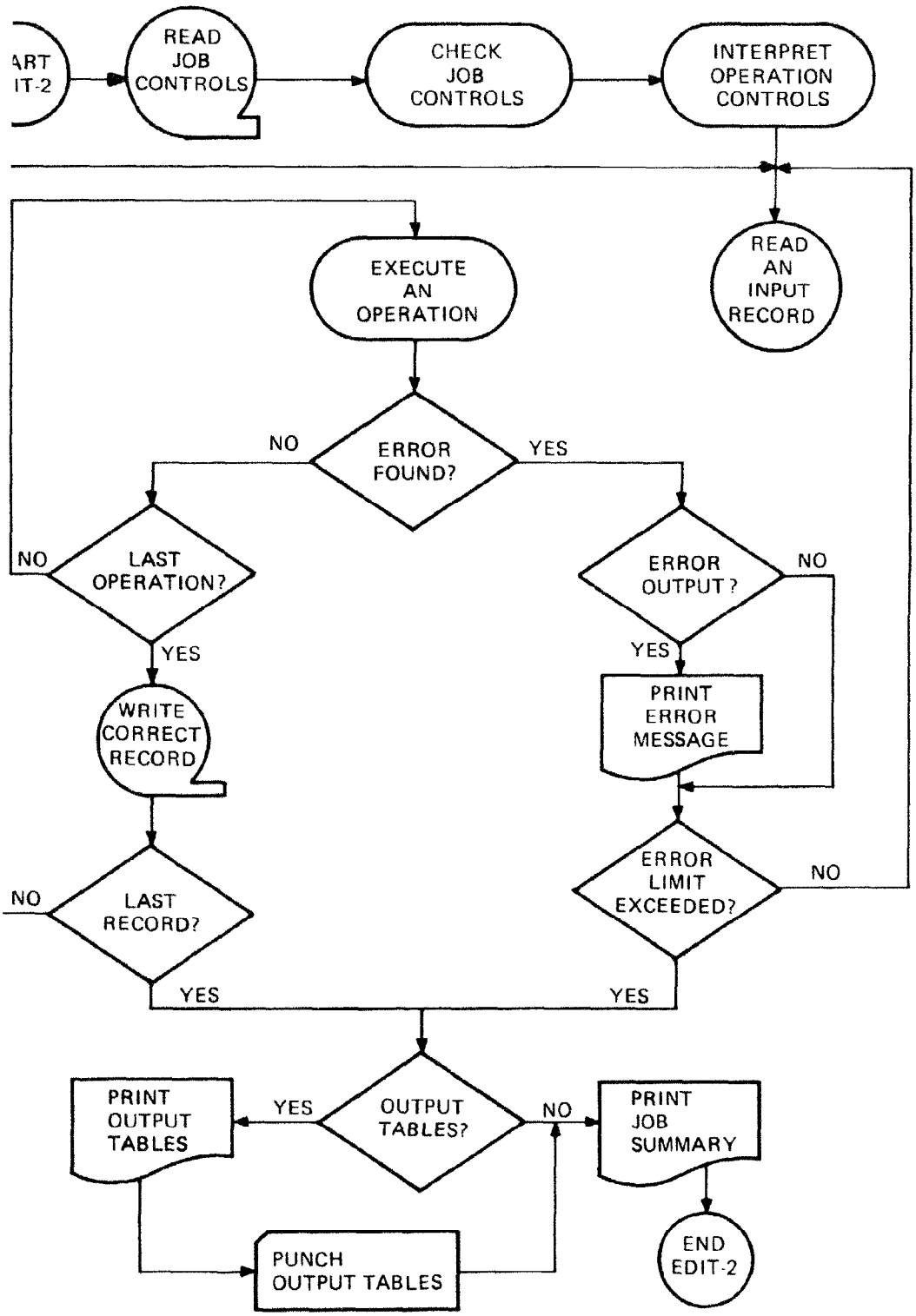


Figure 1.--A Generalized Flow Chart of Subsystem EDIT-2

II. EDIT-2 JOB CONTROL DECK

The EDIT-2 Subsystem can edit unit records and perform desired calculations on these records, make one-dimensional tables of desired data, print messages indicating possible sources of error in data, and output correct data as a separate file. The individual user specifies a particular sequence of EDIT-2 control to accomplish a desired goal. He has complete flexibility in determining the sequence of editing steps.

The EDIT-2 Subsystem includes a translator with language consisting of 14 verbs and several nouns. EDIT-2 translates the verbs into action codes, which are then executed during the processing run. The use of EDIT-2 consists of writing specific instructions with these verbs and the associated data fields.

This section describes the control information that is required to operate the subsystem, and discusses the translator language commands. The setup and use of EDIT-2 also are described. Figures 4 and 5 on page 63 and figure 6 on page 64 provide an overview of the entire EDIT-2-deck setup and a decision tree for developing a particular set of EDIT-2 controls.

A. CONTROL DECK TITLE CARD

Description

The first card in the EDIT-2 Job Control Deck is the CONTROL DECK TITLE CARD. This card is a header for the deck and serves only for identification. The title will appear only on the first page of printed output.

Operation Card

Columns	Contain	Explanation
1-80	AAA...A	Alphameric characters, giving a descriptive title.

B. PASS IDENTIFICATION CARD

Description

This card provides identification of the run within the job. It provides one switch to print or not print the Input tables for this run, and another switch to punch or not punch Update tables formed in this run. It also lets the program know whether Update tables from a previous pass are in the Job Control Deck. The update option (columns 9-18 of the PASS IDENTIFICATION CARD) may be ignored unless Output tables are being formed in this run by ADD operations.

Operation Card

Columns	Contain	Explanation
1-4	PASS	Card label.
5	b	
6-7	XX	2 numeric characters, giving the pass identification number. The number must be right-justified in the field. It will be punched in the header cards of the punched output.
8	b	

9	b, 0	Print the entire Job Control Deck with exception of Update tables.
	1	Print the Job Control Deck with exception of Input tables and Update tables.
10	b	
11	b, 0	Do not punch Update tables.
	1	Punch Update tables.
12	b	
13-18	bbbbbb	No Update tables of initial values for tables produced in ADD operations are in the Job Control Deck. The initial values of the Output tables are set at zero.
	UPDATE	Update tables of initial values are in the Job Control Deck. The initial values of the Output tables are read from the Update tables.

C. INPUT TABLE CARDS

This section describes each type of card required in the Job Control Deck to provide the Input tables used in editing operations. Input tables are required for the following edit operations: LIST CHECK, CROSSCHECK, CROSS RANGE CHECK, GENERATE, and ADD.

The NO INPUT TABLES CARD is to be used if the job does not require Input tables. In this case, no other cards from this section need be used.

As many as 40 Input tables may be placed in the Job Control Deck and the tables may be in any order; however all tables must be placed in the Job Control Deck as a group, and the last card of the group must be the INPUT TABLES END CARD.

Two types of cards are required for each Input table; INPUT TABLE COMMENT CARDS are optional. The cards for each Input table must appear as a set in the Job Control Deck.

Preceding each Input table set are the optional INPUT TABLE COMMENT CARDS. These cards can be used to briefly describe the purpose of the Input table. There is no limit to the number of INPUT TABLE COMMENT CARDS which may precede an Input table.

The first required card of each set is the INPUT TABLE NAME CARD which gives a unique name to the table, the number of entries in the table, the number of entries per card, and the format of each card in the table.

Immediately following the INPUT TABLE NAME CARD are the remaining cards of each set--the INPUT TABLE ENTRY CARDS in which the table entries are punched. These cards must be arranged so that the entry values are in ascending order within each table.

The card following the last INPUT TABLE ENTRY CARD of a given table must be the INPUT TABLE COMMENT CARD or the INPUT TABLE NAME CARD for the next table, or the INPUT TABLES END CARD.

INPUT TABLE COMMENT CARD

Columns	Contain	Explanation
1	C	A control character signifying that this is a comment card. The use of comment cards is optional.
2-34	bbb...b	
35-79	AAA...A	Alphameric characters comprising the comment.

NO INPUT TABLES CARD

Columns	Contain	Explanation
1-4	NONE	A control word signifying that there are no Input tables in the Job Control Deck. The following three control cards (INPUT TABLE NAME CARD, INPUT TABLE ENTRY CARD, INPUT TABLE END CARD) cannot be used if this card is in the Job Control Deck.

INPUT TABLE NAME CARD

Columns	Contain	Explanation
1-4	AAAA	4 alphameric characters, giving a unique name by which the table that follows is referenced by an operation. The user may assign any name he wishes but the name must be left-justified in the field.
5	b	
6-10	XXXXX	5 numeric characters, giving the number of entries in the table just named. The number must be right-justified in the field.
11	b	
12	X	1 numeric character giving the total number of fields contained in an entry of the table. The maximum number allowable is 9.
13	b	
14-15	XX	2 numeric characters, giving the number of table entries per card. The maximum number allowable is 80. The number must be right-justified in the field.
16	b	
17	X	1 numeric character, giving the number of columns occupied by the first (leftmost) field of entry.
18-33	bXb...X	Repetition of columns 16-17 format, giving the number of columns occupied by the remaining fields of an entry.
34	b	
35	(	Left parenthesis.

-80	AAA...A	Up to 45 alphameric characters ending with a right parenthesis, and containing a FORTRAN format specification which describes the format of the table. All fields must be specified as integers (I).

INPUT TABLE ENTRY CARD

lumns	Contain	Explanation
-80	XXX...X	Input table entries punched according to the format specified on the INPUT TABLE NAME CARD. Each entry is limited to a maximum of 9 numeric characters; that is, the sum of the field widths of all fields in the entry must be 9 or less. This limit exists because each table entry is "packed" before storage in a single address location. The user may wish to check the maximum value that can be stored as a binary integer on a particular machine.

INPUT TABLES END CARD

lumns	Contain	Explanation
-4	ENDb	A control word signifying the end of all Input tables. This card must always follow the last table entry card of the last Input table in the Job Control Deck. It must not be used if there are no tables and the NO INPUT TABLES CARD has been used.

D. INPUT CONSTANT CARDS

This section describes each type of card required in the Job Control Deck to provide the table of constants used in editing operations. Input constants can be used only for two edit operations: LOGIC AND ARITHE.

The NO INPUT CONSTANTS CARD is to be used if the job does not require input constants. In this case, no other cards from this section need be used.

Up to 99 input constants may be in the Job Control Deck, and the constants may be in any order; however, all constants must be placed in the Job Control Deck as a group, and the last card of the group must be the INPUT CONSTANTS END CARD.

Only one card, the INPUT CONSTANT ENTRY CARD, is required for each input constant. This card contains a reference number for the constant, the value of the constant, and a descriptive name.

NO INPUT CONSTANTS CARD

Columns	Contain	Explanation
1-4	NONE	A control word signifying that the are no input constants in the Job Control Deck. The following two control cards (INPUT CONSTANT ENTR CARD, INPUT CONSTANTS END CARD) cannot be used if this card is in the Job Control Deck.

INPUT CONSTANT ENTRY CARD

Columns	Contain	Explanation
1-3	LXX	The constant name must start with an L and end with two digits; thus there are 99 available constants: L01, L02...L99.
4	b	
5-15	XXX...X	Right-justified value of the constant.
16-20	bbb...b	
21-80	AAA...A	Alphameric description of the constant.

INPUT CONSTANTS END CARD

Columns	Contain	Explanation
1-3	END	A control word signifying the end of all input constants. This card must always follow the last input constant. It should not be used if there are no input constants and the NO INPUT CONSTANTS CARD has been used.

E. EDIT OPERATION CARDS

This section describes the control words (VERBS) available for developing a particular data editing sequence. There must be at least one edit control operation in the Job Control Deck to make the program operative. There may be as many as 400 edit steps in a given job.

One card is required for each editing operation. The format of this card will vary according to the particular verb used, but all operators have more or less common formats. In general, an edit operation will contain: a step identification number; the name of the verb; the identification numbers of the data fields to be used in the operation; the names of the Input tables, input constants, or values of constants to be used; the identification number of an edit step that will be used as a branch point; and the identification number of a user supplied error message to be printed.

Each type of operation may appear in the Job Control Deck as often as required by the particular editing problem. The operations are placed in the Job Control Deck in the sequence in which they are to be executed. OPERATION COMMENT CARDS may be freely interspersed among the editing operations for documentation.

It should be noted that the values in all data fields used in the FIX, ARITHE, and ADD operations must be expressed as floating-point numbers at the time they are used. For all other operations, the data-field values must be expressed as fixed-point numbers. The FLOAT and FIX operations can be used in making any conversions that are necessary.

A group of operations cards that make up a particular editing sequence must always be followed by the FINISH OPERATIONS CARD. This signals the end of the edit operations segment in the Job Control Deck.

ADD OPERATION CARD

Description

The ADD operation forms an Output table by summing the value in a data field, or a constant value, into a cell of the Output table each time a record is processed. The particular cell in which the value is accumulated is selected by a combination of as many as nine other values in the record; an Input table is used for identification. This operation also records an error if the combination of values used in selecting the cell is not found in the Input table. If the combination is found, a value is summed into the corresponding cell of the Output table.

The values used to select the cell in the Output table must be fixed-point numbers. The value to be summed into the cell must be a floating-point number. The Input table must contain as many entries as there are combinations of permitted values used to select the Output table cell. Each Input table entry consists of one of these combinations.

Since the ADD operation will ignore records that have been found to contain errors, it is recommended that the ADD operations be placed last in the sequence of edit operations so that data from error records are not summarized.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-6	ADD	The name of the operation that forms an Output table by summing the value in a selected data field into a selected cell of the Output table each time an input record is processed.
7-10	bbb...b	

11-13	XXX	3 numeric characters, giving the identification number of the first data field to be used in this operation. The number must be right-justified in the field. Up to 8 additional data fields may be identified in the following columns of this card for use in this operation. The numbers of the data fields to be used in searching the Input table named in columns 70-73 of this card must be listed first, and in the order that their values appear in the table. The last number listed identifies the data field to be summed into the Output table (only if columns 57-62 are blank).
14-15	bb	
16-55	XXX...X	Repetition of columns 11-15 format, giving the identification numbers of the remaining data fields to be used in this operation.
56	b	
57-62	XXX...X	Constant to be accumulated in table. The field must be right-justified. If blank, the value in the data field appearing last in the list in columns 11-55 will be summed in the table.
63-69	bbb...b	
70-73	AAAA	4 alphameric characters, giving the name of the Input table to be used as identification in this operation. The name must be left-justified in the field, and must appear exactly as given in columns 1-4 of the appropriate INPUT TABLE NAME CARD.

74-77	AAAA	4 alphameric characters, giving the name of the Output table to be formed in this operation. The name must be left-justified in the field. This field defines the Output table. No other reference is necessary.

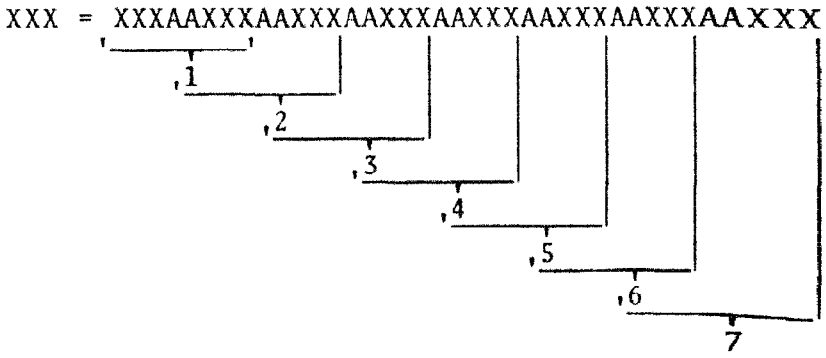
ARITHMETIC OPERATION CARD

Description

The ARITHE (for arithmetic expression) operation supplies a value for a data field by evaluating a given arithmetic expression containing as many as eight other values (including constants from the table of input constants and the two operation specified constants), and any of the following arithmetic operators:

+	=	add
-	=	subtract
*	=	multiply
/	=	divide
**	=	raise to the power of

All values used in the operation must be floating-point numbers. The value generated is also a floating-point number. The expression is evaluated from left to right:



where

XXX = a numeric value
AA = an arithmetic operator

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	ARITHE	The name of the operation that evaluates an arithmetic expression and stores the result in a data field.
10	b	
11-13	XXX	3 numeric characters, giving the identification number of the data field in which the value of the arithmetic expression is to be stored. The number must be right-justified in the field.
14-15	=b	An equal sign and a blank character that mark the beginning of the arithmetic expression to be evaluated.
16-18	AAA	3 alphameric characters, giving the identification number of the data field or the name of the constant (see columns 57-62 and 64-69 below and the table of input constants) to be used as the first value in the expression. The identification number must be right-justified in the field.
19-20	+b	An addition sign and a blank character, or
	-b	A subtraction sign and a blank character, or
	*b	An asterisk representing multiplication and a blank character, or

	/b	A slash representing division and a blank character, or
	**	2 asterisks representing exponentiation. This pair of characters gives the arithmetic operation to be performed, with the value of the entire expression to the left of the sign and the value of the single data field or constant immediately to the right of the sign.
21-23	AAA	3 alphameric characters, giving the identification number of the data field or the name of the constant (see columns 57-62 and 64-69 below and the table of input constants) to be used in the preceding arithmetic operation. The identification number must be right-justified in the field.
24-53	AAA...A	Repetition of columns 19-23 formats, giving the operation symbols and the data fields or constants to be used for the remaining terms of the expression. The expression may contain a total of 8 terms.
54-56	bbb	
57-62	XXXXXX	6 numeric characters, giving the value of the constant named C01 to be used in this operation. The number must be right-justified and punched with a decimal point since this entire operation is performed in floating-point arithmetic.
63	b	
64-69	XXXXXX	6 numeric characters, giving the value of the constant named C02 to be used in this operation. The number must be right-justified and punched with a decimal point.

CALCULATE OPERATION CARD

Description

The CALCUL (for calculate values) operation may be specially programed to perform any unusual or complex calculations required in obtaining values for data fields.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	CALCUL	The name of the operation that may be programed (in FORTRAN IV) by the user to perform special calculations required in creating new values for data fields.
10-50	bbb...b	
51-53	bbb	Execute the next operation in sequence.
	XXX	Right-justified number of the edit step to branch to upon detection of an error.*
54-56	bbb	
57-62	XXXXXX	Right-justified number to be used as an index for branching to appropriate section of subroutine CALCUL. (See use of CALCULATE OPERATION.)
63-77	bbb...b	
78-80	bbb	Do not print an error message upon detection of an error.

*The programer may specify what constitutes an error for each calculate operation. (See use of CALCULATE OEPRATION IN section IV.)

XXX	Right-justified identification number of the error message to be printed upon detection of an error.

CONTINUE OPERATION CARD

Description

The CONTINUE operation is similar to the CONTINUE statement in FORTAN and is used in the same way.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	CONTIN	Dummy operation step, similar to the CONTINUE statement in FORTRAN, usually used for branching.

CROSS CHECK OPERATION CARD

Description

The CROSSC (for cross checks) operation checks the consistency among as many as eight values. There are two checking options: the legal option, which records an error when the combination of values is not found in an Input table containing all combinations of values permitted, and the illegal option, which records an error if the combination of values is found in an Input table containing all combinations of values not permitted.

Upon detection of an error, one of the following options may be activated:

1. Print the error message specified in columns 78-80.

2. Skip to the operation specified in columns 51-53.

3. Print the error message specified in columns 78-80, then skip to the operation specified in columns 51-53.

All data fields used in this operation must contain fixed-point numbers. The Input table must contain as many entries as there are combinations of values permitted (or not permitted, if the illegal option is used) in the data fields being checked. Each entry of the Input table contains one combination of values, in specified order.

For example, assume that the following relationships must exist between the values in the first and the second data fields of a record: if the value in the first field is 1, then the value in the second field must be 1, 2, 3, 4, or 5; and, if the value in the first field is 2, 3, or 4, then the value in the second field must be 2, 3, 4, or 5; and, if the value in the first field is 5 or 6, then the value in the second field must be 6. There are 19 possible combinations of these values, so the Input table must contain 19 entries, using the legal checking option. The first digit of each entry is a permitted value of the first field and the second digit is a corresponding value permitted for the second field. The Input table entries for this example are: 11, 12, 13, 14, 15, 22, 23, 24, 25, 32, 33, 34, 35, 42, 43, 44, 45, 56, and 66.

Note that all Input table entries must be arranged so that the values are in ascending order.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	CROSSC	The name of the operation that checks the consistency of values among several data fields of an input record.
10	L	Legal values are contained in the Input table named in columns 70-73.
	I	Illegal values are contained in the Input table named in columns 70-73.
11-13	XXX	3 numeric characters, giving the identification numbers of the first data field to be used in this operation. The number must be right-justified.

		Up to 7 additional data fields may be identified in the following columns of this card for this operation. The numbers must be listed in the order in which the values of the data fields appear in the Input table named in columns 70-73 of this card.
14-15	bb	
16-50	XXXbb...	Repetition of columns 11-15 format, giving the identification numbers of remaining data fields to be used in this operation.
51-53	bbb	Execute the next operation in sequence.
	XXX	Right-justified number of the edit step to branch to upon detection of an error.
54-69	bbb...b	
70-73	AAAA	4 alphameric characters giving the name of the Input table to be used in this operation. The name must be left-justified, and exactly the same as on the appropriate INPUT TABLE NAME CARD.
74-77	bbbb	
78-80	bbb	Do not print an error message upon detection of an error.
	XXX	3 numeric characters, right-justified, giving the reference number of the error message associated with this operation.

CROSS RANGE CHECK OPERATION CARD

Description

The CROSSR (for cross range checks) operation checks a single value against a range. The range is selected from an Input table on the basis of one other value. Actually, two checks are made: an error is recorded

if the value used to select the range is not found in the Input table (a list check); and an error is recorded if the value being checked is not equal to or greater than the minimum value and less than or equal to the maximum value of the range.

Upon detection of an error, one of the following options may be activated:

1. Print the error message specified in columns 78-80.

2. Skip to the operation specified in columns 51-53.

3. Print the error message specified in columns 78-80, then skip to the operation specified in columns 51-53.

Both data fields used in this operation must contain fixed-point numbers. The Input table must contain as many entries as there are values permitted for the data field used in selecting the range. Each Input table entry consists of three fields: the first contains one of the values used to select the range; the second contains the minimum value of the range; and the third contains the maximum value of the range.

For example, assume that the following relationships must exist between the values in the first and the second data fields of a record: if the value in the first field is 1, then the value in the second field must fall between 1 and 13 inclusive; and, if the value in the first field is 2, then the value in the second field must fall between 18 and 62 inclusive. The Input table must contain two entries: 10113 and 21862.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	CROSSR	The name of the operation that checks the value in a data field against a range of values determined by the value in one other data field.
10	b	

11-13	XXX	3 numeric characters, giving the identification number of the data field that determines the range of values to be used in the operation. The number must be right-justified.
14-15	bb	
16-18	XXX	Repetition of columns 11-13 format, giving the identification number of the data field to be checked in the operation.
19-50	bbb...b	
51-53	bbb	Execute the next operation in sequence.
	XXX	Right-justified number of the edit step to branch to upon detection of an error.
54-69	bbb...b	
70-73	AAAA	4 alphameric characters, giving the name of the Input table to be used in this operation. The name must be left-justified, and exactly the same as on the appropriate INPUT TABLE NAME CARD.
74-77	bbbb	
78-80	bbb	Do not print an error message upon detection of an error.
	XXX	3 numeric characters, right-justified, giving the reference number of the error message associated with this operation.

FINISH OPERATIONS CARD

Description

A FINISH card is required as the last operation in a set of operations.

Operation Card

Columns	Contain	Explanation
1-3	bbb	
4-9	FINISH	The name of the operation signifying the end of the set of operation cards in the Job Control Deck.

THIS IS THE LAST CARD OF THE EDIT-2
OPERATIONS SEGMENT OF THE JOB
CONTROL DECK

FIX OPERATION CARD

Description

The FIX operation converts as many as nine values from floating-point to fixed-point numbers. The operation also allows the floating-point numbers to be scaled before conversion, using multiplication by power of 10.

ACTION:

NDATA(XXX) = PDATA(XXX)*10**Y+0.1

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-6	FIX	The name of the operation which will fix a floating-point number according to the scale provided on the operation card.
7-10	bbbb	

11-14	XXXY	XXX is the data field to be fixed and Y is the number of positions to the right of the decimal to be preserved from the original floating-point number.
15	,	
16-54	XXX...X	Repetition of columns 11-15 format for each data field to be fixed. No comma is required after the last data field and its scale.

FLOAT OPERATION CARD

Description

The FLOAT operation converts as many as nine values from fixed-point to floating-point numbers. The operation also allows the floating-point numbers to be scaled after conversion, using division by powers of 10.

ACTION:

PDATA(XXX) = NDATA(XXX)/10**Y

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-8	FLOAT	The operation that will float a fixed-point number according to the scale provided on the operation card.
9-10	bb	
11-14	XXXY	Where XXX is the data field to be floated and Y is the desired number of places to the right of the decimal.

15	,	
16-54	XXX...X	Repetition of columns 11-15 format for each data field to be floated. No comma is required after the last data field and its scale.

GENERATE OPERATION CARD

Description

The GENERA (for generate values) operation supplies values for one or more data fields. The values are supplied from an Input table according to a combination of other values. This operation also records an error if the combination of values is not found in the Input table. If the combination is found, the corresponding generated values are moved from the Input table to the record.

All data fields used in this operation must contain fixed-point numbers, and all generated values must be fixed-point numbers. The Input table must contain as many entries as there are combinations of permitted values. Each Input table entry contains one of these combinations followed by the corresponding generated values.

For example, assume that the permitted values in the first data fields are 3, 4, 7, and 9; that when the value in the first field is 3 or 4, a value of 1 is to be generated for the second field; that when the first field contains a 7, the second field is to contain a 2; and that when the first field is 9, the second field must be 3. Since there are 4 values permitted for the first field, the Input table must contain these 4 entries; 31, 41, 72, and 93.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	GENERA	The name of the operation that supplies new values for one or more data fields from an input table.
10	b	

11-13	XXX	3 numeric characters, giving the identification number of the first data field to be used in this operation. The number must be right-justified in the field. Up to 8 additional data fields may be identified in the following columns of this card for this operation. The numbers of the data fields to be used in searching the Input table named in columns 70-73 of this card must be listed first, and in the order that their values appear in the table. The last numbers listed identify the data field for which values are to be generated.
14-15	bb	
16-55	XXX...X	Repetition of the columns 11-15 format, giving the identification numbers of the remaining data fields to be used in this operation.
56-61	bbb...b	
62	X	1 numeric character, giving the number of data fields (counting from the left) identified in the above list, that are to be used for identification in searching the Input table. The remaining fields are to be generated.
63-69	bbb...b	
70-73	AAAA	4 alphameric characters, giving the name of the Input table to be used as identification in this operation. The name must be left-justified in the field, and must appear exactly as given in columns 1-4 of the appropriate INPUT TABLE NAME CARD.
74-77	bbbb	A standard error message will be printed.

78-80	XXX	3 numeric characters, right-justified, identifying the reference number of the appropriate error message to be printed if the data-field values cannot be found in the specified Input table.

LIST CHECK OPERATION CARD

Description

The LIST C (for list checks) operation checks a single value against a list of values. An Input table gives the list. There are two checking options: the legal option, which records an error when the value is not found in a list of all values permitted, and the illegal option, which records an error if the value is found in a list containing all values not permitted.

Upon detection of an error, one of the following options may be activated:

1. Print the error message specified in columns 78-80.

2. Skip to the operation specified in columns 51-53.

3. Print the error message specified in columns 78-80, then skip to the operation specified in columns 51-53.

Any data field used in this operation must contain a fixed-point number. The Input table must contain as many entries as there are values permitted (or not permitted, if the illegal option is used). Each entry contains only one of the permitted values.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-9	LISTbC	The name of the operation that checks the value in a data field against a list of values in a table.

10	L	Legal values are contained in the table named in columns 70-73.
	I	Illegal values are contained in the table named in columns 70-73.
11-13	XXX	3 numeric characters, giving the identification number of the data field to be checked. The number must be right-justified.
14-50	bbb...b	
51-53	bbb	Execute the next operation in sequence.
	XXX	Right-justified number of the edit step to branch to upon detection of an error.
54-69	bbb...b	
70-73	AAAA	4 alphameric characters, giving the name of the Input table to be used in the operation. The name must be left-justified and exactly the same as on the appropriate INPUT TABLE NAME CARD.
74-77	bbbb	
78-80	bbb	Do not print an error message upon detection of an error.
	XXX	3 numeric characters, right-justified, giving the reference number of the error message associated with this operation.

LOGIC OPERATION CARD

Description

The LOGIC (for logical expression) operation determines the truth value (true or false) of a given logical expression, and executes a branch specified for that value. For a given truth value, one of the following options is specified:

1. Print the error message specified in columns 78-80.

2. Skip to the operation specified in columns 51-53.

3. Print the error message specified in columns 78-80, then skip to the operation specified in columns 51-53.

For alternate truth values, the action is always to execute the next operation in sequence with the current record.

All numeric values used in this operation must be fixed-point numbers. The values can be those in the data fields, or they can be constants from the table of input constants or from the two constants specified on the operation card.

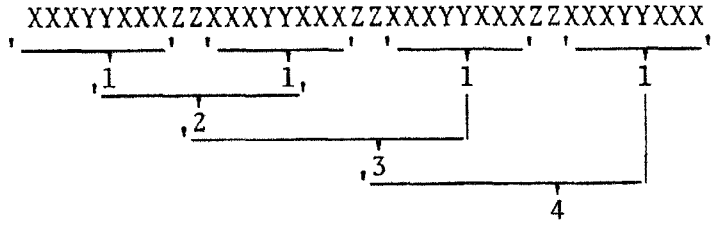
The logical expression is constructed from simple logical statements or comparisons of two values according to one of six relational operators:

EQ = equal to	NE = not equal to
GT = greater than	GE = greater than or equal to
LT = less than	LE = less than or equal to

The logical expression can contain as many as four comparisons, each associated with the others by one of three logical connectives:

AN = and
OR = or
TH = if...then

To determine the truth value of the logical expression, the truth values of the simple comparisons are obtained first. These values, and their logical connectives, are then scanned from left to right to obtain the truth value of the entire expression:



where

XXX = a numeric value
YY = a relational operator
ZZ = a logical connective

The truth sets for the compound expressions involving statements "p" and "q" are:

p	q	p AN q	p OR q	p TH q
T	T	T	T	T
T	F	F	T	F
F	T	F	T	T
F	F	F	F	T

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation. It is desirable, but not essential, to number operations which can produce error messages.
4-8	LOGIC	The name of the operation that determines the truth value of a logical expression and uses it to select an appropriate course of action.
9-10	bb	
11-13	AAA	3 alphameric characters, giving the identification number of the data field or the name of the constant that is the subject of the simple logical statement being constructed. The identification number must be right-justified.

14-15		A relational operator meaning:
	EQ	"is equal to"
	GE	"is greater than or equal to"
	LE	"is less than or equal to"
	LT	"is less than"
	GT	"is greater than"
	NE	"is not equal to"
		The operator acts as a verb in the simple logical statement being constructed.
16-18	AAA	3 alphameric characters, giving the identification number of the data field, or the name of the constant that is the predicate of simple logical statement being constructed. The identification number must be right-justified.
19-20	AN	A logical connective meaning "AND",
	OR	the connective meaning "OR", the
	TH	connective meaning "IF THEN" by which the preceding statement and simple statement following are compounded.
	bb	No logical statement follows.
21-28	AAA...A	Repetition of columns 11-18 format giving the second simple statement in the compound statement being constructed.
29-30	AA	Repetition of columns 19-20 format giving the second logical connective.
31-38	AAA...A	Repetition of columns 11-18 format giving the third simple statement in the compound statement being constructed.
39-40	AA	Repetition of columns 19-20 format giving the third logical connective.
41-48	AAA...A	Repetition of columns 11-18 format giving the fourth simple statement.

49	b	
50	T	A character meaning "TRUE".
	F	A character meaning "FALSE".
		The truth value of the logical statement in columns 11-48 that will alter processing of the current input record according to the contents of columns 51-53. On occurrence of a truth value not specified here, processing proceeds to the next operation in sequence.
51-53	bbb	Execute the next operation in sequence.
	XXX	Right-justified number of the edit step to branch to upon detection of an error.
54-56	bbb	
57-62	XXXXXX	6 numeric characters, giving the value of the constant named C01 to be used in this operation. This number must be right-justified and in fixed-point (I) notation.
63	b	
64-69		6 numeric characters, giving the value of the constant named C02 to be used in this operation. This number must be right-justified and in fixed-point (I) notation.
70-77	bbb...b	
78-80	bbb	Do not print an error message upon detection of an error.
	XXX	3 numeric characters (right-justified), giving the reference number of the error message associated with this operation.

OPERATION COMMENT CARD

Columns	Contain	Explanation
1	C	"C" indicates that the operation is a comment...no action will be taken except that a comment will be written out. Any number of comment cards may be inserted between operations. The use of comment cards is optional.
2-3	bb	
4-55	AAA...A	Any alphameric comment.

PRINT OPERATION CARD

Description

The PRINT operation provides means to print an error message when desired at the end of a branch or when reached by a sequence of operations.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-8	PRINT	The name of the operation which prints the error message specified in columns 78-80.
9-77	bbb...b	
78-80	XXX	Right-justified number of the error message to be printed.

SKIP OPERATION CARD

Description

The SKIP operation allows branching of operations by skipping to a specified step number.

Operation Card

Columns	Contain	Explanation
1-3	XXX	Operation step number. The step number does not have to be used if there is no branching to that operation.
4-7	SKIP	The operation that will cause the processing to branch to other operation steps.
8-50	bbb...b	
51-53	XXX	3 numeric characters which specify the operation step number of the next step in the sequence of operations. The use of a skip card is similar to a GO TO statement in FORTRAN. The number must be right-justified.

F. UPDATE TABLE CARDS

The use of the group of control cards described in this section is optional. The cards contain job identification and summary information and all tables referred to in the ADD OPERATION CARDS of the Job Control Deck; hence, they are not used unless the ADD operation is being used in the editing job. Even then, it is not always necessary that this group of cards be in the Job Control Deck.

The Update table cards usually will be used only on a subsequent pass of a set of input data for which editing was not completed in the first pass--either because errors were detected in some input records, or because of a premature processing halt.

Since this group of cards may be punched at the end of a processing run, the punched table output from a previous pass with a set of input data may be used as the group of Update table cards to be inserted in the Job Control Deck for a subsequent pass. (See PASS IDENTIFICATION CARD description.)

UPDATE TABLE TITLE CARD

ıs	Contain	Explanation
	AAA...A	80 alphameric characters, giving a descriptive title for the job. This card as punched is a duplicate of the first title card, but this is not essential. It is used only to identify the Update tables that follow.

UPDATE TABLE JOB SUMMARY CARD

ıs	Contain	Explanation
	PASSb	Card label.
	XX	2 numeric characters, giving the number of the pass to which the summary information applies. It is the same number that was given in columns 6-7 of the PASS IDENTIFICATION CARD for that pass. The number must be right-justified.
	bNO.bRECORDSbPROCESSED	
	XXXXXX	6 numeric characters, giving the number of input records processed in the pass. Unless an error procedure caused a premature halt in processing, this number will be the same as that given in columns 21-26 of the INPUT RECORD CONTROL CARD for that pass. The number must be right-justified.
	bNO.bCORRECT	Card label.
	XXXXXX	6 numeric characters, giving the number of input records that passed all editing checks. The number must be right-justified.
	bNO.bERROR	Card label.

64-69	XXXXXX	6 numeric characters, giving the number of input records that failed to pass all editing checks. The number must be right-justified.

UPDATE TABLE IDENTIFICATION CARD

1-14	THEbFOLLOWINGb	Card label.
15-19	XXXXX	5 numeric characters, giving the number of table entry cards for the table named below. The number is right-justified in the field.
20-35	bCARDSbAREbPASSb	Card label.
36-37	XX	2 numeric characters, giving the number of the pass from which the table was obtained as output. The number is right-justified in the field and is the same as the one that appears in columns 6-7 of the UPDATE TABLE JOB SUMMARY CARD.
38-44	bTABLEb	Card label.
45-48	AAAA	4 alphameric characters, giving the name of the table which follows. The name is left-justified in the field, and must correspond exactly to a table name as given in columns 70-73 or 74-77 of an ADD OPERATION CARD of this pass.

UPDATE TABLE ENTRY CARD

Columns	Contain	Explanation
1-3	CD.	Card label.
4-8	XXXXX	5 numeric characters, giving consecutive identification numbers for the card. The number is right-justified in the field, and the number of the first card in any table is 1.
9	b	

10-24	bX.XXXXXXXXEbXX	A 15-character numeric field (E specification), giving the value of an entry in a table. Up to 4 sequential table entries may be given in this card.
25	b	
26-73	XXX...X	Repetition of columns 10-25 formats, giving the identification number and values of up to 3 additional entries in the table.
74-76	bbb	
77-80	AAAA	4 alphameric characters, giving the name of the table to which these entries belong. The name is left-justified in the field, and must appear exactly as given in columns 45-48 of the UPDATE TABLE IDENTIFICATION CARD.

UPDATE TABLE FINISH CARD

Columns	Contain	Explanation
1-21	bbb...b	
22-27	FINISH	A control word signifying the end of all Update table cards.

G. INPUT/OUTPUT CONTROL CARDS

The control cards in this section describe the physical condition of the input records, the specifications for the output file of correct records, and the error record output.

The INPUT/OUTPUT CONTROL CARD must always appear in the Job Control Deck. All the other cards described in this section are optional. Their inclusion will depend on the options or combinations of options selected on the INPUT/OUTPUT CONTROL CARD. The order of inclusion of these optional cards must follow the order in which they are discussed below. For example, if a user specified a job in which both BCD input and output of records were desired, the format card for the input records would precede the format card for output records.

INPUT/OUTPUT CONTROL CARD

Columns	Contain	Explanation
1-5	INPUT	Card label.
6	b	
7-9	XXX	3 numeric characters, giving the number of data fields in the input records. The number must be right-justified in the field.
10	b	
11-15	XXXXX	5 numeric characters, giving the total number of input records. The number must be right-justified in the field. When the number specified is blank, zero, or greater than the number on the input file, processsing will terminate in normal manner upon reaching an end-of-file.
16	b	
17	1	The input data are in binary mode.
	2	The input data are in BCD mode on tape.
	3	The input data are in BCD mode on cards.
	4	The input data are in BCD mode greater than 132 characters in length. This option requires special programing for the computer system being used.
18	b	
19	X	The number of variable format cards for the input data. Used only if column 17 contains a 2 or 3. Up to 5 cards can be specified; a blank, zero, or 1 is assumed to mean 1 card.

	b	
)	OUTPUT	Card label.
	b	
)	XXX	3 numeric characters, giving the number of data fields in the output records. The number must be right-justified in the field.
	b	
	b, 0	No correct record output.
	1	Correct record output is to be in binary mode on tape.
	2	Correct record output is to be in BCD mode on tape.
	3	Correct record output is to be punched in BCD mode on cards.
	4	Correct record output is to be printed.
	5	Correct record output is to be printed and in binary mode on tape.
	6	Correct record output is to be printed and in BCD mode on tape.
	7	Correct record output is to be printed and punched in BCD mode on cards.
	b	
	X	The number of variable format cards for the correct record output. Not used if column 32 contains a blank, zero, or 1. Up to 5 cards can be specified; a blank, zero, or 1 is assumed to mean 1 card. If column 32 contains a 4, 5, 6, or 7, a carriage control character must be included in the format.
	b	
41	ERRORS	Card label.

42	b	
43-45	XXX	3 numeric characters, giving the number of data fields in the error records. If left blank or zero, the number is assumed equal to the number of data fields contained in the input records. The number must be right-justified in the field.
46	b	
47-50	XXXX	4 numeric characters, specifying a maximum number of error records. The number must be right-justified in the field. Processing will terminate upon reaching this number.
51	b	
52	X	1 numeric character, specifying a maximum number of errors allowed per record. A blank or zero means an unlimited number. Upon reaching the maximum number, processing will transfer to the next record. Also, as soon as an error is found, succeeding ADD operations will be bypassed for the record.
53	b	
54	b, 0	No error record output.
	1	Print error records.
	2	Error record output is to be printed and punched in BCD mode on cards. Punch error records according to input record format. Used only when input is in BCD mode (options 2, 3 in column 17). The number of data fields punched is equal to the number of data fields in the input records.
55	b	

X	The number of variable format cards for printing of the error records. Up to 5 cards can be used. If left blank or zero, the input format is used.
b	
b, 0	No titles are to be printed above printed error record output.
X	Number of title lines, from 1 to 9, (supplied in the Job Control Deck) which are to be printed above printed error record output. (See ERROR RECORD TITLE CARDS.)
b	
b, 0	Standard error messages are to be used (error on edit step---).
1	Job-specific error messages (supplied in Job Control Deck) are to be added to the standard messages. (See USER SUPPLIED ERROR MESSAGES.)
b	

(The information supplied in columns 62-72 is optional and may be left blank.)

XXX	3 numeric characters, giving the number of the first data field having a constant value for an ordered subset of the input file. The number must be <u>right</u>-justified in the field.
b	
XXX	3 numeric characters, giving the number of the last data field having a constant value for an ordered subset of the input data file. The number must be <u>right</u>-justified in the field.

69	b	
70-72	XXX	3 numeric characters, giving the number of the last edit step which applies to ordered subsets of the input data file. The number must be right-justified in the field.

(The information supplied in columns 73-80 is required for the INT/UNIVAC version.)

73	b	
74-75	XX	Input tape blocking factor. Required for input options 4 and 5 in column 17.
76	b	
77-80	XXXX	Number of characters per logical record on input tape. Required for input option 4 in column 17.

INPUT RECORD FORMAT CARD (Optional)

Columns	Contain	Explanation
1	(	Left parenthesis.
2-80	AAA...A	Up to 79 alphameric characters containing a FORTRAN format specification which describes the format of the input records. If the specification is completed on this card, a right parenthesis follows the format. Used only for BCD input.

INPUT RECORD FORMAT CONTINUATION CARDS (Optional)

Columns	Contain	Explanation
1-80	AAA...A	A continuation of the FORTRAN format specification described for the previous card, ending

		with a right parenthesis. Up to 4 continuation cards can be used.

OUTPUT RECORD FORMAT CARD (Optional)

Columns	Contain	Explanation
1	(	Left parenthesis.
2-80	AAA...A	Up to 79 alphameric characters containing a FORTRAN format specification which describes the correct record output. If the specification is completed on this card, a right parenthesis follows the format. Not used for output options b, 0, or 1 in column 32.

OUTPUT RECORD FORMAT CONTINUATION CARDS (Optional)

Columns	Contain	Explanation
1-80	AAA...A	A continuation of the FORTRAN format specification described for the previous card, ending with a right parenthesis. Up to 4 continuation cards can be used.

ERROR RECORD FORMAT CARD (Optional)

Columns	Contain	Explanation
1	(	Left parenthesis
2-80	AAA...A	Up to 79 alphameric characters, containing a FORTRAN format specification that describes the format of an error record. If the specification is completed on this card, a right parenthesis follows the format. Used only for error output options 1 and 2 in column 54.

ERROR RECORD FORMAT CONTINUATION CARDS (Optional)

Columns	Contain	Explanation
1-80	AAA...A	A continuation of the format specification, ending with a right parenthesis. Up to 4 continuation cards can be used.

ERROR RECORD TITLE CARD (Optional)

Columns	Contain	Explanation
1-80	AAA...A	80 alphameric characters comprising the first 80 columns of the 132 column title line for the printed error record output. Up to 9 title lines represented by 2 cards each can be used. Column 58 on the INPUT/OUTPUT CONTROL CARD must contain the number of 132 column title lines to be printed if this option is used.

ERROR RECORD TITLE CONTINUATION CARD (Optional)

Columns	Contain	Explanation
1-52	AAA...A	52 alphameric characters comprising the last 52 columns of the 132 column title line for the printed error record output. This is the second card of the 2-card set needed for each title line.

H. USER SUPPLIED ERROR MESSAGE CARD

This set is included only if column 60 of the INPUT/OUTPUT CONTROL CARD contains a 1.

Two types of cards make up the set. First are the error messages of which a maximum of NOPER may be included. Second is the END OF ERROR MESSAGES CARD. If an ERROR MESSAGE CARD is not present for an operation encountering an error, only the standard message will print. When an ERROR MESSAGE CARD is included for an operation, the message will print following the standard message. However a number between

001 and 998 must always be specified in columns 78-80 of the operations cards using error messages when messages are desired. When only the standard messages are desired, the step number can be specified; any available number, if the step is not numbered.

ERROR MESSAGE CARD (Optional)

Columns	Contain	Explanation
1-3	XXX	3 unique numeric characters from 001-998 to be used in referencing this message. Column 60 on the INPUT/OUTPUT CONTROL CARD must contain a 1 if this option is used.
4	b	
5-80	AAA...A	Text of the error message. Any alphameric characters may be used.

END OF ERROR MESSAGES CARD (Optional)

Columns	Contain	Explanation
1-3	999	Sentinel signifying the end of error messages.

I. DATA LOT TITLE CARD

Columns	Contain	Explanation
1-80	AAA...A	Alphameric characters comprising a descriptive title to be printed at the top of each page of printed output for the data lot. This card must always be present. If data are BCD mode on cards, place the DATA LOT TITLE CARD at the head of the deck.

J. INPUT DATA CARDS

If input option 3 (column 17 of the INPUT/OUTPUT CONTROL CARD) has been selected, the input cards are placed here in the job stream.

K. MULTIPLE LOT PROCESSING

Users may process as many data lots as desired in one run without recompiling the EDIT Subsystem.

MULTIPLE LOT PROCESSING CONTINUE CARD (Optional)

Columns	Contain	Explanation
1-8	CONTINUE	Control word permitting like data sets to be processed with the same Job Control Deck. This card must be followed by the DATA LOT TITLE CARD for the next lot of data to be processed. Figure 2 illustrates the job setup.

L. OUTPUT TABLE CARDS

Tables used as input or formed by the ADD operation may be printed using the control cards described in this section. If this group of cards is not in the Job Control Deck, no tables will be printed. The use of these cards is optional.

The first card in the set, the OUTPUT TABLE NAMES CARD, lists the names of up to four tables to be printed side by side. All tables listed on one OUTPUT TABLE NAMES CARD must be of the same length. The table names must be the same as they appear on the ADD CONTROL CARD referencing the respective Output table. The OUTPUT TABLE FORMAT CARD follows. It contains a FORTRAN format specification for one line of printed table output. This pair of cards may be repeated as often as necessary, one pair after another, to describe all the required table output.

Output tables cannot be printed between lots when using the multiple lot processing option. Output tables will print following all lots in a processing run using one Job Control Deck if specified.

OUTPUT TABLE NAMES CARD (Optional)

Columns	Contain	Explanation
1-11	TABLEbNAMES	Card label. These cards are only used if Output tables are to be printed.

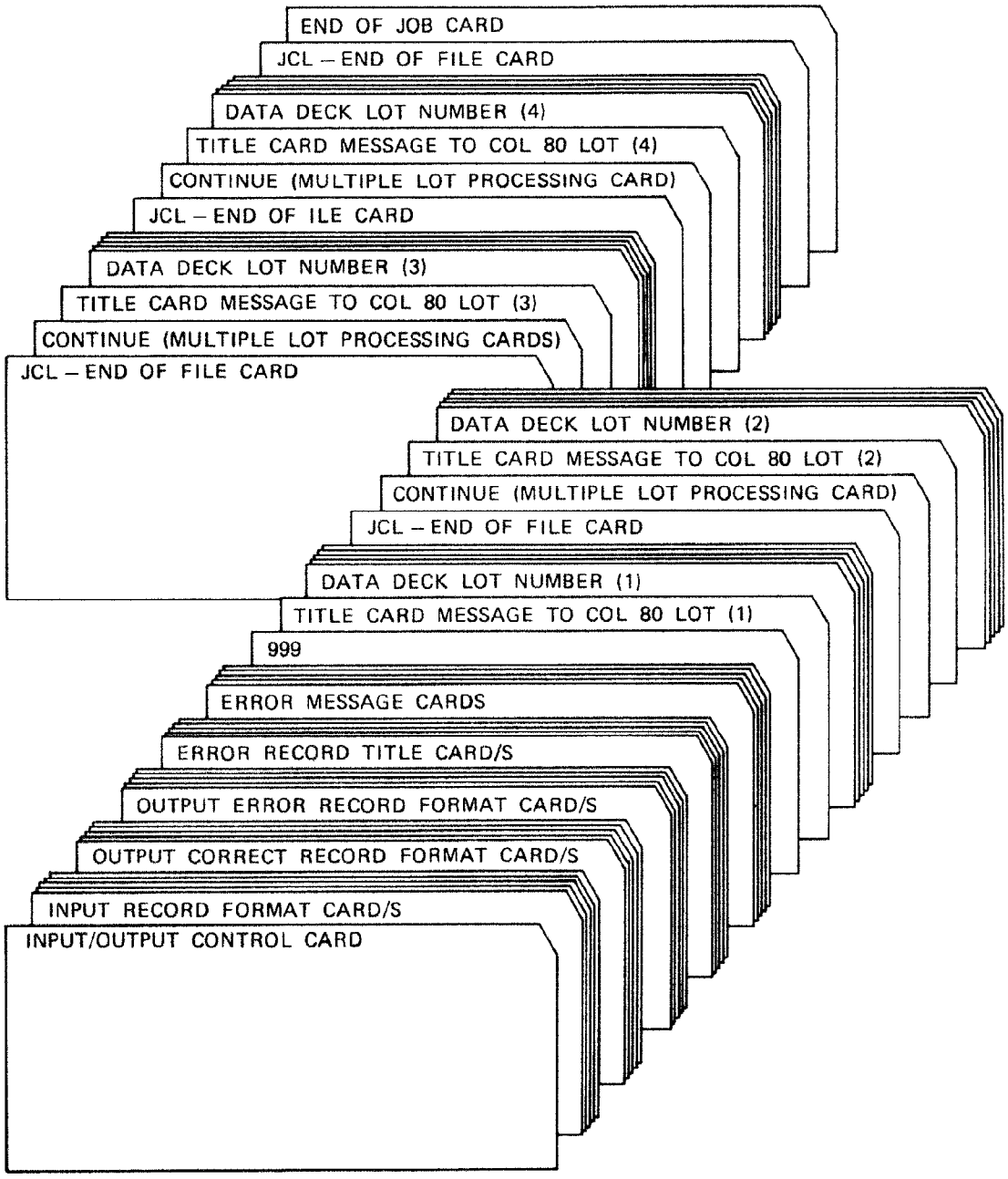


Figure 2.--Multiple Lot Processing--Use of the Continue Option

12-13	bb	
14-17	AAAA	4 alphameric characters, giving the name of the table to be printed in the first column of the table output. The name must be left-justified in the field, and must appear exactly as given in columns 70-73 or 74-77 of an ADD OPERATION CARD. The name is used to select the table to be printed, and is printed at the top of every page of table output. The names of up to 4 tables to be printed side by side may be listed in the following columns of this card. The order in which they are listed determines the order in which they are printed. Table names may be repeated if necessary. The tables must all be the same length.
18	b	
19-33	AAAA	Repetition of columns 14-18 format, giving the names of the remaining tables to be printed in the table output.

OUTPUT TABLE FORMAT CARD (Optional)

Columns	Contain	Explanation
1	(	Left parenthesis.
2-80	AAA...A	Up to 79 alphameric characters, ending with a right parenthesis, and containing a FORTRAN format specification for a line of printed table output. Input tables must be printed under I format with enough I fields to print each field of the input entry. Output tables must be printed under F format. The specification should be written so that the column for each table is centered under the table name that is printed at the top of each page. The table names are written as follows:

TABLE 1 in print positions 22-25.
TABLE 2 in print positions 47-50.
TABLE 3 in print positions 72-75.
TABLE 4 in print positions 97-100.

M. MULTIPLE JOB PROCESSING

Users may process additional Job Control Decks in one processing run without recompiling the EDIT Subsystem.

START OVER CARD (Optional)

Columns	Contain	Explanation
1-10	START OVER	Control word permitting dissimilar data sets to be processed with different Job Control Decks. This card acts as the END OF JOB CARD for the previous Job Control Deck. It must be followed by the CONTROL DECK TITLE CARD for the new Job Control Deck to be processed. Figure 3 illustrates the job setup.

N. END OF JOB CARD

Columns	Contain	Explanation
1-10	ENDbOFbJOB	A control word signifying the end of the job specification. It must always be the last card of the Job Control Deck unless multiple lot or multiple job processing will be used. See the following sections for an explanation.

III. MESSAGES PRINTED DURING EXECUTION

EDIT-2 performs a variety of checks on the Job Control Deck in preparation for execution of the actual edit steps. Possible sources of error on individual control cards are indicated by one of the following error messages. In addition to these EDIT-2 produced messages, the operating system under which the subsystem is being executed may produce its own messages. The consequences of these messages should be determined by consulting with the local systems representative.

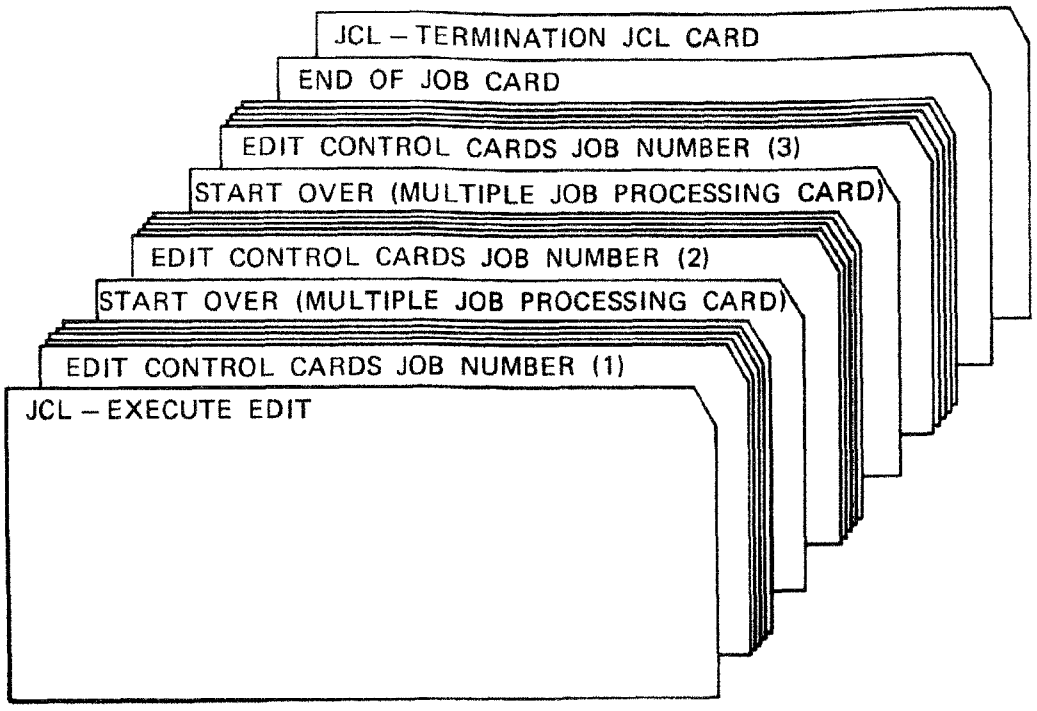


Figure 3.--Multiple Job Processing--Use of the Start Over Option

The following 39 messages are produced by EDIT-2. They are displayed in order by the subroutine which prints them.

SUBROUTINE	NUMBER OF MESSAGES
SUB1	20
SUB2	11
SUB3	4
SUB4	4

Also printed is a storage utilization summary. The first half of this summary is printed by SUB1, the second half by SUB2.

A. SUB1 MESSAGES

1. PASS IDENTIFICATION CARD IS MISSING

This message occurs if the first four columns of the PASS IDENTIFICATION CARD are not PASS. The card may be punched incorrectly, or may be out of order in the deck. Correct the error and start processing from the beginning.

2. ERROR IN INPUT TABLE NAME CARD, CORRECT AND REPROCESS

This message is printed if certain logical relationships specified on the INPUT TABLE NAME CARD do not hold. The image read probably will be an extra entry card from the previous Input table. The logical relationships are (1) the field width must be specified for each field of an entry, (2) the other field widths must be blank or zero.

3. THE NUMBER OF COLUMNS PER ENTRY TIMES THE NUMBER OF ENTRIES PER CARD IS GREATER THAN 80

This message pertains to the INPUT TABLE NAME CARD. Either the image read was not a table name card or the mentioned values are mispunched.

4. ENTRY OUT OF SEQUENCE, TABLE AAAA ENTRY NUMBER YYYYY

This message is printed if the cards comprising an Input table are not in ascending order, as required. AAAA is the table name from columns 1-4 of the INPUT TABLE NAME CARD. YYYYY is the card number in the table. Correct the error and start processing from the beginning.

5. TABLE AAAA CONSISTING OF YYYYY ENTRIES HAS BEEN READ CORRECTLY

This message is printed each time an Input table has been read successfully. AAAA is the name of the table punched in columns 1-4 of the INPUT TABLE NAME CARD. YYYYY is the number of cards read for the table, taken from columns 6-10 of the INPUT TABLE NAME CARD.

6. TABLE NUMBER XX HAS EXCEEDED DIMENSIONED SPACE

This message is printed if the total number of entries in the Input tables is greater than dimensioned storage. XX is the number of the table in the input deck that was being read when available storage was exceeded. The number or size of Input tables must be reduced, or the available storage must be increased before processing can be started again from the beginning.

7. ERROR IN TABLE ENTRY ABOVE

This message refers to the input constants. It is printed if column 1 of an entry does not contain L or if the constant was previously defined. The END or NONE cards for the input constants may be missing.

8. COLUMNS 57 to 62 MUST INDICATE THE NUMBER OF FIELDS USED TO DESIGNATE GENERATED VALUES

This message is only printed for the GENERATE operation if the number of fields used to designate generated values is not specified.

9. OPERATION NAME HAS BEEN MISSPELLED

Message prints if the operation name punched in columns 4-9 does not correspond to one of those mentioned in the section on edit operations. The card may be punched incorrectly or the FINISH OPERATION CARD may be missing.

10. TABULAR CONSTANT HAS ILLEGAL REFERENCE VALUE

The operation contains an input constant of the form LXX where XX decodes to zero. The offending constant may be mispunched.

11. CONSTANT LXX HAS NOT BEEN DEFINED

The constant was not defined in the table of input constants. The offending constant may be mispunched.

12. THIS OPERATION HAS NEITHER A SKIP STEP NUMBER NOR AN ERROR MESSAGE NUMBER

This message applies to operations LOGIC, LIST CHECK, CROSS CHECK, CROSS RANGE CHECK, SKIP, AND PRINT. These operations must have either an error message number punched in columns 78-80 or a skip step number punched in columns 51-53. They may have both options specified.

13. COLUMN 10 SHOULD BE EITHER I OR L

This message applies to operations LIST CHECK and CROSS CHECK. Column 10 must contain I or L to designate whether illegal or legal values are contained in the associated Input table.

14. COLUMN 10 SHOULD BE BLANK

This message refers to all operations except LIST CHECK and CROSS CHECK.

15. CHECK COLUMNS 70-77 FOR ILLEGAL OR UNDEFINED TABLES

Only operations LIST CHECK, CROSS CHECK, CROSS RANGE CHECK, GENERATE, and ADD may have tables defined in columns 70-73. Only the ADD operation may have a table defined in columns 74-77 and this definition is mandatory for the ADD operation.

16. AN OPERAND IS NOT SPECIFIED CORRECTLY

Message prints if an operand punched on an ARITHMETIC OPERATION CARD is not one of those allowed. Correct and start processing from the beginning.

17. TRUE FALSE DESIGNATION IS ABSENT

Each LOGIC OPERATION CARD must have a T or F punched in column 50.

18. THE SYMBOL AAAA IS INVALID

Message prints if a relational operator or connective on a LOGIC OPERATION CARD is not one of those allowed. AAAA is the symbol which is punched incorrectly. Correct and start processing from the beginning.

19. A LOGIC OPERATION HAS AN INVALID COMBINATION OF CONNECTIVES OR OPERATORS. EDIT STEP XXX

Message prints if the statement punched on a LOGIC OPERATION CARD is not one of the types specified.

20. XXXXX EDIT STEPS HAVE BEEN CALLED FOR YYYYYY EDIT STEPS HAVE BEEN PROVIDED FOR--CORRECT AND REPROCESS

Message prints when the number of operation cards exceeds the value of the variable NOPER. In the standard version, NOPER equal 400. XXXXX is the total number of operation cards read and YYYYYY is the value of NOPER. Change the number of operation cards or change the value of NOPER. Start processing from the beginning.

B. SUB2 MESSAGES

21. TABLE NAME AAAA CANNOT BE FOUND

Message prints if an Input table mentioned on an ADD, LIST CHECK, GENERATE, CROSS CHECK, OR CROSS RANGE CHECK OPERATION CARD cannot be found amongst the Input tables. AAAA is the name of the table which cannot be found. The table name may be mispunched on the operation card or the table may be missing from the Job Contrc Deck. Correct and start processing from the beginning.

22. ADD TABLE DEFINED IN OPERATION XXX HAS EXCEEDED DIMENSIONED SPACE

This message is printed if the total number of entries in the Iput tables plus the total number of cells occupied by ADD operation tables is greater than dimensioned space. XXX is the sequential number of the operation which defined the table which exceeded the maximum. The number or size of Input table and/or ADD tables must be reduced, or the available storage must be increased by changing NDIMEN before processing can be started again from the beginning.

23. MAXIMUM NUMBER OF INPUT TABLES HAS BEEN EXCEEDED

Message prints if the number of Input tables exceeds the value of the variable NTBLE. Reduce the number of Input tables or change the value of NTBLE. Correct and start processing from the beginning.

24. INCORRECT CARD IN UPDATE TABLES

Message prints if the UPDATE TABLE JOB SUMMARY CARD or the UPDATE TABLE IDENTIFICATION CARD or the UPDATE TABLE TITLE CARD is missing or out of order. Correct and start processing from beginning.

25. UPDATE TABLE AAAA CANNOT BE FOUND AMONG ADD OPERATION TABLES

Message prints if the table name punched in columns 45-48 of the UPDATE TABLE IDENTIFICATION CARD does not agree with one of the table names punched in columns 74-77 of the ADD OPERATION CARD. AAAA is the table name from the UPDATE TABLE IDENTIFICATION CARD. Correct and start processing from the beginning.

26. UPDATE TABLE CARDS OUT OF ORDER IN TABLE AAAA

Message prints if the cards comprising an Update table are out of sequence according to the sequence number punched in columns 4-8 of the UPDATE TABLE ENTRY CARD or if the table name punched in columns 77-80 of the same card is not identical to the name punched in columns 45-48 of the UPDATE TABLE IDENTIFICATION CARD. AAAA is the table name punched in columns 45-48 of the UPDATE TABLE IDENTIFICATION CARD. Correct and start processing from the beginning.

27. ERROR IN INPUT/OUTPUT CONTROL CARD, CORRECT AND RERUN

An error or inconsistency has been found on the INPUT/OUTPUT CONTROL CARD or the card is out of sequence. Correct and start processing from beginning.

28. INPUT MODE 4 REQUIRES BCD TAPE BLOCKING FACTOR AND NUMBER OF CHARACTERS PER RECORD

This message is only applicable to the INT/UNIVAC version of Subsystem EDIT-2. The indicated items must be recorded on the INPUT/OUTPUT CONTROL CARD.

29. INPUT MODE 5 REQUIRES BINARY TAPE BLOCKING FACTOR

This message is only applicable to the INT/UNIVAC version of Subsystem EDIT-2. The blocking factor must be recorded on the INPUT/OUTPUT CONTROL CARD.

30. 999 END CARD FOR USER SUPPLIED ERROR MESSAGES
IS MISSING OR THERE ARE TOO MANY ERROR MESSAGES.
THE PROGRAM IS SET UP TO HANDLE A MAXIMUM OF XXX.
PROCESSING TERMINATED.

The last card of the set of user supplied error message must be a 999 card. The program limit as to the number of error messages is NOPER.

31. ERRORS HAVE BEEN FOUND IN THE CONTROL DECK--
RUN ABORTED

Correct the errors and start processing from the beginning.

C. SUB3 MESSSAGES

32. THE OPERATIONS FORM AN INFINITE LOOP.
PROCESSING STOPPED.

This message occurs if a given input record takes more than NOPER edit steps to process.

33. XXXX ERRORS HAVE OCCURRED

Message prints if the maximum allowable number of errors specified on the INPUT/OUTPUT CONTROL CARD is exceeded. XXXX is the number of errors at that point. The run is terminated and, if specified, a set of Update tables is punched. To restart, processing must be started from the beginning using the update option on the PASS IDENTIFICATION CARD, columns 11-15, to conform with the number of records remaining to process. (It will be necessary to modify the input data set so that it contains only the unprocessed records.)

34. ERROR IN EDIT STEP XXX BRANCH POINT YYY CANNOT
BE FOUND. PROCESSING STOPPED.

This message is printed when, in the execution of the edit steps, it is discovered that the skip step number specified on operation XXX does not have a corresponding operation step YYY. Either step number XXX is mispunched or step YYY is missing. Correct and start processing from the beginning.

35. INPUT PARITY ERROR COUNT = XXX

The program will print this message each time a parity error or data check is encountered on an input record read. Actual circumtances causing branching through the error clause of a read statement may vary from system to system. Contact your local systems representative for assistance. The program terminates processing after 25 bad input records.

D. SUB4 MESSAGES

36. PASS XX PROCESSED YYYYY RECORDS OF WHICH ZZZZZ WERE FOUND CORRECT

Message prints after all input records have been processed. XX is the pass identification number from columns 6-7 of the PASS IDENTIFICATION CARD. YYYYY is the total number of records processed and should be the same as columns 11-15 of the INPUT/OUTPUT CONTROL CARD. ZZZZZ is the total number of records found correct. This is the number of records written on the output file depending upon the option taken in column 32 of the INPUT/OUTPUT CONTROL CARD.

37. THE INVALID TABLE NAME AAAA HAS BEEN REQUESTED FOR OUTPUT

Message prints if one of the names punched on the OUTPUT TABLE NAME CARD does not correspond with the name of an Input table or a table generated by an ADD operation. AAAA is the offending table name punched on the OUTPUT TABLE NAME CARD. Correct the card and start from the beginning, changing columns 11-15 of the INPUT/OUTPUT CONTROL CARD to 00000 and using the update option of the PASS IDENTIFICATION CARD with the Update tables punched for the current pass. This will cause only the final Output table to be processed.

38. THE TABLE AAAA DOES NOT HAVE THE SAME LENGTH AS OTHERS REQUESTED FOR OUTPUT

Message prints if one or more of the tables mentioned on an OUTPUT TABLE NAME CARD is not of the same length as the other to be printed beside it. AAAA is the name of the table taken from the OUTPUT TABLE NAME CARD. Correct the card and use the same restart procedure described for message 37.

39. TABLE OUTPUT CONTROL CARD INCORRECT

Message prints if columns 1-11 of the OUTPUT TABLE NAME CARD is not punched as one of the following:

TABLEbNAMES
CONTINUE
STARTbOVER
ENDbOFbJOB

Correct the card and use the same restart procedure described for message 37.

E. STORAGE UTILIZATION SUMMARY

This brief summary is printed after all the edit steps have been read. It is provided for users to show how close they are to exceeding the dimension limits built into Subsystem EDIT-2. These limits can, of course, be overriden. The only subroutine which must be modifed is MAIN. (See SUBPROGRAM NAMES AND FUNCTIONS; also see IMPORTANT ARRAYS AND VARIABLES in particular regard to variable dimension limits NOPER, NTBLE, and NDIMEN.) An example of this summary is shown below:

STORAGE UTILIZATION SUMMARY ...

	AVAILABLE	USED
EDIT STEPS	400	60
CONSTANTS	99	1
TABLES INPUT		11
OUTPUT		3
TOTAL	40	14
TABLE SPACE	8,000	42

IV. OPERATING INSTRUCTIONS--INFORMATION FOR PROGRAMERS

A. DIMENSIONED SPACE

There are restrictions on both the dimensions and the overall size of problems that can be handled in a single EDIT-2 processing run. These are the results of the manner in which dimensioned space has been allocated and of the total space available in a given operating system. The subsystem has been written so that all modifications of dimensioned space can be made in the subprogram called MAIN.

Summary of dimensioned-space restrictions and associated program variables and arrays

Item	Restriction	Variable	Arrays
Maximum number of cells in all input and output table entries	8,000	NDIMEN	ZIMP, IMP
Maximum number of fields/record	200	KKVAR	PDATA, NDATA PLOT, IPLOT
Maximum number of input and output tables	40	NTBLE	NTAB, PNTAB
Maximum number of program operations	400	NOPER	NOVAR, NCONST, NAME, PNAME, CONST, IPROG, NESTP, NERMES, NUM

B. INPUT/OUTPUT UNIT ASSIGNMENTS

Subsystem EDIT-2 accepts data and control information by several input devices; the output of the edited data can be received in several forms. The following are the input/output unit assignments in the standard version of the program:

UNIT	USE
10	Input data in binary or BCD mode.
2	Output of correct records in binary or BCD mode.
5	Input program deck, job control, EDIT control and data (when data are entered on cards).
6	Printed output of correct records, error records, tables, and other messages.
7	Punched output of correct records, error records, and Update tables.

Any or all of these assignments can be changed in subprogram MAIN to satisfy local requirements.

C. USE OF THE CALCULATE OPERATION

The EDIT-2 Subsystem includes a dummy subroutine named CALCUL which can be called as a step or steps in the editing sequence. To use this feature, the dummy subroutine must be replaced by another subroutine of the same name, but programed in FORTRAN IV to accomplish the desired data operations. The subroutine has the following calling sequence and DIMENSION statement:

```
      SUBROUTINE CALCUL(ISWTCH,IBRNCH,NDATA,PDATA,IPLOT,PLOT,
     1 KKVAR,INERR,LU6,LINE,LSTEP)
      DIMENSION NDATA(KKVAR),PDATA(KKVAR),IPLOT(KKVAR),PLOT(KKVAR)
```

The arrays, NDATA and PDATA, contain the data fields of the unit record currently being processed. To retrieve or to store information, the user must reference either PDATA or NDATA by appropriate data-field identification numbers. If the information is fixed-point quantity, the name NDATA is used. If it is floating-point quantity, the name PDATA is used.

For example, the following subroutine adds the values in data fields 1 and 2, and stores the resulting value in data field 27; and it divides the value in data field 101 by the value in data field 11, and stores the resulting value in data field 15:

```
      SUBROUTINE CALCUL (ISWTCH,IBRNCH,NDATA,PDATA,IPLOT,PLOT,
     1 KKVAR,INERR,LU6,LINE,LSTEP)
      DIMENSION NDATA(KKVAR),PDATA(KKVAR),IPLOT(KKVAR),PLOT(KKVAR)
      NDATA(27)=NDATA(1)+NDATA(2)
      PDATA(15)=PDATA(101)/PDATA(11)
      RETURN
      END
```

The first (add) arithmetic statement illustrates an operation done entirely in fixed-point arithmetic. The data fields in the right-hand side of the statement must have been read as fixed-point numbers or, if read as floating-point numbers, must have been converted to fixed-point by the FIX operation. The second (divide) arithmetic statement illustrates an operation done entirely in floating-point arithmetic. The data fields in the right-hand side of the statement must have been read as floating-point numbers, or, if read as fixed-point numbers, must have been converted to floating-point by the FLOAT operation.

The variable ISWTCH may be ignored. This variable is used only for multiple entries into subroutine CALCUL.

The variable IBRNCH contains the fixed-point number punched in columns 57-62 of the given CALCUL operation card. If more than one calculate operation is used, IBRNCH can be used to branch to the appropriate part of the calculate subroutine; moreover, this option allows construction of a conglomerate subroutine CALCUL which can be called by several EDIT-2 Job Control Decks with the appropriate calculate operations within each separate job being performed on the basis of IBRNCH.

The variable INERR acts as a switch for printing the user-supplied error message specified in columns 78-80 of the given CALCUL operation card and/or for skipping to the edit step number specified in columns 51-53 of the given CALCUL operation card. INERR may be ignored if these options are not used. The switch values are as follows:

INERR=0 No printing or skipping

INERR=1 Print and/or skip

INERR does not have to be set to zero in the CALCUL subroutine since this is done in subroutine SUB3 before each call to CALCUL.

Variables LU6 (printer logical unit), LINE, and LSTEP allow error messages and partial prints to be written directly out of subroutine CALCUL. LINE is the print line counter for subroutine SUB3. LSTEP is the operation step number punched in columns 1-3 of the given CALCUL operation card. These variables may be ignored unless used.

D. SUBPROGRAM NAMES AND FUNCTIONS

MAIN	The main calling sequence of Subsystem EDIT-2. It sets array dimensions and calls SUB1, SUB2, SUB3, and SUB4 in that order.
SUB1	Reads all Input table and operation cards. Checks for consistency and sets up necessary information for using each operation called.
SUB2	Reads Update table (if present) and all control cards containing input and output record descriptions. Reads headings for printed output. Reads list of user supplied error messages. Sets up all necessary information for input/output.
SUB3	Processes all input data according to operation described in the Job Control Deck. Writes out records which are in error.
SUB4	Reads all table output control cards and prints any table requested.
PACK	Packs each field in a table entry with a 32-bit word. Called by SUB1 and SUB3.
LEFTAB	Searches in IMP, ZIMP array when leftmost table field is the argument.
ALLTAB	Searches table in IMP, ZIMP array when entire entry is used as an argument.
UNPACK	Unpacks a 32-bit word composed of a packed data field or a table entry.
RESTAR	Punches out ADD tables (for restart or update) at end of processing, or if number of errors is greater than expected.

CALCUL	A dummy subroutine which is called by the calculate operation. It may be programed by the user to perform any record processing operations not provided for by other program operations.
SYSSUB	Decodes BCD words for SUB1.

E. IMPORTANT ARRAYS AND VARIABLES

The following are the principal variables and arrays used in Subsystem EDIT-2:

Variable or Array	Dimension	
NW	9	Fixed-point working storage
NPSTEP	1	Total number of program operations
ISTEP	1	The index or identification number (sequential) of the program operation currently being executed
IVAR	1	The number of input data fields
NTAB, PNTAB	NTBLE x 15	Indexing information for the tables; where NTBLE is the number of tables and the second dimension locations are used as follows: 1 Index of the first table value in IMP 2 Index of the final table value in IMP 3 Index of table midpoint 4 Index of first quartile 5 Index of third quartile 6-14 Number of positions, in octal, occupied by each field of a table entry 15 Number of fields in a table entry
NCVT	8	Field widths of a table entry, in bits
NWORK	9	Working storage
IPROG	NOPER	Identification number of the program operation used in each program step
NOVAR	NOPER x 10	Identification numbers of each data field used in each program step, in order listed on operation cards
NCONST, CONST	NOPER x 2	Value of the constant used in each program step, if any. The value referred to as C01 on the operation card is stored in the first location of the second dimension, and C02 is stored in the second location

NAME	NOPER x 4	Identification of Input tables used in each program step, if any; where the locations of the second dimension are used as follows: 1 Identification number of the first table used in the program step 2 Identification number of the second table used in the program step 3 Alphameric name of the first table 4 Alphameric name of the second table
FIN	100	Storage for the read-in format specifications for input data
IMP, ZIMP	NDIMEN	Storage array for all Input and Output tables
NDATA, PDATA	KKVAR	Storage array for all data fields (input and generated) of the unit record currently being processed
IWIDTH, PWIDTH	13	Storage array for Output-table scale factors
FOUT	100	Storage array for correct record output format specification
FERR	100	Storage array for error output format specification
TITLE	20	Storage array for the title for all printed output
NMODE	1	Number identifying the mode in which the input data are written: 1 equals binary; 2 equals BCD
NTVAR	1	Total number of data fields output for a correct record
NCHAR	1	Number identifying the output options
NESTP	NOPER	Identification number of each edit operation step
NELIST	998	Index reference array for user-supplied error messages
NERMES	NOPER x 19	Storage array for user-supplied error messages
CLIST	99	Storage array for input constants

IPLOT, PLOT	KKVAR	Storage array for all data fields (input and generated) of the plot variables. These are variables common to a series of input records
NUM	NOPER	Identification number of the user-supplied error message associated with a given edit operation step
JTITLE	300	Storage array for heading of printed listing

F. BIT MANIPULATION

EDIT-2 stores Input tables required for some operations by packing several fields into single fixed-point words. Some operation controls (those for FIX, FLOAT, LOGIC, AND ARITHE) are stored by packing data-field identification numbers and operation options into the same word. In each case, the words are packed and unpacked by the use of binary arithmetic. The standard subsystem decks will not function properly on machines using either larger or smaller numbers of bits in fixed-point operations unless the shift constants that are used to pack and unpack are changed to correspond with the number of bits per word in that particular machine. The subprograms PACK, UNPACK, and SUB2 perform these bit manipulations.

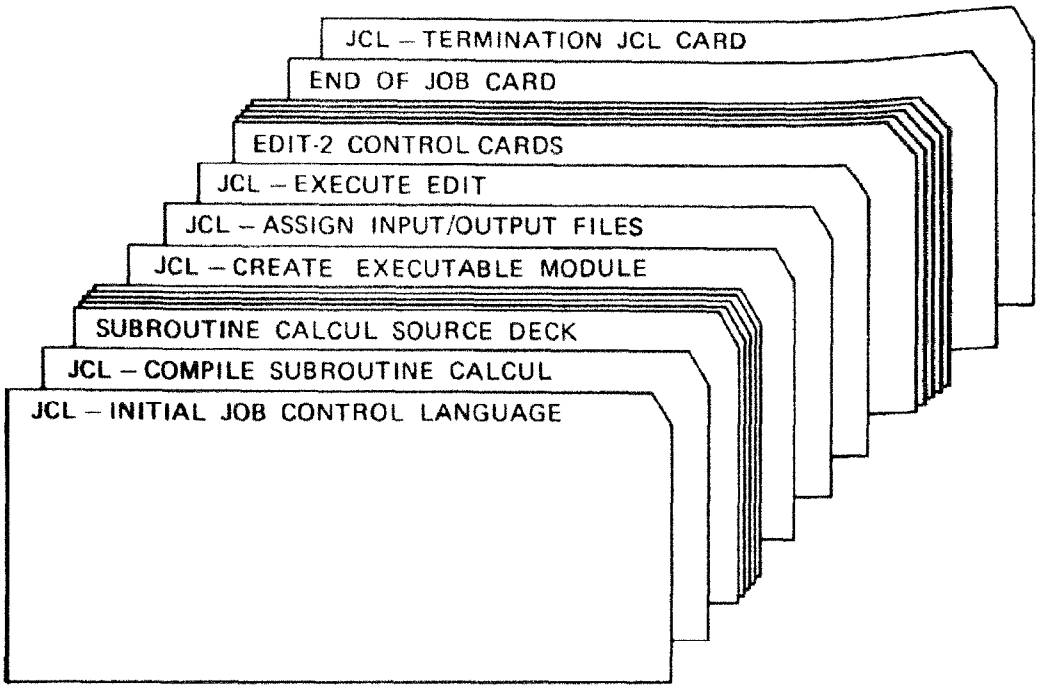


Figure 4. --EDIT-2 Run Stream

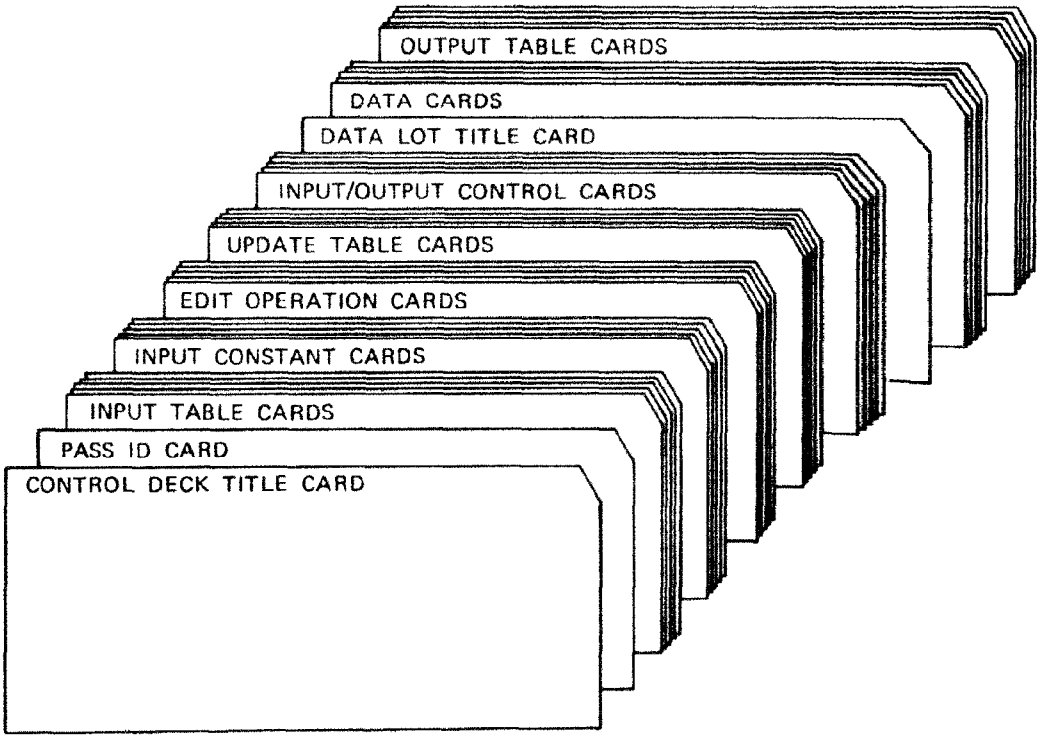


Figure 5. --Job Control Deck

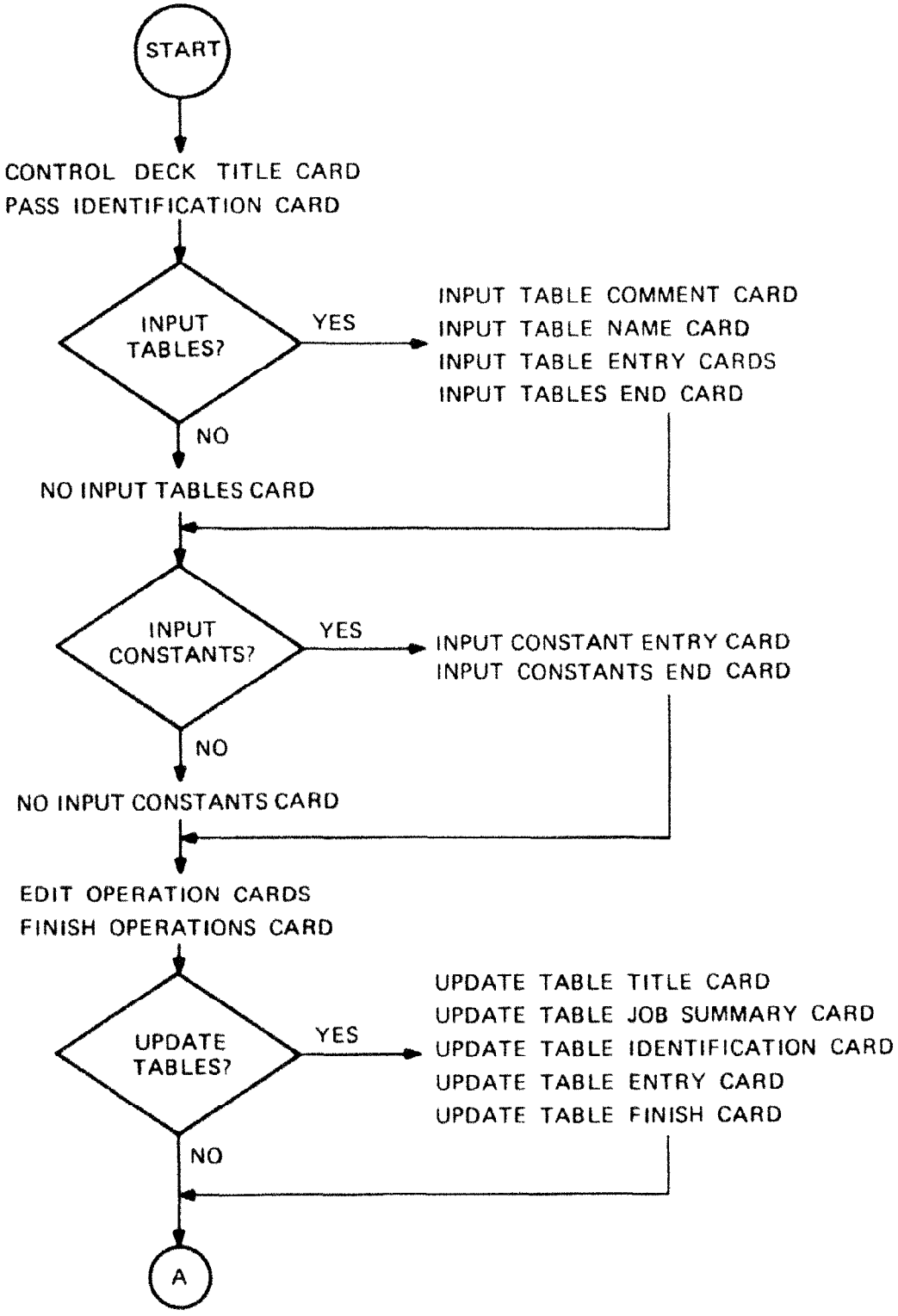


Figure 6.--A DECISION TREE--Setting Up the Job Control Deck (cont'd.)

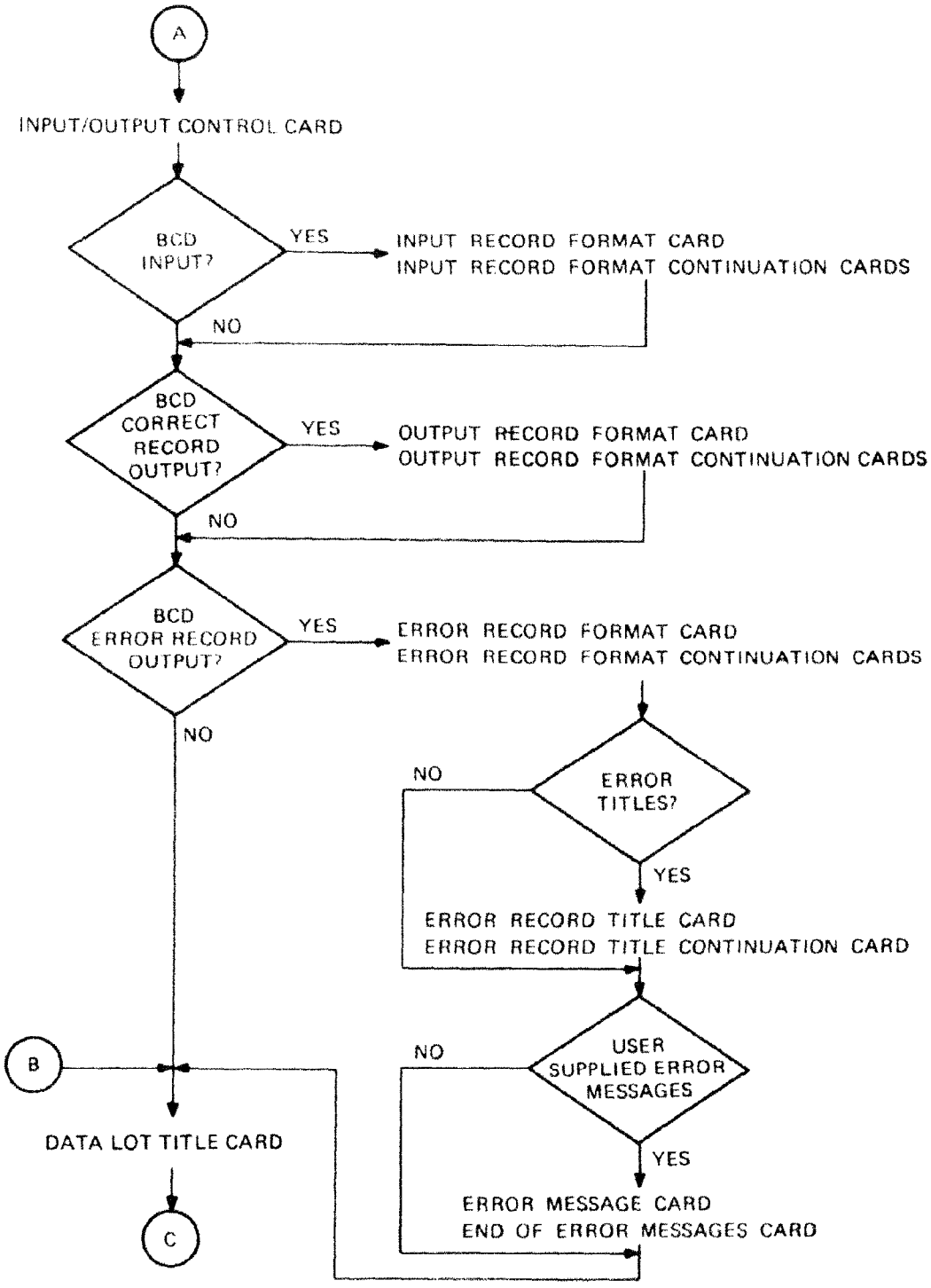


Figure 6.--A DECISION TREE-Setting Up the Job Control Deck (cont'd.)

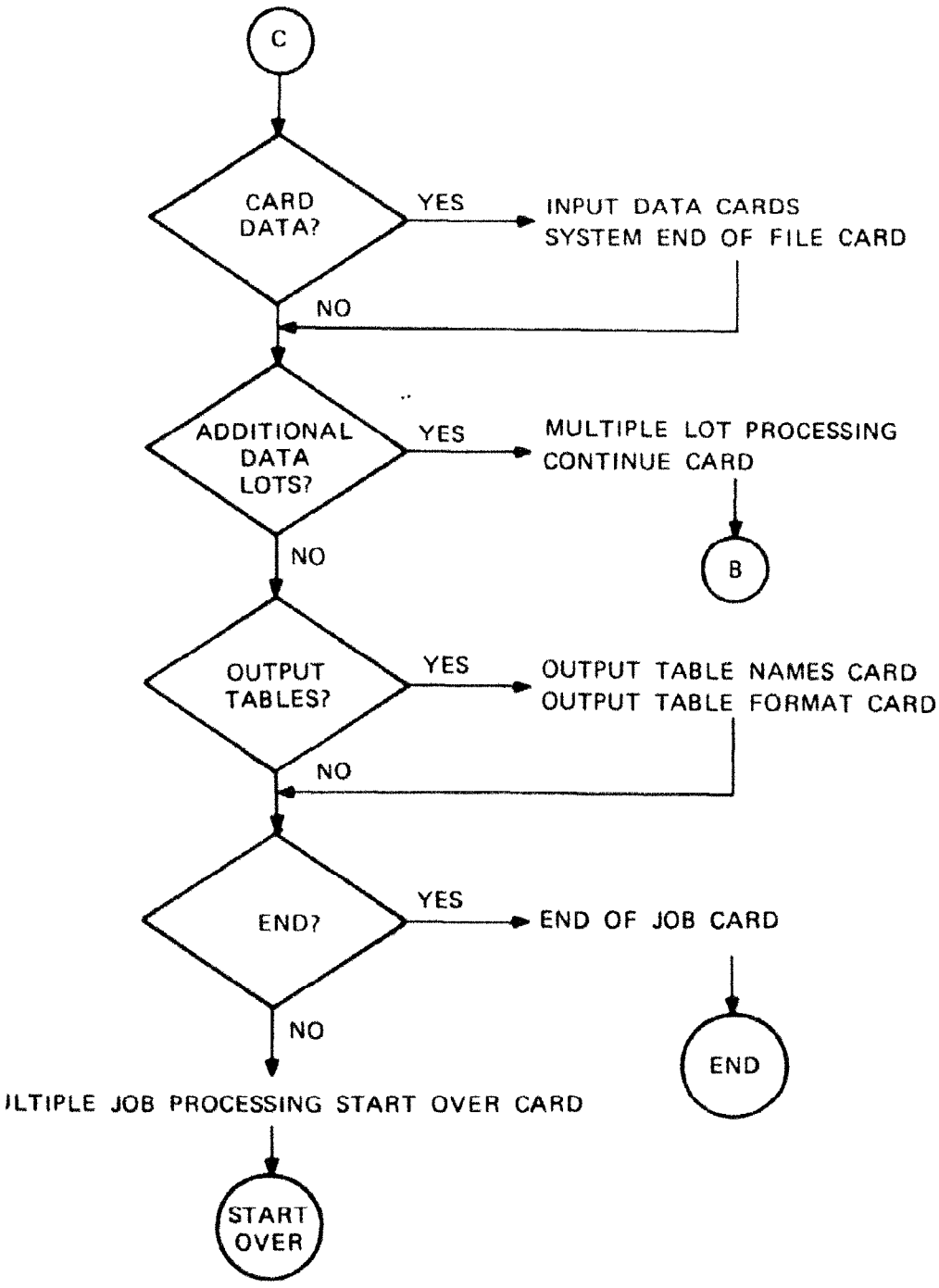


Figure 6.--A DECISION TREE--Setting Up the Job Control Deck

LIBRARY CARD

Barnard, Joseph E., and J. David Born.
1978. FINSYS-2: Subsystem EDIT-2. Northeast.
For. Exp. Stn., Broomall, Pa.
68 p., illus.
(U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. NE-43)

A computer software package for the editing of resource inventory data is described. The flexibility of the system in performing user-designated functions also is described. Full instructions for the operation of tye system are included.

(100.2)--524.6

Keywords: Data processing, edit, forest inventory

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

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