

SERIES 200

EASYTAB UTILITY PROGRAMS

GENERAL SYSTEM:

SERIES 200/BASIC PROGRAMMING SYSTEM

SUBJECT:

Programming and Operating Information for the EASYTAB Utility Programs, Which Perform Tabulating Functions on Series 200 Computers

SPECIAL INSTRUCTIONS:

This software manual supersedes the EASYTAB Utility Programs software manual dated January 28, 1966, and contains revisions and additions to the descriptions and operational characteristics previously described. In addition, the description and operating characteristics of the Update B program, which enables the user to create and maintain object program tapes, are included in the appendix.

DATE: May 10, 1966

FILE NO. 123.6005.000B.1-206*

8889

5166

8566

Printed in U. S. A.

*When ordering this publication please specify Title and Underscored portion of File Number.

FOREWORD

This publication contains programming and operating information for EASYTAB, a set of programs including and extending the functions of standard tabulating equipment. Card or tape files can be altered, merged, or converted to other media. They can be reproduced with or without reformatting. File items can be selected, sorted, and displayed in tabulated output reports.

The EASYTAB programs operate in the Basic Programming System using a Series 200 processor having at least 8K characters of main memory. All programs read, print, and punch in the standard Series 200 code which is used on most tabulating equipment.

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SECTION I
INTRODUCTION TO EASYTAB

The Easytab system performs tabulating functions on any Series 200 computer. For example, the use of Easytab on the Model 120 computer is believed to be the soundest approach available to organizations that have outgrown tabulating equipment and are planning to use computers for the first time. Such organizations can expect to obtain the following advantages from the transition to Easytab:

1. **HIGH-DENSITY, LOW-COST STORAGE.** Magnetic tape offers lower cost per unit of data storage than do punched cards. Files are more compact: an Easytab magnetic tape reel holds more than 60,000 eighty-character items — more data than is contained in a 41-foot tray of cards.
2. **HIGH-SPEED OPERATION.** The peripheral simultaneity and high internal speed of the Series 200 processors, together with the high information rate of magnetic tape drives, yield significant reductions in running time per job. For example, the card reader, the printer, and a tape drive can operate simultaneously with computing — and with no reduction in data transfer rates. This read-write-compute simultaneity means that the Easytab programs process high-volume jobs more rapidly than several tabulating machines operating at once.
3. **LESS MANUAL INTERVENTION.** Whereas a tabulating-equipment run may be impeded by the need for frequent intervention, an equivalent Easytab run requires much less intervention. To use an Easytab program, the programmer prepares one or more parameter cards to request the appropriate options. He inserts these cards in the input deck and then runs the program. Personnel costs per job are reduced: the installation can accommodate more jobs per unit of time without requiring the services of additional operating personnel.

Although the transition to Easytab involves new equipment, the data processing procedures and the formats of the data files remain essentially unchanged. A data file is still processed as a series of eighty-character items. The important difference is that the items can be stored on magnetic tape.

THE EASYTAB PROGRAMS

The Easytab system currently includes seven programs which are described in the following sections. The functions of these programs include and extend the functions of tab equipment (i. e., sorters, collators, reproducers, etc.). All of these programs except Sort B are written in the COBOL B language. One of the advantages afforded by the use of COBOL is ease of program maintenance. The programmer can modify his Easytab programs with a few source-language statements which he implements by recompiling his program. For

example, when he adds additional memory to his system, he can enlarge the appropriate tape records in the Easytab programs to take advantage of the additional memory.

COBOL COMPILER B

If the programmer wants to perform specialized processing to supplement the capabilities of the standard Easytab programs, he can write his own coding in the COBOL B language (Common Business Oriented Language). This easily learned language uses common business terms in data processing expressions that closely resemble the English language. The COBOL compiler translates the programmer's source COBOL statements into object code that the computer can execute. A COBOL program needs to be written and compiled only once; the compiled program can be used repeatedly in production runs.

COBOL offers these advantages:

1. **EASE OF MAINTENANCE.** The modular design of the language permits programs to be modified easily to reflect new data processing requirements or to take advantage of the additional capabilities of a larger Series 200 model.
2. **CLARITY.** A program written in COBOL B can be understood by a person with little background in data processing — and by a programmer who did not write the program but who is called upon to revise it.
3. **SIMPLICITY.** Minimal training is required of the person who writes COBOL programs, whether he is familiar with Series 200 computers or not: the language is problem-oriented rather than computer-oriented.
4. **SMALL MEMORY REQUIREMENT.** COBOL B requires only 8,192 characters of main memory for compilation, the least amount of memory yet required for any COBOL compiler. Yet it contains all the language elements needed to express virtually any business data processing procedure.

SECTION II
THE MERGE B PROGRAM

The Merge B program combines two ordered files into one ordered file in one of four ways:

1. MATCH MERGE. Matched items in both files are merged into an output file (tape drive 3). Non-matched items in both files can be punched into cards or printed. If columns 18 and 19 of the parameter card are blank, non-matched items in the primary input file are ignored; if PL, they are printed; and if PP, they are punched. Similarly, columns 21 and 22 control the output of the non-matched items from the secondary file.
2. NORMAL MERGE. All items in both files are merged onto the output file (tape drive 3).
3. SELECT PRIMARY. Matched items in both files are merged onto the output file (tape drive 3). Non-matched items in only the primary file are punched or printed, depending on columns 15 through 19 of the parameter card.
4. SELECT SECONDARY. Matched items in both files are merged onto the output file (tape drive 3). Non-matched items in only the secondary file are punched or printed, depending on columns 21 and 22 of the parameter card.

Items in the primary input file are compared with items in the secondary input file as follows. In the primary item, the characters in the key field specified by columns 25 through 28 of the parameter card are compared with an equal number of secondary-input-item characters that are specified by columns 45 through 48 of the parameter card. Comparison begins with the major pair of key fields; comparison is performed for successive pairs of minor key fields which are specified by successive pairs of position keys, depending on the number of such pairs specified in column 7 of the parameter card. A maximum of five key fields can be used.

When all required comparisons have been performed for a given pair of items, the action taken depends on the type of run specified in columns 9 and 10 of the parameter card.

The key fields in a given secondary-input-file item need not occupy the same character positions as they occupy in the primary-input-file item, but each file must be ordered on these keys, and both files must be ordered in the same direction (viz., ascending or descending).

INPUTS

Either the primary or the secondary input file can be on cards; both can be on tape. Multi-reel input files are acceptable. If a Type 214-2 or Type 224 Card Reader/Punch is used, only one card operation (reading or punching) can be performed in a given run. If a separate card punch and card reader are available, both reading and punching can be performed in a given run.

OUTPUTS

The merged output file occupies one or more reels of tape. Non-matched primary or secondary items can be printed or punched.

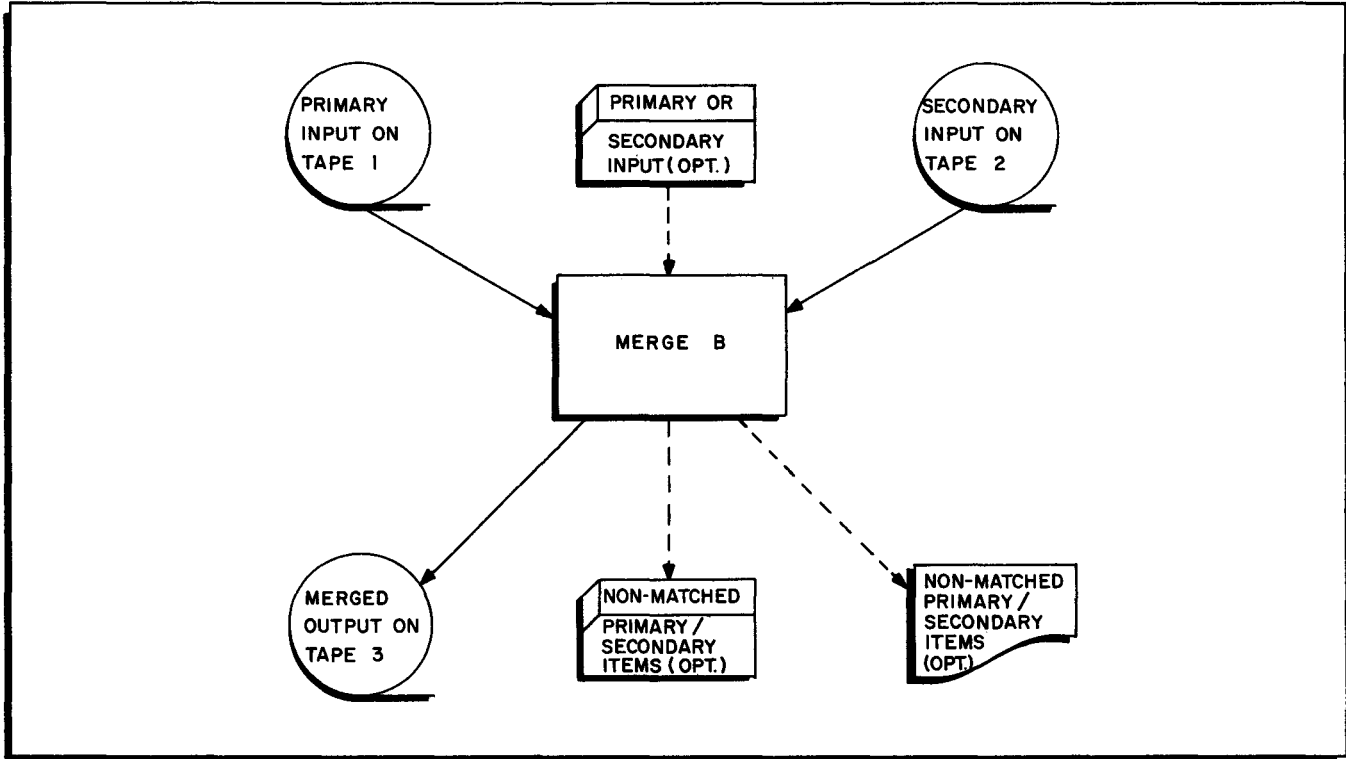


Figure 2-1. The Merge B Program





EASYTAB - MERGE

Date _____

I.D. _____

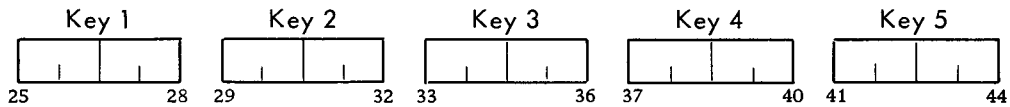
APPLICATION _____

Author _____

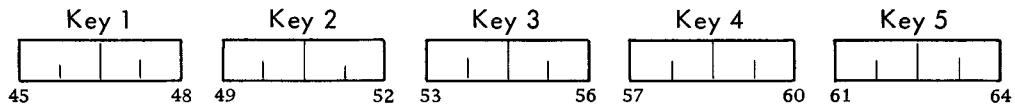
M E R G E
1 5

NO. OF KEYS	FUNCTION	PRIMARY INPUT	SECONDARY INPUT	SELECTED PRIMARY OUTPUT	SELECTED SECONDARY OUTPUT
7	9 10	12 13	15 16	18 19	21 22
1 to 5	SP = Select Primary SS = Select Secondary MM = Match Merge NM = Normal Merge	PC = Card PT = Tape	SC = Card ST = Tape	PL = Printer PP = Punch	SL = Printer SP = Punch

PRIMARY KEYS



SECONDARY KEYS



Keys are in descending order - Major is Key 1, Lowest Minor is Key 5.

INPUT DATA SPECIFICATIONS

The coding form on the facing page facilitates preparation of the parameter card needed to specialize the Merge B program. The template at the right summarizes the corresponding specifications which are detailed in Table 2-1.

The life-size templates on the margins of the following pages can be aligned directly on an 80-column coding form, though the programmer may prefer to use the specialized form illustrated with each program description.

MERGE B PARAMETER CODING FORM TEMPLATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80						
MERGE																						number key fields		1 2 3 4 5		function		MM NM SP SS		primary input		PC PT		secondary input		SC ST		primary output		PL PP		secondary output		SL SP		Key 1		length		beginning position		Key 2		length		beginning position		Key 3		length		beginning position		Key 4		length		beginning position		Key 5		length		beginning position											
																						primary input file		Key 1		length		beginning position		Key 2		length		beginning position		Key 3		length		beginning position		Key 4		length		beginning position		Key 5		length		beginning position		secondary input file		Key 1		length		beginning position		Key 2		length		beginning position		Key 3		length		beginning position		Key 4		length		beginning position		Key 5		length		beginning position	

SECTION II. THE MERGE B PROGRAM

Table 2-1. Merge B Parameter Card Specifications

Column(s)	Contents	Interpretation
1-5	MERGE	Specify that the Merge B program is to be executed.
6	blank	Not used.
7	n	NUMBER OF KEY FIELDS USED. A digit in the range 1-5.
8	blank	Not used.
9-10	FUNCTION. Specify the type of function desired:	
	MM	MATCH MERGE.
	NM	NORMAL MERGE.
	SP	SELECT PRIMARY.
	SS	SELECT SECONDARY.
11	blank	Not used.
12-13	PRIMARY INPUT MEDIUM. Specify whether the primary input file is on cards or tape:	
	PC	PRIMARY INPUT IS CARDS.
	PT	PRIMARY INPUT IS TAPE.
14	blank	Not used.
15-16	SECONDARY INPUT MEDIUM. Specify one of the following:	
	SC	SECONDARY INPUT IS CARDS
	ST	SECONDARY INPUT IS TAPE.
17	blank	Not used.
18-19	NON-MATCHED PRIMARY OUTPUT MEDIUM. If columns 9-10 contain NM or SS, columns 18-19 are ignored and the output device is tape 3. If they contain MM or SP, the main output device is tape 3 and the non-matched primary items are output as follows:	
	PL	LINE PRINTER.
	PP	CARD PUNCH.
20	blank	Not used.
21-22	NON-MATCHED SECONDARY OUTPUT MEDIUM. If columns 9-10 contain NM or SP, columns 21-22 are ignored and the output device is tape 3. If they contain MM or SS, the main output device is tape 3 and the non-matched secondary items are output as follows:	
	PL	LINE PRINTER.
	PP	CARD PUNCH.
23-24	blank	Not used.
25-44	POSITION KEYS FOR THE PRIMARY INPUT FILE. Specify keys in descending sequence, major to minor, as follows:	
25-28	FIRST POSITION KEY FOR THE PRIMARY INPUT FILE. This is a two-part field:	

SECTION II. THE MERGE B PROGRAM

Table 2-1 (cont). Merge B Parameter Card Specifications

Column(s)	Contents	Interpretation
25-26	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit number in the range 01-80, specifying the character position in which the leftmost character of the key field appears.
27-28	nn	LENGTH OF THE KEY FIELD. A two-digit number in the range 01-80, specifying the number of character positions occupied by the key field. This parameter must equal the LENGTH parameter in the corresponding secondary-input-file key which is in columns 45-48.
29-32	SECOND POSITION KEY FOR THE PRIMARY INPUT FILE. Specifications are similar to those for columns 25-28.	
33-36	THIRD POSITION KEY FOR THE PRIMARY INPUT FILE.	
37-40	FOURTH POSITION KEY FOR THE PRIMARY INPUT FILE.	
41-44	FIFTH POSITION KEY FOR THE PRIMARY INPUT FILE.	
45-64	POSITION KEYS FOR THE SECONDARY INPUT FILE. Specifications are similar to those for columns 25-44.	
65-80	blank	Not used.

OPERATING PROCEDURES

The Merge B program can be run on any Series 200 computer having the following minimum equipment configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. Two magnetic tape units.
4. One card reader/punch, or a separate card reader and card punch.
5. One printer.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the contents of the Merge B parameter card. The general procedure is as follows:

1. If the primary file input is on tape, mount the primary input file on tape drive 1 and place it in "protect" status.
2. If the secondary file input is on tape, mount the secondary input file on tape drive 2 and place it in "protect" status.
3. Mount an available tape reel for the merged output on tape drive 3 and place it in "permit" status.
4. Initialize the printer.
5. Initialize the card punch, if used.

6. If the program is loaded from cards, the input deck consists of the Merge B program binary run deck, the Merge B parameter card, and either the primary or secondary file if one of the input files is on cards. If the program is loaded from tape, the input deck consists of a Console Call card for Merge B (see Appendix B), the Merge B parameter card, and a data deck if either of the input files is on cards. Place two or more blank cards at the end of the entire deck.
7. If the input files are in descending sequence, set SENSE switch 4 ON.

Loading the Merge B Program

The Merge B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and tape loading methods are described in Appendix B under the paragraph entitled "Program Loading."

Merge B Programmed Halts

The programmed halts unique to Merge B are given in Table 2-2. Loader B halts are given in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 2-2. Merge B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00001	Sequence error in primary input file.	Sort the file.
00000	00002	Sequence error in secondary input file.	Sort the file.
00000	00077	End of job.	Remove output.

SECTION III
THE SORT B PROGRAM

The Sort B program reads eighty-character items from the input file, sorts them on a maximum of eight key fields, and writes them as one sorted output file on magnetic tape.

INPUTS

The input file can be on cards or tape. The program sorts as many eighty-character items as can be contained on one full reel (2400 feet) of tape, viz., about 60,000 cards. If tape input is used, the input file can occupy a maximum of nine reels if the total input does not exceed one full reel.

OUTPUTS

The output file is written on tape. The printer displays any unreadable records so that they can be corrected. Output tape reel identification is provided as specified on the parameter card.

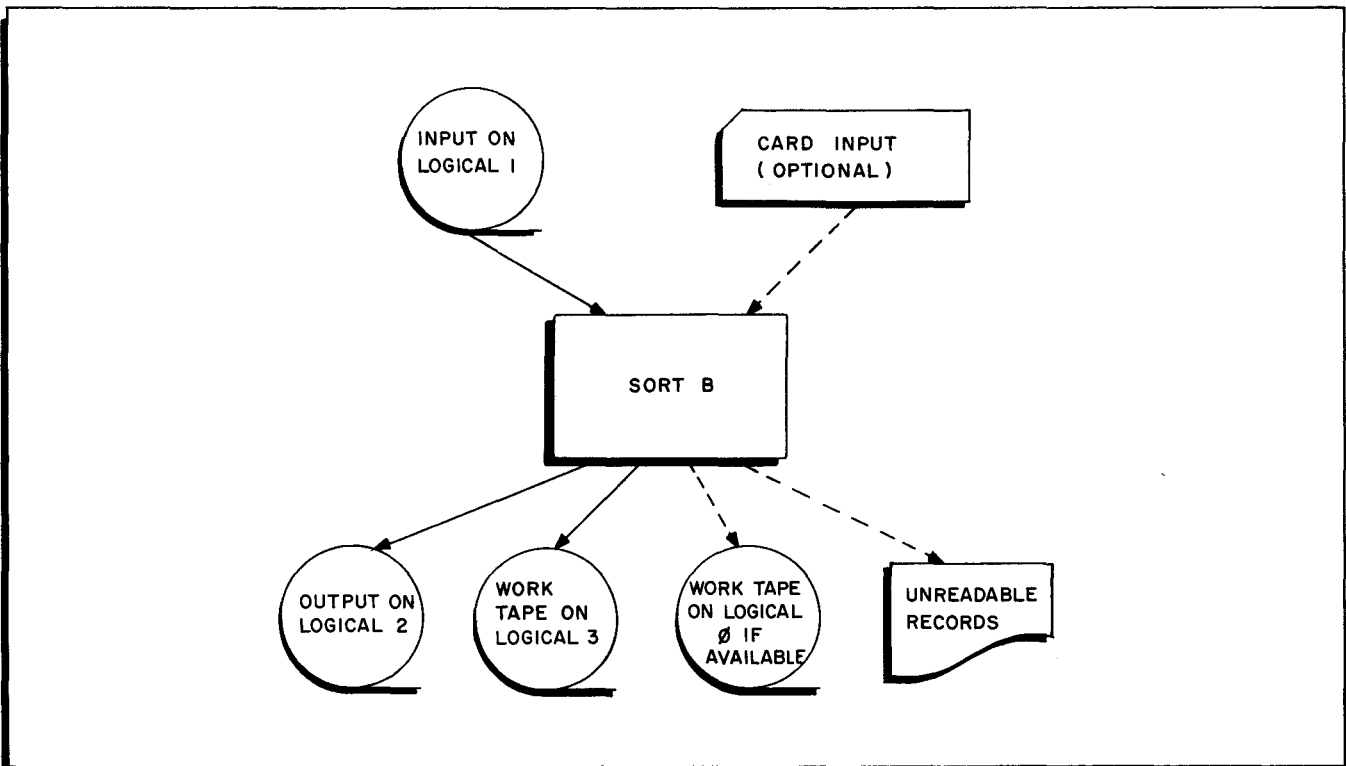


Figure 3-1. The Sort B Program

INPUT DATA SPECIFICATIONS

The coding form on the facing page facilitates preparation of the parameter card needed to specialize the Sort B program. The template at the right summarizes the corresponding specifications which are detailed in Table 3-1.

SORT B PARAMETER CODING FORM TEMPLATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
																			input file																			input reel (s) identification																			output reel (s) identification																						
																			key 1		length		beginning position		key 2		length		beginning position		key 3		length		beginning position		key 4		length		beginning position		key 5		length		beginning position		key 6		length		beginning position		key 7		length		beginning position		key 8		length		beginning position														
																																						# output items/record																			# input items/record																						
																																						# 4 K modules																			◀m▶																						
																																						# input reels																			◀D																						
																																						out sequence																			R-1																						
																																						replace I ?																			P																						
																																						4th. drive																			P																						
																																						input																			P																						
S O R T B																																																																															

SECTION III. THE SORT B PROGRAM

Table 3-1. Sort B Parameter Card Specifications

Column(s)	Contents	Interpretation
1-5	SORTB	Specify that the Sort B program is to be executed.
6	INPUT MEDIUM. C T	Specifies one of the following: CARD INPUT. TAPE INPUT.
7	AVAILABILITY OF FOURTH TAPE DRIVE. Specify one of the following: blank 4	A FOURTH DRIVE IS NOT AVAILABLE TO SORT B. A FOURTH DRIVE IS AVAILABLE TO SORT B.
8	REPLACE TAPE ONE? 1 R	If card input is used, leave this column blank; else specify one of the following: USE CURRENT TAPE ONE AS NEW WORK TAPE. This option can be used only if the total input does not exceed 30,000 items blocked two per record. Sort B preserves the input data and uses the remainder of the tape as a work tape. REWIND LOGICAL 1 AFTER THE INPUT IS READ. A new work tape must then be mounted to replace the rewound tape.
9	OUTPUT SEQUENCE. blank D	Specify the sequence of the output file: ASCENDING SEQUENCE. DESCENDING SEQUENCE.
10	n	NUMBER OF INPUT REELS. A decimal digit. If card input is used, leave this column blank.
11	AVAILABLE MEMORY. blank 3 4	Specify the number of 4K modules of main memory available to the Sort B program: TWO 4K MODULES (8,192 characters). THREE 4K MODULES (12,288 characters). FOUR 4K MODULES (16,384 characters).
12-14	blank	Not used.
15-16	BLOCKING FACTOR FOR INPUT FILE. blank or 02 nn	Standard EASYTAB magnetic tape files are blocked two 80-character items per record. Specify blocking as follows: TWO ITEMS PER RECORD. ITEMS PER RECORD, where nn is a two-digit number in the range 01-99.
17-18	BLOCKING FACTOR FOR OUTPUT FILE.	Specifications are similar to those for columns 15-16.
19	blank	Not used.

SECTION III. THE SORT B PROGRAM

Table 3-1 (cont). Sort B Parameter Card Specifications

Column(s)	Contents	Interpretation
20-58	POSITION KEYS FOR THE INPUT FILE. Specify keys in descending sequence. The first key is the major key, and the last or eighth key is the lowest minor key. Items are to be sorted on the fields addressed by these keys.	
20-23	FIRST POSITION KEY. This is a two-part field, as follows:	
20-21	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit number specifying the character position in which the leftmost character of the key field appears. Leading zeros must be punched.
22-23	nn	LENGTH OF THE KEY FIELD. A two-digit number specifying the number of character positions occupied by the key field.
24	blank	Not used.
25-28	SECOND POSITION KEY. Specifications are similar to those for columns 20-23.	
29	blank	Not used.
30-33	THIRD POSITION KEY.	
34	blank	Not used.
35-38	FOURTH POSITION KEY.	
39	blank	Not used.
40-43	FIFTH POSITION KEY.	
44	blank	Not used.
45-48	SIXTH POSITION KEY.	
49	blank	Not used.
50-53	SEVENTH POSITION KEY.	
54	blank	Not used.
55-58	EIGHTH POSITION KEY.	
59-60	blank	Not used.
61-80	LABEL CHECKING. If tape label checking is desired, specify the following two parameters; else leave these columns blank.	
61-70	x...x	IDENTIFICATION OF THE INPUT REEL(S). Alphanumeric. This identification must match columns 21-30 of the 1HDR record in the input file.
71-80	x...x	IDENTIFICATION OF THE OUTPUT REEL(S). Alphanumeric. This identification is written in columns 21-30 of the 1HDR header record.

OPERATING PROCEDURES

The Sort B program can be run on any Series 200 computer having the following minimum equipment configuration:

1. 8,192 characters of main memory. Additional memory is used to advantage.
2. Advanced programming instructions and the edit instruction.
3. Three tape drives if the Sort B program is loaded from cards; one additional tape drive is usable. Four tape drives if the Sort B program is loaded from tape.
4. One card reader.
5. One printer for printout of unreadable records.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the contents of the Sort B parameter card. The general procedure is as follows:

1. If the input file is on tape, mount the input reel on tape drive 1. If column 8 of the parameter card contains a "1", place the drive in "permit" status. If column 8 contains an "R", place the drive in "protect" status.
2. Mount an available tape for the sorted output on tape drive 2 and place the drive in "permit" status.
3. Mount a work tape on tape drive 3 and place it in "permit" status.
4. If column 7 of the parameter card contains a "4", mount a work tape on tape drive 0 and place it in "permit" status.
5. Initialize the printer to be used for printing unreadable records.
6. If the Sort B program is loaded from cards, the input deck consists of the Sort B program binary run deck with the parameter card inserted between segments ET and 01 and the input data deck (if on cards) inserted behind segment 07. If the program is loaded from tape, the input deck consists of a Console Call card for Sort B, a Sort B parameter card, and the input data deck (if on cards). The input deck is followed by one or more blank cards.

Loading the Sort B Program

The Sort B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and tape loading methods are described in Appendix B under the paragraph entitled "Program Loading."

Sort B Programmed Halts

All of the programmed halts within Sort B are given in Table 3-2.

An error message is displayed at the printer if an invalid parameter is detected. Other programmed halts in Sort B are accompanied by an appropriate display in the A-address and B-address registers, as described in the following index. The following abbreviations are used:

- t = an octal digit specifying the tape control. The standard Easytab assignment is 0.
- d = an octal digit specifying the tape drive.
- b = a buffer address

SECTION III. THE SORT B PROGRAM

Table 3-2. Sort B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
bbbb	00t1d	Occurs in all segments. A read error has been detected for the input file.	<ol style="list-style-type: none"> 1. To reread, press RUN. 2. To accept the record, set SENSE switch 1 ON and press RUN. 3. To delete the record (for presort and last pass), set SENSE switch 2 ON and press run. SENSE switch 2 has no effect on the merge.
bbbb	00t2d	Occurs in all segments. A write error has been detected.	To erase and rewrite the record, press RUN.
bbbb	00t4d	Occurs in presort. Wrong length data record has been detected.	<ol style="list-style-type: none"> 1. To drop the record, set SENSE switch 2 ON, and press RUN. 2. Else, rerun the sort.
bbbb	00t5d	Occurs in presort and last pass. A read error has been detected in a header record.	<ol style="list-style-type: none"> 1. To reread, press RUN. 2. To accept the record, set SENSE switch 1 ON, and press RUN.
bbbb	00t7d	Occurs in presort. A read error has been detected in a trailer record.	<ol style="list-style-type: none"> 1. To reread, press RUN. 2. To accept the record, set SENSE switch 1 ON, and press RUN.
bbbb	006td	Occurs in presort. Wrong length header or trailer record has been detected. Standard length is 80 characters. The non-standard header or trailer record exceeds the data record length.	<ol style="list-style-type: none"> 1. To accept the record, set SENSE switch 1 ON, and press RUN. For non-standard header, this action gives a record equal to the size of an input buffer. 2. Else, rerun the sort.
dddd	040xl	Occurs in last pass. Item count error. The output of the presort does not agree with the input to the last pass. dddd = the discrepancy, with the presort count higher if $x = 0$ or with the presort count lower if $x = 1$.	Restart.
0000x	00t3d	Occurs in all segments. End of tape has been detected.	If $x = 0$, rerun. If $x = 1$, mount a new output reel, and press RUN.

SECTION III. THE SORT B PROGRAM

Table 3-2 (cont). Sort B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	04000	Occurs in merge and last page. A file is out of sequence.	Rerun.
00001	00t0d	Header card not found in presort.	Rerun.
00002	00t0d	Occurs in last pass and merge. Parameter record not found.	Rerun.
00002	04000	Occurs in presort. Incorrect file name. A standard header is present, but it has a content not equal to columns 61-70 of the parameter card.	Rerun using the correct tape.
00003	00002	Occurs in last pass.	Press the RUN button.
00004	04000	Occurs in presort. Key fields overlap.	Correct the parameter. Rerun.
000010	04000	Occurs in presort. Blocking down is required. There must be fewer items per record.	To accept reduced blocking, set SENSE switch 1 ON.
01111	00t0d	Occurs in presort. Halt to permit rewinding of the input tape.	Mount proper tape for merge. Press RUN.
02222	00t0d	Occurs in presort. Halt for multi-reel input. Occurs if there is more than 1 input reel specified in column 10 of the parameter card.	Mount next input tape. Press RUN.
07777	07777	End of job.	Remove output.

SECTION IV
THE SELECT B PROGRAM

The Select B program selects items from an input file by item count, by location in a group of items, or by logical tests. Only one type of selection can be made in a given run, as follows:

1. SELECTION BY COUNT. Every n^{th} item in the input file is selected, where n is a number in columns 12 through 15 of the parameter card.
2. SELECTION BY LOCATION IN THE GROUP. The first or else the last item in each group of items can be selected from the input file. Groups are delimited by a change in the value of one or more key fields.
3. SELECTION BY TEST. Each of one, two, or three input-item fields is compared with a corresponding parameter-card constant using one of the tests equal to, higher than, and lower than. For the results of these arithmetic tests, logical tests (AND or OR) must be specified and met to select the item.

SELECTION BY COUNT

The option to select items by item count is specified by coding columns 1 through 10 and 12 through 15 of the parameter card. The remaining columns should be blank.

SELECTION BY LOCATION IN THE GROUP

The option to select items by location within the group is specified by coding columns of the parameter card except columns 12 through 15 (counter select) and 33 through 80 (test constants).

If the number of keys specified in column 11 of the parameter card is 1, selection proceeds as follows. As successive items are read, if a change is sensed in the value of a key field that is specified by the first position key (i. e., by columns 16 through 19 of the parameter card), selection occurs: the end of the current group of items is defined, and the item that caused the change becomes the first item in a new group. The first or last item in the old group is put in the output file, depending on the contents of column 29 of the parameter card.

If the number of keys specified in column 11 is 2 or 3, a logical OR relationship is assumed; i. e., a control break in any of the specified control fields is regarded as the delimiting of the current group.

SELECTION BY TEST

The option to select items by test is specified by coding E, H, or L in column 29 of the

parameter card. If more than one comparison is desired for each item, then E, H, or L is coded in columns 30 and 31. Columns 12 through 15 are ignored. For each item in the input file, selection is performed as follows:

1. If column 11 of the parameter card contains a digit n in the range 1 through 3, do the next n steps. Then go to step 5.
2. Get the first position key which is in columns 16 through 19 of the parameter card. For the input-item field specified by this key, compare the field with an equal number of characters in the first test constant (comparison with the constant begins in column 33), depending on the first arithmetic operator which is in column 29. Note whether the test is true or false.
3. Get the second position key. Compare the key field with the second test constant, depending on the second arithmetic operator. Note whether the test is true or false.
4. Get the third position key. Compare the key field with the third test constant, depending on the third arithmetic operator. Note whether the test is true or false.
5. If (1) column 28 of the parameter card specifies an AND operation and all the tests performed in steps 2 through 4 are true, or (2) column 28 specifies an OR operation and at least one of the performed tests is true, then select the item and put it in the output file.

Use of Selection by Test

The programmer may want to select cards for all salesmen in the New York branch whose commissions were higher than \$10,000 in 1965. He defines three constants: NEW YORK, \$10,000, and 1965. When the program tests the corresponding key fields, the item is selected if (1) the branch-office key field is equal to the first constant, and (2) the commission field is higher than the second constant, and (3) the year field is equal to 1965; if one or more of the three tests is not met, the item is not selected.

The AND test can be used in such a way that a data card is selected if the card (i.e., item) is a member of a specified class of items. For example, a card can be selected if its key field is higher than the constant \$50 and is lower than the constant \$100.

In an OR test, the card is selected if at least one of the tests is met. For example, the programmer may want to select cards from an inventory file if they pertain to slacks or trousers. The programmer defines two constants: SLACKS and TROUSERS. If the specified key field matches (i.e., is equal to) at least one of the constants in the set of constants, the card is selected; else the card is not selected.

INPUTS

The input file can be on cards or tape, depending on column 6 of the parameter card. Multi-reel input files are acceptable. If a Type 214-2 Card Reader/Punch is used, only one card

operation can be performed in a given run. If a Type 214-1 Card Punch and a Type 123 Card Reader are available, both reading and punching can be performed in a given run.

OUTPUTS

Selected items are output to cards, page print, or tape, depending on columns 7 and 8 of the parameter card.

Non-selected items are output to cards, page print, or tape, depending on columns 9 and 10 of the parameter card.

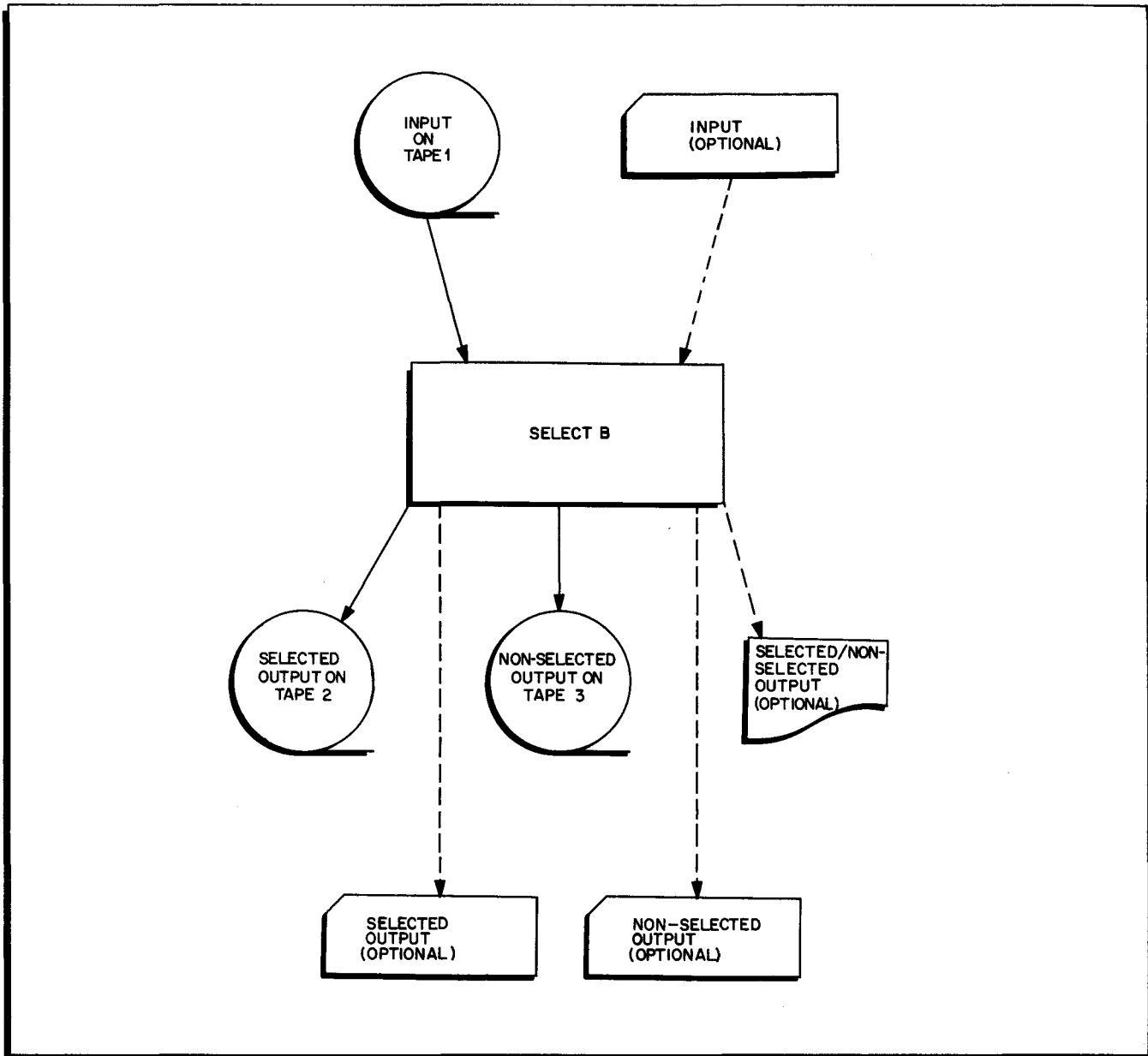


Figure 4-1. The Select B Program

SECTION IV. THE SELECT B PROGRAM

Table 4-1. Select B Parameter Card Specifications

Column(s)	Contents	Interpretation
1-5	SELEC	Specify that the Select B program is to be executed.
6	INPUT MEDIUM.	Specifies one of the following:
	C	CARD INPUT.
	T	TAPE INPUT.
7-8	OUTPUT MEDIA FOR SELECTED ITEMS.	Specify one of the following:
	ΔP	PRINTED OUTPUT
	CΔ	CARD OUTPUT.
	CP	CARD OUTPUT AND PRINTED OUTPUT.
	TΔ	TAPE OUTPUT.
	TP	TAPE OUTPUT AND PRINTED OUTPUT
9-10	OUTPUT MEDIA FOR NON-SELECTED ITEMS.	Same specifications as for columns 7-8.
11	nn	NUMBER OF KEYS USED.
12-15	nmmn	COUNTER SELECT. Select every nmmn th input item for output. Leave these columns blank unless the select option is used in this run.
16-27	POSITION KEYS.	A maximum of three position keys can be defined, as follows.
16-19	FIRST POSITION KEY.	This is a two-part field, as follows:
16-17	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit number in the range 01-80, specifying the character position in which the leftmost character of the key field appears. Leading zeros must be punched.
18-19	nn	LENGTH OF THE KEY FIELD. A two-digit number in the range 01-16, specifying the number of character positions occupied by the key field.
20-23	SECOND POSITION KEY.	Specifications are similar to those for columns 16-19.
24-27	THIRD POSITION KEY.	
28	LOGICAL OPERATOR.	This column specifies whether or not a combination of tests must be met for the item to be selected, as follows:
	A	AND. The item is selected if, and only if, all the tests (a maximum of three) specified in columns 29-31 are met.
	O	OR. The item is selected if at least one of the tests specified in columns 29-31 is met.
29-31	ARITHMETIC OPERATORS.	Depending on the arithmetic operators E, H, and L specified in these columns, each key field is compared with a corresponding constant in columns 33-80. An item can be selected according to its position in a group of cards; in this case, the arithmetic operator is 1 or 2 and the constants in columns 33-80 are not used.

SECTION IV. THE SELECT B PROGRAM

Table 4-1 (cont). Select B Parameter Card Specifications

Column(s)	Contents	Interpretation
29	ARITHMETIC OPERATOR FOR THE FIRST KEY FIELD. Specifies one of the following:	
	E	EQUAL. The test is met if the key field is equal to the tested constant.
	H	HIGH. The test is met if the key field is higher than the tested constant.
	L	LOW. The test is met if the key field is lower than the tested constant.
	1	SELECT THE FIRST ITEM IN THE GROUP OF ITEMS.
	2	SELECT THE LAST ITEM IN THE GROUP OF ITEMS.
30	ARITHMETIC OPERATOR FOR THE SECOND KEY FIELD. Specifications are similar to those for column 29.	
31	ARITHMETIC OPERATOR FOR THE THIRD KEY FIELD.	
32	blank	Not used.
33-48	x...x	TEST CONSTANT FOR THE FIRST KEY FIELD. Alphanumeric. Left-justified.
49-64	x...x	TEST CONSTANT FOR THE SECOND KEY FIELD.
65-80	x...x	TEST CONSTANT FOR THE THIRD KEY FIELD.

OPERATING PROCEDURES

The Select B program can be run on any Series 200 computer having the following minimum configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. One tape drive. Two additional tape drives are usable.
4. One card reader/punch, or a separate card reader and a card punch.
5. One printer, if used for either the selected or non-selected output.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the contents of the Select B parameter card. The general procedure is as follows:

1. If the input data file is on tape, mount the input reel on tape drive 1 and place in "protect" status.
2. If the selected output is to be placed on tape ("T" in column 7 of the parameter card), mount an available tape on tape drive 2 and place it in "permit" status.
3. If the non-selected output is to be placed on tape ("T" in column 9 of the parameter card), mount an available tape on tape drive 3 and place it in "permit" status.

4. Initialize the printer if either the selected or non-selected output is to be printed (a "P" in column 8 or column 10 of the parameter card).
5. Initialize the card punch if either the selected or non-selected output is to be punched (a "C" in column 7 or column 9 of the parameter card).
6. If the program is loaded from cards, the input deck consists of the Select B program binary run deck, the Select B parameter card, and the input data deck (if on cards). If the program is loaded from tape, the input deck consists of a Console Call card for Select B (see Appendix B), the Select B parameter card, and a data deck (if the input file is on cards). Two or more blank cards are placed at the end of the entire deck.

Loading the Select B Program

The Select B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and tape loading methods are described in Appendix B under "Program Loading."

Select B Programmed Halts

The programmed halts unique to the Select B program are given in Table 4-2. Loader B halts are given in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 4-2. Select B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00003	Column 6 if the parameter card contains neither a C nor a T.	Change column 6 to a C or T. Rerun.
00000	00004	A key-field length parameter is greater than 16.	Shorten to a maximum length of 16 characters and rerun.
00000	00077	End of job.	Remove output.

SECTION V
THE REPRODUCE B PROGRAM

This program performs any or all of the following functions in a given run:

1. **REPRODUCE.** Each eighty-character item in the input is copied onto the output file. Specified fields in each item can be dropped.
2. **OFFSET.** In the current input item, the field specified in columns 17 through 20 of the parameter card is put in the output card image in the position specified in columns 49 through 52. This relocation procedure is repeated for successive pairs of position keys, depending on the number of pairs specified in column 8. Character positions not specified by the input position keys are ignored; they generate an equal number of blanks in the output item unless such blanks are filled with an emitted constant, as follows.
3. **EMIT A CONSTANT.** The non-blank characters in a parameter card containing an eighty-character constant are transferred to the same positions in the output.
4. **NUMBERING.** The input file is copied onto the output file as specified by the position keys. The output items are numbered either consecutively or by a specified increment, depending on columns 10 through 16 of the parameter card.

INPUTS

The input file can be on cards or tape. Multi-reel input is acceptable.

OUTPUTS

The main output is the reproduced file on tape or cards. Multi-reel output is possible. If a Type 214-2 or Type 224 Card Reader/Punch is used, only one card operation can be performed in a given run. If a separate card reader and card punch are available, both reading and punching can be performed in a given run. A printed listing of the input and/or output files can be obtained by setting SENSE switches.

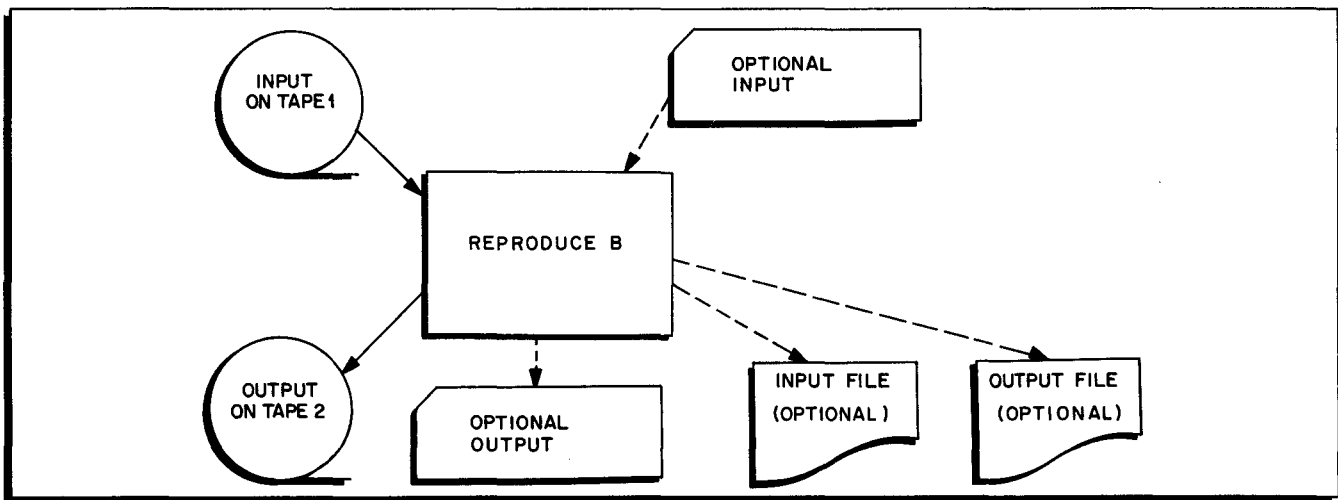


Figure 5-1. The Reproduce B Program

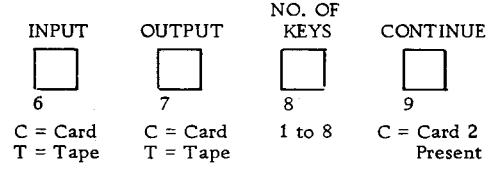
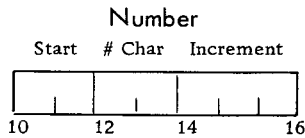


EASYTAB - REPRODUCE

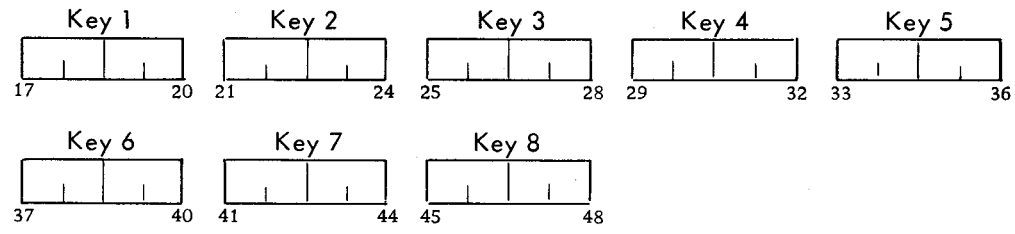
Date _____

I.D. _____

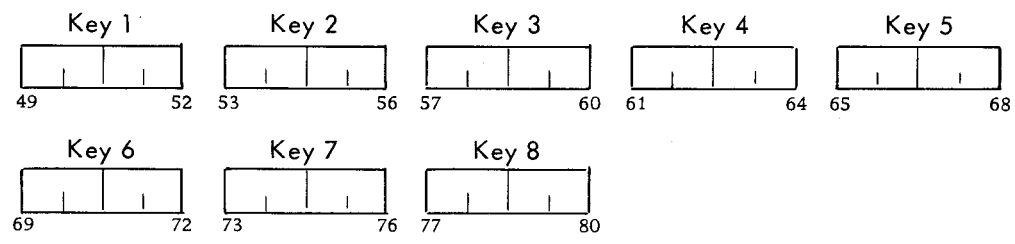
APPLICATION _____ Author _____



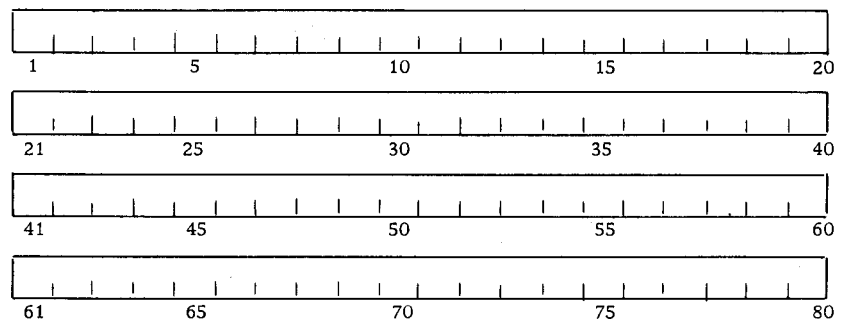
INPUT FIELDS



OUTPUT FIELDS



CARD TWO - If CC9 of Card 1 equals "C," this card must be present.



Characters indicated in Card Two will be emitted into the corresponding positions in the Output Card or Card Image.

SECTION V. THE REPRODUCE B PROGRAM

Table 5-1. Reproduce B Parameter Card Specifications

Column(s)	Contents	Interpretation
1-5	REPRO	Specify that the Reproduce B program is to be executed.
6	INPUT MEDIUM. C T	Specifies one of the following: CARD INPUT. TAPE INPUT
7	OUTPUT MEDIUM. C T	Specify one of the following: CARD OUTPUT. TAPE OUTPUT.
8	n	NUMBER OF KEY FIELDS USED. A digit in the range 1-8.
9	NUMBER OF PARAMETER CARDS. blank C	Specify one of the following: Only the Reproduce B parameter card is present. CONTINUE. An emit card immediately follows the Reproduce B parameter card.
10-16	NUMBERING OPTION.	This option numbers the output items, beginning in any column, with a numeric field occupying a maximum of eight positions.
10-11	nn	BEGINNING POSITION. In each output item, the position in which the leftmost digit of the numbering begins. A two-digit number in the range 01-80.
12-13	nn	LENGTH. In each output item, the number of digits occupied by the numbering field. A two-digit number in the range 01-08.
14-16	nnn	INCREMENT. A three-digit number by which the numbering for successive output items is incremented.
17-48	POSITION KEYS FOR THE INPUT ITEM.	These keys specify the input-item characters to be put in the output item. To reproduce the items unaltered, code 0180 in columns 17-20 and in columns 49-52.
17-20	FIRST POSITION KEY FOR THE INPUT ITEM.	This is a two-part field, as follows:
17-18	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit number in the range 01-80 specifying the character position in which the leftmost character of the key field appears.
19-20	nn	LENGTH OF THE KEY FIELD. A two-digit number in the range 01-80 specifying the number of characters occupied by the field. This parameter must equal the LENGTH parameter in the corresponding output position key which is in columns 49-52.
21-24	SECOND POSITION KEY FOR THE INPUT ITEM.	Specifications are similar to those for columns 17-20.

SECTION V. THE REPRODUCE B PROGRAM

Table 5-1 (cont). Reproduce B Parameter Card Specifications

Column(s)	Contents	Interpretation
25-28	THIRD POSITION KEY OF THE INPUT ITEM.	
29-32	FOURTH POSITION KEY OF THE INPUT ITEM.	
33-36	FIFTH POSITION KEY OF THE INPUT ITEM.	
37-40	SIXTH POSITION KEY OF THE INPUT ITEM.	
41-44	SEVENTH POSITION KEY OF THE INPUT ITEM.	
45-48	EIGHTH POSITION KEY OF THE INPUT ITEM.	
49-80	POSITION KEYS FOR THE OUTPUT ITEM. Similar to columns 17-48.	

Table 5-2. Reproduce B Emit Card Specifications

Column(s)	Contents	Interpretation
1-80	x...x	<p>EMIT CONSTANT. The non-blank characters on this card appear in the output items in positions corresponding to their positions in this card. If this card is present, column 9 of the parameter card must contain a "C".</p> <p>NOTE: If there is a conflict between an output key field specified on the parameter card and an emit constant, the parameter card definition takes precedence. For example, if the parameter card dictates that columns 25-30 of every input item are to be reproduced in columns 5-10 of the output item and columns 8-12 of the emit card contain a constant, the emit constant is placed in positions 8-12 of the output image. Next, the data from the input item is transferred to positions 5-10, overlaying the first three characters of the constant.</p>

OPERATING PROCEDURES

The Reproduce B program can be run on any Series 200 computer having the following minimum configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. Two magnetic tape units.
4. One card reader/punch, or a separate card reader and card punch.
5. One printer.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the contents of the Reproduce B parameter card. The general procedure is as follows:

1. If the input data file is on tape, mount the input reel on tape drive 1 and place it in "protect" status.

2. If the output file is to be placed on tape ("T" in column 7 of the parameter card), mount an available reel on tape drive 2 and place it in "permit" status.
3. If the output file is to be punched, initialize the card punch.
4. Depending upon the functions desired, set the appropriate SENSE switches as follows:

SENSE Switch
and Status

Function

- | | |
|-------|--|
| 2 ON | The output file is listed on the printer. |
| 3 ON | The input file is listed on the printer. |
| 4 ON | The input file is copied onto the output file. Any fields <u>not otherwise specified</u> in the parameter card are copied unaltered. No emit card is permitted. |
| 4 OFF | The input file is copied to the output file as specified by the parameter card. Any fields not specified in the parameter card are <u>not</u> copied. Use of the emit card is permitted. |
5. If the program is loaded from cards, the input deck consists of the Reproduce B binary run deck, a Reproduce B parameter card, and a data deck (if the input file is on cards). If the program is loaded from tape, the input deck consists of a Console Call card for Reproduce B (see Appendix B), a Reproduce B parameter card, and a data deck (if the input file is on cards). Two or more blank cards are placed at the end of the entire deck.

Loading the Reproduce B Program

The Reproduce B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and the tape loading methods are described in Appendix B under "Program Loading."

Reproduce B Programmed Halts

The programmed halts unique to the Reproduce B program are given in Table 5-3. Loader B programmed halts are covered in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 5-3. Reproduce B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00003	Illegal parameter card.	Change column 6 to C or T.
00000	00004	Illegal parameter card.	Change column 7 to C or T.
00000	00005	Illegal parameter card. The number punched in columns 12-13 is larger than 8.	Change number to lie in the range 1-8.
00000	00006	SENSE switch 1 is on and an emit constant is specified by a C in column 9 of the parameter card. Illegal.	Set SENSE switch 1 off and press RUN, if desired. Or remove emit card and press RUN.
00000	00077	End of job.	Remove output.

SECTION VI
THE TOTAL B PROGRAM

The Total B program produces printed reports and offers the following capabilities:

1. ACCUMULATE. The program accumulates and prints a maximum of seven totaled amount fields under control of a maximum of four control-breakkeys.
2. LIST. The list function produces a detail line for each item processed and a total line containing totals for all items within each specified control group. Thus, for example, the program can print totals for all items in Region 1, District 5, Branch 2, and Department 10.
3. TAB. The tab function produces only a total line containing totals of all items within each specified control group.

TYPICAL OPERATION

1. The following discussion indicates how the Total B program uses the input parameters. Assume the following:
 - a. The list function is requested in column 13.
 - b. The highest-level control break is to be at the department level and is to be detected by a change in the value of the field specified by columns 20 through 23 of the parameter card.
 - c. The only other control break is to be at the employee level and is to be detected by a change in the employee number specified by columns 24 through 27 of the parameter card.
 - d. Seven accumulation fields are to be printed. Column 11 of the parameter card contains 7, and columns 44 through 71 are filled in.
2. As successive items are read, a detail line is printed for each item. The seven data fields in the printed line are retrieved from the character positions specified by the accumulation keys in columns 44 through 71.
3. When a new employee is detected, the following occurs:
 - a. A total line is printed as follows:
 - (1) The old value of the control field (viz., the old employee number) is printed beginning in the print position specified in columns 38 through 39 of the parameter card.
 - (2) Totals of the seven accumulation fields are printed. The total line begins with the printout "TOTAL 1" to indicate that it corresponds to the lowest-level control break in the report.
 - b. A detail line for the new employee is printed as in item 2.
4. When a new employee is encountered who is in a new department, a control break occurs at all lower levels (viz., at the employee level) and then at the department level, as follows:
 - a. The old employee number is printed in the print positions specified in columns 38 through 39 of the parameter card.

SECTION VI. THE TOTAL B PROGRAM

- b. A total line for the old employee is printed. This line includes seven totals corresponding to the seven fields specified by columns 44 through 71 of the parameter card. The total line begins with the printout "TOTAL 1" to indicate that the total corresponds to the lowest control break level.
- c. The old department number is printed in the print positions specified in columns 36 and 37 of the parameter card.
- d. A total line for the old department is printed. This line includes seven totals corresponding to the seven fields specified by columns 44 through 71 of the parameter card. The total line begins with the printout "TOTAL 2" to indicate that these totals correspond to the second-lowest, control-break level. This line includes the totals for all employees in the department.

INPUTS

Input to the program can be cards or tape, depending on column 7 of the parameter card. Multi-reel input is acceptable.

OUTPUTS

Output is a printed report. A report heading line and field heading line can be printed on each page of output. Page numbering is automatic.

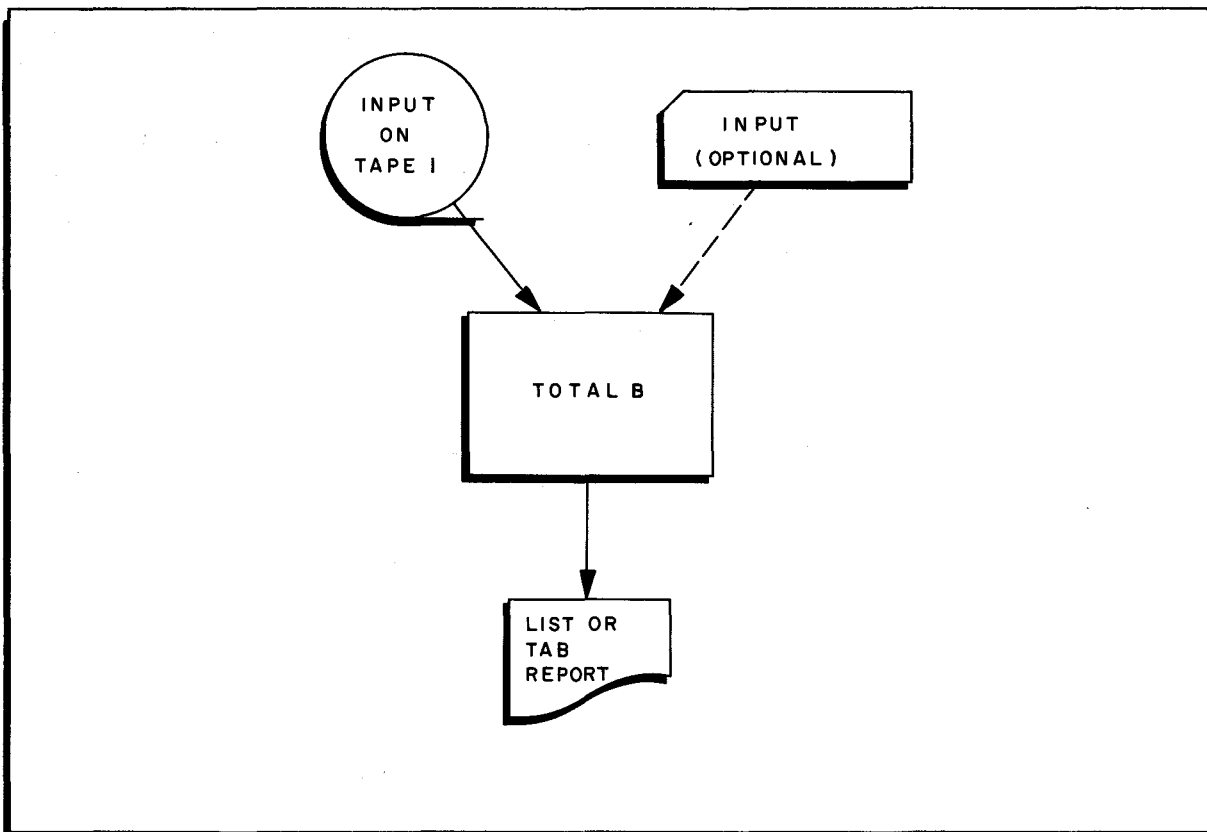


Figure 6-1. The Total B Program



Honeywell
ELECTRONIC DATA PROCESSING

EASYTAB - TOTAL

Date _____

I.D. _____

APPLICATION _____ Author _____

T O T A L
1 5

<p>INPUT 7 C = Card T = Tape</p>	<p>NO. OF CONTROL KEYS 9 1 To 4</p>	<p>NO. OF ACCUMULATIONS 11 1 To 7 ①</p>	<p>FUNCTION 13 T = Tab L = List</p>	<p>REPORT HEADER 15 0 To 4 ②</p>	<p>FIELD HEADER 16 0 To 4</p>
--	---	---	---	--	---------------------------------------

0 = No Header
1 to 4 = No of Header Cards

CONTROL KEYS ③

<p>Key 1 20 23</p>	<p>Key 2 24 27</p>	<p>Key 3 28 31</p>	<p>Key 4 32 35</p>
------------------------	------------------------	------------------------	------------------------

LEFT-MOST PRINT POSITIONS OF CONTROL KEYS ④

<p>Key 1 36 37</p>	<p>Key 2 38 39</p>	<p>Key 3 40 41</p>	<p>Key 4 42 43</p>
------------------------	------------------------	------------------------	------------------------

ACCUMULATION FIELDS ⑤

<p>Field 1 44 47</p>	<p>Field 2 48 51</p>	<p>Field 3 52 55</p>	<p>Field 4 56 59</p>
<p>Field 5 60 63</p>	<p>Field 6 64 67</p>	<p>Field 7 68 71</p>	

- ① Indicates the highest accumulation key field used, i.e.: If the only accumulation is to be placed in Accumulation Key 2, indicate a 2.
- ② Print positions 117-120 of the first line of a Report Header contain the Page Number.
- ③ Each key may not exceed ten characters.
- ④ Total number of print positions may not exceed 36 characters.
- ⑤ The print positions for the accumulations are fixed as follows:
Field 1 = 37 to 48; Field 2 = 49 to 60; Field 3 = 61 to 72; Field 4 = 73 to 84;
Field 5 = 85 to 96; Field 6 = 97 to 108; Field 7 = 109 to 120.

SECTION VI. THE TOTAL B PROGRAM

Table 6-1. Total B Parameter Card Specifications

Column(s)	Contents	Interpretation
1-5	TOTAL	Specifies that the Total B program is to be executed.
6	blank	Not used.
7	INPUT MEDIUM. Specify one of the following:	
	C	CARD INPUT.
	T	TAPE INPUT.
8	blank	Not used.
9	n	NUMBER OF CONTROL-BREAK KEYS USED. A digit in the range 1-4.
10	blank	Not used.
11	n	THE NUMBER OF ACCUMULATION FIELDS USED. A digit in the range 1-7.
12	blank	Not used.
13	FUNCTION TYPE. Specify one of the following:	
	L	LIST. A line is printed for each input item. Totals are printed for each control break.
	T	TAB. A line is not printed for each input item. Totals are printed for each control break.
14	blank	Not used.
15	n	NUMBER OF REPORT HEADING CARDS. A digit in the range 0-4. The first two heading cards form the first heading line on each page of printed output; the second two cards form the second heading line. Print positions 117-120 of the first heading line automatically contain the page number.
16	n	NUMBER OF FIELD HEADING CARDS. A digit in the range 0-4. The first two field heading cards form the first field heading line below the report heading lines on each page of printed output; the second two field heading cards form the second field heading line. The set of report heading and field heading cards should immediately follow the parameter card.
17-19	blank	Not used.
20-35	CONTROL-BREAK KEYS. Specify control-break keys in descending sequence. For example, if control breaks are desired for the region, the district, the branch, and the departmental levels, the first-specified control-break key must address the field that contains the region identification, the second-specified key must address the field that contains the district identification, and so on.	
20-23	HIGHEST-LEVEL CONTROL-BREAK KEY. This is a two-part field, as follows:	
20-21	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit integer in the range 01-80, specifying the character position in which the leftmost character of the key field appears.

SECTION VI. THE TOTAL B PROGRAM

Table 6-1 (cont). Total B Parameter Card Specifications

Column(s)	Contents	Interpretation
22-23	nn	LENGTH OF THE KEY FIELD. A two-digit integer in the range 01-36, specifying the number of characters occupied by the field.
24-27		SECOND-LEVEL CONTROL-BREAK KEY. Specifications are similar to those for columns 20-23.
28-31		THIRD-LEVEL CONTROL-BREAK KEY.
32-35		FOURTH-LEVEL CONTROL-BREAK KEY.
36-43		BEGINNING PRINT POSITIONS OF KEY FIELDS. When a change in the value of a key field causes a control break, the old value of the key field is printed beginning in some print position 1-36, as follows:
36-37	nn	BEGINNING PRINT POSITION OF THE FIRST-LEVEL KEY FIELD. A two-digit number in the range 1-36.
38-39	nn	BEGINNING PRINT POSITION OF THE SECOND-LEVEL KEY FIELD.
40-41	nn	BEGINNING PRINT POSITION OF THE THIRD-LEVEL KEY FIELD.
42-43	nn	BEGINNING PRINT POSITION OF THE FOURTH-LEVEL KEY FIELD.
44-71		ACCUMULATION KEYS. Any given field in a maximum of seven fields in the current item can be printed beginning in print positions 37, 49, 61, 73, 85, 97, or 109. For each control-break level, accumulated totals for the addressed field are printed automatically beginning in the same print position. Fields to be accumulated are specified as follows.
44-47		FIRST (LEFTMOST) ACCUMULATION FIELD, printed in positions 37-48. This is a two-part field, as follows:
44-45	nn	BEGINNING POSITION OF THE ACCUMULATION FIELD. A two-digit number in the range 01-80, specifying the character position in which the leftmost character of the field to be accumulated appears.
46-47	nn	LENGTH OF THE ACCUMULATION FIELD. A two-digit number in the range 01-12, specifying the number of characters occupied by the field to be accumulated.
48-51		SECOND ACCUMULATION FIELD, printed in print positions 49-60. Specifications are similar to those for columns 44-47.
52-55		THIRD ACCUMULATION FIELD, printed in positions 61-72.
56-59		FOURTH ACCUMULATION FIELD, printed in positions 73-84.
60-63		FIFTH ACCUMULATION FIELD, printed in positions 85-96.
64-67		SIXTH ACCUMULATION FIELD, printed in positions 97-108.
68-71		SEVENTH (RIGHTMOST) ACCUMULATION FIELD, printed in positions 109-120.
72-80	blank	Not used.

OPERATING INSTRUCTIONS

The Total B program can be run on any Series 200 computer having the following minimum configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. One tape drive (if input is on tape).
4. One card reader.
5. One printer.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the contents of the Total B parameter card. The general procedure is as follows:

1. If the input file is on tape, mount the input reel on tape drive 1 and place it in "protect" status.
2. Initialize the printer.
3. If the Total B program is loaded from cards, the input deck consists of the Total B program binary run deck, a Total B parameter card, and the input deck (if the input file is on cards). If the program is loaded from tape, the input deck consists of a Console Call card for Total B, a Total B parameter card, and the input deck (if the input file is on cards).

Loading the Total B Program

The Total B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and tape loading methods are described in Appendix B under "Program Loading."

Total B Programmed Halts

The programmed halts unique to the Total B program are given in Table 6-2. Loader B programmed halts are given in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 6-2. Total B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00077	End of job.	Remove output.

SECTION VII
THE ALTER B PROGRAM

The Alter B program performs the following functions on an ordered primary tape file, depending on the contents of a director deck:

1. **DELETE** items. This function is performed for each item in the file immediately following each DELETE card in the director deck. If the fields match all the corresponding fields in the next primary item(s), the primary item(s) is deleted.
2. **INSERT** items in proper sequence. This function is performed for each item in the file immediately following each INSERT card in the director deck. The fields are compared with all the corresponding fields in the next primary card(s) until the director-deck item is inserted in proper sequence in the primary file.
3. **REPLACE** items. This function is performed for each item in the file immediately following each REPLACE card in the director deck. If the fields match all the corresponding fields in the next primary item(s), the director-deck item replaces the primary item(s).

All of these functions can be performed in one pass of the primary data file.

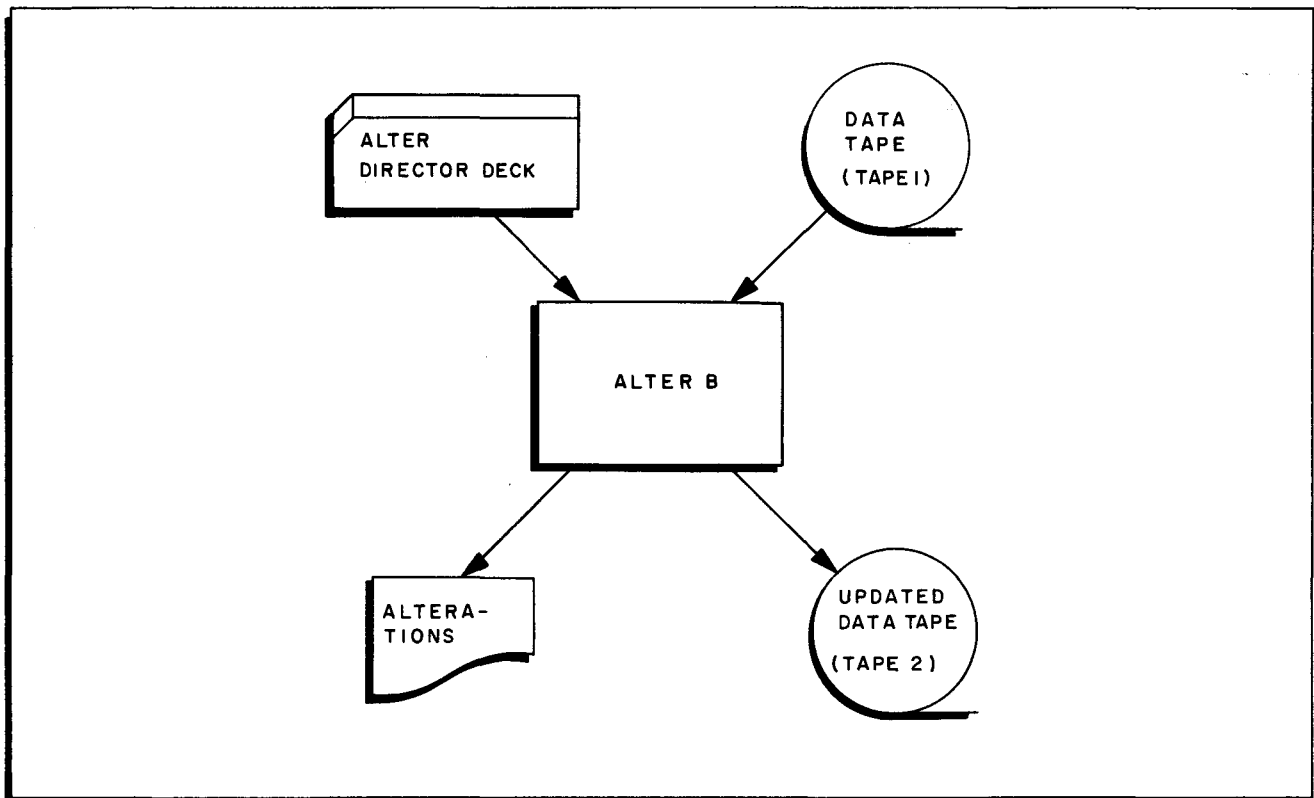


Figure 7-1. The Alter B Program

INPUTS

The primary input file is a magnetic tape file. Multi-reel input is acceptable. The secondary input file is a director card deck, as follows.

The Alter Director Deck

As indicated in Figure 7-2, the Alter director deck has the following makeup:

1. The Alter B parameter card. This parameter card specifies the key fields on which the primary input file has been ordered, and it indicates whether the file is in ascending or descending sequence on those keys. The data cards in the secondary input file must be ordered in the same sequence. A maximum of eight key fields can be specified on the Alter B parameter card. Each key field is located by a parameter indicating the beginning character position and by an adjacent parameter indicating the number of character positions occupied by the key field.
2. Any number of DELETE, INSERT, and/or REPLACE director cards in any sequence, each card followed by a file of data cards.
3. An ENDEND card.

In Figure 7-2, the data cards in the primary input file are ordered on a three-character major key of department number and a four-character minor key of employee number. Note that the data cards in the director deck are in the same sequence. The card images in the output file are blocked two per record, as are the images in the primary input file.

OUTPUTS

The outputs are an updated magnetic tape file and a printed listing of the alterations. A sample updated file appears in the rightmost column in Figure 7-2. A printed listing of the alterations described in this figure would contain a line for each of the shaded data cards shown in the leftmost column of the figure.

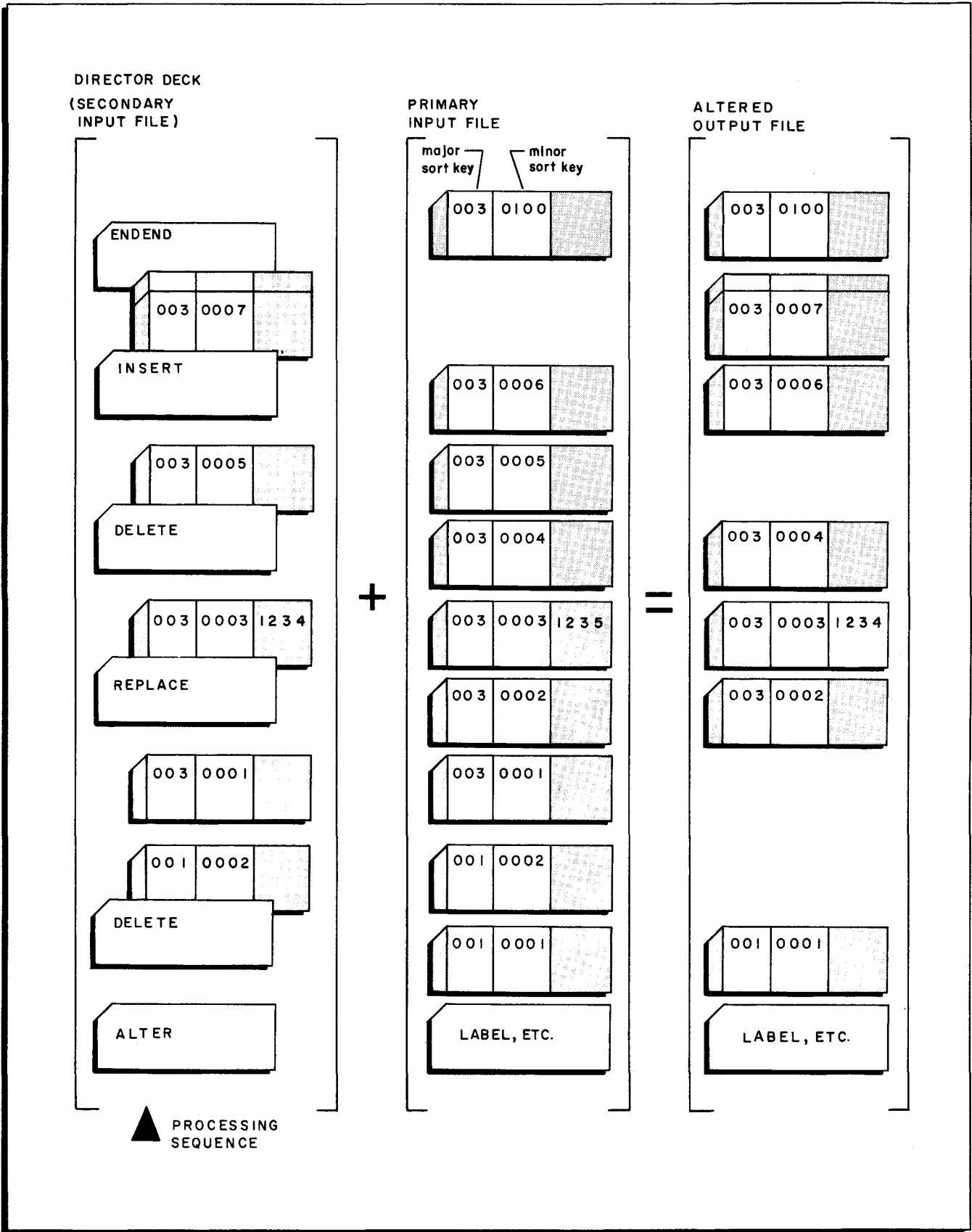


Figure 7-2. Director Deck for the Alter B Program



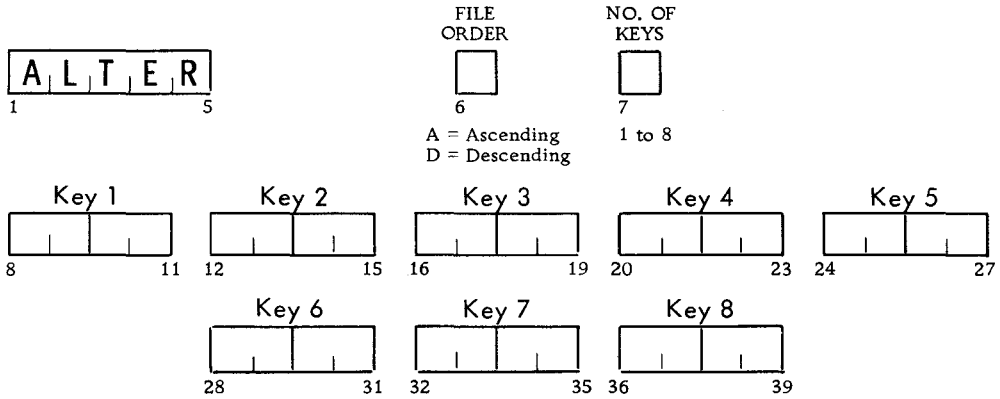
EASYTAB - ALTER

Date _____

I.D. _____

APPLICATION _____ Author _____

ALTER B PARAMETER CARD - First Card.



I N S E R T
1 6

"INSERT" DIRECTOR - Placed before Card(s) to be added to tape file.

R E P L A C E
1 7

"REPLACE" DIRECTOR - Placed before Card(s) to be changed on tape file.

D E L E T E
1 6

"DELETE" DIRECTOR - Placed before Card(s) to be deleted from tape file.

E N D E N D
1 6

END CARD - Last Card.

SECTION VII. THE ALTER B PROGRAM

Table 7-1. Alter B Director Card Specifications

Column(s)	Contents	Interpretation
1-5	ALTER	Specify that the Alter B program is to be executed.
6	SEQUENCE OF PRIMARY INPUT FILE.	Specifies whether the items in the primary input file are in ascending or descending sequence, the sort keys being whatever key fields are specified by the position keys in columns 8-39.
	A	ASCENDING SEQUENCE.
	D	DESCENDING SEQUENCE.
7	n	NUMBER OF KEYS USED. A digit in the range 1-8, specifying the number of position keys that are to be used.
8-39	POSITION KEYS.	Specify keys in descending sequence, major to minor. The number of characters in the fields specified by the position keys cannot exceed 40. That is, the sum of the eight LENGTH parameters below cannot exceed 40.
8-11	FIRST POSITION KEY.	This is a two-part field, as follows:
8-9	nn	BEGINNING POSITION OF THE KEY FIELD. A two-digit number in the range 01-80, specifying the character position in which the leftmost (i. e., high-order) character of the primary-input-file key field appears.
10-11	nn	LENGTH OF THE KEY FIELD. A two-digit number in the range 01-40, specifying the number of characters in the primary-input-file key field.
12-15	SECOND KEY FIELD.	Specifications are similar to those for columns 8-11.
16-19	THIRD KEY FIELD.	
20-23	FOURTH KEY FIELD.	
24-27	FIFTH KEY FIELD.	
28-31	SIXTH KEY FIELD.	
32-35	SEVENTH KEY FIELD.	
36-39	EIGHTH KEY FIELD.	
40-80	blank	Not used.

OPERATING PROCEDURES

The Alter B program can be run on any Series 200 computer having the following minimum equipment configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. Two magnetic tape units.
4. One card reader.
5. One printer.

Initial Setup Procedure

The setup and initialization of the peripheral equipment depends upon the contents of the Alter B parameter card. The general procedure is as follows:

1. Mount the primary input tape (the data file to be altered) on tape drive 1 and place it in "protect" status.
2. Mount an available reel on tape drive 2 for output and place it in "permit" status.
3. Initialize the printer.
4. If the Alter B program is loaded from cards, the input deck consists of the Alter B program binary run deck and the Alter director deck. If the program is loaded from tape, the input deck consists of a Console Call card for Alter B and the Alter director deck. An ENDEND card must follow the director deck. One or more blank cards are placed at the end of the entire deck.

Loading the Alter B Program

The Alter B program can be loaded from either a binary run deck (BRD) or a binary run deck format tape under Loader B. Both the card and the tape loading methods are described in Appendix B under "Program Loading."

Alter B Programmed Halts

The programmed halts unique to Alter B are given in Table 7-2. Loader B programmed halts are covered in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 7-2. Alter B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00001	Director deck is out of sequence relative to the position keys in the Alter B parameter card.	Place the director-deck data cards in the correct sequence.
00000	00002	The primary input file is out of sequence relative to the position keys in the Alter B parameter card.	Sort the file.
00000	00077	End of job.	Remove output.

SECTION VIII
THE PERIPHERAL INPUT/OUTPUT B PROGRAM

The PERIO B (Peripheral Interface Output) program performs media conversions separately or in combination, depending on SENSE switch settings. The available conversions are these:

1. CARDS TO TAPE. The program reads a card file and writes the file on magnetic tape.
2. TAPE TO CARDS. The program reads a tape file and punches the file into cards.
3. TAPE TO PRINTER. The program reads a tape file and prints a listing of the file.
4. TAPE TO PRINTER PERFORMED SIMULTANEOUSLY WITH CARDS TO TAPE.

INPUTS

Input can be cards or tape. Tape files are blocked two items per record. Multi-reel input is acceptable.

OUTPUTS

Output can be cards, tape, or page print. Tape files are blocked two items per record. If a Type 214-2 or Type 224 Card Reader/Punch is used, only one card operation can be performed in a given run. If a separate card reader and card punch are available, both reading and punching can be performed in a given run.

OPERATING PROCEDURES

The PERIO B program can be run on any Series 200 computer having the following minimum configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions and the edit instruction.
3. One magnetic tape unit.
4. One card reader/punch, or a separate card reader and card punch.
5. One printer, if printed output is desired.

Initial Setup

The setup and initialization of the peripheral equipment depends upon the settings of the SENSE switches. The general procedure is as follows:

Card to Tape

1. Mount an available tape for output on tape drive 1 and place it in "permit" status.
2. Place the input card deck in the card reader behind either the PERIO B program binary run deck (if the PERIO B program is loaded from cards) or the Console Call card for PERIO B (if the program is loaded from tape).
3. Set SENSE switch 1 ON.

Tape to Cards

1. Mount the input tape file on tape drive 2 and place it in "protect" status.
2. Initialize the card punch.
3. Set SENSE switch 2 ON.

Tape to Printer

1. Mount the input tape file on tape drive 3 and place it in "protect" status.
2. Initialize the printer.
3. Set SENSE switch 3 ON.

Tape to Printer and Cards to Tape

1. Follow the setup instructions for both "Cards to Tape" and "Tape to Printer."

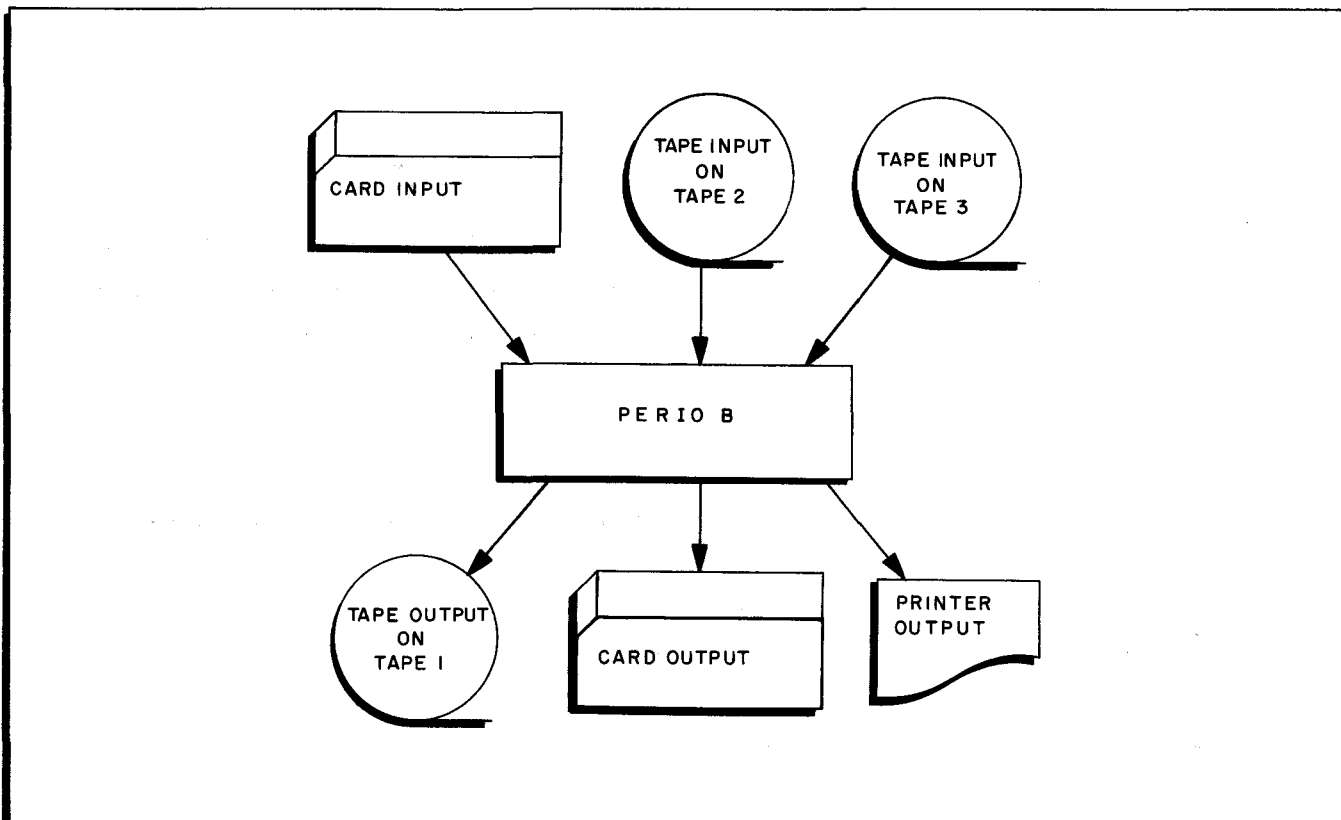


Figure 8-1. The Peripheral Input/Output B Program

Loading the PERIO B Program

The PERIO B program can be loaded from either a binary run deck (BRD) or a binary

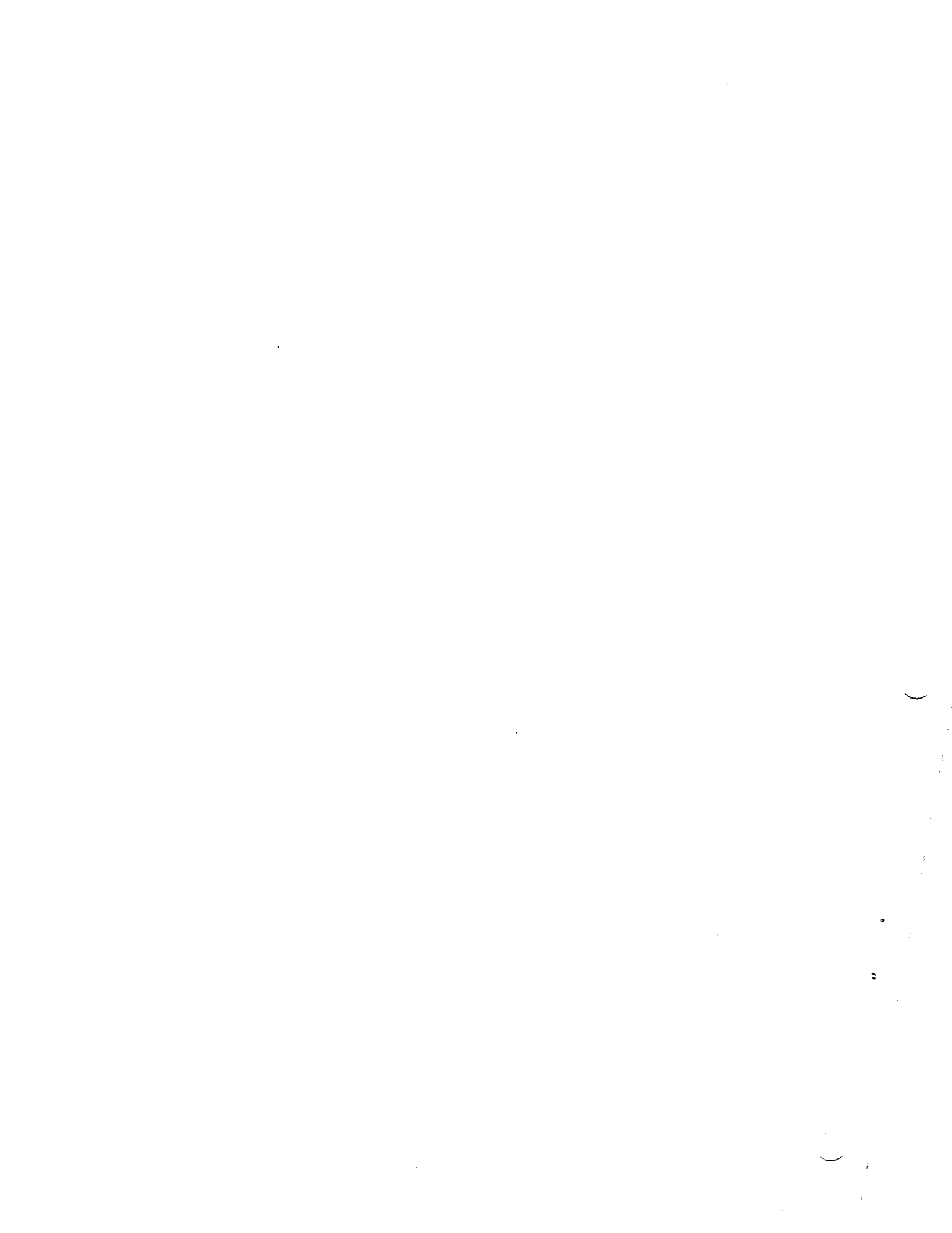
run deck format tape under Loader B. Both the card and tape loading methods are described in Appendix B under "Program Loading."

PERIO B Programmed Halts

The programmed halts unique to the PERIO B program are given in Table 8-1. Loader B programmed halts are given in Appendix B, Table B-2. Input/output routine halts are given in Table C-1.

Table 8-1. PERIO B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00004	Illegal SENSE switch combination (SENSE switches 1 and 2).	Turn off either SENSE switch 1 or SENSE switch 2. Press RUN.
00000	00005	SENSE switches 1, 2, and 3 are off; at least one should be on.	Turn on SENSE switch 1, 2, or 3. Press RUN.
00000	00006	SENSE switch 4 is set and should not be set again.	Turn off SENSE switch 4. Press RUN.
00000	00007	The PERIO program is loaded.	Set SENSE switches. Press RUN.
00000	00077	End of job.	Remove output.



APPENDIX A
THE UPDATE B PROGRAM

The Series 200 Update B program permits more compact storage, easier maintenance, and faster loading of object programs by enabling the user to store them on magnetic tape.

Update B performs either one of two separate functions, depending upon the mode in which it is used. These are:

1. Create mode - creates a program tape by placing one or more object program card decks or card-image tapes on a self-loading tape (SLT).
2. Update mode - maintains and updates an existing SLT by producing a new SLT as follows:
 - a. Copies programs from the old SLT onto the new SLT.
 - b. Deletes old programs by omitting them from the new SLT.
 - c. Inserts new programs onto the new SLT from either punched cards or magnetic tape.

The functions of Update B are directed by an input control deck. The over-all input/output operations of Update B are shown in Figure A-1.

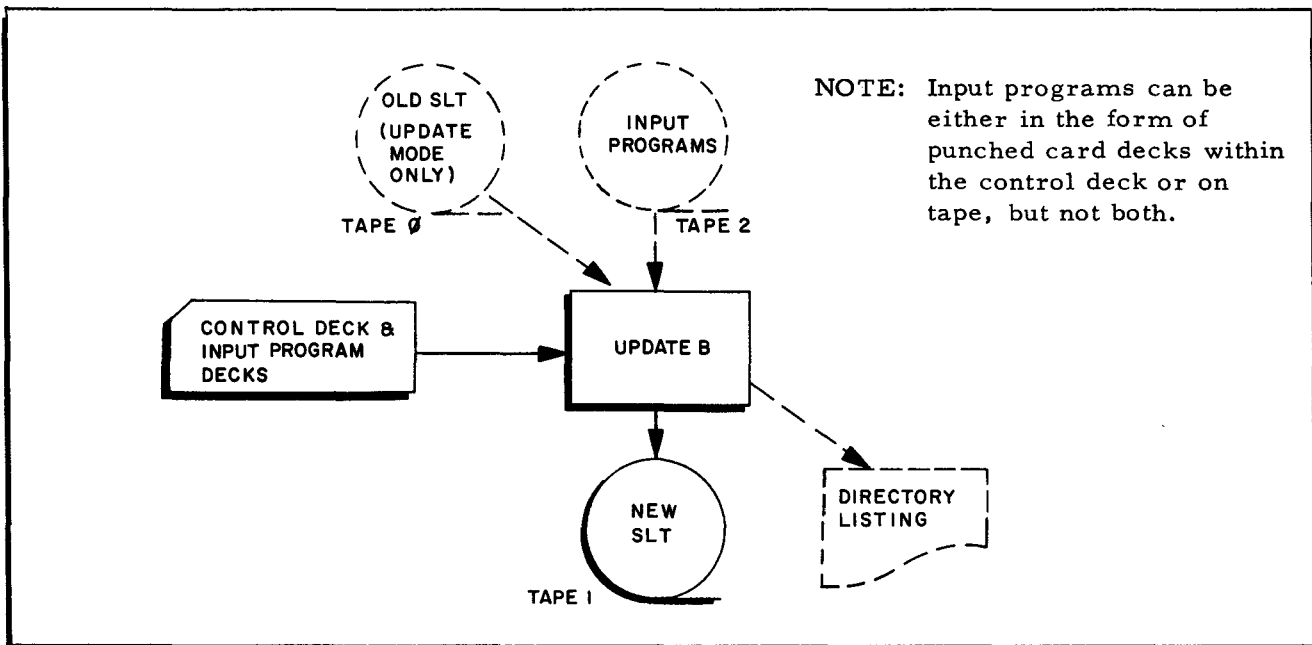


Figure A-1. The Update B Program

INPUT

The input required by Update B depends upon which function is performed. In the create mode, Update B requires as input a control deck and the object programs (on either punched cards or magnetic tape) which are to be placed on the new SLT. In the update mode, the old SLT containing those programs to be copied or deleted is also required.

Old SLT

Required only in the update mode, the old SLT is mounted as logical tape 0. The description of this tape corresponds to that given under "New SLT" below.

Control Deck

The control deck, consisting of a series of director cards which indicate the action to be performed for each input program and each program on the old SLT (update mode only), is read via an on-line card reader. In the create mode, these action directors may be in any sequence; in the update mode, they must be in the same sequence as the programs on the old SLT (with the exception of the Insert directors, which may be interspersed as desired). A description of the format and function of each type of action director is found under "Director Cards" below.

Input Programs

Update B will accept any complete object programs, in the form of punched card decks or card images on tape, which are generated by any of the following Honeywell Series 200 software:

1. Easycoder Assembler A (Self-loading format)
2. Condense A (Self-loading format)
3. Easycoder Assembler B (Self-loading format)
4. Easycoder Assembler B (Binary run deck format)
5. COBOL Compiler B (Binary run deck format)

In addition, Update B will accept any complete object programs from an old SLT (self-loading format) generated by a previous Update B run or from a Distributor Transaction Tape (self-loading and/or binary run deck format) received from Honeywell. All of the Easytab utility programs are valid input to the Update B program.

CARD INPUT

Any object-program card deck which is input to Update B is placed immediately behind its associated action director in the control deck. In the case of an object-program deck generated by COBOL B in binary run deck (BRD) format, the Loader B program must precede the object program (see Appendix B). Both of these decks are then placed behind the appropriate action director.

TAPE INPUT

An input program tape containing one or more complete object programs to be included

on the new SLT can be mounted as logical tape 2. Any action director specifying a program on this tape causes the tape to be searched. If the program is not found, a programmed halt occurs.

Binary Run Deck Format

For each input object program recorded on tape in binary run deck format, Update B generates the following series of self-loading routines. These are written ahead of the object program on the new SLT.

1. Tape Search B bootstrap record (sets up punctuation and reads in next record).
2. Tape Search B program record. (This single-record program locates and initiates the loading of any program on the program tape as called for by a Console Call card. If SENSE switch 4 is set ON, it initiates the loading of the next program on tape without reading a Console Call card).
3. Tape Loader B (loads the BRD-format object program which follows).

Following these is the object program in binary run deck format.

Self-Loading Format

Each object program on tape in self-loading format is handled by Update B as follows:

1. The Tape Search B bootstrap record and the Tape Search B program record are generated ahead of the object program.
2. The object-program bootstrap record is increased in length to 104 characters and the Load card is modified for tape loading.

OUTPUT

New SLT

The new SLT is written on tape drive 1. It is composed of one or more complete object programs, in self-loading or binary run deck format (see Figure A-2). Each object program in binary run deck format is preceded by a Tape Search B bootstrap record, a Tape Search B program record, and the Tape Loader B program. Each object program in self-loading format is preceded by a Tape Search B bootstrap record and a Tape Search B program record; no loader is required since the object program is in self-loading format.

Directory Listing

An optional listing of all programs on the new SLT is produced on an on-line printer.

DIRECTOR CARDS

The director cards which make up the control deck input to Update B consist of three types:

1. Control header card
2. Action directors
3. Trailer card

The control deck, which is always read by an on-line card reader, must begin with a control header card, contain one or more action directors, and terminate with a trailer card.

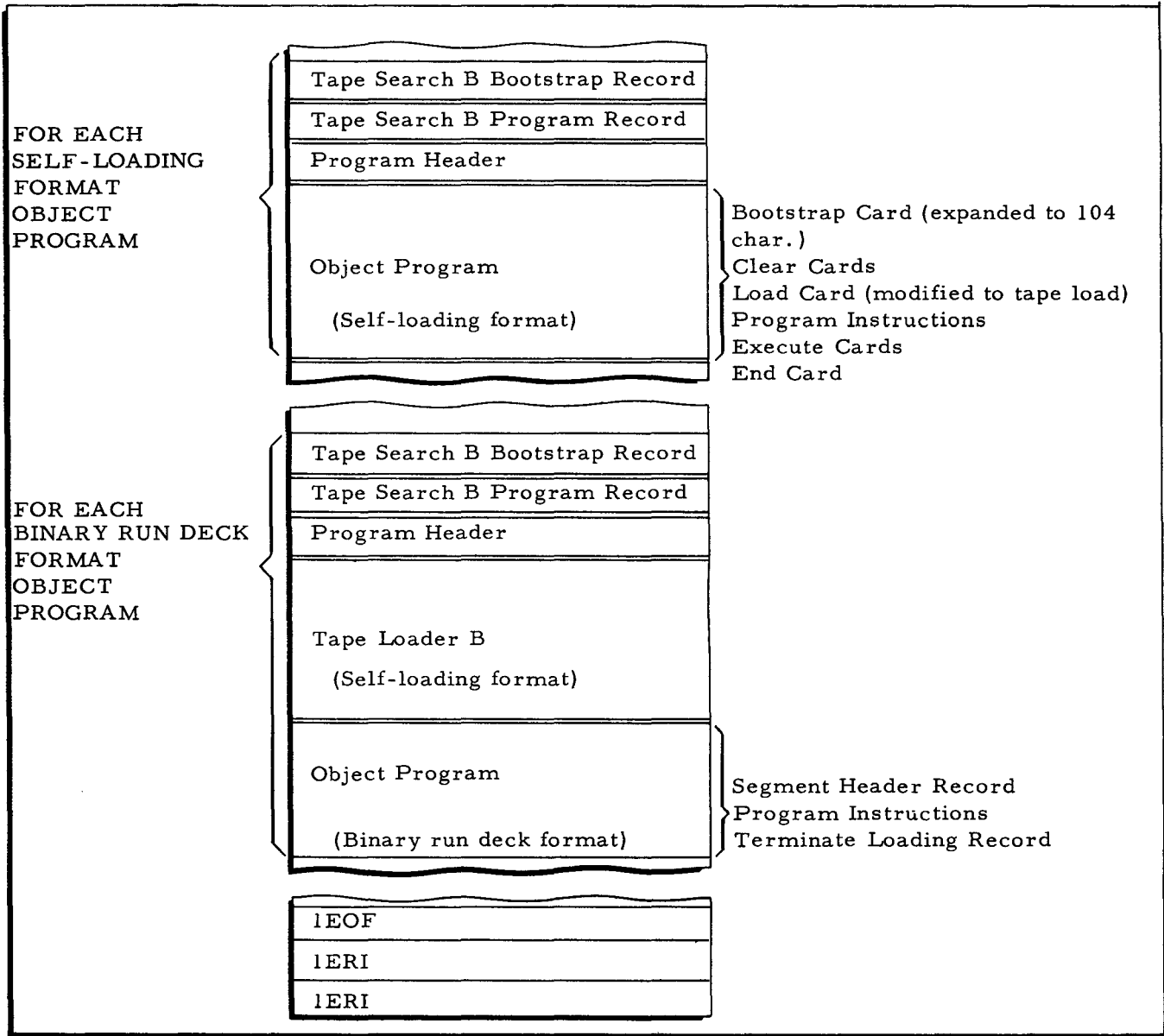


Figure A-2. Self-Loading Tape (SLT) Format

Control Header Card

The control header card identifies the beginning of the control deck and initializes Update B to operate in either the create or the update mode. Table A-1 details the parameters required.

Action Directors

Action director cards are of four types:

1. Insert - Directs Update B to insert the named program, which either follows in punched card form or is on the input program tape, onto the new SLT.
2. Delete - Directs Update B to bypass copying the named program from the old SLT onto the new SLT.

APPENDIX A. THE UPDATE B PROGRAM

- 3. Copy - Directs Update B to copy the named program from the old SLT onto the new SLT.
- 4. Replace - Directs Update B to insert the named program, which either follows in punched card form or is on the input program tape, onto the new SLT in place of an identically named program on the old SLT.

Table A-1. Update B Control Header Card

Column(s)	Contents	Interpretation
1-5	Must contain the value	IHDRΔ.
6-14	Blank	
15	Specifies whether Update B is to operate in the create or the update mode: C - Indicates that Update B is to operate in the create mode. No old SLT is mounted on tape drive 0 and only Insert action directors are permitted in the control deck. U - Indicates that Update B is to operate in the update mode. An old SLT must be mounted on tape drive 0 and all action directors are valid.	
16-27	Blanks	
28-55	Contains any information, such as the revision number or revisions date of the new SLT, to be printed in the header line of the directory listing.	
56-80	Blanks	

INSERT DIRECTOR

In the create mode, Update B requires that there be one Insert director for each program to be written onto the new SLT. The sequence of these directors establishes the order in which these programs will appear on the new SLT. In the update mode, Insert directors may appear anywhere in the control deck and determine at what points the new programs will appear within the order of the programs from the old SLT. The only restriction is that the name of the program to be inserted next cannot be the same as the name of the currently positioned program on the old SLT.

The setting of SENSE switch 2 determines from what source these new programs will be taken. If SENSE switch 2 is OFF, all programs to be inserted are assumed to be on the input program tape (tape drive 2). If SENSE switch 2 is ON, all programs to be inserted must be in punched card form following their respective Insert directors.

The format for the Insert director is described in the Table A-2.

Table A-2. Update B Insert Director Card

Column(s)	Contents	Interpretation
1-3	INS	
4-20	Blanks	
21-26	The six-character program name of the object program to be inserted onto the new SLT. This program must either follow this director card (SENSE switch 2 ON) or else be present on the input program tape (SENSE switch 2 OFF).	
27-29	Blanks	
30-37	Optional identifying information (creation date, revision number, etc).	
38-80	Blanks	

DELETE DIRECTOR

The Delete director is valid only in the update mode. Since there must be some type of director card present for each program on the old SLT, a Delete director must be supplied for all old-SLT programs which are not otherwise referenced by either a Copy or a Replace director. The absence of a director reference to a program on the old SLT results in a programmed halt.

In effect, the old-SLT program specified in the Delete director card is not copied onto the new SLT. A description of the format for this director is given in Table A-3.

Table A-3. Update B Delete Director Card

Column(s)	Contents	Interpretation
1-3	DEL	
4-20	Blanks	
21-26	The six-character program name of the old-SLT object program which is <u>not</u> to be included on the new SLT.	
27-29	Blanks	
30-37	Optional identifying information.	
38-80	Blanks	

COPY DIRECTOR

The Copy director is valid only in the update mode and causes the named program to be copied from the old SLT onto the new SLT. A Copy director must be included for every old-SLT object program which is not otherwise referenced by a Delete or a Replace director. A description of the format for this director is given in Table A-4.

Table A-4. Update B Copy Director Card

Column(s)	Contents	Interpretation
1-3	COP	
4-20	Blanks	
21-26	The six-character program name of the old-SLT object program which is to be included on the new SLT.	
27-29	Blanks	
30-37	Optional identifying information.	
38-80	Blanks	
NOTE: Since the Update B program itself is normally the first program on the SLT, the first action director in the control deck should be a Copy director containing UPDATB in columns 21 through 26.		

REPLACE DIRECTOR

The Replace director is valid only in the update mode. It is used whenever an object program on the old SLT is to be replaced on the new SLT by an input program which is either in punched card format following this director (SENSE switch 2 ON) or on the input program tape (SENSE switch 2 OFF). This function is primarily used to replace an old version of an object program with its updated or corrected version. The program name assigned to this new version is the same as that of the original program. In effect, the Replace director causes the deletion of the existing program and the insertion of the new program. The format for this director is described in Table A-5.

Table A-5. Update B Replace Director Card

Column(s)	Contents	Interpretation
1-3	REP	
4-20	Blanks	
21-26	The six-character program name of the old-SLT object program to be replaced on the new SLT by either the program deck which follows (SENSE switch 2 ON) or by an object program of the <u>same name</u> on the input program tape (SENSE switch 2 OFF).	
27-29	Blanks	
30-37	Optional identifying information.	
38-80	Blanks	

Trailer Card

The trailer card is used to signal the end of the input control deck. Upon reading this card, Update B first verifies that the old SLT has also reached the end of file if operating in the update mode. If the end of file has not been reached on the old SLT, the operator has the option of

causing the remaining programs to be copied onto the new SLT. Update B terminates the new SLT by writing a "1EOFΔ" record followed by two "1ERIΔ" records. The format for the trailer card is shown in Table A-6.

Table A-6. Update B Trailer Card

Column(s)	Contents	Interpretation
1-5	1EOFΔ	
6-80	Blanks	

OPERATING PROCEDURES FOR UPDATE B

The Update B program can be run on any Series 200 computer having the following minimum equipment configuration:

1. 8,192 characters of main memory.
2. Advanced programming instructions.
3. Tape drives:
 Create mode - one tape drive if the input programs are on punched cards;
 two tape drives if the input programs are on tape.
 Update mode - two tape drives if the input programs are on punched cards;
 three tape drives if the input programs are on tape.
4. One card reader.
5. One printer if a directory listing is desired.

Setup and Loading Procedures for Update B

1. If running in the update mode or if loading the Update B program from tape, mount the old SLT on tape drive 0 and place it in "protect" status.
2. Mount an available tape for the output SLT on tape drive 1 and place it in "permit" status.
3. Mount the tape reel containing the input programs (if they are on tape) on tape drive 2 and place it in "protect" status.
4. Initialize the printer if a directory listing is desired.
5. Press INITIALIZE.
6. Depending upon the method of loading the Update B program, follow the appropriate procedure below.

LOADING UPDATE B FROM CARDS

1. Place in the card reader the Update B binary run deck followed by the control deck. No blank cards are permitted between the two decks. The input programs, if on cards, must follow the associated action directors.
2. If the input programs are on punched cards, set SENSE switch 2 ON.
3. If a directory listing is desired, set SENSE switch 4 OFF.

4. Set the ADDRESS buttons to 0000_8 . Set the CONTENTS buttons to the octal address assignment of the card reader (normally 41_8).
5. Press BOOTSTRAP.
6. Press RUN.

LOADING UPDATE B FROM TAPE WITH A CONSOLE CALL CARD

1. Place in the card reader a Console Call card for Update B (UPDATB* in columns 1-7, blanks in the remaining columns) followed by the control deck. The input programs, if on cards, must follow the associated action directors.
2. Set the ADDRESS buttons to 0000_8 . Set the CONTENTS buttons to the octal address assignment of the tape drive containing the old SPT (normally 40_8).
3. Press BOOTSTRAP.
4. Press RUN.
5. At the first programmed halt (sequence register should contain 0032_8), set SENSE switch 2 ON if the input programs are on punched cards and set SENSE switch 4 OFF.
6. Press RUN to initialize the search for Update B.
7. While the search is being made, set SENSE switch 4 ON if a directory listing is not desired.

LOADING UPDATE B FROM TAPE WITHOUT A CONSOLE CALL CARD

The Update B program must be the first program on the old SLT.

1. Place the control deck in the card reader. The input programs, if on cards, must follow the associated action directors.
2. Set the ADDRESS buttons to 0000_8 . Set the CONTENTS buttons to the octal address assignment of the tape drive containing the old SPT (normally 40_8).
3. Press BOOTSTRAP.
4. Press RUN.
5. At the first programmed halt (sequence register should contain 0032_8), set SENSE switch 2 ON if the input programs are on punched cards and set SENSE switch 4 ON (forces the loading of the first program from the old SLT).
6. Press RUN to initiate loading.
7. While Update B is being loaded, set SENSE switch 4 OFF if a directory listing is desired.

Update B Programmed Halts

Table A-7 lists the programmed halts contained in Update B.

NOTE: aaaaa = location of program name from director card.
 bbbbb = buffer address

Table A-7. Update B Programmed Halts

A Address	B Address	Interpretation	Prescribed Action
00000	00001	Card reader not operable.	Initialize card reader; press RUN.
bbbbb	00010	Read error on old SLT.	Press RUN to try again.
bbbbb	00012	Read error on program input.	Press RUN to try again.
bbbbb	00021	Write error on new SLT	Press RUN to try again.
00000	00031	New SLT has reached end of tape.	Press RUN to properly terminate new SLT. Last program is incomplete.
bbbbb	00111	Card read error.	Run out cards. Check and refeed last card out. Press RUN.
00000	00200	Printer not operable.	Initialize printer. Press RUN.
bbbbb	00220	Printer error.	Mark line in error. Press RUN to reprint line.
00000	04001	1HDR card missing.	Correct control deck. Press RUN.
00000	04002	Illegal director card, or control deck is out of order.	Correct control deck. Rerun from the beginning.
00000	04003	First card of program is not a Bootstrap card.	Correct program input. Rerun from the beginning.
00000	04004	Card(s) between Bootstrap and Load card are not Clear cards.	Correct program input. Rerun from the beginning.
aaaaa	04005	Named program is not on the input program tape.	Correct control deck. Rerun from the beginning.
00000	04006	Control deck is at 1EOF. More information remains on the old SLT.	Press RUN to continue copy of all remaining programs.
77777	04777	End of run.	Remove output.

LOADING PROGRAMS FROM THE SLT

Program searching and loader initialization is under control of the Tape Search B program, which precedes each object program on the SLT. A call to search for and load either a specific program or the next sequential program can originate from either the operator (manual operation) or another program (automatic operation).

The Tape Search B program exists on the SLT as two records:

1. The Tape Search B bootstrap record, which sets punctuation and loads the Search program record which follows.
2. The Tape Search B program record, which performs the actual search and loader initialization.

The Tape Search B program occupies memory locations 026 through 199₁₀ (032-307₈). In addition, the bootstrapping of the Search B program destroys the previous contents of locations 00 through 25₁₀ (00-31₈).

Operating Characteristics

After the Search program has been bootstrapped, a programmed halt occurs. At this point, the operator can set SENSE switch 4 ON and press the RUN button to cause the loading of the next sequential program on tape, or he can set SENSE switch 4 OFF, insert a Console Call card in the card reader, and press the RUN button to initiate a search for the program specified in the call card. If the search is successful, the program is loaded and started. If the search is unsuccessful (i. e., the end of file is encountered before locating the named program), the program tape is rewound and a programmed halt occurs. A second search from the beginning of the SLT can be initiated by pressing the RUN button.

The actual operational steps for loading are as follows:

1. The SLT is mounted on tape drive 0 and placed in "protect" status. The tape must be either rewound or positioned directly before a Tape Search B bootstrap record following the loading of the previous run. (The SLT is always thus positioned after the loading of any program except the last.)
2. Press INITIALIZE.
3. Set the CONTENTS buttons to the octal address assignment for the SLT tape drive (normally 40₈).
4. Set the ADDRESS buttons to 0000₈.
5. Press BOOTSTRAP.
6. At the first programmed halt (sequence register contains 0032₈), set up for the desired type of search and load:
 - a. Search and Load by Console Call Card:
 - (1) Place the Console Call card (see format, Table B-1) in the card reader and initialize.
 - (2) Set SENSE switch 4 OFF.
 - (3) Press the RUN button to read the call card and locate the named program.
 - b. Load the Next Sequential Program:
 - (1) Set SENSE switch 4 ON.
 - (2) Press RUN to load the next program on the SLT.

TAPE SEARCH B PROGRAMMED HALTS

The programmed halts for Tape Search B are given in Table A-8.

Table A-8. Tape Search B Programmed Halts

Sequence Register	Interpretation	Prescribed Action
00032	Tape Search B has been bootstrapped and is ready to search for and load the next program.	<ol style="list-style-type: none">1. Console Call Card Mode:<ol style="list-style-type: none">a. Ready call card in card reader.b. Initialize card reader.c. Set SENSE switch 4 OFF.d. Press RUN.2. Load Next Program Mode:<ol style="list-style-type: none">a. Set SENSE switch 4 ON.b. Press RUN.
00043	Column 7 of the Console Call card does not contain an asterisk (*).	Correct the call card, replace in card reader, and press RUN.
00065	Called program has not been found.	SLT has been rewound. Press RUN to search again from beginning of tape.
00121	Tape read error while searching.	Press RUN to accept the record and continue the search.

APPENDIX B

LOADER B

Easytab utility programs and COBOL B programs written and compiled by the user can be loaded from either a binary run deck (BRD) or a binary run deck format tape under the operation of Loader B. In addition, such programs can be placed on a self-loading program tape (SLT) through the use of Update B, which is covered in Appendix A.

EQUIPMENT REQUIREMENTS FOR LOADER B

1. A Series 200 central processor. Approximately 510 memory locations are required by Loader B. These include locations 025 through 189₁₀ (031-275₈) plus the last 345 locations of the highest bank in memory. Loader B also uses index registers X5 and X6.
2. Advanced programming instructions.
3. One card reader or one tape drive.

PROGRAM LOADING

Loading from Cards

1. Place the binary run deck, followed by any required parameter card and/or input data deck, into the card reader. Initialize the card reader.
2. Press INITIALIZE.
3. Set the CONTENTS buttons to the octal address assignment of the card reader (normally 41₈). Set the ADDRESS buttons to 0000₈.
4. Press BOOTSTRAP. This causes the Bootstrap card (first card of the binary run program deck) to be read into memory starting at location 0.
5. Press RUN. This causes the instructions on the Bootstrap card to be executed and results in the subsequent loading of Loader B into memory.
6. The binary run deck following the loader is read and loaded into memory. If SENSE switch 1 is ON, a programmed halt occurs after loading. Press RUN to continue. This halt does not occur for the Sort B program.

Loading from Tape

1. Punch a Console Call card containing the name of the program on the binary run deck format tape which the loader is to search for and load. The format for this card is given below.

Table B-1. Console Call Card Format

Columns	Contents
1-6	Program name: MERGEB SORTBB SELECB REPROB TOTALB ALTERB PERIOB
7	Asterisk (*)
8-80	Blanks

2. Mount the program tape on tape drive 0 and place it in "protect" status.
3. Place the Console Call card, followed by any other input cards (parameter card, input deck, etc.), in the card reader. Initialize the card reader.
4. Press INITIALIZE.
5. Set the CONTENTS buttons to designate the octal address assignment of the program tape (normally 40_8). Set the ADDRESS buttons to 0000_8 .
6. Press BOOTSTRAP. The first record (bootstrap record) is read from the program tape into memory starting at location 0.
7. Press RUN. This causes the execution of the instructions in the bootstrap record.
8. A programmed halt occurs with the sequence register set to 32_8 .
9. Press RUN.
10. The binary run deck card images following the loader on the program tape are read and loaded into memory. If SENSE switch 1 is ON, a programmed halt occurs after loading. Press RUN to continue

Loader B Programmed Halts

Table B-2 shows the programmed halts contained in the Loader B program.

Table B-2. Programmed Halts for Loader B

A Address	B Address	Interpretation	Prescribed Action
xxxxx	00104	Tape version only. Program specified in the Console Call card cannot be found on the program tape.	Recheck the Console Call card and the program tape mounted on tape drive 0. Correct and start again from the beginning.
xxxxx	17002	Current program has reached the end of job and control has been returned to the loader.	Set up, initialize, and bootstrap next program to be executed.
xxxxx	xppld	Uncorrectable read error.	Tape loading: Press RUN to try again. Card loading: Refeed card in error and press RUN to reread.
xxxxx	x4011	Tape version only. The current program has called another program or program segment which cannot be found.	Program tape has been rewound. Correct program name in memory (loc. $145-152_8$), if possible, and press RUN.
xxxxx	14000	This halt occurs after the program has been loaded if SENSE switch 1 is ON.	Perform any actions requested by the programmer and press RUN to begin execution.
NOTE: pp = octal address assignment of loading device. d = 0 if loading from tape; 1 if loading from cards.			x = contents unspecified.

APPENDIX C
INPUT/OUTPUT ROUTINE HALTS

The input/output error routine halts common to all Easytab programs generated by COBOL Compiler B are shown in Table C-1.

Except for the last code shown (end-of-reel halt), every halt denotes some sort of input/output error condition. For each of these error conditions, there are two options available to the operator:

1. He may press RUN.

For card read, card punch, and printer errors, the program repeats the Peripheral Data Transfer (PDT) instruction to that device. This action assumes that the operator has either

- a. retrieved the last card from the eject pocket and reloaded it,
- b. discarded the last card punched, or
- c. manually spaced the printer and marked the last line as erroneous.

For tape read or tape write errors, the program repeats the standard error procedure. All error halt actions are repeatable. For example, the operator may attempt rereading the same tape record any number of times simply by repetitively pressing the RUN button.

2. He may branch to the address specified by the A-address register.

In all cases, the effect of this action is that the program will ignore the error that caused the halt and proceed as if it had not occurred. Caution should be stressed in choosing this option in the case of a read or write error halt. If a read error indication exists, the record will be accepted and processed as though no read error had occurred. If a write error indication exists, the tape is backspaced and an attempt is made to write the record correctly. If the write error persists after 63 such attempts, the record is written anyway and processing continues.

For the tape-swap halt, it is assumed that the operator has dismounted the current reel and mounted the next reel in its place on drive x. (Alternately, he may have already mounted the next reel on a spare drive so that the only action required is to readdress the spare drive in place of drive x.) For the incorrect label halt, it is assumed that the operator has dismounted the incorrect reel from drive x and mounted the correct reel in its place.

Table C-1. Input/Output Routine Halts

Contents of B-Address Register	Explanation of Halt
0001x	Read error on tape drive x
0002x	Write error on tape drive x
00110	Card read error
00120	Card punch error
00220	Printer error
0004x	Label-check failure on tape drive x
0003x	End of reel on tape drive x

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