HONEYWELL EDP

SOFTWARE BULLETIN

SERIES 200

OPERATING SYSTEM-MOD 1 OPERATING PROCEDURE SUMMARIES

GENERAL SYSTEM: SERIES 200/OPERATING SYSTEM - MOD 1

SUBJECT: Summaries of Program Characteristics and Operating Procedures for Programs in the Mod 1 Operating System.

SPECIAL INSTRUCTIONS: The program operating procedures documented herein are intended to be used at the console or control panel as ready reference material for the convenience of the operator. As summary descriptions, they outline only those procedures essential to normal operations. For a complete description of the pertinent operating considerations for each program, the applicable bulletin or manual must be consulted. References to the applicable publications are contained in the text of the summaries. Additional operating summaries of programs in the Mod 1 Operating System will be distributed as addenda to this bulletin.

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FOREWORD

Each of the following program summaries consists of pertinent systems and assembly information as well as the necessary equipment considerations and operating procedures for running the specific program.

A section entitled "Control Panel Basic Operating Procedures" has been included to provide the user with detailed console information for any program run procedure.

Easytran Symbolic Translator C	(Extended Easytran)
Analyzer C	(PLUS – Analyzer)
SPT Merge C	(PLUS – SPT Merge)
Tape Sort C and C(V)	(Sort 2 and 2V)
Collate C and C(V)	(Collate 2 and 2V)
Tape Loader-Monitor C	(PLUS – Tape Loader-Monitor)
Tape Handling Routine C	(THOREX)
Easycoder Assembly C	(Easycoder 12K)
Memory Dump C Routine	(PLUS – Memory Dump)
Library Processor C	(Library Preprocessor)
Tape Dump C Routine	(PLUS – Tape Dump)
Update and Select C and D	(PLUS – Update and Select)

CONTROL PANEL BASIC OPERATING PROCEDURES

In the summaries of operating procedures that follow, some of the more basic procedures are not explained extensively (e.g., displaying the A- and B-address registers for halt codes, bootstrapping information from tape or cards, etc.). Should the operator require more explanation for these procedures, he can refer to the detailed descriptions given below.

The basic operating procedures outlined below can be performed only when the STOP button is illuminated. If depressing the STOP button does not cause the STOP indicator to illuminate, the central processor must be cleared before processing. This is accomplished by depressing the CENTRAL CLEAR button.

NOTE: If the CENTRAL CLEAR button does not cause the STOP button to illuminate (an instruction may be stored in a peripheral device), depressing the INITIALIZE button will cause the STOP button to illuminate; but this alternative procedure should only be applied before program loading, as depressing the INITIALIZE button will also cause several memory registers and counters to be cleared.

1. To display a control memory register and the character in main memory it references:
   a. Depress the STOP button (if not already in the STOP mode);
   b. Depress the appropriate CONTROL buttons (to specify the desired control memory register, if different from the register presently indicated). The address of the desired control memory register now appears in the illuminated CONTROL indicators; and
   c. Depress the CONTROL DISPLAY button. The main memory address specified by the setting of the control memory register now appears in the ADDRESS indicators, and the character referenced by the setting of the address indicators is displayed in the CONTENTS indicators.
2. To display characters in successive main memory locations:
   a. Depress the STOP button (if the system is not already in the STOP mode);
   b. If it is desired to display successive main memory locations beginning with the current setting of the program, proceed to step "F" below;
   c. If it is desired to display some location(s) beginning with other than the current setting of the program, manually enter (by depressing the appropriate ADDRESS buttons) the desired starting address into the memory address register (MAR);
   d. Depress the CONTROL buttons to designate the unassigned register (octal 00).

(NOTE: If any of the CONTROL indicators are illuminated, it is only necessary to depress those pushbuttons which are illuminated in order to select the unassigned register. The absence of illumination in the CONTROL indicators verifies that the unassigned register is in control.)

e. Depress the CONTROL ENTER button to set the control memory register (i.e., the unassigned register) to the starting address selected in step "g" above;

f. Depress the CONTROL DISPLAY+1 or the CONTROL DISPLAY-1 button, depending on the desired direction of the serial display of characters.

(NOTE: This action causes only the extinguishing of the CONTENTS indicators. No incrementation or decrementation takes place upon the first depression of either button.)

g. Depress the CONTROL DISPLAY+1 or the CONTROL DISPLAY-1 button a second time to display in the CONTENTS indicators the character referenced by the setting of the ADDRESS indicators and to increment or decrement the controlling register to the next sequential location.

(NOTE: If the displaying of the characters is to begin with the current setting of the program, the characters displayed in the CONTENTS indicators begin with the character designated by the current setting of the ADDRESS indicators. Otherwise, the display begins with the character referenced in the address selected by the operator in step "c" above.)

h. Depress repeatedly the CONTROL DISPLAY+1 or the CONTROL DISPLAY-1 button until the desired successive main memory locations have been displayed in the CONTENTS indicators.

3. To enter characters into successive main memory locations:

a. Depress the STOP button (if the system is not already in the STOP mode);

b. If it is desired to enter information into successive main memory locations beginning with the current setting of the program, proceed to step "f" below;

c. If it is desired to enter information into some location(s) beginning with other than the current setting of the program, manually enter (by depressing the ADDRESS CLEAR button and the appropriate ADDRESS buttons) the desired starting address into the memory address register;

d. Depress the CONTROL buttons to designate the unassigned register (octal 00).

(NOTE: If any of the CONTROL indicators are illuminated, it is only necessary to depress those pushbuttons which are illuminated in order to select the unassigned register. The absence of illumination in the CONTROL indicators verifies that the unassigned register is in control.)

e. Depress the CONTROL ENTER button to set the control memory register (i.e., the unassigned register) to the starting address selected in step "c" above;

f. Depress the CONTROL DISPLAY+1 or the CONTROL DISPLAY-1 button, depending on the desired direction of character entry into main memory.

(NOTE: This action causes only the extinguishing of the CONTENTS indicators. No incrementation or decrementation takes place upon the first depression of either button.)

g. Depress the CONTROL DISPLAY+1 or the CONTROL DISPLAY-1 button again to display in the CONTENTS indicators the character referenced by the setting of the ADDRESS indicators and to increment or decrement the controlling (unassigned) register to the next sequential location.

(NOTE: If the entering of the characters is to begin with the current setting of the program, the character displayed in the CONTENTS indicators is the one designated by the current setting of the ADDRESS indicators. Otherwise, the character displayed is the one referenced in the address selected by the operator in step "c" above.)

h. If a different character from that displayed in step "g" above is to be written into the desired memory location, depress the CONTENTS CLEAR button;

i. Depress the CONTENTS buttons to create the octal equivalent of the desired character; and

j. Depress the CONTENTS ENTER button to write the desired character into main memory.

k. Repeat steps "g" through "j" as many times as there are characters to be written into successive main memory locations.

4. To trace program flow manually:

a. Depress the STOP button (if not already in the STOP mode);

b. Set the CONTROL buttons to designate the instruction address register;

c. Depress the CONTROL DISPLAY button, if it is desired to display the current operation code and the contents of the instruction address register; and

d. Depress the INSTRUCT button (to execute the instruction).

Repeat steps "c" and "d" the desired number of times.

5. To perform a BOOTSTRAP and RUN operation:

a. Depress the STOP button (if not already in the STOP mode);

b. Depress the INITIALIZE button;

c. Depress the ADDRESS buttons (to designate the starting location in main memory, if different from zero);

d. Depress the CONTENTS buttons to designate the desired peripheral control (see peripheral control assignments below);

e. Prepare the peripheral device designated in "d" above (i.e., cycle-up the device) to accept a PDT instruction which will read in the loading program;

f. Depress the BOOTSTRAP button;

g. If necessary, depress the ADDRESS MODE button (to designate addressing mode of the program being loaded if not two-character mode; and

h. Depress the RUN button.

ADDRESS ASSIGNMENTS FOR PERIPHERAL CONTROLS

Peripheral Control	Octal Address
Magnetic Tape (output)	00*
Magnetic Tape (input)	40
Card Reader or Paper Tape Reader	41
Card Punch or Paper Tape Punch	01
High-Speed Printer	02
On-Line-Adapter	42
Console (output)	07
Console (input)	47
*If 00 is used when bootstrapping information to magnetic tape, results are unspecified.	

In the interest of uniformity among Series 200 installations, it is desirable to use the recommended address assignments for peripheral controls; however, the ability to assign any address to a peripheral control is maintained to permit changing of the recommended assignments on an installation basis when necessary.

OPERATING PROCEDURE FOR EASYTRAN SYMBOLIC TRANSLATOR C

Easytran Symbolic Translator C converts existing 1401 programs, recorded in 1401/1460 SPS or Autocoder symbolic language, to Series 200 programs, expressed in Easycoder C symbolic language. It automatically translates IOCS macro instructions, DIOCS entries, and DTF entries into 1/2-inch Tape and Terminal I/O B macro calls, DIOCS entries, and DTF entries respectively. It will also convert programmer-written 1401 macro calls, if the programmer-written macro routine has been previously converted to a Series 200 macro routine and stored on the Easycoder C symbolic program tape. These macro calls will be processed by Library Processor C before assembly.

The translator program operates in either three or four phases: three to convert Autocoder and four to convert SPS (see Figure 1). The first phase, Phase 0, converts all SPS statements into Autocoder language, so input to Phase I is always in Autocoder. For a more detailed description, refer to the Honeywell Information Bulletin entitled Extended Easytran, DSI-355A.

Either a four- or five-tape system configuration may be used. The source program can be read in from either cards or tape. The translator program is on a BRT.

INPUT ORGANIZATION

The input deck will be arranged in one of the following ways.

1. For SPS conversion from cards:
   a. SPS symbolic program
   b. 1EOI card.
   c. Easytran control card.
   d. One blank card.
   e. Any carriage control card(s).
   f. Three blank cards.
2. For Autocoder conversion from cards:
   a. Easytran control card.
   b. Autocoder symbolic program.
   c. One blank card.
   d. Any carriage control cards.
   e. Three blank cards.

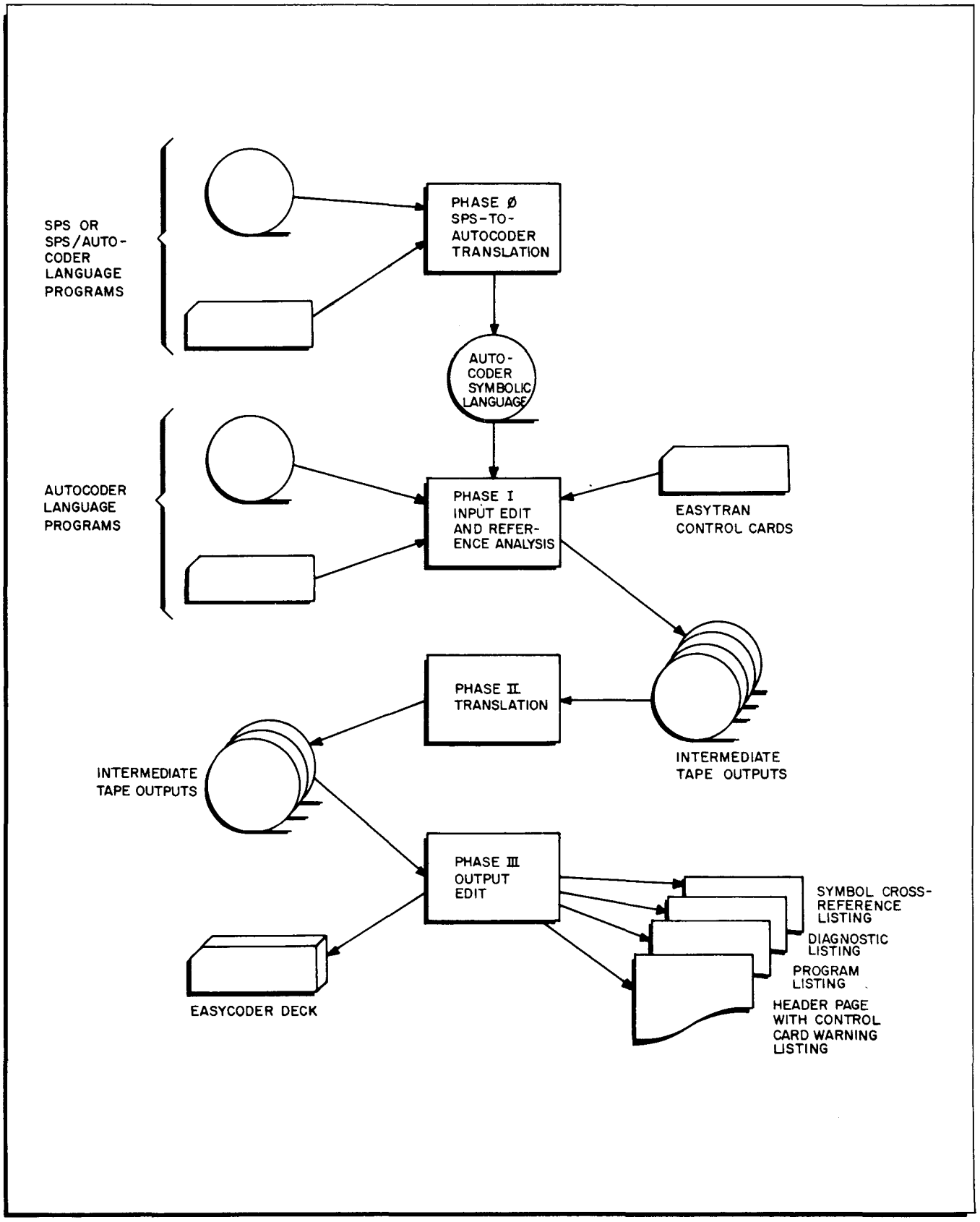


Figure 1. The Four Phases of the Easytran Symbolic Translator

3. For programs loaded from tape:
   a. Easytran control card.
   b. One blank card.
   c. Any carriage control cards.
   d. Three blank cards.

The format of the control cards are presented in the Easytran Reference Manual (DSI 356).

Every symbolic program must terminate with an End card, punched "END". For SPS programs, the End card is punched in columns 14-16. For Autocoder programs, the End card is punched in columns 16-18. Any SPS symbolic program must be followed by a 1EOI card, punched in columns 1-4.

In mixed SPS-Autocoder programs, an Enter card, containing the punches ENT, must appear each time the 1401 symbolic source language changes (see Figure 2). The Enter card is the last statement of the preceding language and introduces the first statement of the following language. Therefore, if the language changes from SPS to Autocoder, an Enter card in SPS format (SPS format cards are punched beginning in column 14) must precede the first Autocoder statement. Conversely, if the language changes from Autocoder to SPS, the first SPS statement is preceded by an Enter card in Autocoder format (punched beginning in column 16). Every program is assumed to begin with SPS statements. Thus, in mixed runs, no program that begins with Autocoder statements must be preceded by an SPS-type Enter card.

OPERATING INSTRUCTIONS

The system may be operated in any of eight different conversion modes, depending on the number of tape drives (four or five), the language being translated (SPS or Autocoder), and the input medium (card or tape).

SPS tape input is always mounted as logical tape 1 and the resulting Autocoder translation becomes logical tape 2. The Easytran system tape is always mounted as logical tape 0.

There is a halt at the end of Phase 0 for possible operator action; transitions between the other phases are automatic. Other standard halts occur in Phases I, II, and III, if (a) Easytran is being run on a four-tape configuration, (b) Symbolic autocoder input is loaded from tape, or (c) SPS is the input language.

Note On SPS Batch Conversion

SPS programs may be converted to symbolic Autocoder language on a batch basis. As in program-by-program conversion, the Autocoder programs which are the output of Phase 0 are written onto tape 2. SPS input may be on cards or tape. Each SPS symbolic program must terminate with an End card. The last SPS program must be followed by a 1EOI card and three blank cards.

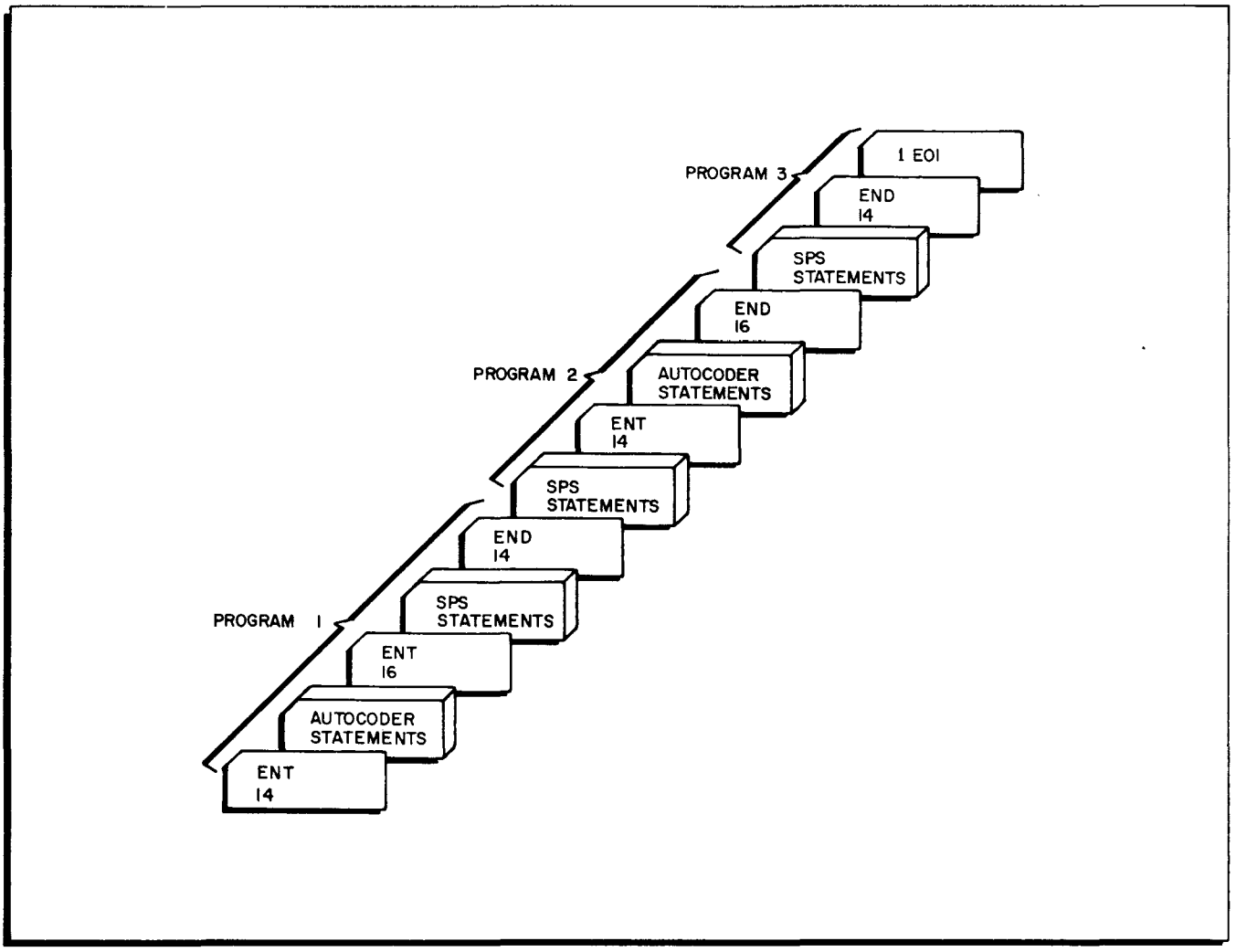


Figure 2. Typical Mixed-Language Input to Phase 0 of the Easytran Symbolic Translator

The Easytran system tape is mounted as logical 0, and the output tape is mounted as logical 2. An input tape, if used, is mounted as logical 1. SENSE switch settings are identical to those for regular Easytran conversion from SPS. The only operating instructions are:

1. Bootstrap the system tape into location 31_8.
2. Depress the RUN button.

Four-Tape System: SPS Conversion from Cards (Figure 3)

1. Make up the Easytran input deck as shown in Figure 3; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 1, 2, and 3 — work tape in PERMIT status

3. Set SENSE switches as follows for the SPS-to-Autocoder prepass.

   Switch 1 — OFF

   Switch 2 — ON

   Switch 3 — ON — no SPS/Autocoder listing
   OFF — listing

   Switch 4 — OFF

4. Bootstrap the system tape into location 31_8.

5. Depress the RUN button.

6. After halt 7777, reset SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — OFF

7. Depress the RUN button.

8. After halt 103, demount the system tape and, in its place, mount a work tape in PERMIT status. Readdress the physical tape drive as logical 4.

9. Depress the RUN button.

10. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.

11. Depress the RUN button.

Four-Tape System: SPS Conversion from Tape (Figure 4)

1. Make up the Easytran load deck as shown in Figure 4; load the card reader.

2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 1 — SPS symbolic tape in PERMIT status

   Logical 2 and 3 — work tapes in PERMIT status

3. Set SENSE switches for the SPS-to-Autocoder prepass as follows:

   Switch 1 — ON

   Switch 2 — ON

   Switch 3 — ON — no SPS/Autocoder listing
   OFF — listing

   Switch 4 — OFF

4. Bootstrap the system tape into location 31_8.

5. Depress the RUN button.

6. After halt 7777, the SPS tape input on drive 1 may be saved by replacing it with a work tape mounted in PERMIT status.

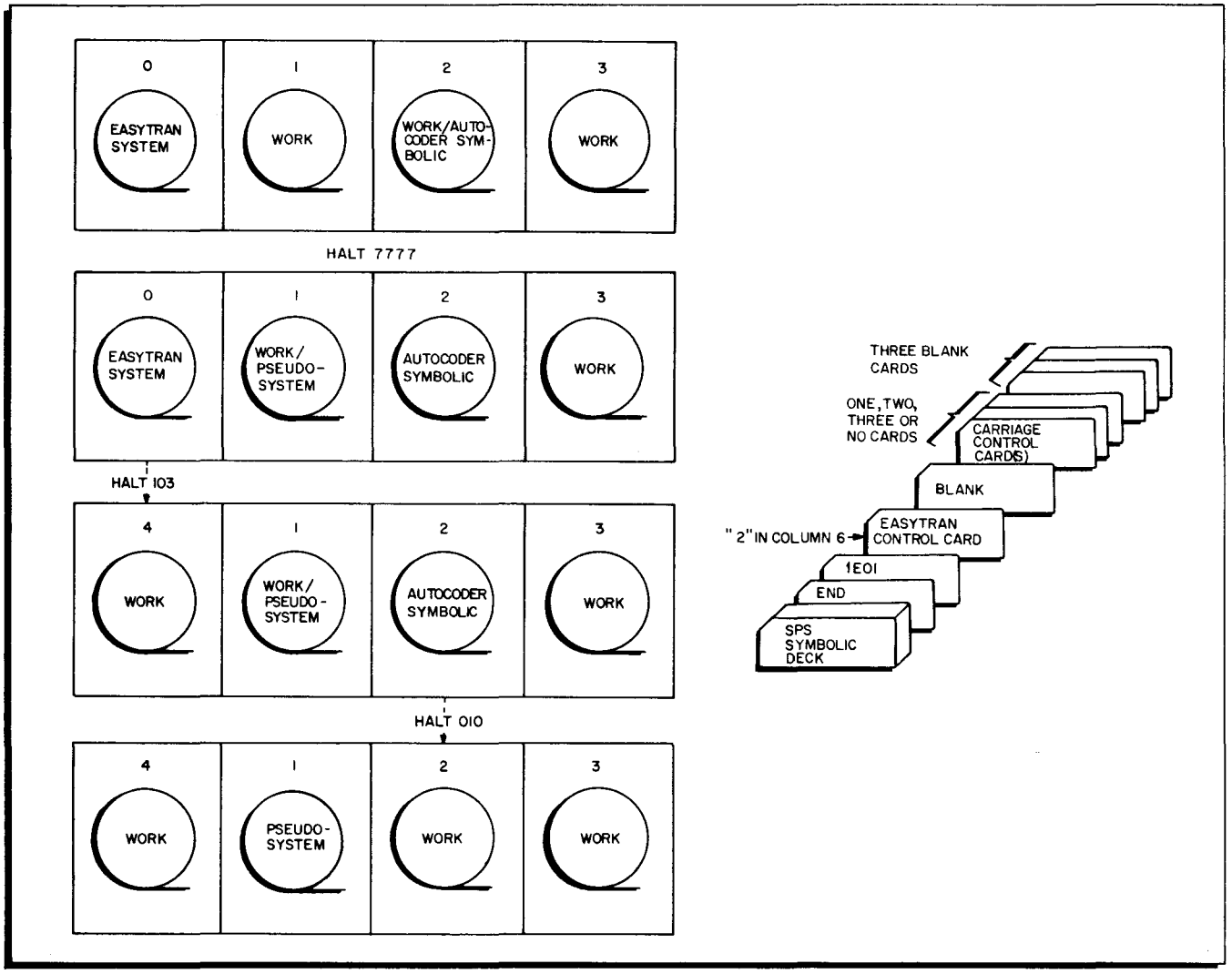


Figure 3. Four Tape System — Tape Manipulation and Card Input for SPS Conversion from Cards

7. Reset SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — OFF

8. Depress the RUN button.

9. After halt 103, demount the system tape and, in its place, mount a work tape in PERMIT status. Readdress the physical tape drive as logical 4.

10. Depress the RUN button.

11. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.

12. Depress the RUN button.

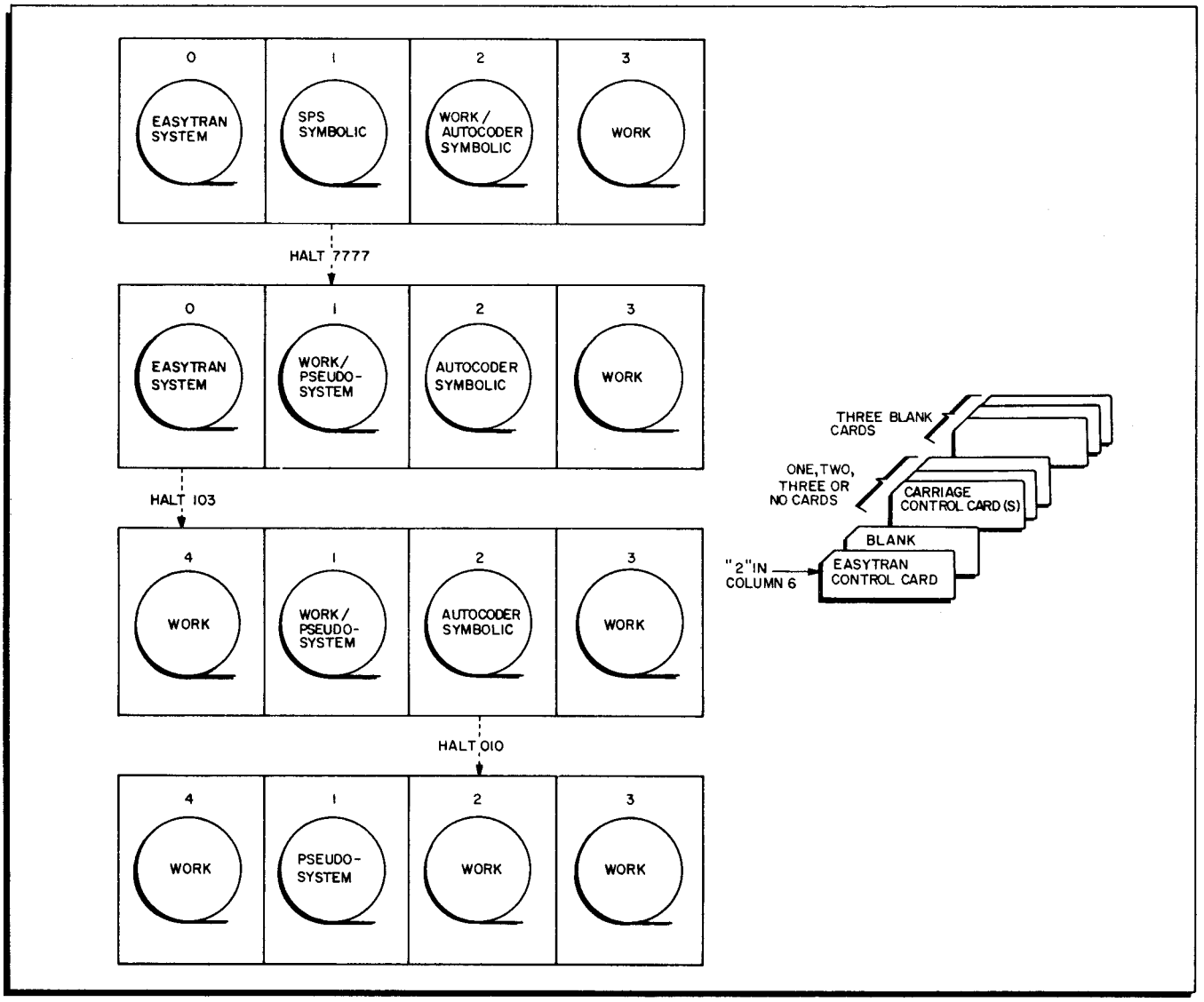


Figure 4. Four-Tape System — Tape Manipulation and Card Input for SPS Conversion from Tape

Four-Tape System: Autocoder Conversion from Cards (Figure 5)

1. Make up the Easytran load deck as shown in Figure 5; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Eaystran system tape in PROTECT status

   Logical 1, 2, and 3 — work tapes in PERMIT status
3. Set SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — OFF

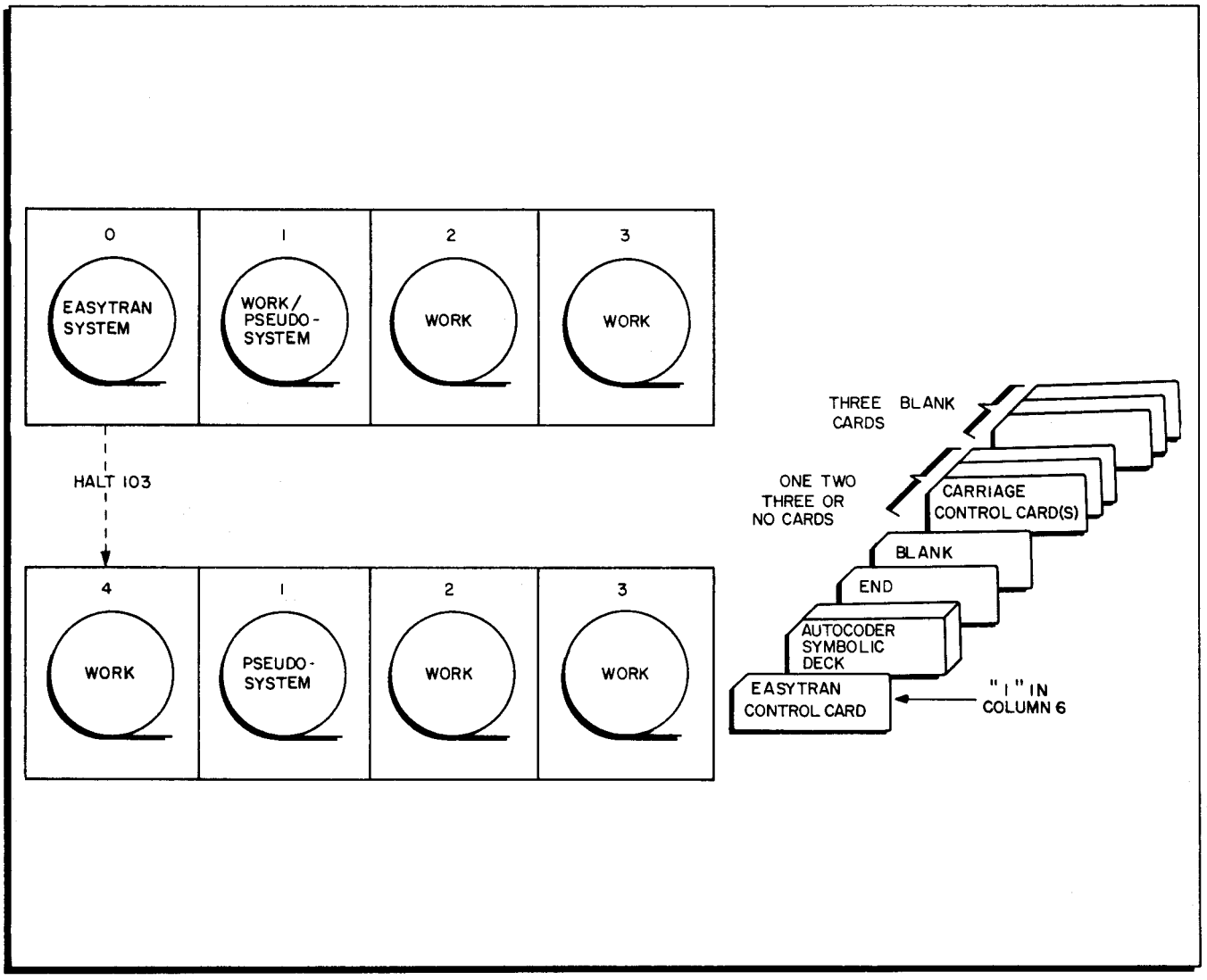


Figure 5. Four-Tape System — Tape Manipulation and Card Input for Autocoder Conversion from Cards

4. Bootstrap the system tape into location 31_8.
5. Depress the RUN button.
6. After halt 103, demount the system tape and, in its place, mount work tape in PERMIT status. Readdress the physical tape drive logical 4.
7. Depress the RUN button.

Four-Tape System: Autocoder Conversion from Tape (Figure 6)

1. Make up the Easytran load deck as shown in Figure 6; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 2 — Autocoder symbolic tape in PERMIT status

   Logical 1 and 3 — work tapes in PERMIT status

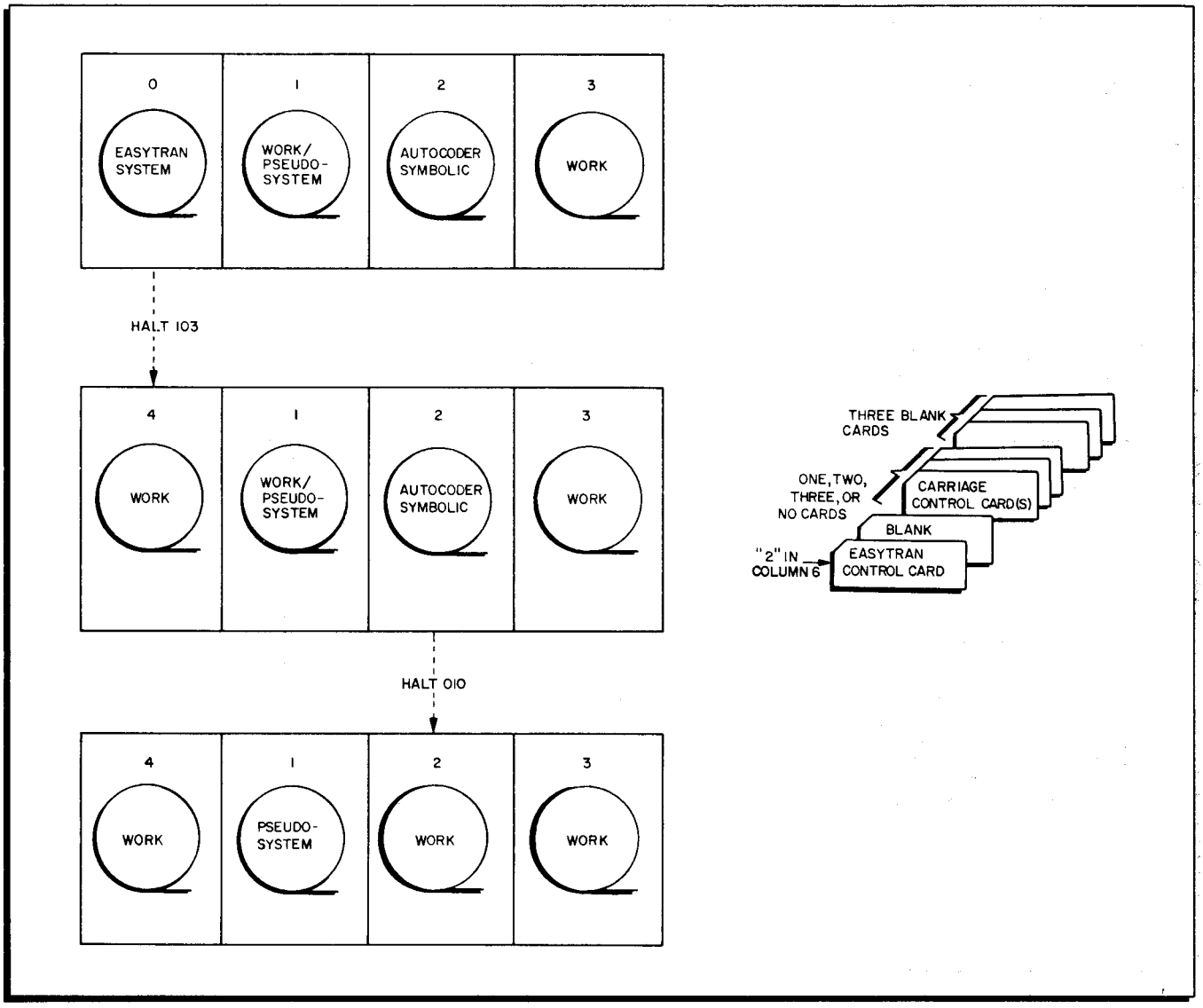


Figure 6. Four-Tape System — Tape Manipulation and Card Input for Autocoder Conversion from Tape

3. Set SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — OFF

4. Bootstrap the system tape into location 31_8.

5. Depress the RUN button.

6. After halt 103, demount the system tape and, in its place, mount a work tape in PERMIT status. Readdress the physical tape drive as logical 4.

7. Depress the RUN button.

8. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.

9. Depress the RUN button.

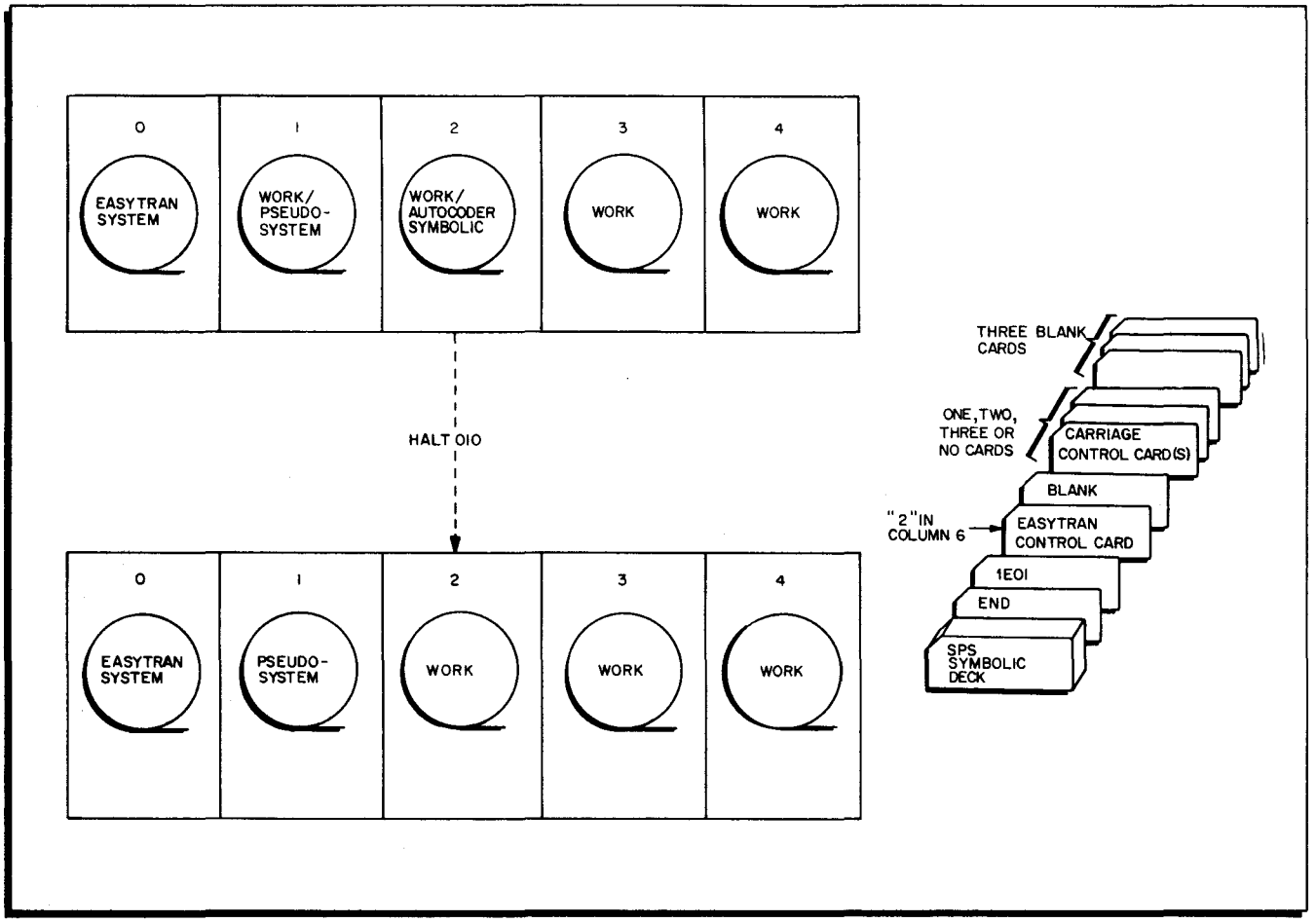


Figure 7. Five-Tape System — Tape Manipulation and Card Input for SPS Conversion from Cards

Five-Tape System: SPS Conversion from Cards (Figure 7)

1. Make up the Easytran load deck as shown in Figure 7; load the card reader.

2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 1, 2, 3, and 4 — work tapes in PERMIT status

3. Set SENSE switches as follows for the SPS-to-Autocoder prepass.

   Switch 1 — OFF

   Switch 2 — ON

   Switch 3 — ON — no SPS/Autocoder listing
   OFF — listing

   Switch 4 — OFF

4. Bootstrap the system tape into locations 31_8.
5. Depress the RUN button.
6. After halt 7777, reset SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — ON
7. Depress the RUN button.
8. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.
9. Depress the RUN button.

Five-Tape System: SPS Conversion from Tape (Figure 8)

1. Make up the Easytran load deck as shown in Figure 8; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 1 — SPS symbolic program tape in PERMIT status

   Logical 2, 3, and 4 — work tapes in PERMIT status
3. Set SENSE switches as follows for the SPS-to-Autocoder prepass:

   Switch 1 — ON

   Switch 2 — ON

   Switch 3 — ON — no SPS/Autocoder listing
   OFF — listing

   Switch 4 — OFF
4. Bootstrap the system tape into location 31_8.
5. Depress the RUN button.
6. After halt 7777, the SPS tape input on drive 1 may be saved by replacing it with a work tape mounted in PERMIT status.
7. Reset SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — ON
8. Depress the RUN button.
9. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.
10. Depress the RUN button.

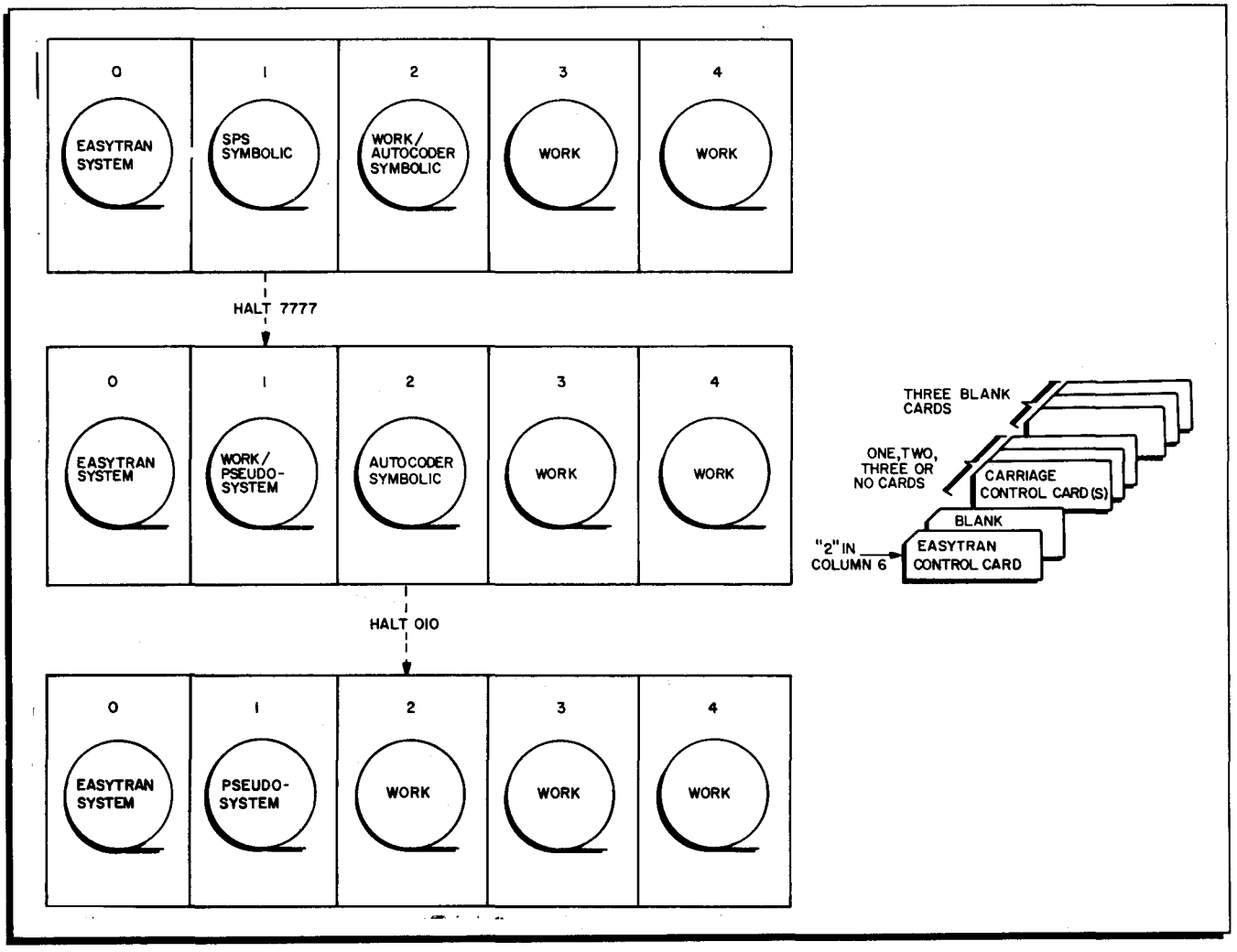


Figure 8. Five-Tape System — Tape Manipulation and Card Input for SPS Conversion from Tape

Five-Tape System: Autocoder Conversion from Cards (Figure 9)

1. Make up the Easytran load deck as shown in Figure 9; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 1, 2, 3, 4 — work tapes in PERMIT status
3. Set SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — ON
4. Bootstrap the system tape into location 31_8.
5. Depress the RUN button.

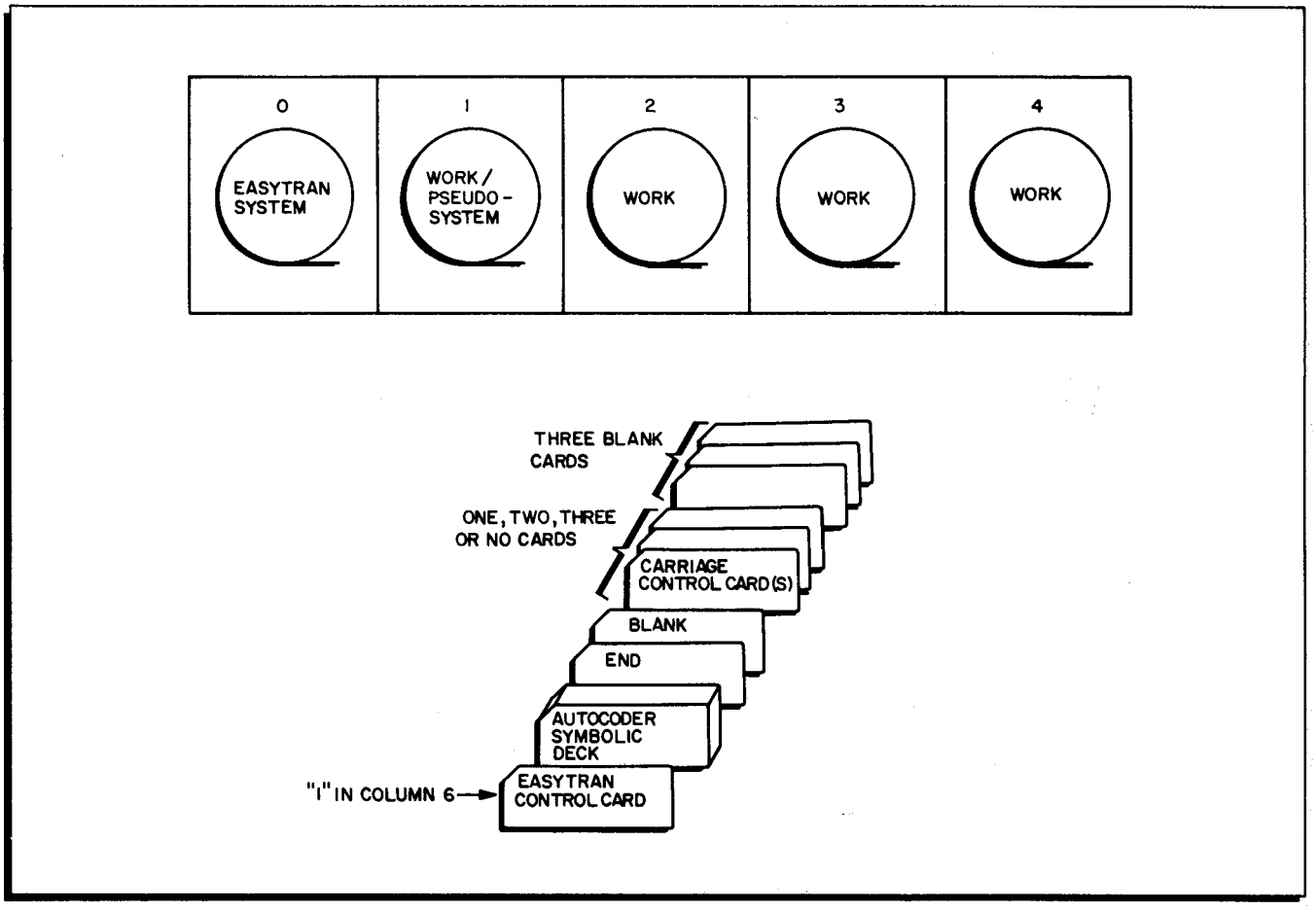


Figure 9. Five-Tape System — Tape Manipulation and Card Input for Autocoder Conversion from Cards

Five-Tape System: Autocoder Conversion from Tape (Figure 10)

1. Make up the Easytran load deck as shown in Figure 10; load the card reader.
2. Mount tapes as follows:

   Logical 0 — Easytran system tape in PROTECT status

   Logical 2 — Autocoder symbolic tape in PERMIT status

   Logical 1, 3, and 4 — work tapes in PERMIT status
3. Set SENSE switches as follows:

   Switch 1 — ON — suppresses punching of Easycoder output
   OFF — punches Easycoder deck

   Switch 2 — OFF

   Switch 3 — OFF

   Switch 4 — ON
4. Bootstrap the system tape into location 31_8.
5. Depress the RUN button.

6. After halt 010, the Autocoder input may be saved by mounting a work tape in its place as logical 2.

7. Depress the RUN button.

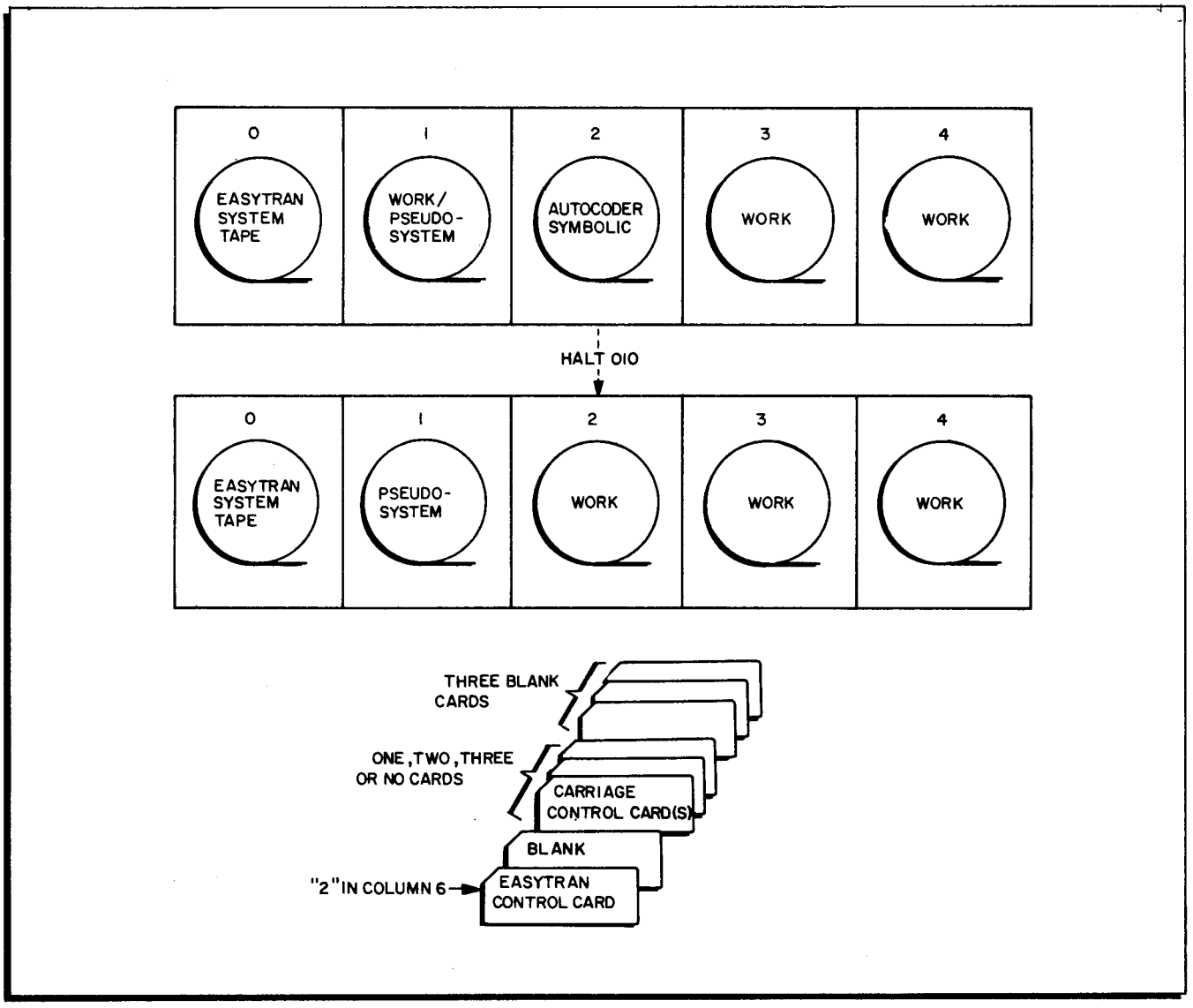


Figure 10. Five-Tape System — Tape Manipulation and Card Input for Autocoder Conversion from Tape

Table 1. Translator Halts and Restart Procedures During SPS-to-Autocoder Conversion

HALT NUMBER		REASON	RESTART PROCEDURE
A	B		
001	001	Card read error.	Reload card
002	002	End of input tape.	Reduce input number of program and try rerunning, if tape not at end and job not finished.
003	003	End of output tape	Dump memory and tape, if tape not on end.
004	004	10 read errors	Depress the RUN button for 10 additional tries.
005	005	10 write errors	Depress the RUN button for 10 additional tries.
006	006	10 write errors at end of job	Depress the RUN button for 10 additional tries.
7777	7777	End of run	Depress the RUN button to continue Easytran.

Table 2. Halts and Restart Procedures During Phases I, II, and III

HALT NUMBER		REASON	RESTART PROCEDURE
A	B		
101	101	Tape read error during loading of the Easytran system tape (logical 0).	Depress the RUN button. If the tape is in error, it may be necessary to recrease the Easytran system tape (see Appendix C).
102	102	Tape read error during loading of the pseudo-system tape (logical 1).	Depress the RUN button. If the tape is in error, it may be necessary to restart the run.
103	103	Program halt for four-tape system during Phase I.	Demount the Easytran system tape and replace it with a work tape in PERMIT status. Readdress the physical tape drive as logical 4. Depress the RUN button.
010	010	Save input tape on drive 2?	If yes, mount work tape on drive 2 and depress the RUN button. If no, depress the RUN button; tape on drive 2 is used as work tape.
011 021 031	011 021 031	End of reel on tape read or write	Reload Easytran

Table 2 (cont). Halts and Restart Procedures During Phases I, II, and III

HALT NUMBER		REASON	RESTART PROCEDURE
A	B		
013 023 033	013 023 033	Halt after 10 attempts to correct a read error.	Depress the RUN button for 10 additional tries.
014	014	Input Error. a) Over 10,000 input statements, or b) Both SPS and Autocoder exist in the program (Phase I will accept only Autocoder).	Correct and reload.
015	015	Control Card Error a) ATOEC missing b) Input language incorrect c) Input medium incorrect (tape or card). d) The number of carriage control cards specified in the ATOEC control card and the actual number present are not equal. e) Carriage control cards are not in proper sequence.	Correct and reload.
017	017	ORG with symbolic address not defined in previous entries.	Correct and reload.
035	035	Easytran subroutine library out of sequence.	Resequence deck, then depress the RUN button.
037	037	ORG overflow in ORG table.	Reload program on a larger memory configuration.
777	777	End of job.	
17513 17514	17513 17514	Card read hole-count error.	Run out cards, insert correct card, cycle-up reader, and depress the RUN button.
17515	17515	Card read error during program loading	Run out cards, insert correct card, cycle-up reader, and depress the RUN button.
17537	17537	Halt after 10 attempts to correct punch errors.	Run out cards, cycle-up reader, and depress the RUN button.
17551	17551	Halt after 30 attempts to write errors.	Depress the RUN button for 30 additional tries.

Table 3. Subroutine Halt Numbers at Execution Time

H-200 DISPLAY	REASON	RESTART PROCEDURE
00011	Read error.	Run out reader, reload last three cards and depress RUN.
00012	Read error when testing for last card.	Same as above.
00013	Read error when trying to read first load card after an execute overlay.	Same as above.
00021	A form control skip to a channel which is not specified in the carriage control table has been given.	Correct program and reload.
00031	10 punch errors accumulated.	Press RUN to continue. Program will be reset to accumulate 10 more punch errors.
00041	30 erase commands executed due to write errors caused by bad tapes.	Press RUN to continue. Program will be reset to accumulate 30 more tape skip commands.

OPERATING PROCEDURES FOR ANALYZER C

The Series 200 Analyzer C (AAJANA) is a programming aid which helps a programmer analyze any Series 200 program that is coded in the Easycoder symbolic language. From the input program, the Analyzer extracts symbolic tags, references (to each tag, to index registers, and to absolute addresses), and calls to library routines. It then processes the information to produce the Analyzer printed listing, which is arranged in alphanumeric order so that all information about a particular tag, absolute location, or library routine is grouped together. This is done in three phases by two Analyzer program segments and Tape Sort C. For a more detailed description, refer to the Honeywell Information Bulletin entitled Analyzer C (DSI-358).

INPUT ORGANIZATION

Input Units

The programs to be analyzed may be on symbolic program tape (SPT), card-image tape, punched cards, or paper tape. The type of input used is specified on the ECD.

Program Loading

The Analyzer program can be loaded from either a binary run tape (BRT), using Tape Loader-Monitor C, or from a program card deck, using Card Loader-Monitor B. The program BRT, when used, should contain Tape Loader-Monitor C, Tape Sort C, and the two Analyzer C program segments in that order. If the program is loaded from a BRT, the input deck (or card-image tape, or paper tape) is arranged as shown in Figure 1.

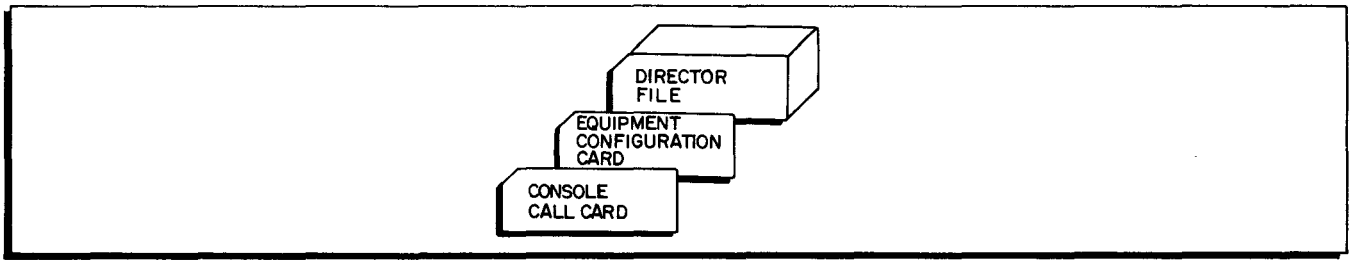


Figure 1. Input Deck FORMAT with Tape Loader-Monitor

If the program is loaded from cards, the input deck is arranged in the following order:

1. Self-loading Card Loader-Monitor deck
2. Analyzer Program Segment 1 (AANANA01)
3. Equipment Configuration Descriptor

4. Input Cards (if any)
5. Tape Sort C deck
6. Analyzer Program Segment 2 (AANANA02)

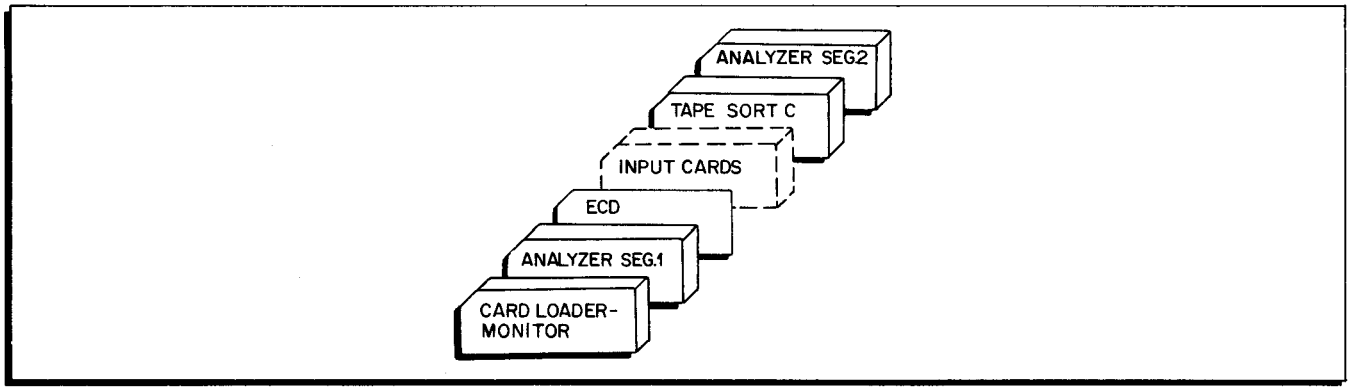


Figure 2. Input Deck Format with Card Loader-Monitor

The Analyzer requires the use of three work tapes and a fourth may be used if available.

Equipment Configuration Descriptor

The Equipment Configuration Descriptor can be entered from a card, card-image tape, or paper tape. The proper ECD format is presented in the Analyzer C Information Bulletin (DSI-358). The Loader-Monitor is initially set up to expect card input for the ECD, unless the ECD field in the communication area is modified from the control panel or console. Analyzer has four standard equipment configurations available (see Table 1), which can be specified either by a standard ECD, or by modifying the ECD field from the control panel or console (see OPERATING INSTRUCTIONS Page 4).

Table 1. Analyzer C Standard Equipment Configurations

Standard Configuration Number	0-4	6	5, 7	8, 9
Analyzer Program	Tape 0	Tape 0	Tape 0	Tape 0
Console Device	Control Panel	Control Panel	Control Panel	Control Panel
Director File		Card Reader	Card Reader	Card Reader
Listing Device	Printer	Printer	Printer	Printer
SPT File			Tape 3	Tape 3
Card-Image File	Card Reader	Tape 1		
Work Tape 1	Tape 4	Tape 4	Tape 4	Tape 4
Work Tape 2	Tape 2	Tape 2	Tape 2	Tape 2
Work Tape 3	Tape 3	Tape 3	Tape 6	Tape 6
Work Tape 4				Tape 5
NOTE: All standard ECD's assume RWC's 1, 2, and 3 and 12K of memory.				

Director File

The director file may be entered from any card-image medium (cards, card-image tape, or paper tape). It is composed as follows:

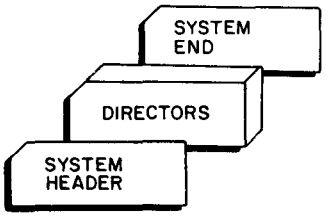
1. System Header Card;
2. A Director for each program to be analyzed; and
3. System End Card.

The formats for these cards are presented in Analyzer C Information Bulletin, DSI-358.

The Directors specify which programs on an SPT or card-image file are to be analyzed. They must appear in the same order that the selected programs appear in the program file.

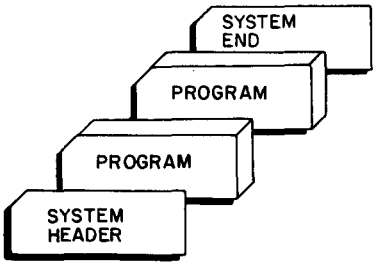
SPT INPUT

When the programs to be analyzed are on an SPT, director cards must always be included to specify each program to be analyzed – even when all programs in the file are to be processed.

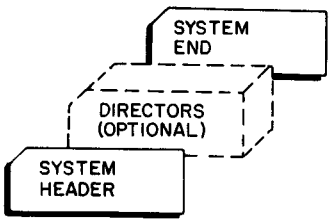


CARD IMAGE INPUT

When programs in card-image form are read from the same device as the Director File, they are placed between the System Header and the System End cards. In this case, since all programs in the input presumably are to be analyzed, director cards are not needed.



When card-image programs are read from a device different from that used to read the Director File, there may or may not be director cards. Director cards are used to select certain program from the file for analysis. If no director cards are included, all programs in the file will be processed.



OPERATING INSTRUCTIONS

Initial Setup

1. Mount tapes on drives as specified on the ECD. See Table 1 for standard configurations.
   a. The three (or four) work tapes are mounted in PERMIT status.
   b. The program BRT (if used) is mounted in PROTECT status.
   c. The input SPT or card-image tape (if used) is mounted in PROTECT status.
   d. The print-image tape (if used) is mounted in PERMIT status. (Work tape 1, 3, or 4 may be used for the print file.)
2. Initialize the printer.
3. If cards are to be read, place the correctly arranged deck in the card reader and initialize the card reader.
4. If the input is from paper tape, mount it on the paper tape reader and initialize the reader.

Bootstrapping the Loader-Monitor

1. When the Analyzer program is on a BRT, bootstrap the program tape (normal address 40_8) into location 0 twice. If a control address other than 40_8 is used, the correct address must also be entered into memory locations 65_8, 73_8, and 101_8.

   When the Analyzer program is on BRD format cards, bootstrap the card reader (normal address 41_8) into location 1620_8.
2. Press the RUN button.
3. When halts occur, refer to the operating procedures for the Tape or Card Loader-Monitor.
4. When Halt 3 (B Address = 17002) occurs, the loader-monitor is in memory and awaiting a console call and (if needed) modification of the loader ECD field.
5. If a Console Call card and an ECD card have not been punched and placed in the input hopper, refer to the Console Call and ECD entry instructions before proceeding (see page 5).

Program Loading and Execution

1. Press the RUN button.
2. When halts or console messages occur, follow the procedures specified in Tables 2, 3, and 4. (Error conditions are indicated either by a halt or by a message typed on the console typewriter, depending on which device was specified on the ECD.)

Console Call Entry

The format of the Console Call card is given in the Analyzer C Bulletin DSI-358. If the required console call information is not punched on a Console Call card (or entered by a preceding program), it can be entered from the control panel into octal locations 100 and 104 through 124 as follows:

1. Designate manual entry by entering octal 01 into octal location 100.
2. Enter program name (AAJANA = 21, 21, 41, 21, 45, 21_8) into octal locations 104 through 111.
3. Enter segment name (00, 01) into octal locations 112 and 113.
4. Enter the logical drive number of the program BRT (normally 00) into octal location 114.
5. If a halt is desired after any segment of the program is loaded, enter the program and segment names into octal locations 115 through 124.

ECD Entry

The format for the ECD card is given in the Analyzer C Bulletin, DSI-358. If the required equipment configuration information is not punched on a card, the operator can specify another ECD entry device or any standard configuration from the control panel or console as follows.

SPECIFYING AN ALTERNATE DEVICE

1. Enter the octal number of the device type into octal location 227.
2. Enter the PCU address into octal location 230.
3. Enter the device number into location 231.
4. Enter the read/write channel assignment for reading the ECD, into octal location 232.

SPECIFYING A STANDARD ECD

1. Enter a blank (15_8) into octal location 227.
2. Enter the configuration number into octal location 230.
3. If more memory than 12K is desired and available, enter the octal number of the highest memory bank used into octal locations 231 and 232.

Table 2. Analyzer Program Halts

B Address	Console Message	Significance	Operator Action
07025	: NO E CARD	The specified ECD input source has not found the ECD.	1. Put the ECD in the specified input source (usually the card reader). Or alter the ECD field to specify another input source or to select a standard ECD. 2. Press RUN.

Table 2 (cont). Analyzer Program Halts

B Address	Console Message	Significance	Operator Action
04010	: NO SYSTEM HEADER	System Header of input file not found.	Mount the correct input file or correct the System Header card, whichever is in error. And start the run over.
04011	: ILLEGAL ECD	ECD card is invalid	Correct the ECD and start run over.
04021	: PROG nnnnnn NOT FOUND	Program named on Analyzer director card not found in the symbolic program file. (If no console, name of missing program is in the six locations beginning at the address in the A-address register.)	Continue the run to complete the analysis of the previous program.

Table 3. Peripheral Error Halts

B Address	Console Message	Significance	Operator Action
0cu1d	: RD ER cu d	When cu is a tape control, there is an uncorrectable read error on tape d of control unit cu.	Press RUN to retry the correction procedure.
0cu11	: RD ER cu 1	When cu is the card reader control unit, there is a hole-count error.	Remove cards from input hopper. Run out the cards in the reader. Place cards from run-out in hopper followed by remaining input cards. Continue the run.
0cu12	: RD ER cu 2	When cu is the card reader control unit, an illegal punch has been detected.	Remove cards from input hopper. Run out the cards in the reader. Correct the first card in the run out to remove the illegal punch. Place cards from run-out in feed followed by remaining input cards. Continue the run.
0cu2d	: WR ER cu d	When cu is a tape control, there is an uncorrectable write error on tape d of control unit cu.	Press RUN to retry the correction procedure.
0cu3d	: END cu d	End of tape has been reached on output tape d of control unit cu.	Reduce the amount of input and start the run over.

Table 3 (cont). Peripheral Error Halts

B Address	Console Message	Significance	Operator Action
0cu10	: RD ER cu 0	When cu is the paper tape reader control unit, a parity error has been detected on the paper tape.	Note which program is being copied. Continue the run.
0cu7d	: PRINT cu d	The print routine, in off-line mode, has determined that there is no printing "stacked" on print tape d of control unit cu.	If print tape on drive d is to be saved, replace with a work tape and continue the run. Otherwise continue the run, writing new print image records on this tape.

Table 4. Tape Sort C Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
05555	05555	Segment 00	S2 not found in columns 79-80 of parameter card 1	Correct parameter card 1 and rerun the sort.
00000	04000	Merge and last pass	Data or record out of sequence in merge, or record out of sequence in last pass	Rerun sort.
00001	04000	Presort	Invalid parameters 1-80	Correct parameter(s) and rerun sort.
00002	04000	Presort	Incorrect input file name: standard header	Rerun sort with correct tape or parameter.
00003	04000	Presort	Duplication of tape drive assignments	Correct parameters and rerun sort.
00004	04000	Presort	Overlap in key fields	Correct parameters and rerun sort.
00005	04000	Presort	Invalid parameters 81-160	Correct parameter(s) and rerun sort.
00006	04000	Presort	Own-coding lies within the Sort program	Correct parameter(s) and rerun sort.
00007	04000	Presort	Insufficient memory to sort	Correct parameter and rerun sort.
00010	04000	Presort	Blocking down required	Set SENSE switch 1 ON to accept reduced blocking and press RUN. If the halt recurs, the record is too large for the memory available.
00001	00p0d	Presort	1 HDR record missing	Rerun sort.
00002	00p0d	Merge and last pass	Parameter record missing	Rerun sort.

Table 4 (cont). Tape Sort C Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
00003	00p0d	Last pass	Output retention incorrect during multi-reel output	Set SENSE switch 1 OFF and press RUN to override, or set SENSE switch 1 ON and mount correct reel.
00004	00p0d	Last pass	To change tape density or to reassign the logical address of work tape 1 to an unused drive	Press RUN when output tape is ready.
bbbbb	00p1d	All Segments	Read error: data record (64 attempts have been made to reread the record)	To try to reread the record, set SENSE switches 1 and 2 OFF and press RUN. To process the record (assuming that the record was corrected via the control panel, during the presort only) set SENSE switch 1 ON and press RUN. To delete the record, during the presort and last pass only, set SENSE switch 2 ON and press RUN.
bbbbb	00p2d	All Segments	Write Error (a) routine to backspace, erase, and rewrite has been executed nine times)	To try to rewrite the record, press RUN.
0000x	00p3d	All Segments	End of tape	Rerun sort if x = 0. Mount a new output reel and press RUN if x = 1.
bbbbb	00p4d	Presort	Data record of incorrect length	Press RUN; if halt is repeated, the data record is of the wrong length. To drop the record, set SENSE switch 2 ON and press RUN; otherwise, the sort must be rerun.
bbbbb	00p5d	Presort and last-pass	Read error: header record	To try to reread the record, press RUN. To process the record, set SENSE switch 1 ON and press RUN.
bbbbb	00p7d	Presort	Read error: trailer record	To try to reread the record, press RUN. To process the record, set SENSE switch 1 ON and press RUN.

Table 4 (cont). Tape Sort C Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
bbbbb	00p6d	Presort	Header or trailer record of incorrect length (standard header or trailer ≠ 80 characters, or non-standard header or trailer exceeds record length)	To process the record, set SENSE switch 1 ON and press RUN. If a standard header and/or trailer was specified, this action supplies 80 characters. If a non-standard header and/or trailer is specified, this action supplies a record equal to the size of an input buffer. If the record is not to be processed, the sort must be rerun.
ddddd	040x1	Last pass	Number of items in Presort differs from No. of items in L.P.	Presort is high if x = 0. Presort is low if x = 1. ddddd = amount of discrepancy (decimal).
01111	00p0d	Presort	Halt for input tape rewind	Press RUN when new tape is mounted for the merge work tape
02222	00p0d	Presort	Halt for multi-reel input	Mount the next input tape on the drive specified, "d", and press RUN. This halt will occur whenever there is more than one input reel specified and no alternate input drive specified. If the alternate input drive is specified, the program will not halt, but will stall until the next reel is mounted.
07777	00p0d	Last-pass	End-of-job	The B-address register contains the address of the final output tape (work tape 1).

OPERATING PROCEDURES FOR SPT MERGE C

The Series 200 SPT Merge program (AAGMER) makes it easier and faster to handle object programs that are stacked on symbolic program tapes. The SPT Merge can take programs from as many as four SPT's and select, rearrange, and copy any of them onto another tape in any order desired. It also produces a directory listing on the high-speed printer to record the revision numbers of the input SPT's and the sequence of the programs as they appear on the output SPT. The Merge is controlled by three action directors – Position, Duplicate, and Rewind. For a more detailed description, refer to the Honeywell Information Bulletin entitled SPT Merge (DSI-407).

INPUT ORGANIZATION

SPT Merge Program

The Merge program can be loaded either from a binary run tape (BRT), using Tape Loader-Monitor C or from a program card deck, using Card Loader-Monitor B. If the program is loaded from a BRT, the input deck (or card-image tape, or paper tape) is arranged as shown in Figure 1.

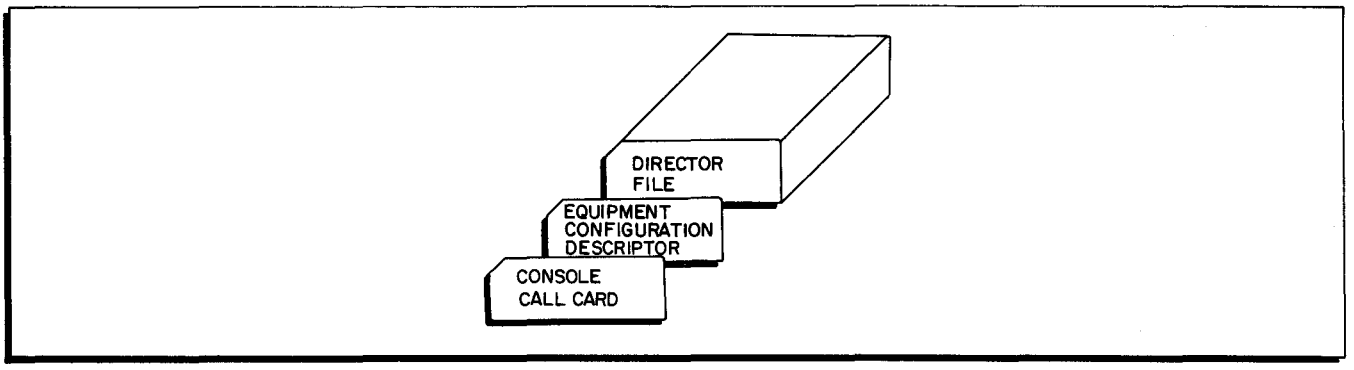


Figure 1. Input Deck with Tape Loader-Monitor

If the program is loaded from cards, the input deck is arranged in the following order as shown in Figure 2.

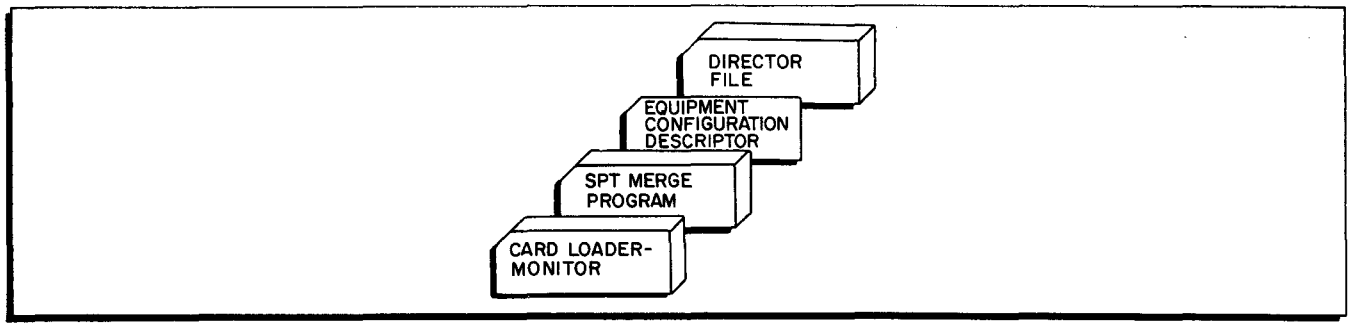


Figure 2. Input Deck with Card Loader-Monitor

Equipment Configuration Descriptor

The Equipment Configuration Descriptor can be entered from a card, card-image tape, or paper tape. The proper ECD format is presented in SPT Merge Information Bulletin (DSI-407). The Loader-Monitor is initially set up to expect card input for the ECD, unless the ECD field in the communication area is modified from the control panel or console. SPT Merge has two standard equipment configurations available (see Table 1), which can be specified either by a standard ECD, or by modifying the ECD field from the control panel or console (see OPERATING INSTRUCTIONS).

Table 1. SPT Merge Standard Equipment Configurations

Standard Configuration Number	0	1-9
SPT Merge Program	Tape 0	Tape 0
Console Device	Control Panel	Control Panel
Director File	Card Reader	Card Reader
SPT Directory	Printer	Printer
Input SPT #1	Tape 3	Tape 3
Output SPT	Tape 4	Tape 4
Input SPT #2		Tape 5
All standard ECD's assume RWC's 1, 2, and 3 and 12K of memory.		

Director File

The director file (illustrated below) may be entered from cards, card-image tape, or paper tape. It is composed as follows:

1. System Specific Header;
2. Revision Number Director;
3. Action Directors; and
4. End of File.

The formats of these cards are presented in the SPT Merge Information Bulletin (DSI-407). The sequences and formats of the various director entries remain the same for each mode of entry (assuming normal use of control frames with paper tape).

The Revision Number Director may be left out of the director deck in which case revision numbers in the header labels of the input SPT's are not checked.

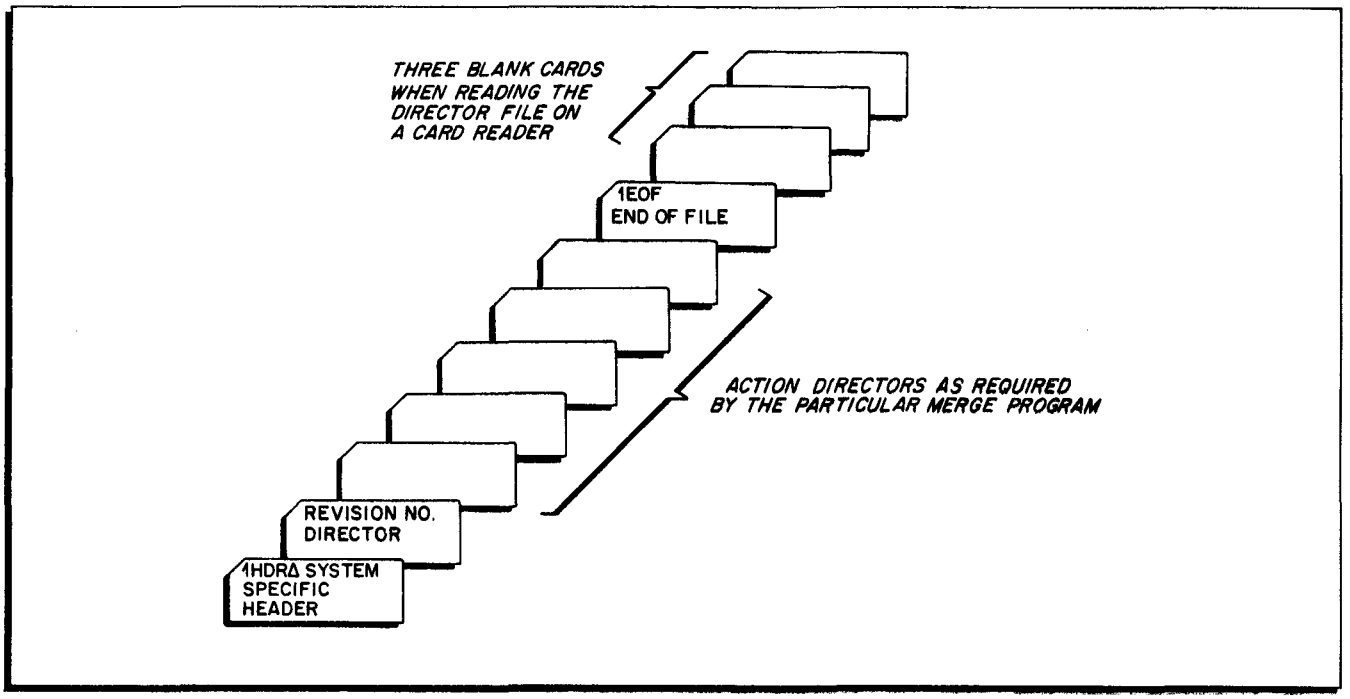


Figure 3. The Director File Order

OPERATING INSTRUCTIONS

Initial Setup

1. Mount tapes on drives as specified by the ECD. See Table 1 for standard configurations.
   a. The output SPT is mounted in PERMIT status.
   b. The input SPT's are mounted in PROTECT status.
   c. The program BRT (if used) is mounted in PROTECT status.
   d. The print image tape (if used) is mounted in PERMIT status.
2. Initialize the Printer.
3. If cards are to be read, place the correctly arranged deck in the card reader and initialize the card reader.
4. If paper tape is used, mount it on the paper tape reader and initialize the reader.

Bootstrapping the Loader-Monitor

1. When the Merge program is on a BRT, bootstrap the program tape (normal address 40_8) into location 0 twice. If a control address other than 40_8 is used, the correct address must be entered into memory locations 65_8, 73_8, and 101_8.

   When the Merge program is on binary run format cards, bootstrap the card reader (normal address 41_8) into location 1620_8.
2. Press the RUN button.

3. When halts occur, refer to the operating procedures for Tape or Card Loader-Monitor.
4. When Halt 3 (B Address = 17002) occurs, the loader-monitor is in memory and awaiting a console call and (if needed) modification of the Loader ECD field.
5. If a Console Call card and an ECD card have not been punched and placed in the input hopper, refer to the console call and ECD entry instructions before proceeding (see below).

Program Loading and Execution

1. Press the RUN button.
2. When halts or console messages occur, follow the procedures specified in Tables 2 and 3. (Error conditions are indicated either by a halt or by a message typed on the console typewriter, depending on which device was specified on the ECD.)

Console Call Entry

The format of the Console Call card is given in the SPT Merge Information Bulletin, DSI-407. If the required console call information is not punched on a Console Call card (or entered by the preceding program), it can be entered from the control panel into octal locations 100 through 124 as follows:

1. Designate manual entry by entering octal 01 into octal location 100.
2. Enter program name (AAGMER = 21, 21, 27, 44, 25, 51) into octal locations 104 through 111.
3. Enter segment name (GE = 27, 25) into octal locations 112 and 113.
4. Enter the logical drive number of the program BRT (normally 00) into octal location 114.
5. If a halt is desired after any segment of the program is loaded, enter the program and segment names into octal locations 115 through 124.

ECD Entry

If an ECD card has been punched and is in the card reader input hopper, proceed to Program Loading and Execution. If the required equipment configuration information has not been punched on an ECD card, the operator can specify another ECD entry device or any standard configuration from the control panel or console as follows:

Specifying an Alternate Device

1. Enter the octal number of the device type into octal location 227.
2. Enter the PCU address into octal location 230.
3. Enter the device number into octal location 231.
4. Enter the read/write channel assignment for reading the ECD into octal location 232.

Specifying a Standard ECD

1. Enter a blank (15_8) into octal location 227.
2. Enter the configuration number into octal location 230.
3. If more memory than 12K is desired and available, enter the octal number of the highest memory bank used into octal locations 231 and 232.

Table 2. SPT Merge Program Halts

B Address	Console Message	Significance	Operator Action
07025	: NO E CARD	The specified ECD input source has not found the ECD.	1. Put the ECD in the specified input source (usually the card reader). Or alter the ECD field to specify another input source or to select a standard ECD. 2. Press RUN.
04007	: WRONG INPUT ON d	The revision number of an input SPT does not agree with the revision number on the REVNO Director.	Change the REVNO Director or mount the correct tape, whichever is in error. And start the run over. Or, continue the run accepting the input SPT as is.
04010	: NO SYSTEM HEADER	System Header of input file not found.	Mount the correct input file or correct the System Header card, whichever is in error. And start the run over.
04011	: ECD IN ERROR	The ECD file media field for the output SPT, input SPT, or printer is blank.	Correct the ECD to include the necessary file media fields and start the run over.

Table 3. Peripheral Error Halts

B Address	Console Message	Significance	Operator Action
0culd	: RD ER cu d	When cu is a tape control, there is an uncorrectable read error on tape d of control unit cu.	Press RUN to retry the correction procedure.
0cull	: RD ER cu 1	When cu is the card reader control unit, there is a hole-count error.	Remove cards from input hopper. Run out the cards in the reader. Place cards from run-out in hopper followed by remaining input cards. Continue the run.

Table 3 (cont). Peripheral Error Halts

B Address	Console Message	Significance	Operator Action
0cu12	: RD ER cu 2	When cu is the card reader control unit, an illegal punch has been detected.	Remove cards from input hopper. Run out the cards in the reader. Correct the first card in the run out to remove the illegal punch. Place cards from run-out in feed followed by remaining input cards. Continue the run.
0cu2d	: WR ER cu d	When cu is a tape control, there is an uncorrectable write error on tape d of control unit cu.	Press RUN to retry the correction procedure.
0cu3d	: END cu d	End of tape has been reached on output tape d of control unit cu.	Reduce the amount of input and start the run over.
0cu10	: RD ER cu 0	When cu is the paper tape reader control unit, a parity error has been detected on the paper tape.	Note which program is being copied. Continue the run.
0cu7d	: PRINT cu d	The print routine has determined that there is no printing "stacked" on print tape d of control unit cu.	If print tape on drive d is to be saved, replace with a work tape and continue the run. Otherwise continue the run, writing new print image records on this tape.

OPERATING PROCEDURES FOR TAPE SORT C AND TAPE SORT C(V)

Tape Sort C is a general-purpose program which performs basic sorting functions on a Honeywell Series 200 computer equipped with 1/2-inch magnetic tape. For a detailed description of Tape Sort C, refer to the Honeywell Software Bulletin Tape Sort C and Collate C, File Number 122.6005.025C.00.01. Tape Sort C(V) is similar to Tape Sort C differing only in the fact that it is capable of handling variable length items. For a detailed description of Tape Sort C(V), refer to the Honeywell Information Bulletin Sort 2V and Collate 2V, DSI-445.

Tape Sort C may be assembled as a card deck in a binary run format or as a program on a BRT; in either case, the program will be loaded as any program operating under the PLUS System, i.e., by a call to the Loader-Monitor. If Tape Sort C is on cards in binary run format, it will be called and loaded by the Card Loader-Monitor B program. If Tape Sort C program is on a BRT, it will be called and loaded by the Tape Loader-Monitor C program.

TAPE SORT C PROGRAM FORMAT

Tape Sort C consists of the following operational segments, which must be in the order listed in the table below.

Program Name	Segment Name	
AADS2Δ	00*	Presort
AADS2Δ	RS**	
AADS2Δ	01	
AADS2Δ	A1	
AADS2Δ	02	
AADS2Δ	03	
AADS2Δ	04	
AADS2Δ	05	
AADS2Δ	06	
AADS2Δ	07	
AADS2Δ	08	
AADS2Δ	M1	Merge
AADS2Δ	M2	
AADS2Δ	M3	
AADS2Δ	G1	Last-Pass
AADS2Δ	G2	
AADS2Δ	G3	
AADS2Δ	G4	

*Segment 00 is used when Tape Sort C is run as the initial program in a series or as a single program, so that parameters are read from the card reader under control of this segment. After segment 00 has loaded the parameters, the Sort program, as in all cases, will search forward for its next segment, 01.

**Segment RS is used to perform the restarting functions.

TAPE SORT C(V) PROGRAM FORMAT

Tape Sort C(V) consists of the following operational segments, which must be in the order listed in the table below.

Program Name	Segment Name	
AADS2V	P0*	Presort
AADS2V	P1	
AADS2V	P2	
AADS2V	P3	
AADS2V	P4	
AADS2V	P5	
AADS2V	P6	
AADS2V	M1	Merge
AADS2V	M2	
AADS2V	S1	Last-Pass
AADS2V	S2	
AADS2V	S3	
AADS2V	S4	
AADS2V	S5	

*Segment P0 is used when Sort C(V) is run as the initial program in a series or as a single program, so that parameters are read from the card reader under control of this segment. After segment P0 has loaded the parameters, the sort program, as in all cases, will search forward for its next segment, P1.

LOADING AND SPECIALIZING

The procedures required for loading and specializing the sort program will depend upon whether it is on tape or cards, i.e., whether Tape or Card Loader-Monitor is to be used. The B is to be used. The operating procedures are further differentiated according to the method used to enter the sort parameters: (1) if the sort is run as a program within a series of programs, parameters are assumed to be left in memory by the program executed before the sort; (2) if the sort is run as the initial program in a series or as a single program, parameters are to be entered from the card reader at loading time.[1]

NOTE: If presort own-coding is to be used, it must be loaded before the sort program is loaded.

Loading the Sort C or C(V) from a BRT Using Tape Loader-Monitor C

The procedures given below assume that the Tape Loader-Monitor C program has already been loaded into memory and is awaiting a call (17002 is contained in the B-address register).

[1] Parameters may be loaded by any method available to the operator, but they must be in correct format in octal locations 2477 through 2760 before the sort program (segment 01 or P1) is loaded (see Table 1).

LOADING THE SORT C OR C(V) AS A PROGRAM WITHIN A SERIES

It is assumed that the program executed before the sort has entered the program name AADS2Δ (or V) and segment name 01 (or P1) into the appropriate Loader-Monitor communication area. Segment 01 (or P1) assumes the presence of parameters in memory. Once the sort input and work tapes are mounted, no further operator action is required unless card input is desired with Sort C, in which case, the card input (followed by a 1EOF card) is placed in the card reader input hopper and the card reader is cycled-up before the sort program is called (see Figure 1).

LOADING THE SORT C OR C(V) AS A SINGLE PROGRAM

It is suggested that the parameters be loaded into memory via the card reader. The Console Call card and the parameters cards are placed in the card reader as shown in Figure 2. The operator should then perform the steps listed below:

1. Check that the sort input and work tapes are mounted on the appropriate drives.
2. Depress the RUN button on the control panel.

If any halts should occur during the loading or running of the sort, refer to the halt codes in Table 2, and the loader-monitor halts on page 6-9 of the Tape Loader-Monitor information bulletin, DSI-327.

Loading The Sort C or C(V) from a Card Deck Using Card Loader-Monitor B

The procedures given below assume that the Card Loader-Monitor B has already been loaded into memory and is awaiting a call (17002 is contained in the B-address register).[1] If the program executed before the sort did not enter the parameters, the parameters can be punched on three cards and inserted between sort segments 00 and RS (segments P0 and P1 for Sort C(V)) in the program deck. The parameters are placed after the end-of-segment card for 00 (or P0 which contains an X4(M) punch in column 1. A suggested format for the object program deck is shown in Figure 3.

Once the program deck is placed in the card reader input hopper, the operator should perform the steps listed below:

1. Check that the sort input and work tapes are mounted on the appropriate drives.
2. Depress the RUN button on the control panel.

If any halts should occur during the loading and running of the sort program refer to the codes in Table 2.

[1] Refer to Card Loader-Monitor B operating procedures if necessary.

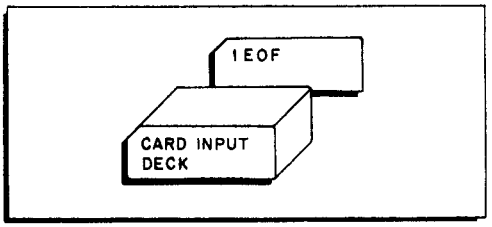
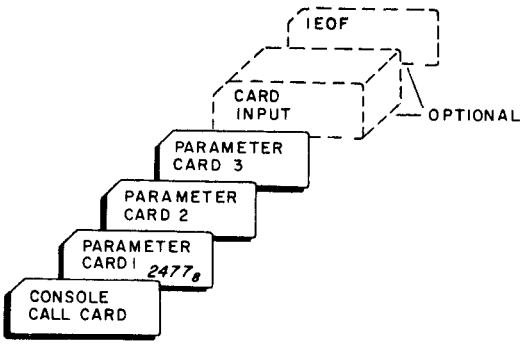


Figure 1. Card Input for Tape Sort C



1. The Console Call Card. The Console Call Card is punched as follows:

   Columns 1-6: contain the characters AADS2 (or AADS2V) to indicate the program name.

   Columns 7-8: contain the characters 00 (or P0) to indicate the segment name.

   Column 9: contains the character 0 to indicate the address of the run tape containing the sort program.

   Columns 10-17: may contain a halt name if desired.

   Column 18: contains an asterisk (*) to identify the Console Call Card.

2. Parameter card 1 (parameter characters 1-80 in Table 3, on page 6).
3. Parameter card 2 (parameter characters 81-160 in Table 2).
4. Parameter card 3 (parameter characters 161-178 in Table 3).

*If no Loader-Monitor information is required, parameter card 3 is blank; however, the blank card must be placed after parameter card 2.

Figure 2. Parameter Card Input for Loading Sort from Tape

NOTE: In the card decksshown in Figures 3 and 4, the punched configuration in card column 1 can be used to differentiate the program segments as follows:

Card Column 1	Card Type
Q or *	Segment Header (check columns 17 and 18 for segment name)
J	Program card
M	End of Segment Card

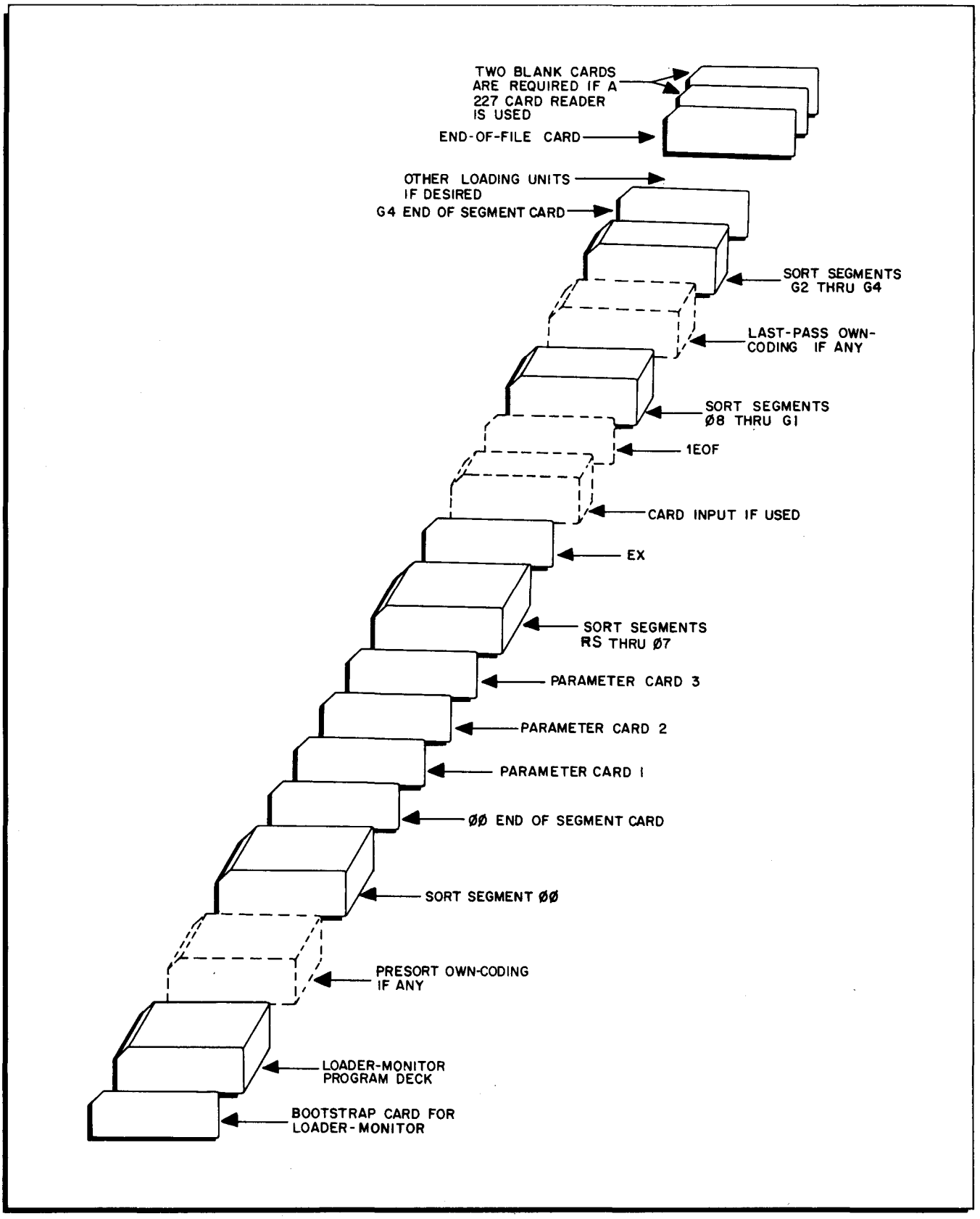


Figure 3. Suggested Program Deck Format for Loading the Sort C

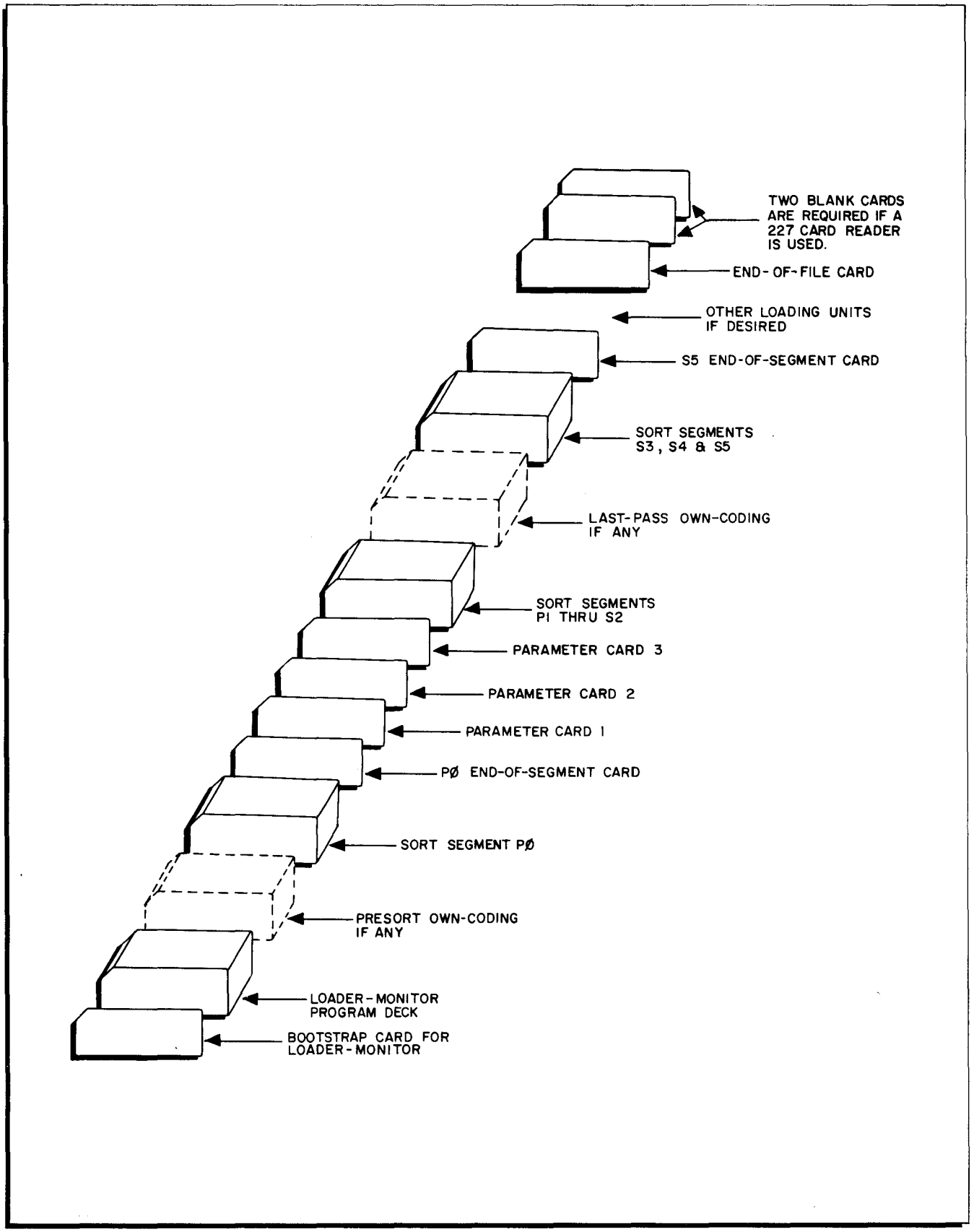


Figure 4. Suggested Program Deck Format for Loading Tape Sort C(V)

Table 1. Parameter Specification for Sort C

Parameter Characters	Octal Location of First Character of Field	Description
1-2	2477	Address of primary input tape
3-4	2501	Address of alternate input tape (optional)
5-6	2503	Address of first work tape
7-8	2505	Address of second work tape
9-10	2507	Address of third work tape (optional)
11-12	2511	Address of fourth work tape (optional)
13-14	2513	Address of fifth work tape (optional)
15-16	2515	Address of merge work tape
17-18	2517	Total number of input reels
19	2521	Option to read primary input tape forward or backward
20-23	2522	Number of characters per item
24-27	2526	Number of items per input record
28-31	2532	Number of items per output record
32	2536	Padding characters
33-34	2537	Label indicators
35	2541	Not used
36	2542	Input banner character option
37	2543	Output banner character option
38	2544	Input parity indicator
39	2545	Output parity and gap-size indicator
40-41	2546	Error options
42	2550	Printer control unit
43	2551	Not used
44	2552	Option to stop after the merge segment
45-50	2553	Highest address available to the presort
51-52	2561	Collating sequence translation
53	2563	Ascending or descending sequenced output
54-59	2564	Address or presort header-trailer own-coding
60-65	2572	Address of presort item-by-item own-coding
66-71	2600	Address of last-pass header-trailer own-coding
72-77	2606	Address of last-pass item-by-item own-coding
79-80	2614	Contain S2 (if parameter cards are used)
81-84	2617	1st key field
85-86	2623	1st key field
87-90	2625	2nd key field
91-92	2631	2nd key field
.		.
.		.
.		.
135-138	2705	10th key field
139-140	2711	10th key field
141-150	2713	Input file name check
151-160	2725	Output file name change
161-166	2737	Last-pass own-coding program name
167-168	2745	Last-pass own-coding segment name
169	2747	Search direction for last-pass own-coding
170-175	2750	Next program name
176-177	2756	Next segment name
178	2760	Search direction for next program

The parameters for Sort C(V) are the same as those for Sort C except for the following:

Table 2. Parameter Specification for Sort C(V)

Parameter Characters	Octal Location First Character of Field	Description
19	2521	Record Blocking
20-23	2522	Maximum number of characters per item
24-27	2526	Maximum number of characters per input record
28-31	2532	Maximum number of characters per output record
32	2536	Not Used
35	2541	Output label check
79-80	2615	Contains 2V (if parameter cards are used)

HALT PROCEDURES

A halt numbering system is used to identify the various halts which may occur during the running of the program. The contents of the A-address register and the B-address register display the particular halt configurations on the control panel. The causes of the halts and the necessary corrective actions to be taken by the operator when they occur are shown in Table 3.

Program halts are divided into two categories for easy identification: (1) peripheral errors and (2) non-peripheral errors. When a particular halt specifies a peripheral error, the B-address register contains a 0 in the second (from left) octal digit. With a non-peripheral error, the B-address register contains a 4 in the second octal digit.

In Table 3, T = tape control address, D = tape drive, and BBBBB = buffer address. The buffer address in the presort is the address of the first location of the input buffer if the input was read forward; if the input was read backward, the buffer address is the address of the last location of the input buffer. The buffer address in the merge and last pass is the address of the last location of the input buffer.

Table 3. Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
00000	04000	Merge and last pass	Data or record out of sequence in merge, or record out of sequence in last pass.	Rerun sort.

Table 3 (cont). Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
00001	04000	Presort	Invalid parameters 1-80.	Correct parameter(s) and rerun sort.
00002	04000	Presort	Incorrect input file name: Standard header.	Rerun sort with correct tape of parameters.
00003	04000	Presort	Duplication of tape drive assignments	Correct parameters and rerun sort.
00004	04000	Presort	Overlap in key fields.	Correct parameters and rerun sort.
00005	04000	Presort	Invalid parameters 81-160.	Correct parameter(s) and rerun sort.
00006	04000	Presort	Own-coding lies within sort.	Correct parameter(s) and rerun sort.
00007	04000	Presort	Insufficient memory for sort.	Correct parameter and rerun sort.
00010	04000	Presort	Blocking down required.	Set SSW 1 ON to accept reduced blocking and press RUN. If the error recurs, not enough memory available.
05555	05555	Segment 00	Parameter card identification not found in parameter card 1.	Correct card 1 and rerun.
00001	00T0D	Presort	1HDR record missing	Rerun sort
00002	00T0D	Merge and last pass	Parameter record missing.	Rerun sort
00003	00T0D	Last pass	Output retention incorrect during multi-reel output.	Depress RUN to override (SSW 1 OFF), or set SSW 1 ON to check newly mounted reel.
00004	00T0D	Last pass	Segment halt, e.g., to change output tape density or address.	Depress RUN when output tape is ready.
01111	00T0D	Presort	Halt for input rewind.	Depress RUN when proper tape is selected for merge work tape.
02222	00T0D	Presort	Halt for multi-reel input.	Mount next input tape on this drive and depress RUN. This halt will occur whenever there is more than 1 input reel specified and no alternate drive. If the alternate drive is specified, the program will not halt, but will stall in a busy status if the next reel is not mounted.

Table 3 (cont). Halt Codes

A-Address Register	B-Address Register	Segment(s) Involved	Cause	Corrective Action
BBBBB	00T1D	All segments	Read error: Data record.	To reread 9 more times, set SSW's 1 & 2 OFF and depress RUN. To process record (assuming that record was corrected via control panel or the halt was erroneous), set SSW 1 ON and depress RUN. To delete the record (presort and last pass), set SSW 2 ON and depress RUN (SSW 2 has no effect on merge)
BBBBB	00T2D	All segments	Write error.	Depress RUN to erase and rewrite.
0000X	00T3D	All segments	End of tape.	X = 0, rerun. X = 1, mount new output reel and depress RUN.
BBBBB	00T4D	Presort	Data record of incorrect length.	To drop the record, set SSW2 ON and depress RUN; otherwise, sort must be rerun.
BBBBB	00T5D	Presort and last pass	Read error: header record.	To try to reread 9 more times, depress RUN. To process record, set SSW 1 ON and depress RUN.
BBBBB	00T6D	Presort	Header or trailer record of incorrect length (standard header or trailer ≠ 80 characters, or non-standard header or trailer exceeds record length).	To process the record, set SSW 1 ON and depress RUN. If standard header and/or trailer was specified, this action supplies 80 characters. If non-standard header and/or trailer is specified, this action supplies record equal to size of input buffer. If the record is not to be processed, the sort must be rerun.
BBBBB	00T7D	Presort	Read error: trailer record.	To try to reread 9 more times, depress RUN. To process the record, set SSW 1 ON and depress RUN.
ddddd	040X1	Last pass	Number of items in presort differs from Number of items in last pass.	Presort is high if X = 0. Presort is low if X = 1. ddddd = amount of discrepancy (decimal).
07777	00T0D	Last pass	End of job.	BC register contains output tape address.

METHOD OF RESTARTING TAPE SORT C

A method of restarting has been incorporated into the Tape Sort C program to allow the operator to resume execution of the sort after a halt occurs for either of two reasons. One occasion for restarting is in a situation where the sort has a low priority and it is desired to

stop the sort and run another program in its place. In this case, the sort is stopped and all tapes are demounted; at a later time the sort is stopped and all tapes are demounted; at a later time the sort will continue through a restart action. The second occasion for restarting occurs if the sort halts because of a malfunction. In this instance, the restart is activated to resume execution immediately.

When a restart situation occurs, the restart is initiated in either of two ways: through a Branch to the address stored in octal locations 142 through 145 (fixed-start 3) of the Loader-Monitor communication area, or by means of a console call for segment AADS2ΔRS, which references the portion of the Tape Sort C program that provides the restart routine. In either case, once the restart has been initiated, a halt will occur:

1. The A-address register contains an address which references the left-hand end of a four-character field (see Table 4) and
2. The B-address register contains 07700.

To execute the restart, the necessary two, three, or four characters from Table 4 are entered from left to right, beginning at the address register contained in the A-address register.

Table 4. Restart Entries

Character	Content	Explanation
1-2	pd	Peripheral control unit address (p) and drive number (d) for work tape 2.
3	M or Δ	If the sort is halted during the merge, "M" should be specified to prevent restarting at the beginning of the presort rather than the beginning of the current merge phase. "M" must not be entered if the sort was stopped during the presort
4	P or Δ	"P" is designated if work tape 1 (the final output tape) was not rewound at the beginning of the sort; otherwise, this character is blank. When "P" is specified, the user must reposition work tape 1 as it was when the sort began.

Once the necessary characters have been entered, the RUN button is pressed to resume sort processing.

Tape Positioning For Restarting

Tape Sort C will always resume execution at the beginning of the phase in which the halt or interruption occurred. When restarting during the presort, the restart point is at the

beginning of the presort. Restarting in the merge causes execution to resume at the start of the current phase of the merge; if the print option was specified, a printout will appear when merge processing has begun (see page 13). A restart during the last pass resumes execution at the beginning of the last pass.

If the sort is to be interrupted for a considerable time and all work tapes are to be demounted, the tapes must be mounted (before the restart is initiated) on the same logical drives from which they were removed. If locations 142 through 145 of the Loader-Monitor communication area were modified during the delay, such that fixed-start 3 could not be used for restarting, a console call can be entered to initiate the restart. The console call must be entered for segment AADS2Δ RS. Work tape 2 must be mounted on the proper logical drive, for work tape 2 contains the information necessary for restarting.

POSITIONING THE INPUT TAPE

If the restart is returning to the beginning of the presort, the input tape must be mounted and positioned as it was at the beginning of the sort. Normally, positioning requires rewinding the tape; however, if the input was positioned beyond the beginning of the tape, it is necessary for the operator to reposition it to the actual starting point.

POSITIONING OF WORK TAPE 1

If work tape 1 (the final output tape) was positioned at the beginning of tape when the sort run began, the operator should enter a blank as the fourth control character (see Table 4) to cause the restart to rewind the tape from the beginning. If work tape 1 was not positioned at the beginning of tape when the sort began, the operator must enter "P" as the fourth control character. The "P" entry inhibits the rewind of work tape 1 and assumes that the operator has repositioned the tape exactly as it was at the beginning of the sort.

Own-Coding

Restarts will not restore any own-coding other than that which is called in by the last pass. Presort or last-pass own-coding loaded prior to the Tape Sort C program will not be restored.

Printouts

If a printer has been specified in the sort parameters, the printout at the end of the presort is as follows:

END OF PRESORT, RESTART MSG pdM[1]

[1] Where p = peripheral control unit address, d = drive number, and M indicates that merge processing has begun.

After this printout appears, the value "M" should always be entered as the third control character necessary for restarting (see Table 4).

Restart Halts

If the restart was attempted before the sort had established any restart information, the following halt occurs: A-address register contains 04444, B-address register contains 07700; in this instance, the sort must be rerun. The two halts involved in restarting are summarized in Table 5.

Table 5. Halt Codes for Tape Sort C Restarts

A-address	B-address	Segment Involved	Cause	Action
0aaaa	07700	Restart	Restart information is required in field referenced by aaaa.	Enter the necessary characters (from left to right) into this field (see Table 1) and press RUN.
04444	07700	Restart	Restart information is not yet available to the sort.	Rerun the sort.

OPERATING PROCEDURES FOR COLLATE C AND COLLATE C(V)

LOADING COLLATE C FROM A BRT

Suggested methods for calling and loading Collate C and C(V) are given below. These procedures are similar to those explained in the Honeywell Information Bulletin entitled, PLUS Tape Loader-Monitor DSI-327.

Loading Collate from a BRT with Parameters on Cards

If the program executed before the Collate program did not include instructions for loading the parameters and calling Collate C or C(V), the call to load the parameters and program can be issued from the card reader via a Console Call card. The Console Call card and the parameter cards are placed in the card reader and the operator should then performs the steps listed below.

1. Check that all peripheral devices to be used are cycled up.
2. Check that the program tape is mounted on logical drive 0 and that the Collate input and output tapes are mounted on the appropriate drives according to parameters (see parameters on page 8-9 of Tape Sort C and Collate C bulletin).
3. Depress the following buttons on the console:
   a. STOP.
   b. INITIALIZE.
   c. CONTENTS buttons to designate the address of the tape control, usually 40_8.
   d. BOOTSTRAP. (This causes the program tape label to be read into location 0. A halt occurs.)
   e. Repeat steps c and d. (This causes the first tape bootstrap record to be read.)
   f. RUN. (A halt occurs with 17001 contained in the B-address register.)[1]
   g. RUN. (Another Loader-Monitor halt occurs, this time with 17002 contained in the B-address register.)
   h. RUN. (The Loader-Monitor reads the Console Call card which calls Collate segment 00 to read in the parameter cards and begin Collate program loading and execution. If a halt should occur during the loading or running of the program, it can be detected and corrected as explained on page 6.)

Loading Collate from a BRT by Programmed Call

If there are programs preceding Collate on the BRT, the program executed before the

[1] The Loader-Monitor C halts are explained on page 6-9 of the Tape Loader-Monitor bulletin.

Collate program can enter the parameters and initiate a call for the Loader-Monitor C to load the Collate. If this method is used, there are no console operations required by the operator to load Collate.

NOTE: If a halt should occur during the loading or running of the Collate program, see "Collate Halt Codes" starting on page 6 to determine the cause and necessary corrective action.

LOADING COLLATE FROM AN OBJECT PROGRAM DECK

The methods given below for calling and loading the Collate program are suggested. These methods are similar to those explained in the Card Loader-Monitor bulletin.

Loading Collate Parameters and Program from Cards

If the program executed before Collate did not enter the Collate parameters, the parameters are punched on two cards and inserted between segments 00 and 01 in the program deck.[1] A suggested format for the program deck with the above configuration is shown in Figure 1.

Once the object program deck is placed in the card reader input hopper, the operator should perform the steps listed below.

1. Check that all peripheral devices to be used are cycled up.
2. Check that the collate input and output tapes are mounted on the appropriate drives according to parameters (see parameters on page 8-9) of Tape Sort C and Collate C bulletin.
3. Depress the following buttons on the console:
   a. STOP.
   b. INITIALIZE.
   c. ADDRESS buttons to designate location 1620 (octal).
   d. CONTENTS buttons to designate 41 (octal), the card reader.
   e. BOOTSTRAP. (A halt will occur.)
   f. RUN. (A halt will occur when the Loader-Monitor is loaded; the B-address register will contain 17002.)
   g. RUN. (The Loader-Monitor reads the 00 segment header card and proceeds loading and starting the Collate program. Should any halts occur during the loading or running of the Collate program, refer to Table 1 for correction procedures.)

Loading Collate from an Object Program Deck by Programmed Call

When there are programs preceding Collate in the object program deck, it is assumed that the program executed before the collate will enter parameters and initiate a call for the Loader-Monitor to load Collate. Note that the Loader-Monitor must be in memory before the

[1] The parameters are placed after the end-of-segment card for 00, which contains an X4 (M) punch in column 1.

Collate parameters and program are loaded. If a halt should occur during the loading or running of the Collate program, see Table 1 to determine the cause and the necessary corrective action.

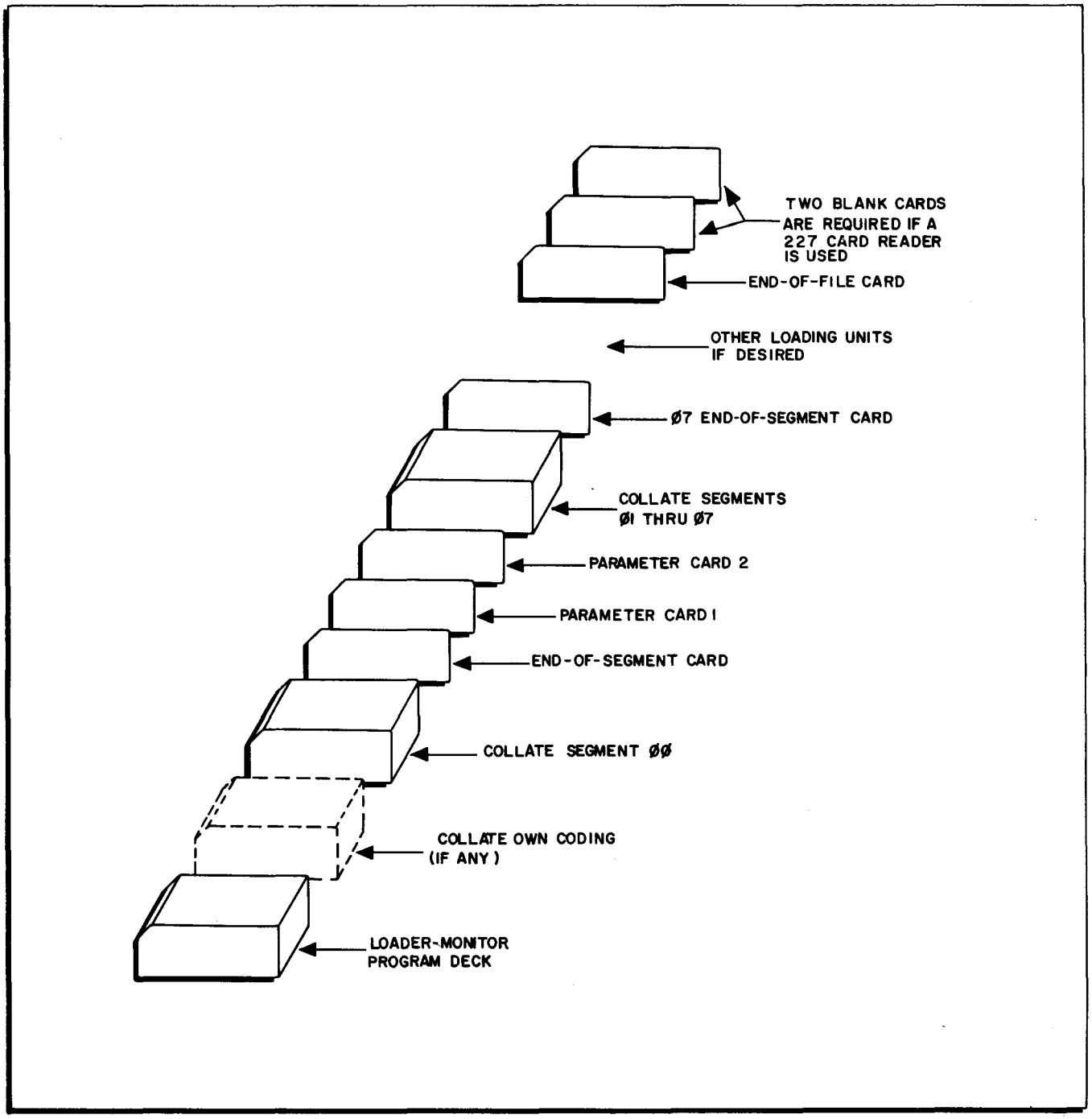


Figure 1. Suggested Object Deck Format for Loading Collate with Parameter Cards

If the programmed call method is used to call Collate, a suggested object program deck format is shown in Figure 2.

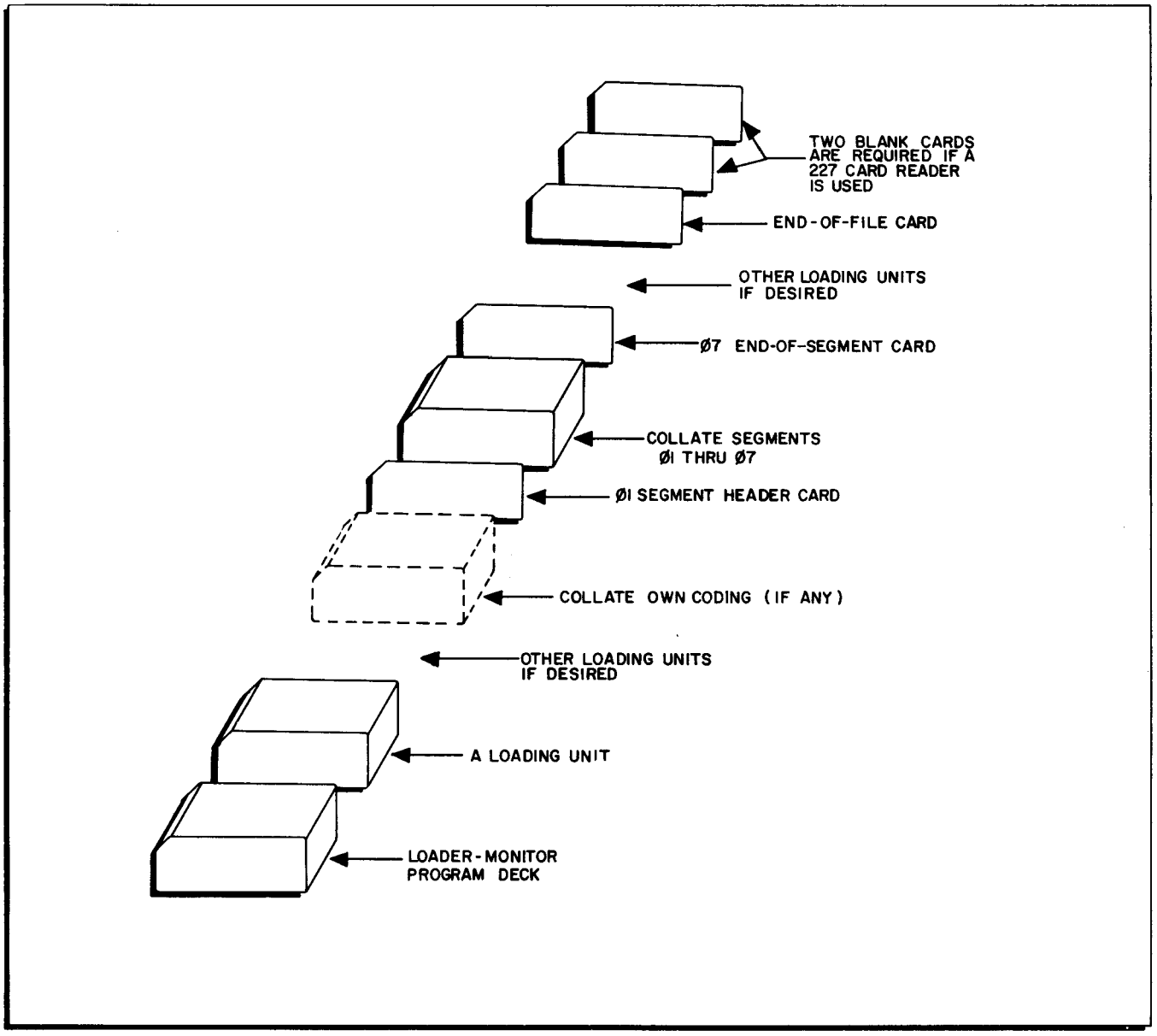


Figure 2. Suggested Object Program Deck Format for Loading Collate without Parameter Cards

PROGRAM HALTS

A halt numbering system is used to identify the various halts which may occur during the running of the program. The contents of the A-address register and the B-address register identify the particular halt.

When a particular halt specifies a peripheral error, the B-address register contains a "0" in the fourth octal digit (from the right). For a non-peripheral error, the B-address register contains a "4" in the fourth octal digit.

In Table 1, t is the tape control unit address, d is the tape drive, and bbbbb is the buffer address. The buffer address (bbbbb) is the address of the high-order leftmost location of the input buffer.

Table 1. Collate C and C(V) Halt Codes

A Address	B Address	Cause	Corrective Action
05555	05555	The first parameter card does not contain C2 or C(V)	The first 17 halt codes in this table are concerned with parameter errors: for all parameter errors, the specific parameter must be corrected and the collate must be rerun.
00001	04000	Error in key field parameter	
00002	04000	Error in tape specification parameters	
00003	04000	A parameter to be specified in decimal contains a non-decimal character	
00004	04000	Parity and gap size indicator incorrect	
00005	04000	Header and/or trailer parameter incorrect	
00006	04000	Own-coding lies within the Collate program	
00007	04000	Insufficient memory	
00011	04000	Output-label-check parameter is incorrect	
00012	04000	Banner character parameter is incorrect	
00013	04000	Read error parameter is incorrect	
00014	04000	Collating sequence parameter is incorrect	
00015	04000	Ascending/descending sequence parameter is incorrect	
00016	04000	Rewind option parameter is incorrect	
00017	04000	Input file name and reel number check parameter is incorrect	
00020	04000	Record-blocking parameter is incorrect	
00021	04000	Printer control unit parameter is incorrect	
00000	00000	Parameter card read error	Correct the parameter card and rerun the collate.

Table 1 (cont). Collate C and C(V) Halt Codes

A-Address	B-Address	Cause	Corrective Action
bbbbb	00T1D	Read error (after 64 attempts to reread)	To reread, press RUN. To accept the record, set SENSE switch 1 ON and press RUN. To drop the record, set SENSE switch 2 ON and press RUN.
bbbbb	00T2D	Write error (a routine to back-space, erase and rewrite has been executed nine times)	To try to rewrite, press RUN.
bbbbb	00T5D	Header record causing read error	To reread the header, press RUN. To accept the header, set SENSE switch 1 ON and press RUN.
00001	00T3D	Multi-reel output	Mount another reel on the indicated drive.
00000	00T4D	Item length exceeds limit	Mount correct reel of the prescribed input format on this same drive and rerun the collate.
00000	04T0D	Sequence error (input files not in sequence)	The input on the indicated drive is not in sequence; correct and rerun the collate.
00002	00T0D	Multi-reel input (end of reel)	Mount the next reel of this input on the same drive and press RUN.
00003	00T0D	Retention cycle check (label is in error)	Either accept the tape by setting SENSE switch 1 ON and pressing RUN or mount another reel and check the retention cycle on this tape by pressing RUN.
02222	00T0D	File name and reel number check has failed	Mount the correct reel of the prescribed input format on the indicated drive and press RUN.
07777	00T0D	End-of-job	The B-address register contains the address and number of the drive that contains the collated output. (If parameters 152-160 were blank, the RUN button may be pressed to return control to the Loader-Monitor general return address.)

READ ERROR CORRECTION

A read error can be corrected manually during Collate processing. The user specifies (in parameters 46 and 47) the action to be taken by the program when an unreadable record is encountered. The designated action may be one of the following:

1. The record is to be printed, and the machine halts ("PΔ " in parameters);

2. The record is to be printed and eliminated, and the program continues in sequence ("PD" in parameters); or

3. The machine halts without printing or eliminating the record ("ΔΔ" in parameters).

If halt 1 or 3 above occurs, the operator may reread the record by setting SENSE switches 1 and 2 OFF and pressing the RUN button. The record may be corrected (as explained below) and then accepted, or accepted as is, by setting SENSE switch 1 ON and pressing the RUN button. The record can be deleted from the file by setting SENSE switch 2 ON and pressing the RUN button.

To correct an unreadable record which was printed (1 above), the operator should first check the printout of the record to determine the character(s) in error. To correct and unreadable record which was not printed, the operator should display the characters of the record in error via the control panel as follows:

1. Display the contents of the A-address register (octal 14). The address in this register is the beginning location of the buffer that contains the record in error.

2. Depress the CONTROL + 1 display button repeatedly to display successive characters, from left to right, of the record. Each time the DISPLAY + 1 button is pressed, a character (including punctuation) is displayed in the CONTENTS indicators.

Once the characters in error have been noted (or the printed record is checked and the corrections noted), the operator enters the correct characters (including punctuation) into memory and directs the program to continue.

OPERATING PROCEDURES FOR TAPE LOADER-MONITOR C

The Tape Loader-Monitor C program searches for, loads, and starts Series 200 programs which are recorded on self-loading binary run tapes immediately following the Loader-Monitor. A call to search for and load a specified program may be issued by the operator or by program instruction from a previously loaded program.

PRELIMINARY PROCEDURES

The preliminary or initial setup procedures include mounting the binary run tape (BRT) on an available tape drive which is assigned the logical address of zero (tape zero), cycling-up the card reader if the Console Call card is to be used, and cycling-up and loading the additional input/output devices to be used in the execution of the program run.

BOOTSTRAP PROCEDURES

Prior to loading a unit of an object program, the tape header-label record, the tape bootstrap routine, and the Loader-Monitor program are read into memory by performing the following steps:

1. Initialize the central processor and activate the peripheral devices to be used.
2. Mount the BRT containing the Tape Loader-Monitor on logical drive 0.
3. Bootstrap the tape information into location 0. (This causes the tape header-label record to be read.)
4. Repeat step 3. (This causes the tape bootstrap record to be read.)
5. If the octal address assignment of the tape control used in steps 3 and 4 above was 40 (octal), proceed to step 6; otherwise, enter the appropriate octal address assignment into octal memory locations 65, 73, and 101. (Note that punctuation must be retained.)
6. Depress the RUN button on the control panel. (The machine will halt - halt #1 in Table 1.)
7. Depress RUN. (The machine will halt - halt #3 - Loader-Monitor is ready to accept a console call.)

CONSOLE CALL PROCEDURE

Once the Tape Loader-Monitor has been loaded into memory (as evidenced by halt #3), the appropriate parameter values for the first loading unit to be called must be entered into the Loader-Monitor communication area. These parameter values may be set up in memory by the program executed before the unit to be called, entered manually at the control panel, or entered via a Console Call card.

NOTE: The punctuation in the Loader-Monitor communication fields must be retained.

Obtaining Halt Number Three

Halt number 3 is reached automatically by performing the bootstrap procedures above. In addition, halt number 3 can be obtained at any time by performing the following steps:

1. Enter octal address 126 into Instruction Address Register 1, as follows:
   a. Depress the STOP button;
   b. Set the ADDRESS indicators to octal 126;
   c. Set the CONTROL indicators to octal 17; and
   d. Depress the CONTROL ENTER button to enter octal 126 into Instruction Address Register 1.
2. Set the ADDRESS MODE indicator to the three-character addressing mode (if necessary);
3. Depress the RUN button. The machine then stops at halt number 3.

Card Entry of Parameter Values

After halt number 3 is obtained, the parameter values may be entered into the Loader-Monitor communication area of memory. To enter parameter values using the Console Call card, perform the following steps:

1. Punch the required Console Call parameter values in the appropriate card columns (see Figure 1).
2. Place the Console Call card (followed by two additional blank cards if a 227 card reader is used) in the card reader input hopper and cycle-up the card reader.
3. Depress the RUN button on the control panel. (The parameter values then initiate the searching, loading, and starting of the designated loading unit.)

If any halts should occur during the loading of the Loader-Monitor program, refer to the halt codes in Table 1.

Manual Entry of Parameter Values

Manual entry of parameter values is accomplished by performing the following steps:

1. Designate manual entry of parameter values by entering octal 01 into octal location 100.
2. Enter the appropriate parameters into the prescribed octal locations as follows:

Parameter	Location
Program name	104-111
Segment name	112-113
Tape drive no.	114
Halt name (if used)	115-124

3. Depress the RUN button on the control panel. (This initiates the searching, loading, and starting of the called unit.)

If any halts occur during the loading of the called unit, refer to Table 1.

For a detailed description of the Tape Loader-Monitor, refer to the Honeywell Information Bulletin PLUS - Tape Loader-Monitor, DSI-327A.

Table 1. Coded Halts for Tape Bootstrap Routine and Loader-Monitor Program

Halt No.	Cause	A Address	B Address	Operator Action
1	Bootstrap routine requests loader visibility if non-standard	00124	17001	If a loader of non-standard visibility (not visibility A) is desired, perform steps 1 and 2 below; if the standard Tape Loader-Monitor is to be used, proceed to step 2. 1. Enter six-character visibility code of desired loader into memory, beginning at octal location 124. 2. Depress RUN button.
2	Loader of requested visibility missing	00000	14002	Check mounted BRT and requested visibility. Correct error, rewind BRT, and start again from beginning of bootstrap procedure.
3	Loader requests console call	00100	17002	Enter necessary parameter values into communication area, using either card entry or manual entry as outlined in "Console Call Procedure"; then depress RUN button.
4	Uncorrectable read error on BRT. p: tape control d: tape drive	00000	10pld	Check tape for dirt and damage, and correct as necessary. (Refer to the Honeywell 200 Equipment Operators' Manual.) Start again with console call procedure to try to reread.
5	Illegal punch on Console Call card	00000	10110	Correct Console Call card, obtain halt number 3 as outlined in "Obtaining Halt Number 3," and reread Console Call card as outlined in "Card Entry of Parameter Values."
6	"Halt name" unit has been loaded	00000	14000	Perform action requested by programmer; then depress RUN button to continue.
7	Called unit not found on backward search	00000	14010	Depress RUN button to search forward.
8	Called segment not found within current program (loading unit), searching in specified direction	00000	14012	Depress RUN button to search in opposite direction.

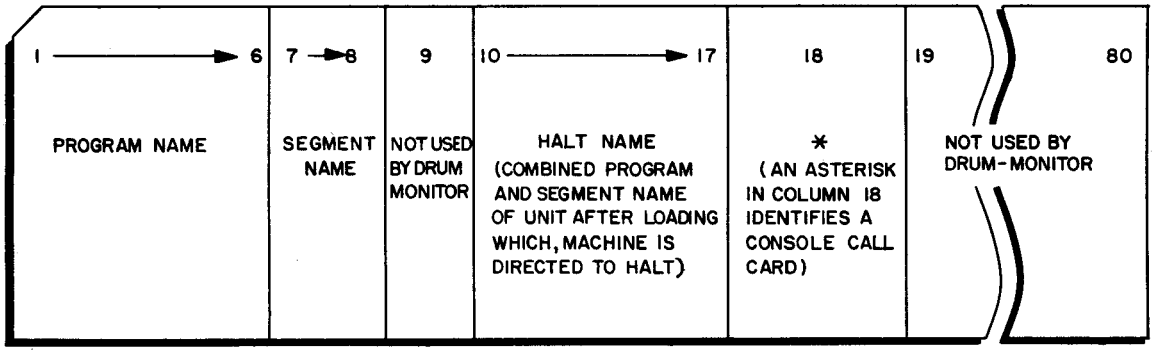


Figure 1. Console Call Card

Table 2. Sequential Layout of the Loader-Monitor Communication Area

Location		Function
Decimal	Octal	
64	100	Console call card versus direct (manual) entry.
65-67	101-103	Revision number of unit last loaded.
68-73	104-111	Program name.
74-75	112-113	Segment name.
76	114	Tape drive.
77-84	115-124	Halt name.
85	125	ID character from column 18 of console call card.
86-89	126-131	Fixed start 0 (Loader-Monitor entrance for console call: via operator's control panel or Console Call card).
90-93	132-135	Fixed start 1 (not used by Loader-Monitor).
94-97	136-141	Fixed start 2 (not used by Loader-Monitor).
98-101	142-145	Fixed start 3 (not used by Loader-Monitor).
102-105	146-151	Branch to own-code routine.
106	152	Direction for searching.
107-109	153-155	Relocation augment.
110	156	Relative position.
111	157	Search mode.
112	160	Start mode.
113-118	161-166	Visibility mask.
119-121	167-171	Special starting location.
122-125	172-175	Own-code return 1 (before distribution).
126-129	176-201	Own-code return 2 (after distribution).
130-138	202-212	Loader-Monitor entrance for normal call from unit currently being executed.
139-141	213-215	General return address.
142-146	216-222	Current date.
147	223	Trapping Mode.
148-150	224-226	Alternate return address.
151-154	227-232	ECD field.

OPERATING PROCEDURES FOR TAPE HANDLING ROUTINE C (THOREX)

Tape Handling Routine C (THOREX) is a set of general tape-handling and correction routines for use on Honeywell Series 200 systems. Under the direction of input parameters (which are read either from punched cards or from paper tape, or entered from the control panel) THOREX can manipulate 1/2-inch magnetic tapes, 3/4-inch magnetic tapes, or a combination of both tape sizes.

For further information on the characteristics of Tape Handling Routine C, refer to the Honeywell Information Bulletin entitled Tape Handling Routine C, File No. 123.6305.020B.00.00.

PROGRAM LOADING

There are a number of ways in which the THOREX program can be loaded into memory.

1. Easycoder Assembly A and B Systems: THOREX can be loaded from –
   a. A self-loading card deck, described on page 1.
   b. A self-loading tape (SLT), described on page 2; or
   c. Paper tape, described on page 4.
2. Easycoder Assembly C System: THOREX (AAFTOR) can be loaded using the Loader-Monitor C, described on page 4.

THOREX performs specific functions as designated by parameters (see Table 3 on page 9). Each THOREX function is terminated by either processing up to a specified number of records (record option) or processing up to the first incidence of the specified label (file option) as called for by the requesting parameter.

NOTE: If the operator wishes to stop the current THOREX function being performed and read in the next parameter, he can stop the machine, enter 3004 (octal) into the I-address register, set SENSE switch 2 OFF, and press RUN.

When the entire THOREX routine is completed, the machine halts and an end-of-job configuration is contained in the A- and B-address registers (A:0000, and B:4777). If any halts should occur during the loading and running of the THOREX program, see page 6.

LOADING THOREX WITH A SELF-LOADING CARD DECK

Program Loading

1. Initialize the central processor and activate the peripheral devices to be used.

2. Set SENSE switches as follows:

   a. SENSE switch 1 ON for halt after loading;

   b. SENSE switch 2 OFF;

   c. SENSE switch 4 ON for parameter entry from the control panel; OFF if parameters are to be entered from parameter cards.

3. Place the THOREX program deck in the card reader input hopper, as shown in Figure 1A.

   a. If the parameters have been punched on cards and are to be read immediately following the program, place the parameter cards in the card reader input hopper, as shown in Figure 1B.

4. Cycle-up the card reader.

5. Bootstrap the card reader contents into location 02301 (octal) and press RUN. (If a halt should occur during the loading or running of THOREX, display the A- and B-address registers and refer to Table 1 on page 6.)

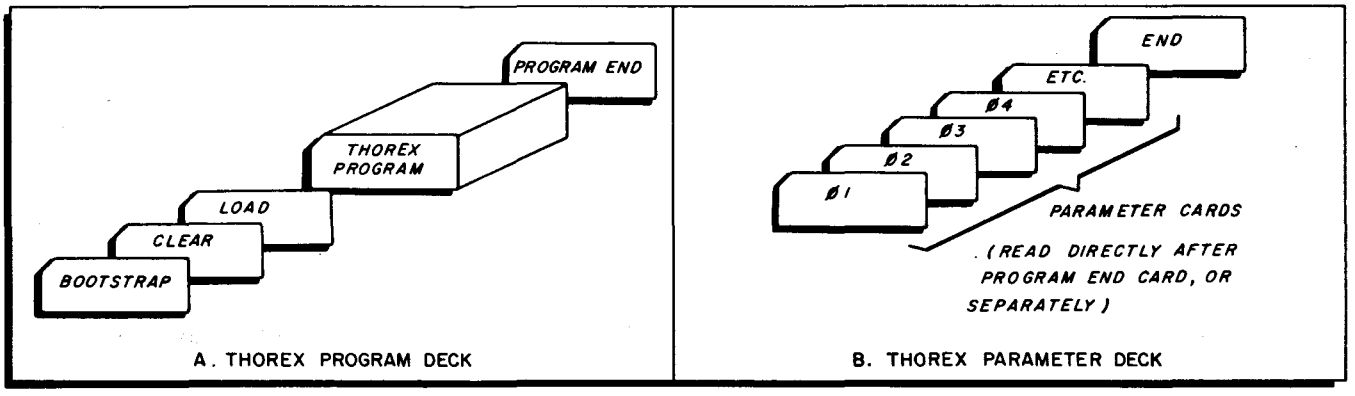


Figure 1. Organization of Card Decks

Parameter Loading

When THOREX is loaded from a self-loading card deck, parameters can be entered from the card reader or from the control panel. SENSE switch settings for the program loading procedure will determine the operator action for parameter loading:

1. SENSE switches 1 and 4 OFF; parameters will be loaded immediately after the program deck (see step 3a.); no further action is required at the console.

2. SENSE switch 1 ON; a halt occurs after program loading (I-address register contains 13172); place the parameter cards in the card reader input hopper and press RUN. A halt will occur whenever an END card is read; press RUN to restart.

3. SENSE switch 4 ON; a program halt will occur; enter parameters from the control panel (see page 9).

LOADING THOREX FROM A SELF-LOADING TAPE (SLT)

Program Loading

1. Initialize the central processor and activate the peripheral devices to be used.

2. Mount the self-loading tape on logical drive 0.

3. If the parameters are punched on cards, place the cards in the card reader input hopper and cycle-up the card reader; if parameters are on paper tape, mount the paper tape reel (or strip) and cycle-up the paper tape reader. (The organization of parameters is shown in Figure 1B.)

4. Set SENSE switches as follows:

   a. SENSE switch 1 ON for halt after program loading.

   b. SENSE switch 2 OFF.

   c. SENSE switch 4 ON for parameter entry from the control panel; OFF if parameters are entered from cards or paper tape.

5. Depress the following buttons on the control panel.

   a. CONTENTS buttons to indicate 40 (octal), the recommended trunk address of the self-loading tape.

   b. BOOTSTRAP. (This causes the first record of the SLT to be bootstrapped into location 00000.)

   c. RUN. (This causes the second Search routine record to be read into memory; a halt will occur with 0032_8 contained in the I-address register.)

   d. Enter the program name THOREX into octal locations 00145-00152 as follows (retain punctuation):

Octal Locations	Octal Contents
00145	63 (T)
00146	30 (H)
00147	46 (O)
00150	51 (R)
00151	25 (E)
00152	67 (X)

   e. RUN. (Pressing RUN causes THOREX to be loaded into memory.)

Parameter Loading

When THOREX is loaded from an SLT, parameters may be loaded from cards or paper tape, or entered via the control panel. SENSE switch settings for the program loading procedure will determine the operator action for parameter loading:

1. SENSE switches 1 and 4 OFF; if parameters are on cards or paper tape (see parameter organization in Figure 1B on page 2), they will be loaded immediately after the program deck; no further action is required at the control panel.

2. SENSE switch 1 ON; a halt occurs after program loading (I-address register contains 13172_8); place the parameter cards in the card reader input hopper or mount the paper tape reel (or strip) containing the parameters and press RUN. A halt will occur whenever an "END" configuration is sensed; press RUN to restart.

3. SENSE switch 4 ON; a program halt will occur; enter parameters from the control panel (see page 9).

LOADING THOREX FROM PAPER TAPE

Program Loading

1. Initialize the central processor and activate the peripheral devices to be used.
2. Mount the paper tape program reel on the paper tape reader and cycle-up the reader.
3. Set SENSE switches as follows:
   a. SENSE switch 1 ON.
   b. SENSE switch 2 OFF.
   c. SENSE switch 4 ON if parameters are entered from the control panel; OFF if they are entered from paper tape.
4. Depress the following buttons on the console:
   a. CONTENTS buttons to designate 43 (octal), the recommended trunk address of paper tape reader.
   b. BOOTSTRAP. (This causes the paper tape to be positioned before the THOREX bootstrap record.)
   c. ADDRESS buttons to indicate 02301 (octal).
   d. CONTENTS buttons to designate 43 (octal).
   e. BOOTSTRAP. (This causes the bootstrap record to be read.)
   f. RUN. (Pressing the RUN button causes the program to be loaded.)

Parameter Loading

When the machine halts after program loading (I-address register contains 13712), the paper tape containing the parameters may be mounted and the RUN button pressed. A halt will occur whenever an "END" configuration is sensed; press RUN to restart. If SENSE switch 4 was set to ON during program loading, enter parameters from the control panel at this time (see page 9).

LOADING THOREX WITH PLUS TAPE LOADER-MONITOR C

Program Loading

1. Initialize the central processor and activate the peripheral devices to be used.
2. Mount the program tape on logical drive 0.
3. If parameters are on cards, place them in the card reader input hopper following the Console Call card (if used) and cycle-up the card reader (see Figure 2 on page 5). If parameters are on paper tape, mount the paper tape reel or strip and cycle-up the reader; note that the console call information is entered from the control panel (see note below).
4. Set SENSE switches as follows:
   a. 1 : Not used.

b. 2 : OFF.

c. 4 : ON if parameters are entered from the control panel; OFF if parameters are entered from parameter cards or paper tape.

5. Depress the following buttons on the control panel:

a. CONTENTS buttons to designate the octal address of the program tape, 40_8 recommended.

b. BOOTSTRAP. (This causes the tape label record to be read.)

c. Repeat step 5a, above.

d. BOOTSTRAP. (This causes the first bootstrap record to be read.)

e. If the CONTENTS buttons were set to 40_8 in steps 1 and 3 above, proceed to 4f; otherwise, set the following octal memory locations to the appropriate address assignment of the program tape: 65, 73, 101.

f. RUN. (A halt will occur with 17001 contained in the B-address register. This is a Loader-Monitor halt.)

g. RUN. (Another Loader-Monitor halt occurs when the Loader-Monitor program has been loaded and is ready to accept a console call; 17002 is contained in the B-address register.)

NOTE: If the required console call information has not been punched on a Console Call card and placed in the card reader, it must be entered from the control panel into locations 100 and 104-124 as follows (retain punctuation in these fields):

Location	Contents (in octal)
100	01 ("Do not read a card")
104-111	21, 21, 26, 63, 46, 51 (AAFTOR)
112-113	62, 00, (S0)
114	Address of tape (0) from which the program is to be loaded
115-124	21, 21, 26, 63, 46, 51, 62, 00 (AAFTORS0)

h. RUN. (This causes the Loader-Monitor to search for, locate, and load THOREX – a halt occurs after THOREX is loaded; 14000 is contained in the A-address register. If there are any program constants to be changed, they should be changed now; see page 10.)

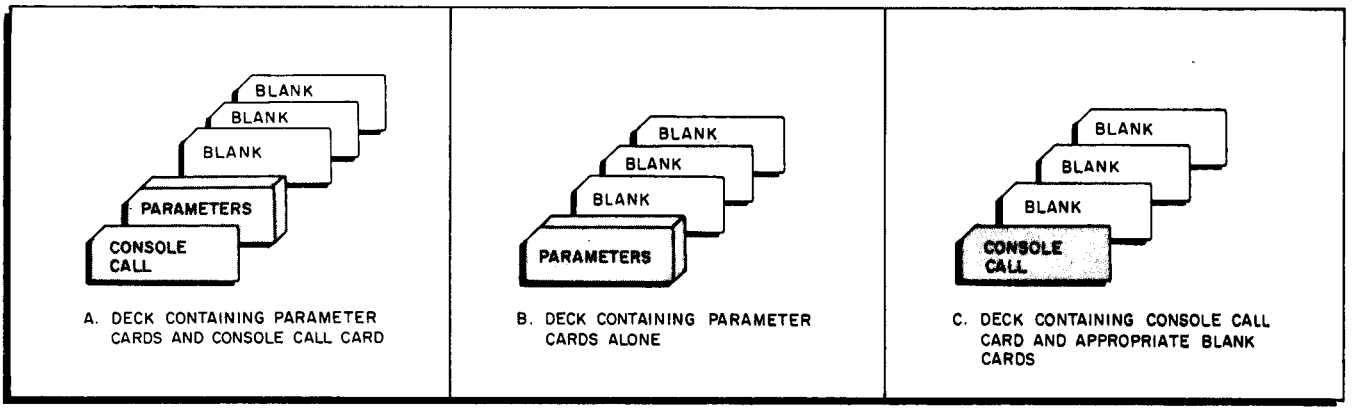


Figure 2. Organization of the Various AAFTOR (THOREX) Decks

Parameter Loading

When the halt occurs after loading THOREX (14000 in the A-address register), the parameters, if on cards or tape, are loaded by pressing the RUN button. A halt will occur whenever an "END" configuration is sensed; press RUN to restart. If SENSE switch 4 was set to ON during program loading, enter the parameters from the control panel at this time (see page 9).

HALTS ASSOCIATED WITH THOREX

Console Halts

THOREX program halts may occur for two general reasons: (1) logical errors and halts which are generated by parameter input, and (2) peripheral errors. For all halts, the B-address register should be displayed; in addition, if it is desired to identify the parameter or buffer in question, the contents of the A-address register should be displayed. The halt codes are listed in Table 1.

Table 1. Halt Coding

B Address	A Address	Significance	Type of Halt
00p1x[1]	Buffer Address	Uncorrectable tape read	Peripheral
00p2x	Buffer Address	Uncorrectable tape write	Peripheral
00p3x	Buffer Address	End of tape	Peripheral
00060	Buffer Address	Printer error	Peripheral
00040	Parameter Number[2]	Hole-count error	Parameter
04001	Parameter Number	Tape 1 not a valid number	Parameter
04002	Parameter Number	Tape 2 not a valid number	Parameter
04003	Parameter Number	Function code not valid	Parameter
04004	Parameter Number	Other fields not valid[3]	Parameter
04006	Parameter Number	More than 80 consecutive paper tape characters without a termination character.	Parameter
04007	Parameter Number	No find on Locate	Parameter
04010	Parameter Number	Attempt to apply write dummy header label function to 3/4-inch tape.	Parameter
04011	Parameter Number	Attempt to apply skip copy function to 1/2-inch tape.	Parameter
04021	Parameter Number	Machine size constant not a valid number (1 through 7)	Parameter
04777	Parameter Number	End of job	Operational

[1] p = Peripheral control unit number
x = Tape drive number

[2] The parameter number is the two-character number found in positions 1-2 of the parameter input request. This number is right-justified in the A-address register.

[3] Includes number of records, hhh, uuu, kkk. These parameters must be fully punched as numbers 0 through 9 and must be present in those functions which require them. A single blank invalidates the entire field.

CORRECTIVE ACTION

For the errors listed in Table 1, either of two corrective actions can be taken:

1. To bypass the error and read the next parameter, set SENSE switch 2 OFF and press RUN.

   NOTE: If the operator wishes to stop the current THOREX function being performed and read in the next parameter, he can stop the machine, enter 3004 (octal) into the I-address register, set SENSE switch 2 OFF, and press RUN.

2. To attempt to correct the error, set SENSE switch 2 ON and press RUN. This action automatically causes a branch to a restart location depending on the particular error involved.

Parameter Halts

Halts caused by parameter card errors can be corrected by either repunching the incorrect parameter card, placing it in the card reader input hopper, and performing corrective action 1 above or entering the correct parameter via the control panel as explained below.

To correct parameters from the control panel, note that parameters 1-80 are read into locations 02301 to 02420 (octal). The operator should also be aware of the following points:

1. SENSE switch 2 must be ON for each parameter entry.
2. If it is necessary to enter any character into octal location 02304, 02305, 02312, 02313, or 02325, the operator must enter the character with a word mark.
3. The format of the parameter must be followed; refer to Figure 3.

Function	Option	Parameter Positions										Notes
		1 2	3	4	5 6 7 8 9	10	11 12 13	14 15 16	17 18 19	20	21 through 80	
FORWARD	RECORD	c c	F	t1	r r r r r	t2						t1 or t2 must be blank.
FORWARD	FILE	c c	F	t1	F a a a a	t2						t1 or t2 must be blank.
BACKSPACE	RECORD	c c	B	t1	r r r r r	t2						t1 or t2 must be blank.
LOCATE	RECORD	c c	L	t1	r r r r r	t2	h h h	u u u	k k k		i - - - - - i	t1 or t2 must be blank.
LOCATE	FILE	c c	L	t1	F a a a a	t2	h h h	u u u	k k k		i - - - - - i	t1 or t2 must be blank.
EDIT ENTIRE RCD.	RECORD	c c	E	t1	r r r r r	t2				m		t1 or t2 must be blank.
EDIT FIELD	RECORD	c c	E	t1	r r r r r	t2	h h h	u u u		m		t1 or t2 must be blank.
EDIT ENTIRE RCD.	FILE	c c	E	t1	F a a a a	t2				m		t1 or t2 must be blank.
EDIT FIELD	FILE	c c	E	t1	F a a a a	t2	h h h	u u u		m		t1 or t2 must be blank.
WRITE LABEL	RECORD	c c	W	t1	s s s s s	t2						1/2-inch tapes only. t1 or t2 must be blank.
REWIND	RECORD	c c	R	t1	t2 t3 t4 t5 t6	(2)						
COPY	RECORD	c c	C	t1	r r r r r	t2			(E)			
COPY	FILE	c c	C	t1	F a a a a	t2			(E)			
CORRECT AND COPY	RECORD	c c	K	t1		t2	h h h	u u u	(E)	(1)	i - - - - - i	
COMPARE AND PRINT	RECORD	c c	P	t1	r r r r r	t2				m		
COMPARE AND PRINT	FILE	c c	P	t1	F a a a a	t2				m		
SKIP COPY	RECORD	c c	S	t1		t2			(E)			t2 must be 3/4-inch tape.
END THOREX	-	E N	D									An END card should always follow a batch of parameter cards.

NOTES:
1. For the functions where the file option is applicable (i.e., Forward, Locate, Edit, Copy, and Compare and Print) this option is shown for 1/2-inch standard tapes only. Where Faaaa appears, however, FTM can be substituted for 1/2-inch, even-parity, non-Honeywell tapes; for 3/4-inch magnetic tape users Faa must be substituted. FTM and Faa should appear in positions 5-7.
2. For the Rewind function the format for 1/2-inch tapes is listed. For the 3/4-inch tape user the numbers of the tapes to be rewound should appear in positions 4-7 only.
3. All numeric fields are decimal. Any number placed in one of these fields must be preceded by leading zeros if necessary. If a specific field is not employed, the entire field should be blank.

Figure 3. Format for THOREX Parameters

Peripheral Halts

For the peripheral halts given in Table 1, the buffer address is given so that the operator can find and correct the character(s) in error. In addition to the halts listed in Table 1, some peripheral failures occur which do not result in a halt. These peripheral failures and their appropriate restarts are listed in Table 2.

Table 2. Peripheral Errors and Restarts

Function	Tape A[1]		Tape B[2]	
	Peripheral Error Handling	Restart Action on SENSE Switch 2	Peripheral Error Handling	Restart Action on SENSE Switch 2
Forward	Ignore tape A read fail	None		
Backspace	No read fail	None		
Rewind	No read fail	None		
Write Dummy Header Label	After original write fail: backspaces, erases, and writes. After three backspace/ erase/write series, halts.	Retry write		
Locate	Tries to read 63 times after original read fail, then halts with record in question in the buffer.	Continue locate on record as it has been placed in buffer. Locate function will continue through following records.		
Copy, Skip Copy	Read fail. Tries to read 63 times after original read fail, then halts with record in question in position to be reread.	Retry read	Write fail. 1/2-inch tape: backspaces, erases and tries to write again; after three backspace/erase/ write series, halts.	Retry write
			3/4-inch tape: backspaces and tries to write three times after original write fail; halts.	Retry write
Correct and Copy	Read fail. Tries to read 63 times after original read fail, then halts with record in question in position to be reread.	Routine will continue; parameter correction will be made to record in question as it resides in buffer.	Write fail. 1/2-inch tape: backspaces, erases, and tries to write again; after three backspace/erase/ write series, halts.	Retry write
			3/4-inch tape: backspaces and tries to write three times after original write fail; halts.	Retry write
Compare and Print	Tries to read 63 times after original read fail, then halts with record in question in the buffer.	Continue routine, noting read fail (RDE) on tape A print line if an unequal compare results.	Same as for tape A.	Same as for tape A.
Edit	Tries to read 63 times after original read fail. If unsuccessful, a read fail (RDE) will be noted on the print line and routine will continue.	None		
Printer Cycle Check	Line will be reprinted with PLE appearing at left of line.	Continue routine		

[1] For single tape functions (i.e., forward, backspace, locate, edit, and write dummy header label) tape A may be either t_1 or t_2, as specified in the parameter. For multiple tape functions, tape A always refers to t_1.

[2] Tape B, used only in multiple tape functions, always refers to t_2.

ENTERING PARAMETERS FROM THE CONTROL PANEL

THOREX parameters may be manually inserted at the control panel if SENSE switch 4 has been placed in the ON position.[1] The format to be used in entering a parameter from the control panel is identical to that illustrated in Figure 3. Thus position 3 is used for the function code, position 4 to indicate the primary tape number, etc. Parameter positions 1 - 80 are read into memory locations 02301 - 02420 (octal). Table 3 lists the THOREX functions and parameters with their corresponding ADDRESS and CONTENTS bits in the form in which they appear on the control panel. After entering each parameter, depressing the RUN button causes the requested function to be performed.

NOTES

1. As long as SENSE switch 4 remains ON, the End parameter is not required (as the program halts after the execution of each parameter).
2. If it is necessary to enter any character into octal location 02304, 02305, 02312, 02313, or 02325, the operator must enter the character with a word mark.

Table 3. THOREX Function ADDRESS and CONTENTS Bits

THOREX Parameter	Octal ADDRESS (Start)	ADDRESS Bits	CONTENTS	CONTENTS Bits
Functions				
Forward	02303	000 010 011 000 011	F	010 110
Backspace			B	010 010
Locate			L	100 011
Edit			E	010 101
Write Dummy Header Label			W	110 110
Rewind			R	101 001
Copy			C	010 011
Correct and Copy			K	100 010
Compare and Print			P	100 111
Skip Copy			S	110 010
Tape Number 1	02304	000 010 011 000 100	t_1	Any number 0-7.
Number of Records	02305	000 010 011 000 101	rrrrr	Any number 1-99, 999.
Tape Number 2	02312	000 010 011 001 010	t_2	Any number 0-7.
Position of High-Order Character	02313	000 010 011 001 011	hhh	Any number 1-999.
Position of Low-Order Character	02316	000 010 011 001 110	uuu	Any number 1-999.
Number of Characters in Record	02321	000 010 011 010 001	kkk	Any number 1-999.
Printer output mode	02324	000 010 011 010 100	A or 1	010 001 (if A). 000 001 (if 1).
Information Content	02325	000 010 011 010 101	i...i	Any character(s) or number(s).

[1] When entering parameters from the control panel, extreme care must be taken. It is suggested that the operator perform only the simpler functions (such as rewind, backspace, etc.) from the control panel, employing cards or paper tape for those parameters having many symbols (e.g., locate).

PROGRAM CONSTANT ALTERATION

The operator may wish to alter certain THOREX program constants which are given in the tables below. If the program is supplied on cards, the symbolic card(s) specifying the constant to be changed can be repunched and the program deck assembled. If the program is not on cards, it is efficient to change the constants via the control panel according to the octal locations and alphanumeric configurations given in the tables.

NOTE: A word mark must always be entered with the new value.

Table 4. Memory Size Constant

Card Number	Octal Location	Stored Value	Memory Size Designated by Stored Value
01500	02511	1	8K
		2	12K
		3	16K
		4	20K
		5	24K
		6	28K
		7	32K

Table 5. Tape Size Constants

Card Number	Octal Location	Designates	Stored Value	Tape Size Designated by Stored Value
01460	02505	Primary tape - t_1	A (octal 21)	3/4-inch tape
			B (octal 22)	1/2-inch tape
01470	02506	Secondary tape - t_2	A (octal 21)	3/4-inch tape
			B (octal 22)	1/2-inch tape

Table 6. Device Type Constant

Card Number	Octal Location	Stored Value	Input Device Designated by Stored Value
01510	02512	C (octal 23)	Card input
		P (octal 47)	Paper tape input

Table 7. Peripheral Address Assignments

Card Number	Octal Location	Peripheral Device	"Normal" Value[1]	Constant Tag
01410	02500	t_1 Operations	00	TPPCU
01420	02501	t_2 Operations	00	TCU2
01430	02502	Card Reader	41	CDPCU
01440	02503	Paper Tape Reader	43	PTPCU
01450	02504	Printer	02	PRPCU

NOTE: [1] The constant values listed for the various peripheral devices may be altered if desired.

Table 8. Tape Parity/Gap Length Constants

Card Number	Octal Location	Designates	Stored Value	Operation Designated by Stored Value
01480	02507	t_1 Operations (VE1)	60 (octal)	Normal operation. Tape read in odd parity, and written in long gap/odd parity.
			70 (octal)	Tape read in even parity, and written in long gap/even parity.
01490	02510	t_2 Operations (VE2)	20 (octal)	Tape written in short gap/odd parity.
			30 (octal)	Tape written in short gap/even parity.

NOTES: 1. The contents of the last two columns apply to both t_1 and t_2 operations

2. The tape control constant for 3/4-inch tapes should never be changed from octal 60.

OPERATING PROCEDURES FOR EASYCODER ASSEMBLY C

The Easycoder Assembly C System is a powerful processor which translates symbolic programs into machine language, maintains a file of programs in both symbolic and machine languages on a symbolic program tape, and allows specified programs to be selected from the symbolic program tape for execution under the Basic Programming System.

Combinations of these three functions constitute the four Easycoder Assembly C operating modes:

1.	Assembly:	Translates programs written in Easycoder symbolic language and places the result on a symbolic program tape in both symbolic form and binary form.
2.	Selection:	Selects specified programs from a symbolic program tape and places these programs on a binary run tape or on punched cards.
3.	Assembly and updating:	Enables an input symbolic program tape to be maintained through the correction of individual programs, the addition of new programs, and the deletion of unwanted programs.
4.	Assembly, updating, and selection:	Performs the same operations as the assembly and updating phase with the added ability to select specified programs and place these programs on a binary run tape or punch the programs on cards in executable form.

OPERATING SYSTEMS

Easycoder Assembly C operates in either of two basic systems:

1. The tape-oriented system, in which the Easycoder Assembly C system is loaded from a BRT by Tape Loader-Monitor C (see PLUS - Tape Loader-Monitor, DSI-327); or
2. The drum-oriented system, in which the Easycoder Assembly C is loaded from the Type 270 random access drum by the Drum Monitor C (see PLUS Drum Monitor, DSI-408).

MACHINE LANGUAGE OUTPUT

The machine language output may be in either of two forms:

1. A binary run tape (BRT) containing object programs and the Tape Loader-Monitor C and tape bootstrap routine. The format of the BRT is described in the PLUS - Tape Loader-Monitor (DSI-327).
2. A card deck punched in BRT format, containing object programs only. The format of this deck is described in PLUS - Card Loader-Monitor (DSI-349).

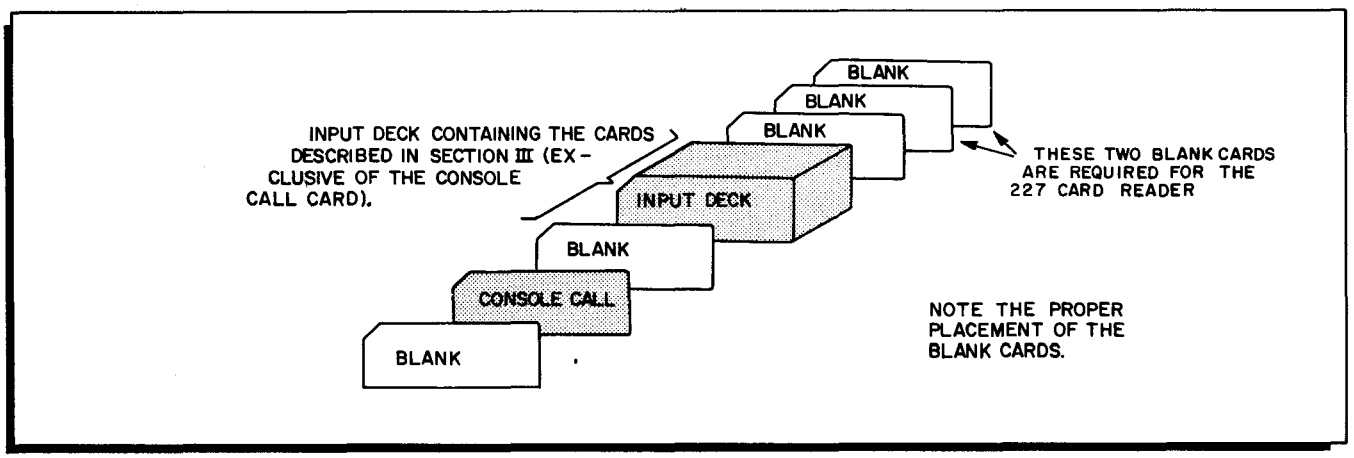


Figure 1. Makeup of Deck Containing Input Deck and Console Call Card

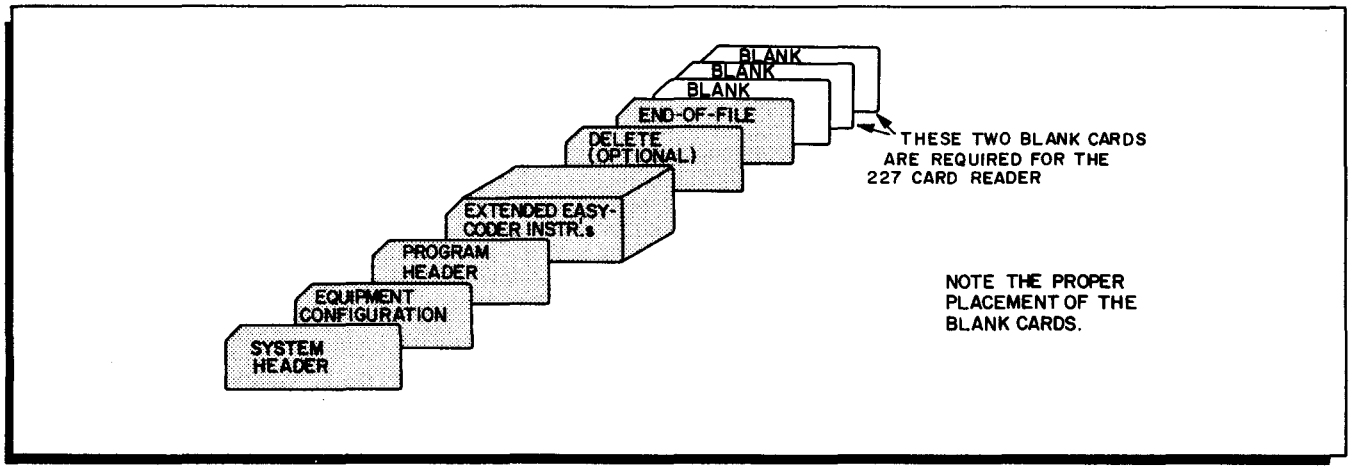


Figure 2. Makeup of Deck Containing Input Deck Alone

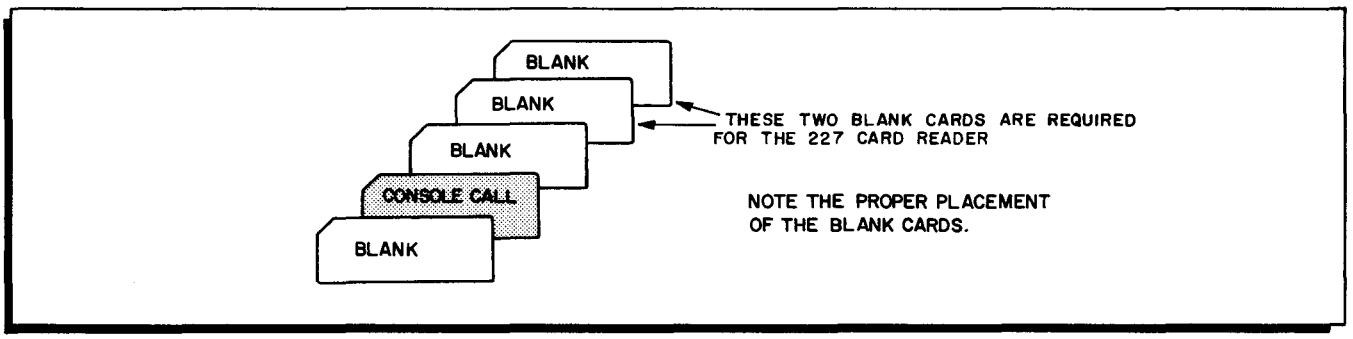


Figure 3. Makeup of Deck Containing Console Call Card and Appropriate Blank Cards

INITIAL SETUP PROCEDURES

The following initial steps should be taken to load and execute the assembly program. Note that while the SENSE switches are not used by Easycoder Assembly C, they should nevertheless remain OFF.

1. Initialize the central processor and activate the peripheral devices to be used.
2. Prepare the input to assembly according to the input media to be used.
   a. Card Input: Place the appropriate card deck in the card reader input hopper (see Figure 1) and cycle-up the card reader.
   b. Paper Tape Input: Mount the paper tape reel on the reader and depress the reader START button.
   c. Magnetic Tape Input: Mount the tape input on the requested drive.
3. If a BRT-format deck is to be produced, place blank cards in the card punch output hopper.
4. Prepare for program loading depending upon system orientation: tape or drum.
   a. Tape System: Mount the program tape on logical drive 0.
   b. Drum System: Initialize the program drum (drum unit 0).

   NOTE: For all input tapes, mount the appropriate tape and set the PERMIT-PROTECT switch to PROTECT. For all output tapes, insert the write-enable ring, mount the appropriate tape, and set the PERMIT-PROTECT switch to PERMIT.
5. Bootstrap and load the Tape Loader-Monitor or Drum Loader-Monitor (refer to operating procedures for Tape Loader-Monitor C or PLUS Drum Loader-Monitor C).
6. A Loader-Monitor halt will occur with 17002 contained in the B-address register. This indicates that the Loader is in memory and awaiting a console call. If the Console Call card has been placed in the card reader (see Figures 1 and 3), proceed to step 7. Otherwise, the contents that would ordinarily be punched on the Console Call card must be entered into the addresses specified below:

Address	Contents (octal)
100	01
104-111	21, 21, 22, 25, 71, 23(AABEZC)
112-113	62, 00
114	00

   NOTE: Punctuation must be retained in these fields.
7. Depress the RUN button on the control panel. Another Loader-Monitor halt will occur with 07001 contained in the B-address register. This halt indicates that the first program of the Assembly system has been loaded.
8. If the input to assembly is in the card reader, proceed to step 9. Otherwise, the following characters must be entered from the control panel, beginning in the location specified by the contents of the A-address register.

Character		Contents
(leftmost)	1	01 or 43 (Device type)
	2	00 or pp, where pp = PCU address for paper tape reader
	3	0x, where x = logical tape assignment of card-image tape
	4	51 if RWC1 (normal) 52 if RWC2 53 if RWC3

NOTE: Punctuation must be retained in these fields.

9. Depress the RUN button on the control panel.

10. At End-of-Job, a halt will occur with 17002 contained in the B-address register.

For any error halts that may occur during assembly, display the B-address register and refer to the halt codes in Table 1 to determine the corrective action.

NOTE: In Table 1, "cu" represents the control address of the peripheral device involved.

Table 1. Error Halts Identified by B-Address Register

B-Address* Register	Cause	Operator Action
0cu1x	Read error on tape x	Depress RUN to re-enter read correction routine (four more attempts to read will occur). If the read error is uncorrectable, either return to start of "Bootstrap and Run" (step 1) or execute the restart program (see page 5).
0cu2x	Write error on tape x	Depress RUN to retry write (four more attempts to write will occur). If attempts to write prove unsuccessful, change tape and return to start of "Bootstrap and Run" (step 1).
0cu3x	Physical end of tape x has been sensed	Reduce the amount of input, and return to the start of "Bootstrap and Run" (step 1).
0cu6x	The Assembly system has written an illegal record on tape x	Begin again from start of "Bootstrap and Run" (step 1).
0cu7x	Print image records will be written on tape x starting at the beginning of tape	If the tape on drive x is to be saved, replace it with a work tape and press RUN.
0cu10	Parity error on paper tape	Press RUN to ignore error.
0cu11	Hole-count error	Correct card, place it in the proper position in the card reader, and press RUN.
0cu12	Illegal punch error	Correct card, place it in the proper position in the card reader, and press RUN.
04007	Incorrect input symbolic program tape is mounted, or the revision number in columns 31-35 of the System Header card is incorrect.	Mount the correct input symbolic program tape and return to start of "Bootstrap and Run" (step 1).

Table 1 (cont). Error Halts Identified by B-Address Register

B-Address* Register	Cause	Operator Action
04010	System Header card was not found	Place System Header card in its proper position in the deck. Return to the start of "Bootstrap and Run" (step 1).
04014	No input or output symbolic program tape is specified on the Equipment Configuration card.	Correct the card; place it in the proper position in the card reader, and return to the start of the "Bootstrap and Run" (step 1).
04017	The tape mounted as the program tape is not correct according to the tape label.	Mount the correct program tape. Depress RUN.
04024	Work tape is not mounted.	Mount work tape. Make corrections to Equipment Configuration card. Return to start of "Bootstrap and Run" (step 1).
04034	One of the following conditions has occurred: 1. The last card read is not a Program Header card or End-of-File card. 2. The last card read is a blank card. 3. No name is specified in columns 21-26 of the Program Header card. 4. No action directive is specified in columns 1-3 of the Program Header card. 5. A CPY action directive does not contain a program name in columns 28-33.	Correct card and return to the card reader. Depress RUN. (The card in error is the next to the last card in the output hopper.)
04044	The End-of-File has been read on the input symbolic program tape, and a Program Header card with an action directive other than INS has been read.	Depress RUN. This will cause Assembly to proceed to the normal end of job.
04054	Expected hash total does not agree with computed hash total.	Depress RUN. This will cause Assembly to continue its normal run.
02775	Illegal record has been read.	Return to "Bootstrap and Run" (step 1).

*A Loader-Monitor halt may occur during the loading or running of the Assembly program; if the error halt is not listed in Table 1, refer to the halt code table for the Loader-Monitor program.

READ ERROR RESTART PROGRAM (AABRST)

Should an uncorrectable magnetic tape read error occur when using the Easycoder

Assembly C System, the Restart Program (AABRST) may be employed. Use of this program enables the operator to either (1) restart the system at its present job or (2) terminate the system prematurely.

1. When restarting the program at the current job, the following functions are performed:

   a. All relevant tapes are repositioned to the beginning of the program being assembled or copied.

   b. The Restart Program halts after repositioning the tapes so that any manual operations may be performed (such as positioning of the card-image file).

      NOTE: When a print-image tape (rather than the on-line assembly and directory listings) is being generated, it is necessary to change the reel so that the information already written is preserved. When such a reel change is necessary, the Assembly Program halts with 0cu7t contained in the B-address register.

   c. Processing of the current program is resumed after repositioning is performed.

2. When terminating the system prematurely, the following functions are performed:

   a. The assembly program proceeds to the normal end-of-job without allowing the program in which the read error occurred to be copied on the output SPT, and an indication of this deletion is stated on the directory listing.

   b. The output SPT will contain all of the updated programs positioned before the program in which the read error occurred and all the non-updated programs positioned after the program in which the read error occurred.

   c. The output BRT contains all assembled and selected programs positioned before the program in which the read error occurred.

Operating Procedures for Restart Program

1. Ascertain that an uncorrectable read error has occurred. (If the B-address register contains 0cult, a read error exists.)

2. Depress the RUN button several times. (Each time this button is depressed four additional attempts are made to read the tape in error.)

3. If an attempt to restart the system is to be made, perform the operations listed in this step. If, however, it is desired to terminate the system prematurely, omit step 3 and proceed to step 4.

   a. Enter octal 136 into the I-address register. (This action causes the Restart Program to be loaded into memory by the execution of the Loader-Monitor fixed start 2.)

   b. Depress the RUN button. (The relevant tapes are now positioned to the start of the program being assembled or copied.)

   c. If a halt occurs, display the contents of the B-address register. If the halt number appears in Table 2, below, perform the specified actions.

NOTE: If manual repositioning of the card-image input file is necessary, the A-address register indicates the director at which the input medium should be repositioned.

d. Depress the RUN button. With all files repositioned, processing of the current program resumes.

4. If the system is to be terminated prior to its normal completion, perform the following operations.

a. Enter octal 132 into the I-address register. (This action causes the Restart Program to be loaded into memory by the execution of the PLUS fixed start 1.)

b. Depress the RUN button. (The functions performed are described on page 6.)

Table 2. Restart Halts

Halt No.	B Address	A Address	Significance	Operator Action
1	05034	dirloc	Card-image input file (located on either cards or paper tape) must be repositioned.	Reposition the card-image input file to the indicated director and depress the RUN button. (The action directive specified on the director card must be entered in locations dirloc through dirloc + 2; the program name must be entered in locations dirloc + 3 through dirloc + 8.
2	05035		Restart cannot be attempted as the Assembly Program has not been initialized.	Return to the start of "Bootstrap and Run," page 3; restart not possible.
3	05036		End file reached while searching for director at which card input file is to be repositioned.	Reposition card-image input file correctly and depress the RUN button. (See halt #1 above.)

OPERATING PROCEDURES FOR MEMORY DUMP C ROUTINE

The Memory Dump C (AAAMEM) routine edits and prints the contents of core memory (both data and punctuation bits) within limits specified at the time of execution. Normally, Memory Dump is stored on a binary run tape (BRT) from which it is called and loaded using the Tape Loader-Monitor C program. The Memory Dump C routine may be called by program instructions in the current program for dynamic and/or terminal dumping, or it may be called by the operator for a conventional static (terminal) memory dump.

The procedures for operating the Memory Dump C routine are dependent on the type of call. If a programmed call (dynamic operation) is used, the dump is accomplished completely under program control. However, if an operator (console) call is used, operator action is required to accomplish the dump. Both methods of operation assume that the Tape Loader-Monitor C program has been stored in memory and is used to load the Memory Dump C routine from a binary run tape (BRT).

There are no programmed halts for dynamic operation of the Memory Dump routine; however, for an operator call, there is one coded halt that is identified by displaying the B-address register for an indication of 07001, indicating that the Memory Dump routine has been loaded into memory and is ready to accept the required parameter values into its communication area.

It is assumed that a card reader is available to enter the parameter values for program name, segment name, and tape drive number; however, these parameters may be entered manually by first entering octal 01 into octal location 100. The operator call (i.e., card or control panel entry of parameters) requires that the Tape Loader-Monitor C program be residing in memory. Both methods of entry are described below.

For a detailed description of the Memory Dump C routine, refer to the Honeywell Information Bulletin PLUS – Memory and Tape Dump Routines, DSI-341.

CALLING AND LOADING MEMORY DUMP C

Using a Console Call Card

1. Ascertain that the Console Call card is punched with the required parameter values for program name (AAAMEM), segment name (S1), and tape drive number (see Figure 1).
2. Obtain halt number 3 of the Loader-Monitor program.
3. Enter the required value for the "relocation augment" parameter into octal locations 153 to 155.[1] (This parameter field must contain the address of the leftmost location of the area into which Memory Dump C is to be loaded.)

[1] Do not disturb the punctuation in these fields.

4. Enter any other values not provided by the Console Call card into their appropriate fields. [1]
5. Place the Console Call card (followed by two blank cards if a 227 card reader is used) in the card reader input hopper and cycle-up the card reader.
6. Depress the RUN button on the control panel.
7. The machine will halt with octal 07001 contained in the B-address register to indicate that the Memory Dump routine has been loaded and is ready to accept the entry of the appropriate parameter values into the Memory Dump communication area.
8. Enter into the "from" parameter field the three-character address of the lowest memory location to be dumped. [1] (The address of the first location in the "from" parameter field is equal to the octal value of the appropriate "relocation augment" as entered in step 2 above. Refer to Table 1 for the relative addresses of the Memory Dump parameter fields.)
9. Enter into the "to" parameter field the three-character address of the highest memory location to be dumped (see Table 1). [1]
10. Depress the RUN button on the control panel to execute the memory dump of the specified area. The machine will then halt (at halt number 3) with 17002 contained in the B-address register to indicate that the dump has been performed.

Entering Parameter Values Manually

1. Obtain halt number 3 of the Loader-Monitor program.
2. Designate manual entry by entering octal 01 into octal location 100.
3. Enter the program name (AAAMEM) of the loading unit to be called into octal locations 104 through 111. [2]
4. Enter the two characters of the segment name (S1) of the first segment of the loading unit to be called into octal locations 112-113.
5. Enter the number of the tape drive containing the loading unit to be called into 1148.
6. Enter the required value for the "relocation augment" parameter into octal locations 153-155. (This parameter field must contain the address of the leftmost location of the area into which the Memory Dump is to be loaded.)
7. Enter any other parameter values requested for the run.
8. Depress the RUN button.
9. The machine will halt with 07001 contained in the B-address register to indicate that the Memory Dump has been loaded and is ready to accept the entry of the appropriate parameter values into the Memory Dump communication area.
10. Enter into the "from" parameter field the three-character address of the lowest memory location to be dumped. (The address of the first location in the "from" field is equal to the octal value of the appropriate "relocation augment" as entered in step 6 above. Refer to Table 1 for the relative addresses of the Memory Dump parameter fields.)

[1] Do not disturb the punctuation in these fields.

[2] Do not disturb word marks in these fields.

11. Enter into the "to" parameter field the three-character address of the highest memory location to be dumped (see Table 1).

12. Depress the RUN button to execute the memory dump of the specified area. The machine will halt (at halt number 3) with 17002 contained in the B-address register to indicate that the dump has been performed.

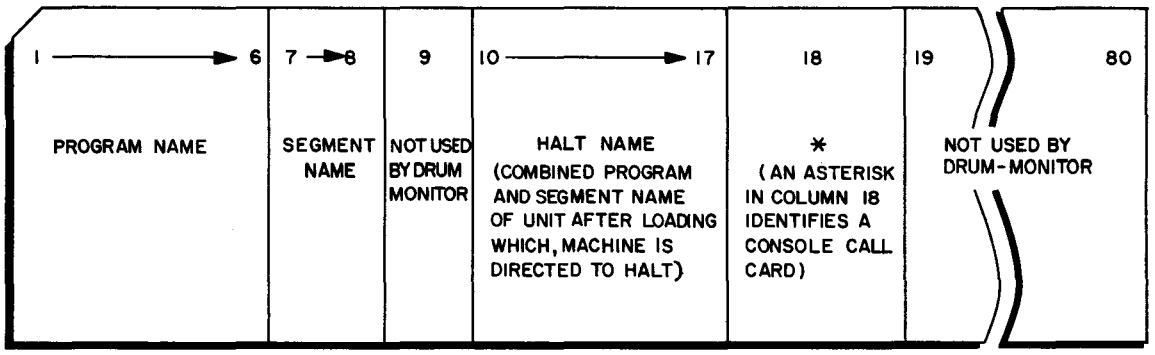


Figure 1. Console Call Card

Table 1. Sequential Layout of the Memory Dump C Communication Area

Sequential Character Positions	Parameter	Location[1]		Initial Value[2]		Function
		Decimal	Octal	Decimal	Octal	
1-3	From	0-2	0-2	0	0	Address of the first memory location to be dumped.
4-6	To	3-5	3-5	8,191	17,777	Address of the last character to be dumped.
7-9	Return	6-8	6-10	86[3]	126	Address to which the Memory Dump routine branches after executing a memory dump.
10	-	9	11	-	-	Memory Dump entrance for a program call from the program currently being executed (location to which calling program must branch to execute a memory dump).

NOTES

1. These locations are relative. For example, when the relocation augment is 5,000 (decimal), the "from" parameter occupies locations 5,000 to 5,002 (11,610 to 11,612 octal).

2. Initial value refers to the contents of the designated parameter field within the Memory Dump communication area as established when the routine is initially brought (loaded) into memory.

3. The initial value of the "return" parameter (86_{10}) is the address of the "fixed start 0" field in the communication area of the PLUS Tape Loader-Monitor program. Branching to location 86_{10} transfers control to the Loader-Monitor and results in halt number 3.

OPERATING PROCEDURES FOR LIBRARY PROCESSOR C

Library Processor C is used prior to Easycoder C Assembly of a source program. The Processor program inserts macro routines which exist on the symbolic program tape (SPT) into source programs in response to macro instructions (calls) within the source program, and it specializes each routine to perform the specific functions desired. Library Processor C has the same relationship with Easycoder C Assembly that the program Macro has with Easycoder A or B Assembly. The same terms are used in the description of both programs.

For a detailed description of the Library Processor C functions, refer to DSI-326.

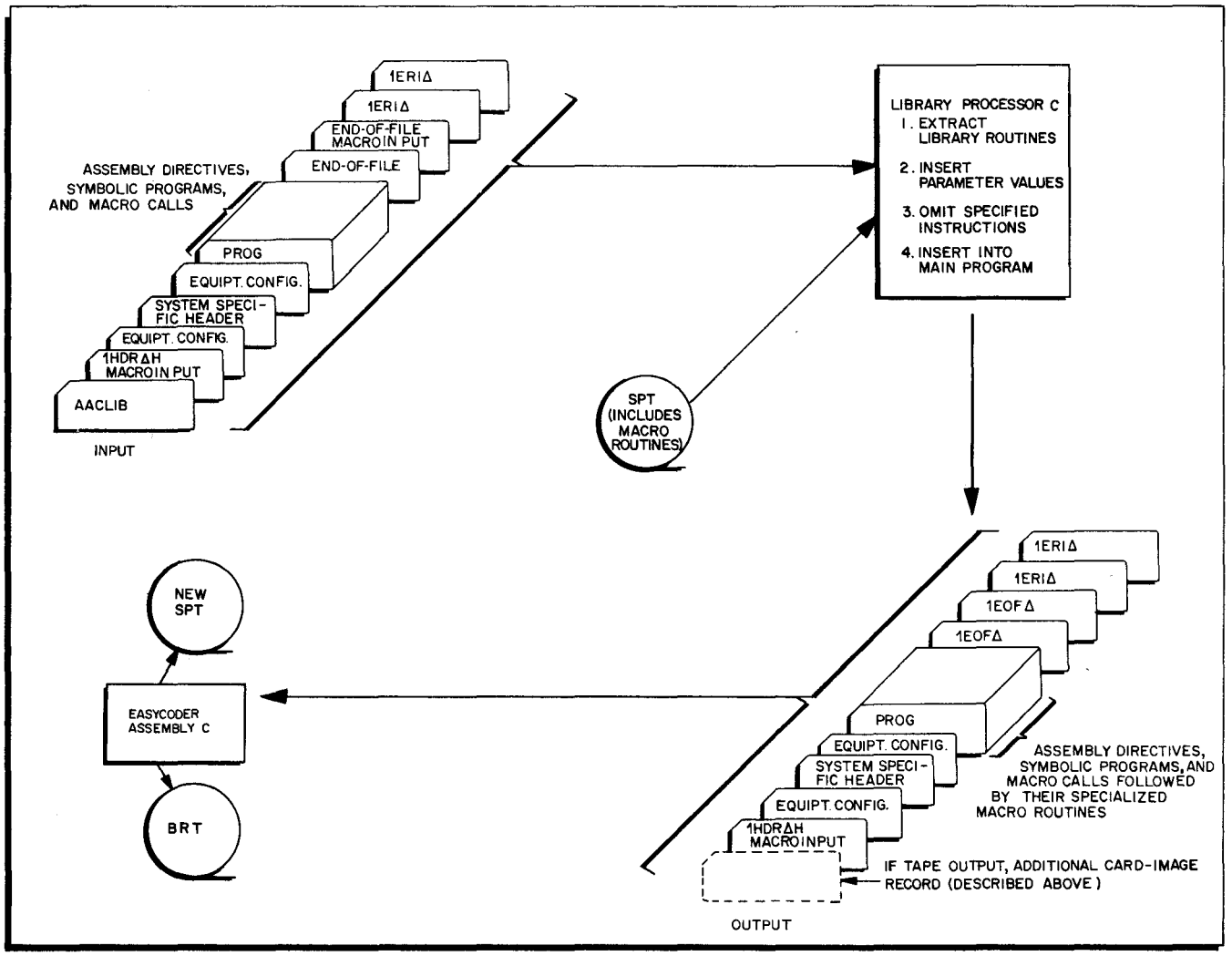


Figure 1. Library Processor Specialization of and Easycoder C Assembly of a Source Program Using Macro Routines

OPERATING PROCEDURES

The Library Processor C has a loading unit name of AACLIB01 and is loaded by the loader-monitor program. The input and output files for the processor run are set up as specified on the first equipment configuration card in the Processor input deck.

The operator should perform the necessary operating procedures for loading the loader-monitor program, whether from cards or tape. Once the loader-monitor program is loaded, a halt will occur with 17002 contained in the B-address register. The operator should then perform the following steps:

1. Enter the console call information into the appropriate fields of the loader-monitor communication area. If a Console Call card is used, place it in the card reader input hopper and cycle-up the card reader.
2. Depress the RUN button on the console. (A Processor halt will occur with 07001 contained in the B-address register.)

   NOTE: If the input is to be read over read/write channel 1 (51_8) from a card reader addressed as 41_8, proceed to step 4; if not, proceed to step 3.
3. Display the contents of the A-address register. The address contained therein is the address of the first (leftmost) location of a four-character field which contains information concerning input media. Enter into that location the appropriate input information given in the table below. Depress the DISPLAY + 1 button to display the address for the location of the next character of the field and enter the appropriate information, etc., until the field is specified.

Location Addressed in A-address register	Location + 1	Location + 2	Location + 3
Input Device	Control Unit Address	Tape Drive Number	Read/Write Channel
41_8 (card reader)	41_8	0	As desired for the specific application
01_8 (magnetic tape)	40_8	0-7	
43_8 (paper tape)	41_8	0	

   NOTE: Do not disturb punctuation in these fields.
4. Depress the RUN button on the console. (Unless an error condition causes a halt, the program will complete processing and halt with 17002 contained in the B-address register.)

All halt conditions are coded for display in the B-address register. The error halts and corrective actions are listed in Table 1.

Table 1. Error Halts and Corrective Actions

B-Address Register	Condition	Action
04003	Equipment configuration card is missing	Correct input and restart run.
04010	Macro routines not found	Mount correct input (card input or SPT) and restart run.
0cu10	Parity error; paper tape (if parity checking has been requested by reassembling AACLIB)	Press RUN to ignore error.
0cu11	Card read (hole-count) error	Reposition cards in the reader, and depress the RUN button.
0cu12	Card read (illegal-punch) error	Correct error card, reposition cards in the reader, and depress the RUN button.
0cu21	Card punch error	Error card has been rejected. Depress the RUN button to eject the following card and repunch both cards. Discard ejected cards.
0cu1t	Uncorrectable tape read error	Record has been reread four times without success. Depress the RUN button to re-enter a correction routine; if necessary, perform other corrective measures such as cleaning the tape and restarting, repeating the run which created the tape, etc.
0cu2t	Uncorrectable tape write error	Record has been rewritten four times without success. Depress the RUN button to re-enter a correction routine to write again.

Note: cu = control unit number with the high order bit = 0.
t = tape drive number.

OPERATING PROCEDURES FOR TAPE DUMP C ROUTINE

The Tape Dump C routine is a Series 200 utility routine that is stored on a binary run tape (BRT), from which it is called and loaded into memory using the Tape Loader-Monitor C program. The Tape Dump C routine is used to position magnetic tape files mounted on half-inch (Model 204B) tape drives and to edit and print their contents.

The Tape Dump C routine operates in either the "dynamic" or the "independent" mode. The dynamic mode requires instructions in the user's object program to enter parameter values into the Tape Dump communication area. The independent mode requires either card entry or manual entry of parameter values into the communication area.

The procedures involved in operating the Tape Dump C routine depend on the desired mode of operation. The dynamic mode is accomplished completely under control of the calling object program (unless error conditions are encountered). However, operator action is required for independent operation by employing either manual or card entry of parameter values into the Tape Dump communication area. Both dynamic and independent operation of the Tape Dump routine assume that the Tape Loader-Monitor C program is residing in memory and is available to load the Tape Dump routine from a binary run tape. Refer to the Honeywell Information Bulletin PLUS - Tape Loader-Monitor, DSI-327 for the applicable Loader-Monitor operating procedures. Both methods of independent operation (i.e., card or manual entry) are described below.

Card Entry of Parameter Values

In the independent mode when it is desired to use cards for entering parameter values into the communication area of the Tape Dump routine, the operator must first load the Tape Dump routine using the Tape Loader-Monitor C (see DSI-327). The following procedures assume that the Tape Dump routine has been stored in memory in its normal location (as evidenced by Loader-Monitor halt number three) using the Tape Loader-Monitor.

To operate the Tape Dump C routine using card entry of parameter values, perform the following steps:

1. If the cards listed below have not already been punched, the operator must punch the requested information in the appropriate card columns. The cards must be placed in the card reader in the order given below.
   a. Console Call card (program name AAATAP; segment name 01)

b. Parameter card(s) (see Figure 1 & 2)

c. End card (see Figure 3)

d. Two blank cards if a 227 card reader is used

2. Cycle-up the card reader.

3. Depress the RUN button on the control panel. (The Loader-Monitor will load and start Tape Dump execution; when the END card is read, an end-of-run halt occurs, Loader-Monitor halt number 3.)

Manual Entry of Parameter Values

For manual entry of parameter values, the operator must enter (through the operator's control panel or console) the octal value 01 into octal location 10,000 at the Loader-Monitor segment halt and then depress the RUN button to cause the Tape Dump routine to continue processing until halt number 1 is encountered. At halt number 1, the operator manually enters the required parameter values into the Tape Dump communication area (see Table 2). When the parameter values have been entered, the operator again depresses the RUN button to cause the specified function to be executed. Upon completion of the specified function, the machine stops at halt number 1, thus allowing the operator merely to enter the required parameter values and depress the RUN button to execute each subsequent function. Any number of functions can be performed in succession without reloading the Tape Dump routine.

To operate the Tape Dump routine using manual entry of parameter values, perform the following steps:

1. Prepare a Console Call card with a halt name "AAATAP01" in columns 10-17. (Program name AAATAP; segment name 01.)

2. Place the Console Call card in the card reader input hopper. (If a 227 card reader is used, follow the Console Call card with two blank cards.)

3. Cycle-up the card reader.

4. Depress the RUN button on the control panel. (The Loader-Monitor will load and start execution of the Tape Dump; when segment 01 has been executed, a Loader-Monitor halt will occur with 14000 contained in the B-address register.)

5. Enter 01 (octal) into location 10,000 (octal) and press RUN. (A halt will occur; see halt #1 in Table 1.)

6. Enter the requested parameter values into their appropriate fields (see Table 2). Do not disturb word marks.

7. Press RUN. (Halt #1 will occur, and the operator must enter the parameter for the next function, if any, and press RUN.)

NOTE: If it is desired to execute another Console Call after the last Tape Dump function has been executed, the operator must obtain halt number 3 of the Loader-Monitor before issuing the call.

Table 1. Coded Halts for Tape Dump Routine

Halt No.	Applicable Mode[1]	Cause	A Address	B Address	Operator Action
1	I_m	Operator halt number 1 (Normal)	00001	07001	Perform operating procedures for "Manual Entry of Parameter Values" beginning with step 5 & 6.
2	I_c	Hole-count error	0XXXX[2]	00040	To ignore parameter entry card last read, proceed to step 4 below; otherwise, begin with step 1. 1. Run out cards. 2. Check ejected card and correct or replace as necessary. 3. Reorganize cards placing ejected card (or its replacement) first in card reader input hopper. 4. Depress START on card reader. 5. Depress RUN.
3	D, I_c, I_m	Invalid tape request	0XXXX[2]	04001	Check parameter field 3 for illegal tape address (not 0-7). Correct the error via the operator's control panel; then depress RUN.
4	D, I_c, I_m	Invalid function request	0XXXX[2]	04003	Check parameter field 2 for illegal function request (not F, B, R, or E). Correct error via the operator's control panel; then depress RUN.
5	D, I_c, I_m	Number of records not consistent with function request	0XXXX[2]	04004	Check parameter field 4 for incorrect "number of records" entry (i.e., a value of 0 for other than a rewind request, or a value not 00001-99,999 for F, B, and E requests). Correct error via the operator's control panel; then depress RUN button on operator's control panel.

NOTES

1. The "Applicable Mode" column indicates the mode(s) of operation for which each coded halts applies. "D" designates dynamic mode of operation. "I_c" designates the independent mode of operation using card entry of parameter values, and "I_m" designates the independent mode of operation using manual entry of parameter values.
2. When using card entry of parameter values, the card number (if punched) of the pertinent parameter entry card is identified by displaying the A address register.

Table 2. Sequential Layout of Tape Dump Communication Area

Field	Parameter	Location		Values	Initial Value[2]	Function
		Decimal	Octal			
0	Method of parameter entry[1]	4,096	10,000	00: parameter entry card 01: manual entry via operator's control panel (or console)	00	Used only in independent mode to designate either card entry or manual entry of parameter values.
1	Card number	4,097-4,098	10,001-10,002	-	-	Identifies parameter entry card (optional).
2	Function code	4,099	10,003	-	-	Designates one of the four function parameters: F, B, R, or E.[4]
3	Tape address	4,100	10,004	-	-	Designates logical address of tape to be positioned or dumped.
4	No. of records	4,101-4,105	10,005-10,011	-	-	Designates the number of records involved in the specified function.
5	Printer output mode	4,116[3]	10,024	-	-	Designates the printed format: an A causes an alphabetic listing, any other entry including a blank (octal 15) causes an octal listing.

NOTES

1. The contents of each of the locations in fields 2 through 5 must be explicitly specified, and field 0 must specify the appropriate "method of parameter entry" unless operating in the dynamic mode. The use of field 1 to identify individual parameter cards is optional.
2. Initial value refers to the contents of the designated parameter field within the Tape Dump communication area as established when the routine is initially loaded into memory.
3. Locations 4,106-4,115 (decimal) are not used by the Tape Dump routine.
4. F = Move Tape forward

   B = Backspace

   R = Rewind

   E = Edit

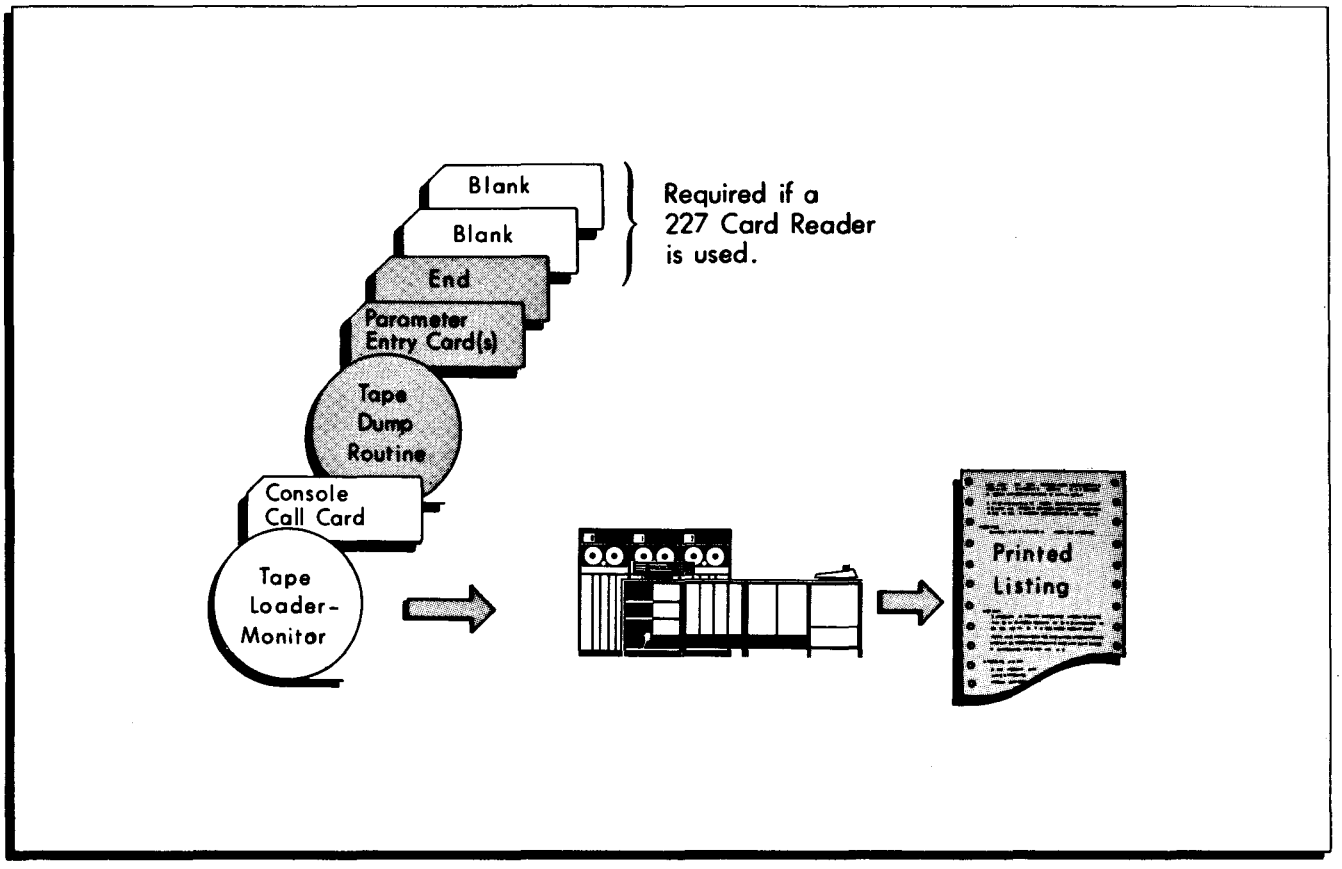


Figure 1. Simplified Representation of Tape Dumping Using Card Parameter Entry

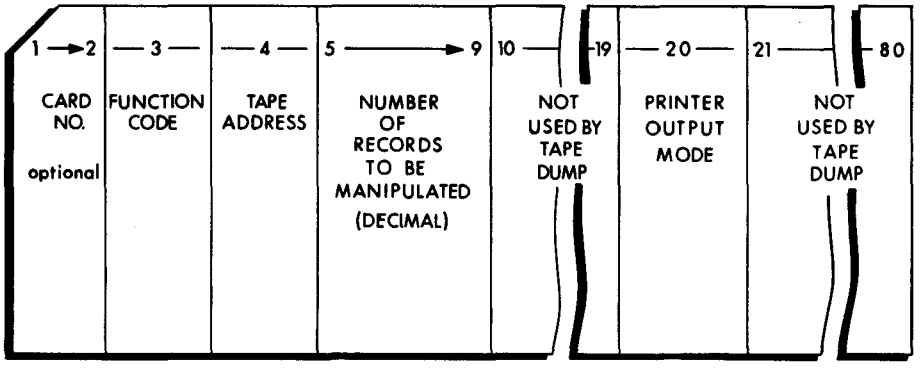


Figure 2. Tape Dump Parameter Entry Card

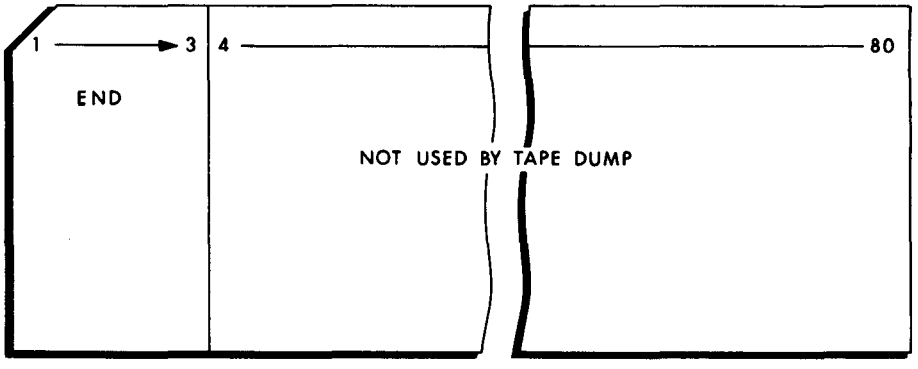


Figure 3. Last Card of Tape Dump Parameter Entry Card Deck

OPERATING PROCEDURES FOR UPDATE AND SELECT C AND D

The Update and Select C and D programs, designed for use on larger Honeywell 200 systems, serve two purposes. They maintain a master file of binary executable programs (updating), and they enable programs to be selected from the master file and placed on a run tape (selection). Updating and selecting can be accomplished separately. The programmer may choose, however, to accomplish both operations in a single run, in which case the director deck will contain the cards required for both operations. For a detailed description of Update and Select, refer to the Honeywell Information Bulletin Update and Select C and D, File No. 122.3305.001C.00.00.

SENSE switches are not used by Update and Select; they should, therefore, remain OFF. The procedures for operating Update and Select follow:

1. Initialize the central processor and activate the peripheral device to be used.
2. Mount the tape containing the Tape Loader-Monitor C on logical drive 0.
3. Mount any other tapes requested for the particular run and assign their logical addresses as specified on the Equipment Configuration card.

   NOTE: If card-image and/or print-image tapes are to be used, mount and assign their logical addresses at this time.
4. Place the requested card deck configuration in the card reader input hopper (refer to Figure 1) and cycle-up the card reader.
5. Depress the following buttons on the control panel:
   a. CONTENTS buttons to designate the tape control, usually 40 (octal).
   b. BOOTSTRAP. (This causes the program tape label to be read.)
   c. Repeat steps a and b. (This causes the first tape bootstrap record to read.)
   d. RUN. (A Loader-Monitor halt will occur with 17001 contained in the B-address register.)
   e. RUN. (Another Loader-Monitor halt will occur with 17002 contained in the B-address register. This halt indicates that the Loader-Monitor is in memory and is awaiting a console call for program name AAAUPS and segment name S1.)
   f. RUN. (Pressing RUN causes the Console Call card to be read in from the card reader, thereby causing the Update and Select program to be loaded and started.)

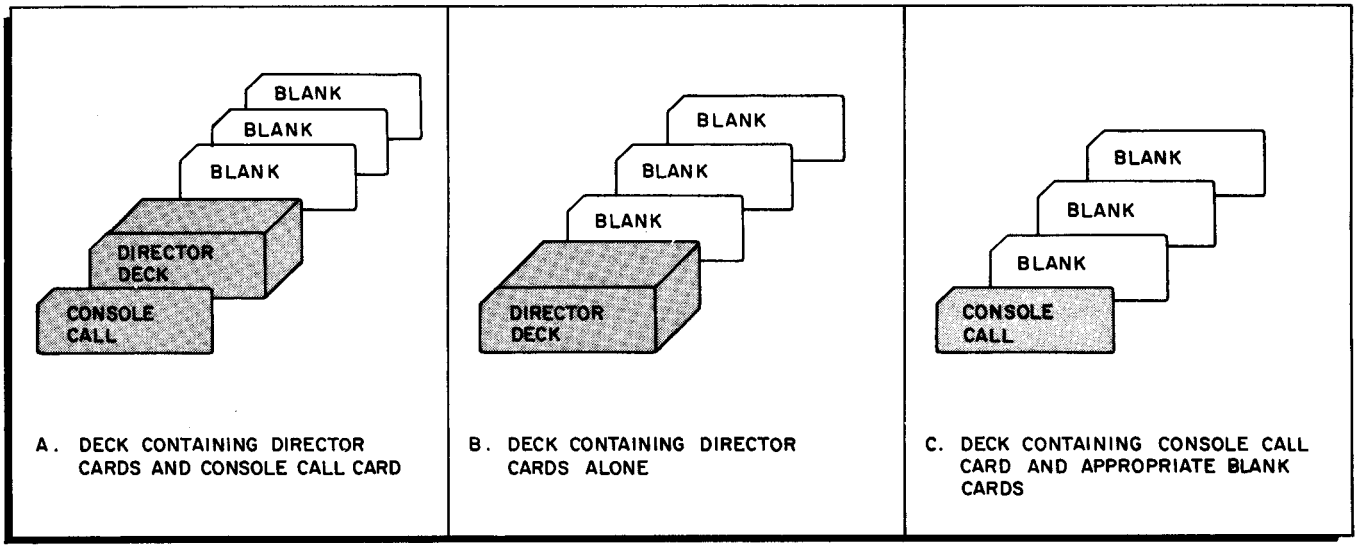


Figure 1. Organization of Various Update and Select Program Decks

Programmed Halts

The various programmed halts in Update and Select (classified as "normal" halts and "error" halts) are located at points in the program where possible operator action may be required. These halts (see Tables 1 and 2) are identified by displaying the contents of the B-address register.

Table 1. Normal Halts Identified by B-Address Register

B Address	Significance	Operator Action
07001	Request for entering card-image input medium and the read/write channel assignment.	If the director deck is to be read on-line using RWC1, and the card reader control number is 1, no operator action is required. Any deviation from the above necessitates that information be entered from the control panel. The contents of the A-address register should be displayed, specifying the leftmost character position of a four-character field. Into this and subsequent character positions, from left to right, enter the following information (without disturbing punctuation): First Position: (Device type); 01 for off-line input. 41 for on-line input. Second Position: (Peripheral control number and I/O bit); enter 1nnnnn (where nnnnn is the peripheral control number) exactly as it would appear

Table 1 (cont). Normal Halts Identified by B-Address Register

B Address	Significance	Operator Action
07001 (cont)		Second Position: (cont) as the second control character in a PDT instruction. Third Position: Device number as it appears in the third control character of a PDT instruction. If the device number is irrelevant, this character is 0. Fourth Position: (Read/Write channel assignment); 51 if RWC1 (normal) 52 if RWC2 53 if RWC3
04006	One of the input tapes is specified as the same logical device from which Update and Select was loaded.	Demount loading tape and replace with updating tape if loading tape and updating tape are different physical reels. Otherwise, depress RUN.

Table 2. Error Halts Identified by B-Address Register

B Address	Significance	Operator Action
07002	Leftmost character of the card-image input medium (device type) as entered by the operator is illegal.	Reload program and correct error.
04003	The program has not detected an Equipment Configuration card following the System Specific Header card.	Insert the Equipment Configuration card and reload program.
04004	An illegal file media field has been detected on the Equipment Configuration card.	Correct card and reload program.
04005	The listing device (as punched on the Equipment Configuration card) has been found to be illegal.	Correct card and reload program.
04007	An inequality has been found on comparing the binary run tape revision number on the major input tape with the binary run tape number specified in columns 31-35 of the System Specific Header card.	There are two possible actions to take: 1. Mount the correct tape and depress RUN. 2. Correct the System Specific Header card and reload the program.
04010	The card input file has not been found, for one of the following reasons: 1. The wrong medium is being searched for the appropriate director deck.	The correct medium must be specified, or the System Specific Header card must be corrected and returned to the director deck. Reload the program.

Table 2 (cont). Error Halts Identified by B-Address Register

B Address	Significance	Operator Action
04010 (cont)	2. The System Specific Header card has an incorrect file name.	
04011	The Update and Select C and D Program has attempted to write a record larger than 250 characters. (This condition invariably results from the presence of a transaction binary tape in the configuration with one or more of its program records in error.)	The run cannot continue, as the transaction binary tape is unacceptable.
00u3d	Physical end of tape d has been sensed. (The Loader-Monitor system is not equipped to handle multi-reel binary run tapes; the output from this run is therefore not usable.) "u" represents the Peripheral control number.	Either the director deck must be modified, or inactive units on the major input tape must be deleted.
00u7d	The print routine (in off-line mode) has determined that printing is not being stored on the print-image tape. ("u" represents the peripheral control number; "d" represents the device number.)	The operator has two choices: 1. He can depress RUN. (This will cause the print routine to assume that information on this tape is not to be preserved and to commence writing print-image records from the beginning of the tape.) 2. If this tape is to be saved, he can replaced it with a work tape, and depress RUN.
00u1d	Uncorrectable read error on tape d. Several attempts have been made to read the record. ("u" represents the peripheral control number; "d" represents the device number.)	Depress RUN. The routine will again attempt to read the record correctly.
00u1d	Uncorrectable read error on card reader. ("u" represents the peripheral control number; "d" = 1 for hole-count error, and 2 for illegal punch.)	The operator should remove the remaining cards from the input hopper, run out the cards in the reader and correct the first card. Following this, he should refeed the cards, and depress the RUN button.
00u2d	Uncorrectable write error on tape d. Several attempts have been made to write the record. ("u" represents the peripheral control number.)	Depress RUN. The routine will erase the record and attempt again to write it correctly.

NOTES

NOTES

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TITLE: OPERATING SYSTEM - MOD 1
OPERATING PROCEDURE SUMMARIES
SOFTWARE BULLETIN

DATED: NOVEMBER 29, 1965

FILE NO: 122.0005.001C.0-069

ERRORS NOTED:

Fold

Cut Along Line

SUGGESTIONS FOR IMPROVEMENT:

Fold

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