HONEYWELL EDP

SERIES 200

UPDATE AND SELECT C AND D

GENERAL SYSTEM: SERIES 200/OPERATING SYSTEM — MOD 1

SUBJECT: Programming and Operating Procedures for the
                       Update and Select C and D Program.

SPECIAL   This software bulletin completely supersedes
INSTRUCTIONS: the Honeywell Information Bulletin entitled
                       PLUS—Update and Select, DSI-305A, and
                       dated April 30, 1965.

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PREFACE

This bulletin describes the operation of the Update and Select C and D programs, which are used to update a tape file of binary executable programs and to select programs from this file for execution. Update and Select C and D have the same general characteristics; therefore, in the narrative the term "Update and Select" refers to both programs.

The use of these programs as described herein presupposes that they are stored on a binary run tape (BRT); hence they are loaded into memory by the Tape Loader-Monitor C program, which is described in detail in the Honeywell Information Bulletin entitled PLUS—Tape Loader-Monitor, DSI-327.

The reader is assumed to be familiar with the Honeywell Series 200 Equipment Operators' Manual (Model 200), DSI-294, and the Honeywell Series 200 Programmers' Reference Manual (Models 200/1200/2200), File No. 113.0005.0000.00.00.

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GENERAL DESCRIPTION

The Update and Select C and D programs, referred to jointly as Update and Select, serve two purposes. First of all, they maintain a master file of binary executable programs ("updating"), and secondly, they enable programs to be selected from the master file and placed on a run tape ("selection").

Specifically, the Update and Select programs can perform the following operations:

1. Replace a specified unit in the master file with another specified unit.

2. Insert a designated unit into the master file.

3. Delete a specified unit from the master file.

4. Position the master file after a given unit.

5. Select a unit (or block of units) and place it on a selected run tape.

6. Back up the master file and select a designated unit (or block of units), placing the unit(s) on a selected run tape.

In addition, octal corrections may be made to specified units. In some cases, this ability eliminates the need for resubmitting these units to the appropriate Easycoder Assembly Program.

Updating the master file is accomplished by writing a new master tape, adding, deleting, or replacing units of code as specified by the director deck. Units not specifically revised are copied onto the new master tape in their proper order.

Selection consists of creating a selected run tape by copying specified units from either the new master tape or (if a new master is not present) the input tape. As with updating, selection is controlled by the director deck, which specifies the order in which coding will appear on the selected run tape.

Updating and selection 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.

EQUIPMENT REQUIREMENTS

Update and Select runs on the following equipment configuration:

Required Equipment:

1. 12,288 characters of memory for Update and Select C; 16,384 characters of memory for Update and Select D.

1-1

2.   One card reader.

3.   One printer.

4.   Two to four magnetic tape drives.

5.   Advanced Programming Instructions.

Optional Equipment:

An additional magnetic tape drive or a paper tape reader may be included for card-image input. One additional magnetic tape drive may be included for print-image output.

LOADING UNITS

The basic unit of coding manipulated by both Update and Select C and D is the "segment unit." In brief, a "segment unit" is defined as a block of program records identified by a program name and a segment name.   Update and Select D has been implemented with the added option of manipulating either "segment units" or "program units," where a "program unit" is defined as a block of program records identified by a program name only.   In the ensuing narrative, the unqualified term "unit" refers to both segment and program units.

> NOTE: Update and Select deals with units in their machine-language form. This should not be confused with the symbolic updating and selection process performed by the Easycoder Assembler C and D.

SECTION II
UPDATE AND SELECT OPERATIONS

As previously stated, updating the master file is one function of the dual-purpose Update and Select programs. With this operation, a number of actions can be performed on the machine-language master file: Corrections can be made to specified segment units, new units can be added, and unwanted units may be deleted or replaced. The Select operation enables specified units to be drawn from the master file and placed on a selected run tape.

Four program files are employable with Update and Select. These files are indistinguishable in format, however, as they all have the binary run tape format (described in the Tape Loader-Monitor bulletin). All four tape files bear the file name BINARY△RUN in characters 21 - 30 of the header labels. Thus the distinction between the four files is purely a functional one.

UPDATE AND SELECT CONFIGURATIONS

Six possible configurations may be employed with the Update and Select programs.[1] One of these, configuration A, employs the full complement of tapes (i. e. , the old master tape, transaction binary tape, new master tape, and selected run tape). Configurations B through F employ fewer than the full complement of tapes, however, and are consequently restricted in the operations that they can perform.

Figures 2-1 through 2-6 illustrate the six possible Update and Select configurations. Within each configuration, card-image input may optionally come from magnetic tape or paper tape. Likewise, print-image output may optionally go onto magnetic tape. Each device within each configuration is explained in detail following the illustration.

> NOTE: The "applicable action directors" listed for each configuration are explained in detail in Section III.

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[1] A "configuration" is defined as a set of input/output program files present during a given run.
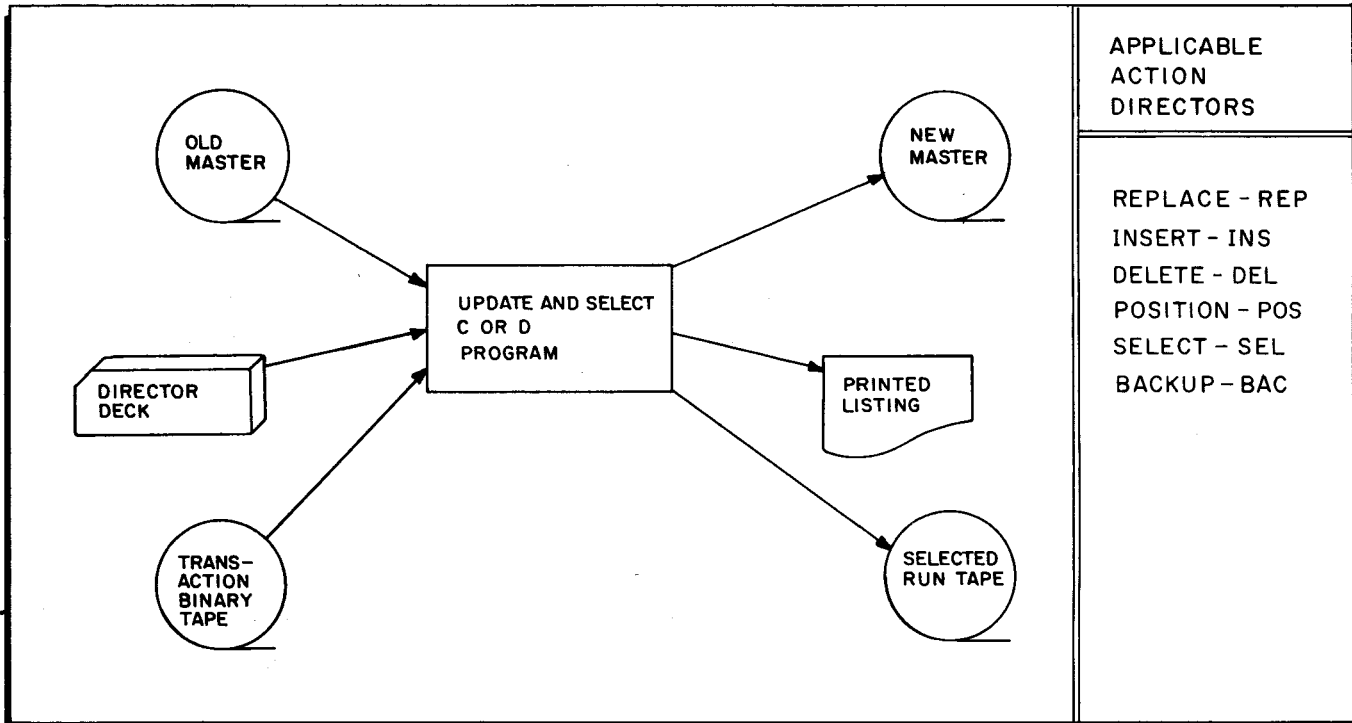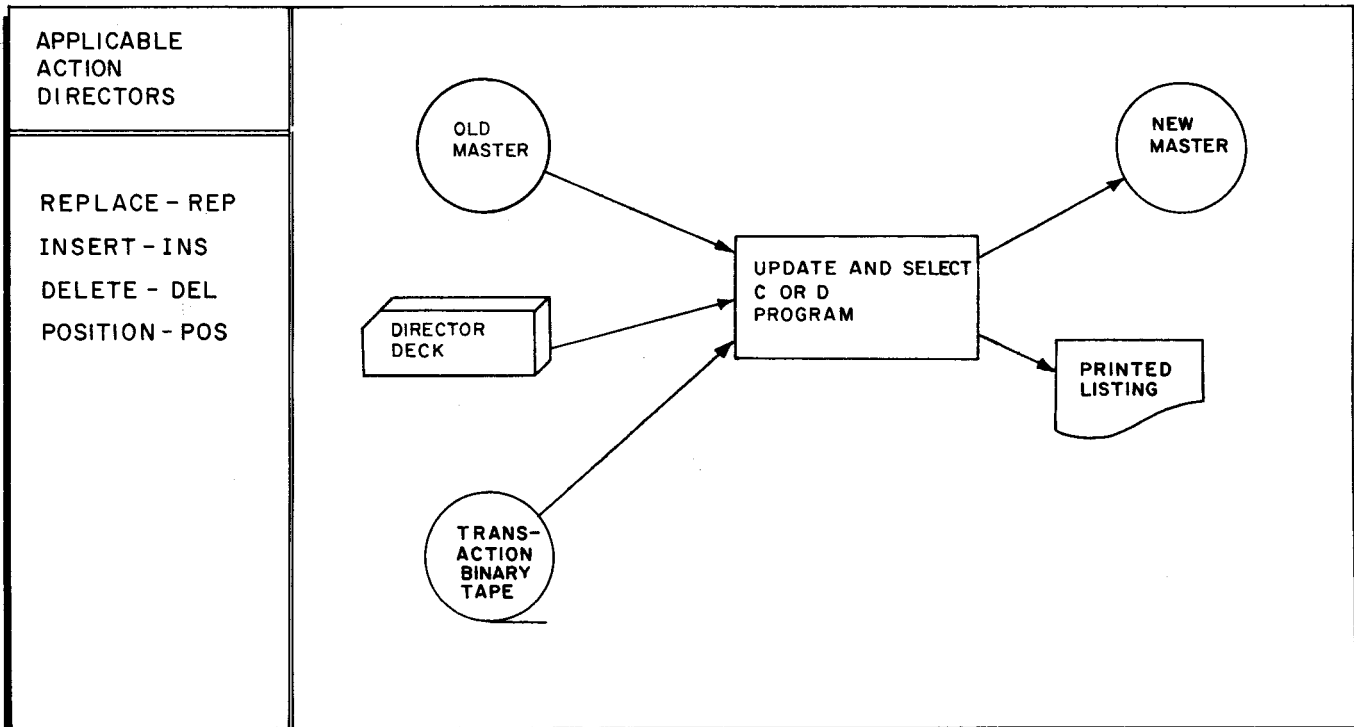
Figure 2-1.   Configuration A
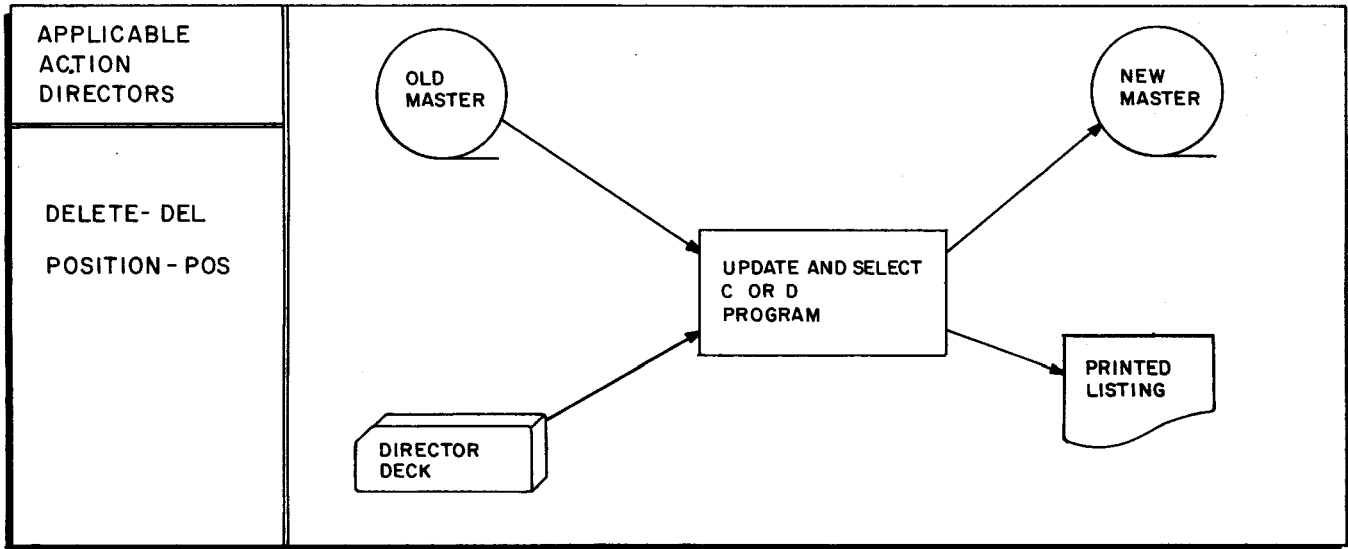

Figure 2-2.   Configuration B
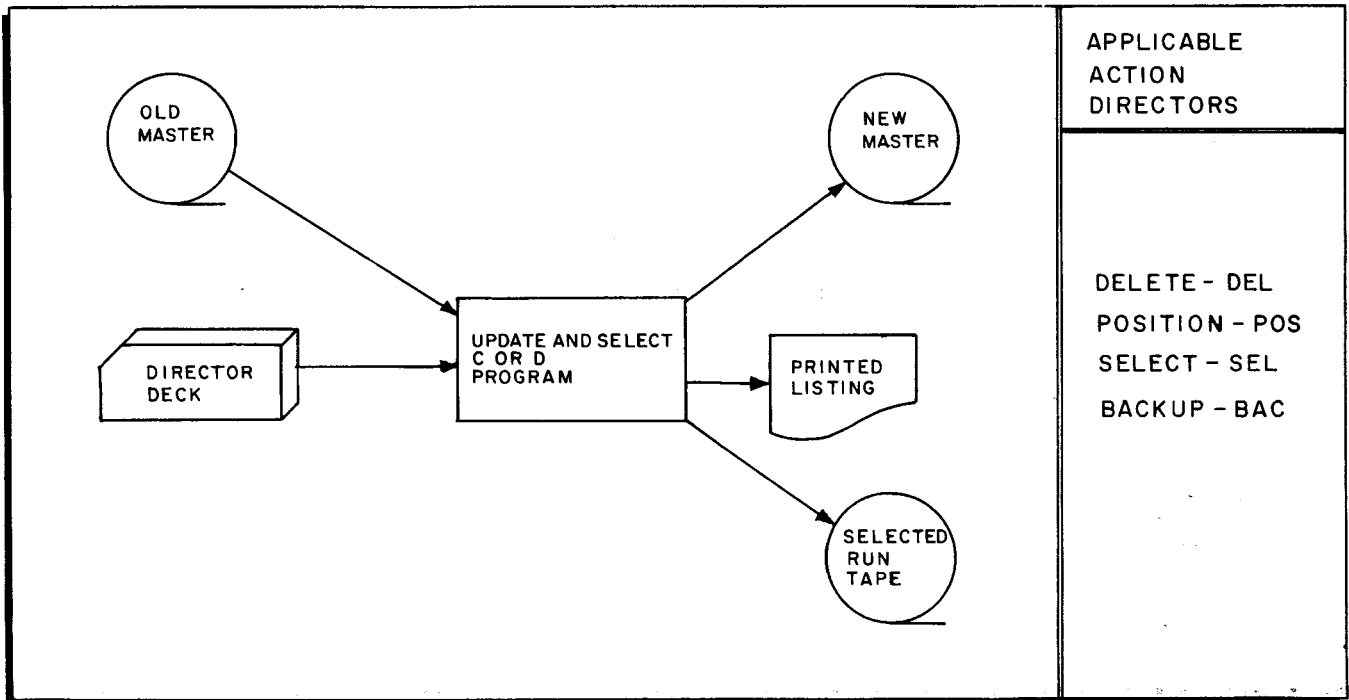
Figure 2-3.　Configuration C
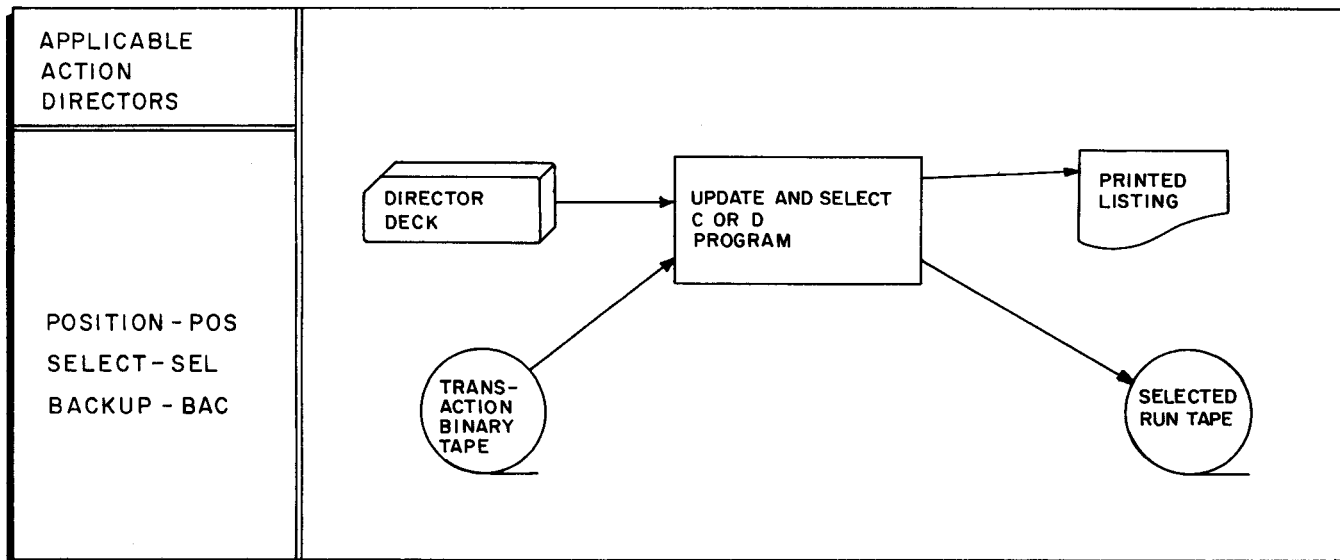

Figure 2-4.　Configuration D
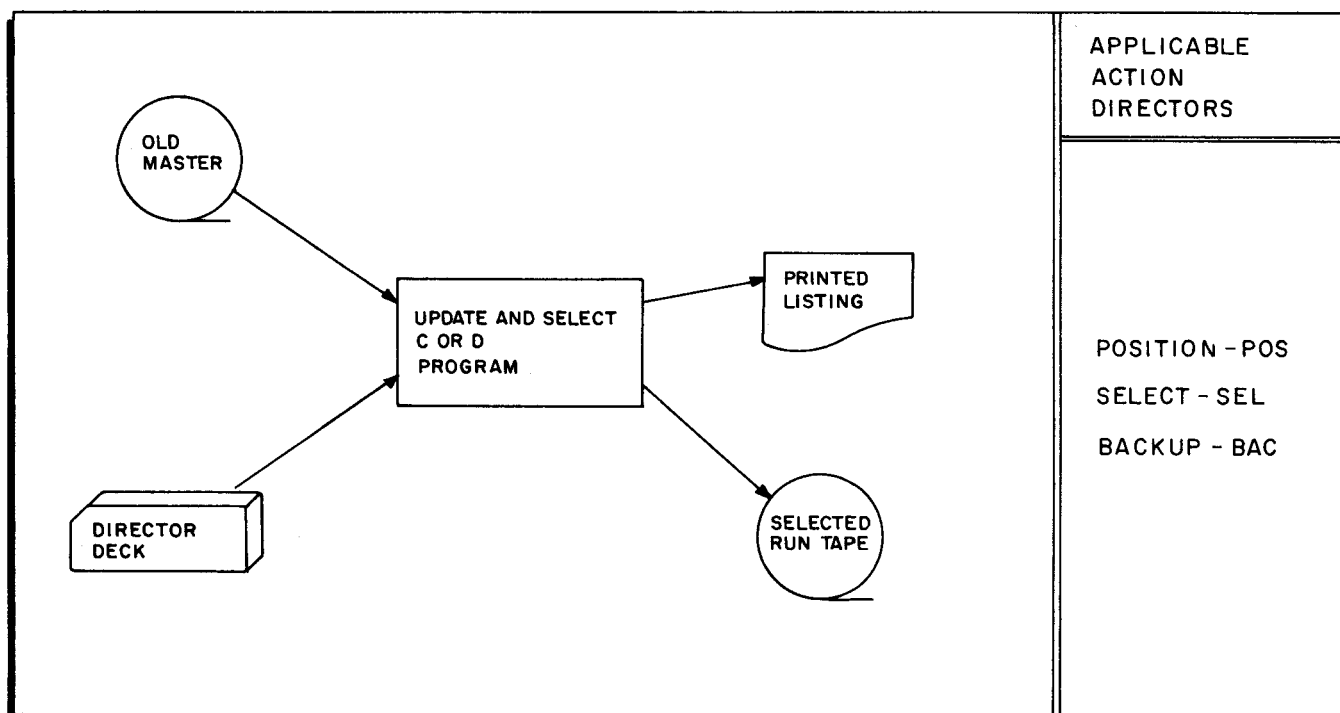
Figure 2-5. Configuration E

Figure 2-6. Configuration F

As illustrated in Figures 2-1 through 2-6, there may be as many as three inputs to Update and Select:

1. An old master tape containing the existing master file.
2. A transaction binary tape such as the binary run tape produced by the Easycoder Assembler C or D or the Series 200 compilers (COBOL and FORTRAN).
3. The director deck containing updating and/or selection information; octal coding for any corrections to be made can also be included in the director deck.

The figures also show that as many as three outputs may be produced by Update and Select. These outputs are as follows:

1. The new master tape, which is the updated version of the old master tape.
2. The selected run tape containing the specified units which have been selected.
3. A listing which consists of the director card images, a directory of the new master tape, and a directory of the selected run tape.

COMPONENTS OF THE UPDATE AND SELECT CONFIGURATIONS

Each component of the Update and Select configurations is explained in detail below.

The old master tape (i.e., the existing master tape) is normally a master file of binary executable programs. Its format is illustrated below:
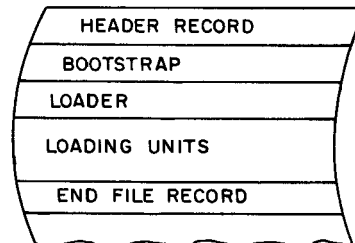
It should be noted that only one pass is made over the old master tape. Upon reaching the end-of-file record during an unsuccessful search, the run is terminated and any action directors not yet processed are rejected. The director deck, consequently, must be arranged in the same order in which the specified units appear on the old master tape.

NOTE: While the Update and Select program may be located on either the old master tape or the transaction binary tape, the Loader-Monitor appears on both input binary run tapes.

The first card in the director deck must be the System Specific Header card, while the Trailer card forms the final entry. An action director card must be included for each unit to be updated and for each unit (or block of units) to be selected; these cards identify the specific operations to be performed.

TRAILER

SEL
(SDSE△△SR)

OCTAL
CORRECTIONS

POS
(REGG△△ER)

DEL
(HERD△△GD)

INS
(CHRL△△AN)

SYSTEM
HEADER·

DIRECTOR DECK

OR

CARD-
IMAGE   OR   PUNCHED
TAPE   PAPER
                TAPE

TRANS-
ACTION
BINARY
TAPE

NEW
MASTER
TAPE

PRINTED
LISTING

OR   PRINT-
       IMAGE
       TAPE
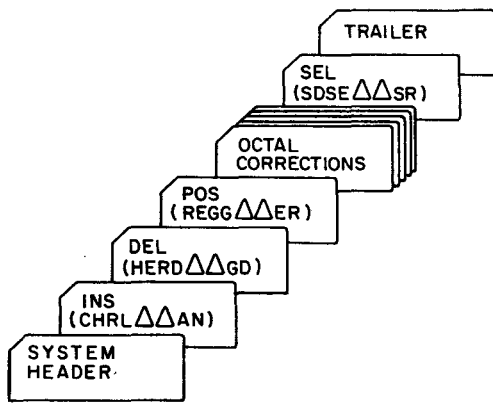
The director deck may contain any number of action director cards. Octal correction cards may also be included in the director deck; they must, however, be preceded by an action director card. (Section III describes each card in the director deck in detail.)

EXAMPLE: It is desired to insert unit CHRL△△AN (existing on the transaction binary tape) onto the master file. It is also desired to delete unit HERD△△GD from the master file, make corrections to unit REGG△△ER, and select unit SDSE△△SR. Making certain that the unit names appear in the director deck in the same order in which these units appear on the old master tape, the programmer places the cards in the director deck as illustrated to the left.

OPTION: A magnetic tape or paper tape containing card images may optionally serve to provide the director deck input to Update and Select.

NOTE: Cards contained in the Update and Select director deck are always punched in Honeywell special code.

Loading units added to the master file during a run are taken from the transaction binary tape. This tape normally consists of a file of executable programs (in binary run tape format) produced by either the Easycoder Assembly C or D System or a Series 200 compiler. No particular unit sequence is assumed for this tape. If a requested unit is not found by a forward search, the tape is rewound and searched from its beginning.

The new master tape represents the updated version of the old master tape; the new tape contains units copied from the old master tape and/or the transaction binary tape, with or without changes in name and visibility. Loading units on the new master tape are ordered as they were on the old master tape.

Units are automatically copied from the old master tape to the new master tape unless they are specifically deleted or replaced by units from the transaction binary tape. Octal corrections may be made to a segment unit when it is written on the new master tape.

A sample listing for the Update and Select program (showing all action directors and several octal corrections) appears in Figure 2-7.

Appearing first, from left to right, is the directory of the new master tape. This is followed by the program revision number (PRN) and the directory of the selected run tape. The visibility codes for the various units appear next. Following this may be a partial image of the director itself, showing the action code, the A, B, and C fields, and the remarks field. Octal corrections appear in the listing below the entry to which they refer.

```
MASTER     PRN  SELECTED    ---------VISIBILITY   FIELD---------                     MM/DD/YY         REMARKS
LISTING         LISTING                                                              BRT NO. 00002

AAAMONS1   000              A

CRBRT NV   000                                                    7

TPELST01   000              AZ3CD                                            REP THOR   TH   TTWO   SK   TPELST01

DATGENGR   000                                                   78

REPRO LN   000                                                    7

TFIVE 01   000              ZCAD3                                            INS REPRO LN   TFIVE MD   TFIVE 01

                           CCT W 004657  10      002570      006570   35
                           ***CCT  W005632           175
                           ***DIRECTOR REJECTED

           000  TPELST01   A CD                         Z    3             BAC TPELST01

           000  DATGENGR                                           78      BAC TPELST01

           000  REPRO LN                                            7      BAC TPELST01

           000  TFIVE 01   A CD                         Z    3             BAC TPELST01

DMP-3CFB   000                                                   789

PERIPHTL   000                                                    78

TONE  RC   000                                              123

TTWO  SK   000                                               12

TTHREECS   000                                                1

           000  PERIPHTL   A                                              SEL PERIPHTL  TTHREECS

           000  TONE  RC   A                                              SEL PERIPHTL  TTHREECS

           000  TTWO  SK   A                                              SEL PERIPHTL  TTHREECS

           000  TTHREECS   A                                              SEL PERIPHTL  TTHREECS

TFOUR MD   000       '                                      123

                                                                          DEL TFIVE MD

TSIX  SH   000                                                1

UPDSEL81   000              ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789   POS UPDSEL8A              UPDSEL81

UPDSEL8B   000              ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

UPDSELS1   000              ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
```

Figure 2-7.   Sample Update and Select Listing

Note that the date specified on the System Specific
Header card appears on the header line.

OPTION: The listing may be recorded on tape for
off-line printing.

In the process of selecting units, the specified units
are first of all written on the new master tape, then
copied onto the selected run tape. (The selected run
tape thus contains some or all of the units contained
on the new master tape.) If a new master tape is not
included in the configuration, the specified units to
be selected are drawn from the input tape (i.e., the
transaction binary tape for configuration E and the
old master tape for configuration F).

SELECTED
RUN
TAPE

The same unit may appear any number of times on
the selected run tape with the same (or different)
names and visibilities. Any corrections that may
have been made when a segment unit was written
on the new master tape automatically appear on the
selected run tape. Further octal corrections may
be added to a segment unit when it is written on the
selected run tape by simply including the octal
correction cards after the SEL action director.

NOTE: The Tape Loader-Monitor C (AAAMONS1),
       treated as any other program, will not
       automatically appear on the selected run
       tape. If it is desired to include the Loader-
       Monitor on this tape, it must be specifically
       selected.

THE DIRECTOR DECK

The director deck controls the operation of the Update and Select C or D program. A sample arrangement of this deck is illustrated in Figure 3-1, and a description of each card that may be included in the deck is contained in this section. Note that while the Console Call card and the Equipment Configuration Descriptor are included in Figure 3-1 and described below, they are not considered part of the director deck.
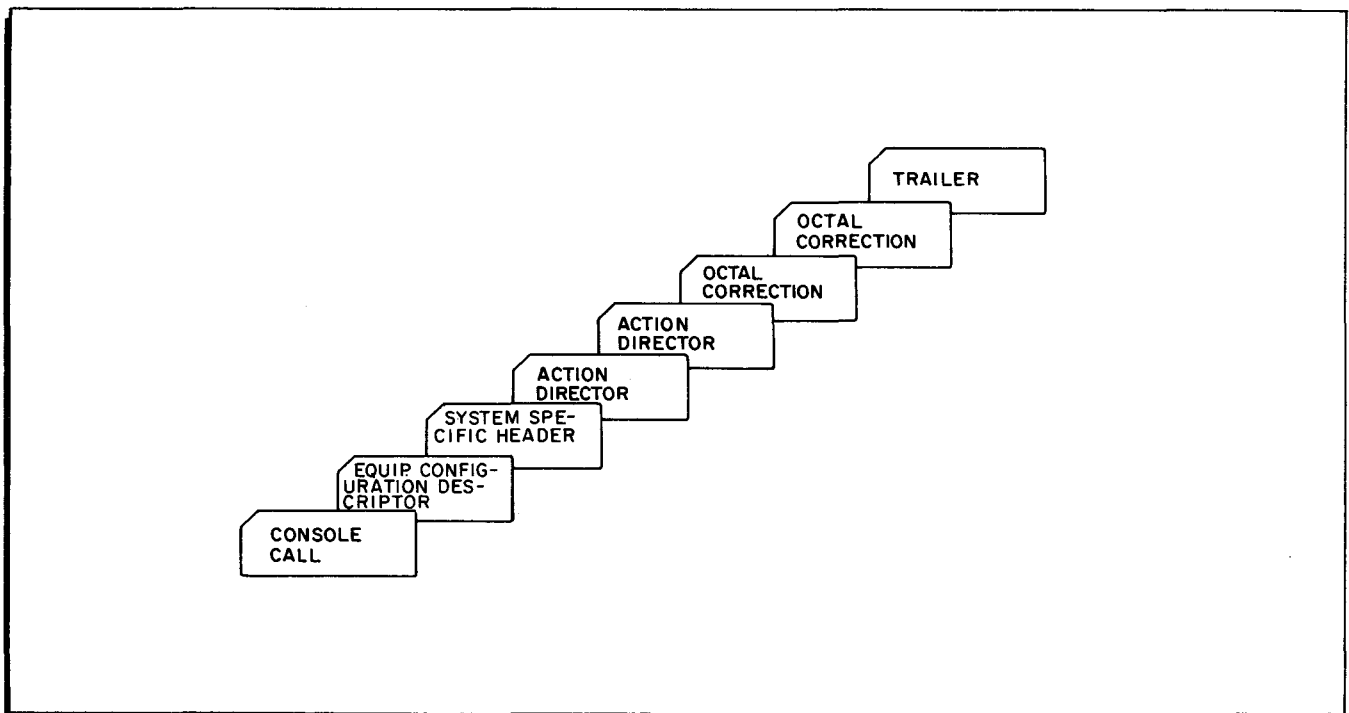

Figure 3-1. Sample Update and Select Director Deck

CONSOLE CALL CARD

The Console Call card (see Figure 3-2) directs the loader to load the Update and Select C or D program. As stated above, this card is not considered part of the director deck. The reason for this is that its contents may optionally be entered from the control panel, or console typewriter. (The Console Call card is presented here to illustrate how it is coded.)
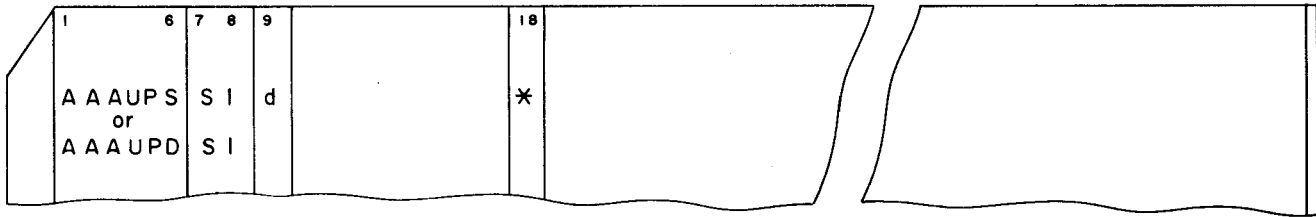
Figure 3-2. Console Call Card

Col. 1-6: Contain the program name:
AAAUPS for Update and Select C
AAAUPD for Update and Select D.

Col. 7-8: Contain the characters S1 to indicate the first segment to be loaded.

Col. 9: Designates the device (d) from which Update and Select is to be loaded.

Col. 18: Contains an asterisk (*).

EQUIPMENT CONFIGURATION DESCRIPTOR CARD

The Equipment Configuration Descriptor (ECD) card describes the equipment configuration available for use by the Update and Select program. This card either fully describes the equipment configuration to be used ("full ECD") or specifies a standard equipment configuration ("standard ECD") contained in the Update and Select program. The Equipment Configuration Descriptor can optionally be read from magnetic tape or paper tape.

Update and Select contains five standard equipment configurations assembled within itself. Each standard configuration is identified by a decimal integer from 0-4. The user may select a standard configuration by specifying the corresponding decimal integer (see Table 3-1). Should the desired equipment configuration not be included among the standard ECD's contained in the program, a full ECD card should be constructed. The standard equipment configurations are designed to allow the user to obtain a smooth flow between system programs without constructing an ECD card for each program.
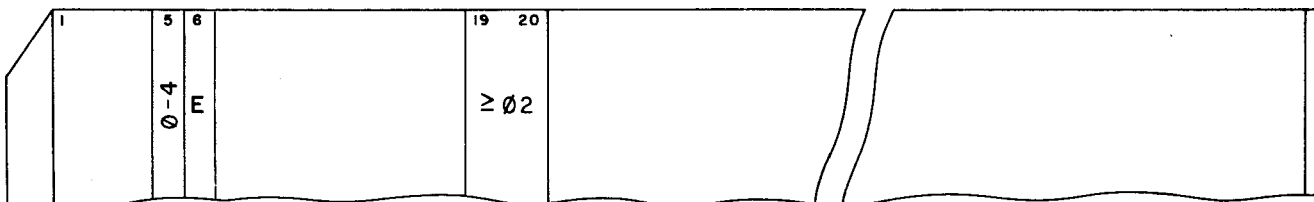
Standard ECD Card

Figure 3-3. Standard Equipment Configuration Descriptor Card

Col. 5: Contains a decimal integer from 0-4 indicating a standard ECD assembled in the program. (An integer from 5-9 results in the use of standard configuration 3.)

Col. 6:   Contains the letter E to indicate that this is the Equipment Con-figuration Descriptor card.

Col. 19-20:   Contain the number (octal) of the highest memory bank used; this number will always be ≥ 02. If this field is blank the memory size contained in the standard ECD's of Update and Select C and D will be used.

NOTE: The remaining columns of the standard ECD card are ignored.

Update and Select C and D may be reassembled to alter one or more of the standard equipment configurations so as to more accurately describe the particular equipment configurations desired by the user.

Full ECD Card

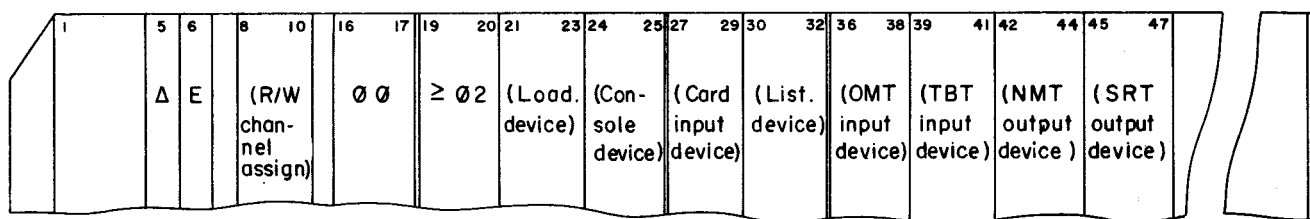| 1	5	6	8 10	16 17	19 20	21 23	24 25	27 29	30 32	36 38	39 41	42 44	45 47
	Δ	E	(R/W chan-nel assign)	0 0	≥ 02	(Load. device)	(Con-sole device)	(Card input device)	(List. device)	(OMT input device)	(TBT input device)	(NMT output device)	(SRT output device)

Figure 3-4.   Full Equipment Configuration Descriptor Card

Col. 5:   Contains a blank to indicate that this is a full ECD card.

Col. 6:   Contains the letter E to indicate that this is the Equipment Configuration Descriptor card.

Col. 8-10:   Update and Select was originally coded to use certain read/write channel assignments for its input/output operations. Columns 8 to 10 are usually coded as follows to specify these channels:

Col. 8:   11, 9 punch (control character 51_8); designates RWC1.

Col. 9:   8, 2 punch (control character 12_8); designates RWC2.

Col. 10:   8, 3 punch (control character 13_8); designates RWC3.

This field may be used, however, to alter the read/write channel assignments specified above. For example, if the programmer desires that channel 3 not be used by Update and Select, he may punch columns 8 to 10 in the following manner:

Col. 8:   11, 9 punch (control character 51_8).

Col. 9:   8, 2 punch (control character 12_8).

Col. 10:   8, 2 punch (control character 12_8).

NOTE: This field must be punched, even if the channels are not to be reassigned.

Col. 16-17:   Contain the number (octal) of the lowest memory bank used; this number will always be 00.

3-3

Col. 19-20: Contain the number (octal) of the highest memory bank used; this number will always be ≥ 02.

Col. 21-47: Contain the eight file media fields which designate the configurations for the particular run. The eight file media fields employed with Update and Select are made up of three columns each. Each field contains three characters which completely specify the tape drive or device to be used. The contents of each of the eight fields are listed in Table 3-1.

Source of the ECD Card

The communication area of Tape Loader-Monitor C contains a four-character equipment configuration field in locations 151-154 (octal 227-232), which is used by Update and Select in conjunction with the standard Equipment Configuration Descriptor card. This field specifies either the device type and peripheral unit address for reading the ECD card itself or a standard ECD number, in which case no ECD card is required.

If character 1 of the equipment configuration field is blank, character 2 is a standard ECD number which specifies the equipment configuration for the run. If characters 3 and 4 are non-blank, they are interpreted as a new memory size and override the size contained in the specified standard configuration.

If character 1 of the equipment configuration field is not blank, it specifies the device type from which the ECD card is to be read. Characters 2, 3, and 4 contain the peripheral unit address, drive number, and R/W channel, respectively, to be used in reading the ECD card. The initial value of the equipment configuration field is JJ0R; meaning that the ECD card will be read from a card reader via read/write channel 1. The contents of these locations may be changed by reassembling the Loader-Monitor or by manual entry from the console.

NOTE: The ECD card need not be read from the same input medium as the director deck.

SYSTEM SPECIFIC HEADER CARD

This card serves to identify the director deck. The System Specific Header card may also be used to verify that the correct major input tape[1] has been mounted, and to assign a revision number to the output tape(s). The format for this card is illustrated in Figure 3-5 and explained in detail on page 3-6.

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[1] The term "major input tape" refers either to the old master tape or, in configurations that do not include an old master tape, to the transaction binary tape.

Table 3-1. Format for File Media Fields and Standard ECD Values

Columns	Designation	First Character Device Type[1]	Second Character Peripheral Address[2]	Third Character Tape Drive[3]	Standard ECD Values[4]				
					ECD0	ECD1	ECD2	ECD3	ECD4
21-23	Loading Device	1	p	t	100	100	100	100	100
24-26	Console Device	2 (or 5)	0 (or p)	0 (or 1)	200	200	200	200	200
27-29	Card Input Device	J (or L, N, 1)	p	0 (or t)	JJ0	JJ0	JJ0	JJ0	JJ0
30-32	Listing Device	- (or 1)	p	0 (or t)	-20	-20	-20	-20	-20
36-38	Input OMT	1 (or Δ)	p (or Δ)	t (or Δ)	106	100	$\Delta\Delta\Delta$	106	106
39-41	Input TBT	1 (or Δ)	p (or Δ)	t (or Δ)	$\Delta\Delta\Delta$	102	102	102	102
42-44	Output NMT	1 (or Δ)	p (or Δ)	t (or Δ)	101	101	$\Delta\Delta\Delta$	101	101
45-47	Output SRT	1 (or Δ)	p (or Δ)	t (or Δ)	$\Delta\Delta\Delta$	$\Delta\Delta\Delta$	104	$\Delta\Delta\Delta$	104

[1] The first character specifies the device used; the symbol for each device is as follows:

Symbol	Octal Code	Device
Δ	15	Not used
1	01	Type 203B Tape Control
-	40	Type 206 or 222 Printer
J	41	Type 227 Card Reader
N	45	Type 214, 223, or 224 Card Reader
2	02	Control Panel
L	43	Type 209 Paper Tape Reader
5	05	Console

(Card readers and printers should be assigned codes with bit 1 equal to 1; tape controls should be assigned codes with bit 1 equal to 0.)

[2] The second character specifies the peripheral control address. This is control character C_2 of the PDT instruction.

[3] The third character specifies the number of the tape drive to be used. This is the low-order octal digit of control character C_3 of the PDT instruction. If a particular device is not a tape drive, this third character is 0 except when the console is specified. In the event the console is specified, a 1 in this character position indicates a carriage return.

[4] These are the standard ECD's contained in the Update and Select program. Standard ECD numbers 5, 6, 7, 8, and 9 are the same value as ECD3.
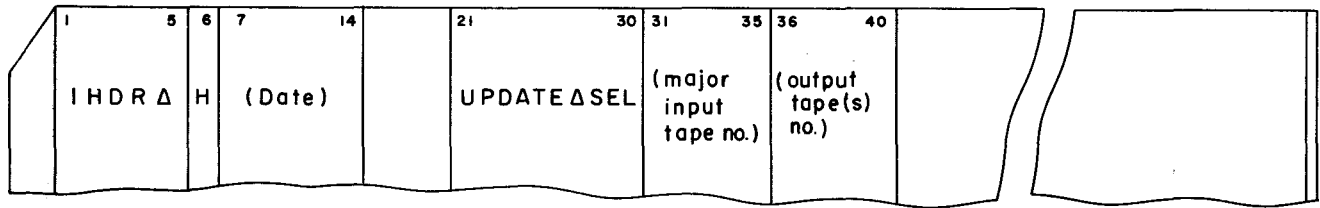
1	5	6	7	14		21	30	31	35	36	40			
IHDR Δ		H	(Date)			UPDATE Δ SEL		(major input tape no.)		(output tape(s) no.)				

Figure 3-5. System Specific Header Card

Col. 1-5:   Contain the symbol 1HDR Δ which denotes that this is the beginning of the input.

Col. 6:   Contains the letter H to indicate that this is the System Specific Header card.

Col. 7-14:   Contain the date in any desired format.

Col. 21-30:   Contain the card input file name which in this case is UPDATE Δ SEL.

Col. 31-35:   This field enables the programmer to verify that the correct major input tape has been mounted. If this field is punched, Update and Select compares the revision number in the header label of the major input tape with that number specified in columns 31-35. An inequality will result in a halt. (Revision numbers are five-digit decimal numbers which are right-justified with leading zeros.)

A blank field will result in no check being made.

Col. 36-40:   If this field is blank, Update and Select increments the revision number contained on the old master tape by one, placing the new number into the header label of the output tape(s).

A revision number may be included in this field for two reasons: to begin the revision numbering series, or to interrupt the numbering sequence and specify a new revision number to be placed on the output tape(s).

ACTION DIRECTOR CARD

Following the System Specific Header card, as many action director cards as necessary are included in the director deck. As the title "action director" implies, the function of this card is to direct Update and Select to perform functions which are dependent upon the action specified and upon the configuration of the run. Any octal correction cards included in the director deck are applied to the segment unit specified by the action director immediately preceding these correction cards. The format of the action director card is illustrated in Figure 3-6 and described below.
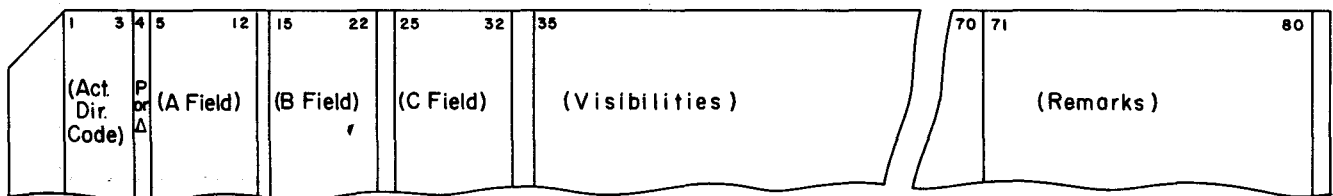

1	3	4	5	12	15	22	25	32	35		70	71	80
(Act. Dir. Code)		P or Δ	(A Field)		(B Field)		(C Field)		(Visibilities)			(Remarks)	

Figure 3-6. Action Director Card

3-6

Col. 1-3: Contain one of the six action director codes which direct the operations of the Update and Select programs. A detailed description of each code may be found in Table 3-2. Note that where the use of the field is optional with a particular action director, its contents are enclosed in parentheses in Table 3-2. Unused fields, indicated in Table 3-2 by a dash, must remain blank.

Col. 4: Contains the program option field. The option to manipulate program units, available only with Update and Select D, is elected by punching the letter P in this column. When this option is specified, Update and Select D interprets all names on the director card as the names of program units, i.e., the segment names are not referenced. A blank in this column informs the program that segment units are specified on this director.

NOTE: 1. The octal correction option applies only when segment units are specified on the director card.

2. Where two or more programs with like names are together on a BRT and it is desired to operate on one of these programs, the corresponding director(s) should specify segment units, i.e., column 4 should be left blank.

Col. 5-12: Contain the A field, which specifies a unit on a major input tape (i.e., the old master tape or the transaction binary tape). When using the BAC action director, however, with a configuration which includes a new master tape, the A field specifies the name of a unit on the new master.

Col. 15-22: Contain the B field which, with the exception of the SEL action director, specifies the name of a unit on the transaction binary tape.

Col. 25-32: Contain the C field, which specifies the new name that will be assigned to a segment unit on an output tape, if a name change is desired. If a name change is _not_ desired, this field remains blank.

NOTE: The name change option applies only when a single segment unit is placed on an output tape, i.e., when using the following action directors: REP, INS, POS, SEL (single segment unit only), and BAC (single segment unit only).

Col. 35-70: Contain the visibility field which may be employed if a change in visibility is desired. Visibilities appearing on the action director card supersede all previous visibilities for that particular unit as it appears on the input tape.

Visibility codes may appear in any order and may be distributed in any way, with the exception that if any column is non-blank, column 35 must be non-blank. If column 35 is blank, the unit retains the visibility it had on the input tape from which it was copied. The correspondence between visibility codes and the resulting octal visibility key for the unit is defined in Appendix A. Note that an asterisk punched in column 35 results in a key of all zeros and an "invisible" unit (i.e., the unit can be called for only by program name and segment name).

NOTE: A visibility change may be made when either a single unit or a block of units is placed on the output tape, i.e., when using the following action directors: REP, INS, POS, SEL, and BAC.

Col. 71-80: Contain the remarks field. While it has no effect on processing, this field is printed on the listing.

Table 3-2. Action Director Codes

Code	Directive	Configurations in which valid[1]	A Field	B Field	C Field	Visibility Field	Description
REP	Replace	A B	Unit name on OMT Replace this unit	Unit name on TBT Replace with this unit	New segment unit name	New visibility code	All units up to (but <u>not</u> including) the unit specified in the A field are copied from the old master tape to the new master tape. The old master tape is then positioned immediately after the unit specified in the A field. If there is a unit name entered in the B field, the transaction binary tape is searched for this unit. If no unit name is entered in the B field, the transaction binary tape is searched for the unit specified in the A field. Once found, the unit is copied to the new master tape.
INS	Insert	A B	Unit name on OMT Insert after this unit	Unit name on TBT Insert this unit	New segment unit name	New visibility code	All units up to and including the unit specified in the A field are copied from the old master tape to the new master tape. The unit specified in the B field is then copied from the transaction binary tape to the new master tape. If the A field is blank, only the unit specified in the B field is copied to the new master tape (from the transaction binary tape).
DEL	Delete	A B C D	Unit name on OMT Delete this unit	-	-	-	All units up to (but <u>not</u> including) the unit specified in the A field are copied from the old master tape to the new master tape. The old master tape is then positioned immediately after the unit specified in the A field.
POS	Position	A B C D E F	Unit name on major input tape Position after this unit	-	New segment unit name	New visibility code	If a new master tape is included in the configuration, all units up to and including the unit specified in the A field are copied from the major input tape to the new master tape. If a new master tape is <u>not</u> present, the major input tape is spaced forward so as to be positioned after the unit specified in the A field. (Name change and visibility change options are not applicable in this case.)
SEL	Select	A D E F	Unit name on major input tape Select this unit or the block of units starting here	Unit name on major input tape Select block of units ending here	New segment unit name	New visibility code	Use of the SEL action director enables one or more units to be selected from the major input tape and placed on the selected run tape. If the B field is blank, the single unit specified in the A field is selected. If the B field is <u>not</u> blank, a block of units (beginning with the unit specified in the A field and ending with the unit named in the B field) is selected and placed on the selected run tape.

Table 3-2 (cont). Action Director Codes

Code	Action Directive	Configu-rations in which valid[1]	A Field	B Field	C Field	Visibility Field	Description
SEL (cont)	Select						The SEL action director initiates a forward search of the old master tape for the unit (or units) to be selected. During this search, all units up to and including the unit(s) to be selected are copied to the new master tape. The new master tape is then backspaced to the unit specified in the A field and the specified unit (or units) copied to the selected run tape. If the new master tape is _not_ present in the configuration, units are selected directly from the input file, which is the transaction binary tape for configuration E and the old master tape for configuration F. NOTE: The SEL action director initiates a forward search; therefore, when the SEL action director card is read, the single unit to be selected, or the first unit of a block to be selected, should not have already been copied to the new master tape. If it has already been copied (e.g., through the action of a REP or INS director), selection can be accomplished through use of a BAC action director (see below).
BAC	Backup	A D E F	Unit name on major input tape or new master tape Backup and select block starting here		New segment unit name	New visibility code	The BAC action director, like the SEL action director, enables one or more units to be selected and placed on the selected run tape. If the A field is blank, the segment unit immediately before the current position of the read/write head on the source tape is selected. If the A field contains a unit name, the major input tape (or new master tape) is backspaced until the unit named in the A field is located. This unit is placed on the selected run tape and is in turn followed by all other units between it and the original position of the read/write head. The source file from which units are selected is the new master tape if one is included in the configuration. If a new master tape is not present, units are selected directly from the input file, which is the transaction binary tape for configuration E and the old master tape for configuration F.

[1] The six-configurations are shown in Figures 2-1 through 2-6.

OCTAL CORRECTION CARD

The octal correction facility enables corrections to be made to specified segment units without the need for resubmitting these units to assembly. On these cards, op codes, addresses, and variant characters are written in octal notation, with two card columns representing one machine character.

Octal correction cards (see Figure 3-7) are placed in the director deck immediately after an action director that specifies the particular segment unit to be copied to an output tape. For example, assume that a particular segment unit is to be placed on the selected run tape and patched with octal corrections. An action director that will cause this segment unit to be copied to the selected run tape is placed in the director deck. Immediately following this card are the octal correction cards specifying the corrections to be made on this segment unit.

The octal correction cards are converted into the standard binary run tape format by Update and Select. Following this, the cards are written (as one or more records) on the output tape following the segment unit copied as a result of the action director.

The previously existing coding within the specified segment unit is not changed on the selected run tape. However, at execution time, the octal corrections (since they are loaded last) may overlay any part of the previously existing coding.

Additional corrections may be added at a later time without affecting earlier corrections. Corrections may be deleted, however, only by deleting or replacing the entire segment unit to which the corrections are attached.

The information contained in this card is described below.
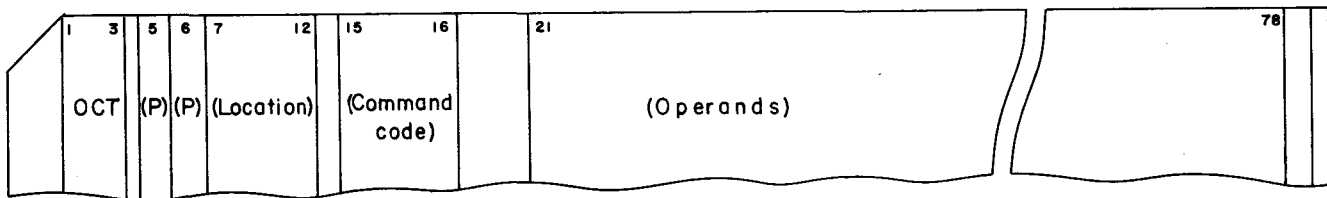
Figure 3-7. Octal Correction Card

Col. 1-3:   Contain the letters OCT.

Col. 5:   Contains the letter which specifies the punctuation to be placed at the <u>left</u> end of the string of characters. The codes employed are as follows:

3-10

Δ	No punctuation	
W	Word mark	
I	Item mark	
R	Record mark	

Col. 6: Contains the letter which specifies the punctuation to be placed at the <u>right</u> end of the string of characters. The codes employed in this column are exactly the same as those used in column 5.

Col. 7-12: Specify the location into which the leftmost character is to be loaded. This location must be punched as a three-character address, regardless of the addressing mode of the unit.

Col. 15-16: Contain the octal command code in the case of a machine instruction. For a constant, this field must remain blank.

Col. 21-78: Contain instruction operands or a constant. When a machine instruction is punched, the A address, B address, and variant characters are punched in discontinuous fields as follows:

Field	Columns	
	Two char.	Three-char.
A address	21-24	21-26
B address	31-34	31-36
Variants	41-78	41-78

Variants must be punched, without imbedded blanks, starting in column 41. The first blank in an odd-numbered column terminates the field.

A constant appearing in the operands field must be punched in octal, without imbedded blanks, starting in column 21. The first blank in an odd-numbered column terminates the field. Data constants and address constants receive identical treatment.

NOTE: Whenever octal correction cards are included as part of the Update and Select C director deck, the device assigned as the loading device for the program must not be assigned to an input file. If this rule is violated, the program will reject any octal correction cards in the director deck. However, if sufficient tape drives to meet this requirement are not available in the normal updating run, octal corrections can be made in a separate run. Configuration C, which is specified by standard ECD0 (see Table 3-1), is provided for this purpose.

TRAILER CARD

The last card in the director deck must be the Trailer card illustrated in Figure 3-8 and described below.
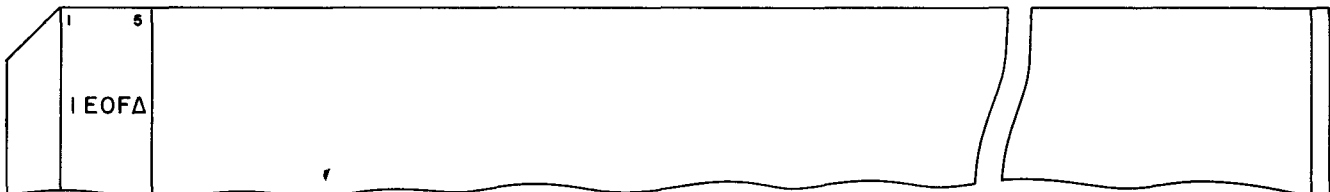
Figure 3-8. Trailer Card

Col. 1-5: Contain the symbol 1EOFΔ which specifies the termination of the director deck.

3-11

LOADING UPDATE AND SELECT

Tape Mounting Procedures

Mount the tape containing the Tape Loader-Monitor (in most cases this will probably be the old master tape) on the tape drive designated as logical 0. Set the PERMIT-PROTECT switch to PROTECT.

Mount the remaining tapes involved in the particular configuration, and assign their logical addresses as specified on the Equipment Configuration Descriptor card. (Refer to Figures 2-1 through 2-6, pages 2-2 through 2-4, for the tapes required for each configuration.) If a card-image tape and/or a print-image tape are to be used, mount and assign them at this time.

> NOTE: Input tapes should be mounted in PROTECT status, while output tapes
> should be in PERMIT status. The DENSITY switch for an input tape
> must be in agreement with the density in which the tape was produced.

Bootstrap Procedures

The tape containing the Tape Loader-Monitor is bootstrapped twice from tape drive 0 into location 0. The steps necessary to accomplish this are outlined in Table 4-1.

Table 4-1. Bootstrap Procedures for Control Panel
and Console Typewriter

Control Panel	Console Typewriter
1. Press INITIALIZE.	1. Press INITIALIZE
2. Set the CONTENTS button to designate the octal address assignment of tape 0 (normally octal 40).	2. B XX 00000 (XX is the octal address assignment of tape 0 (normally octal 40). This action causes the tape label record to be bypassed.
3. Press BOOTSTRAP. (This will cause the tape label record to be bypassed.)	3. Repeat step 2, above. (This will cause the first bootstrap record to be read.)
4. Repeat step 2, above.	4. If the octal address assignment of the tape control used in step 2 above was 40, proceed to step 5; otherwise, enter the appropriate octal address assignment into octal memory locations 65, 73, and 101.
5. Press BOOTSTRAP. (This will cause the first bootstrap record to be read.)	5. Press RUN.

Table 4-1 (cont). Bootstrap Procedures for Control Panel
and Console Typewriter

Control Panel	Console Typewriter
6. If the octal address assignment of the tape control used in step 2 above was 40, proceed to step 7; otherwise, enter the appropriate octal address assignment into octal memory locations 65, 73, and 101.	6. A halt will occur, and the contents of the B-address register should be 17001. An explanation of this halt may be found in the Information Bulletin entitled PLUS – Tape Loader-Monitor. P 10 (10 is the octal address of the B-address register) will cause the contents of the B-address register to be typed out on the console.
7. Press RUN.	7. Press RUN.
8. A halt will occur, and the contents of the B-address register should be 17001. An explanation of this halt may be found in the Information Bulletin entitled PLUS – Tape Loader-Monitor.	8. Another halt will occur, and the contents of the B-address register should be 17002. This indicates that the Loader-Monitor is in memory and awaiting a console call.
9. Press RUN.	
10. Another halt will occur, and the contents of the B-address register should be 17002. This halt indicates that the Loader-Monitor is in memory and awaiting a console call.	

Console Call Procedure

The eight-character program and segment name for calling Update and Select C is AAAUPSS1. The name for Update and Select D is AAAUPDS1. 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 or console typewriter. The information to be entered into octal locations 100 and 104 through 114 is as follows:

Location	Contents (octal)
100	01
104-111	21, 21, 21, 64, 47, 62 (AAAUPS) or 21, 21, 21, 64, 47, 24 (AAAUPD)
112-113	62, 01 (S1)
114	Device number from which Update and Select is to be loaded.

NOTE: When running Update and Select, it is not necessary to use the halt-after-loading option provided by the Loader-Monitor.

Press the RUN button. On receiving the console call parameter, the loader proceeds to search for, locate, and load the desired Update and Select program.

If any further amplification of the loading process is desired, refer to the Tape Loader-Monitor bulletin.

UPDATE AND SELECT PROGRAMMED HALTS

At various points during the execution of Update and Select, operator intervention may be required because of possible error situations occurring. When these situations occur, the program will communicate with the operator in one of two ways. If a console typewriter is specified as present in the equipment configuration, the program communicates via typed messages. Otherwise, communication is accomplished via programmed halts in which the contents of the B-address register specify the halt situation which has occurred.

Table 4-2 describes the various error situations in Update and Select which cause programmed communication to occur. For each situation, the contents of the B-address register and the associated console message are listed and recommended action is outlined.

If the operator action described in Table 4-2 requires the operator to continue the run after some corrective action has been taken, he should do one of the following:

1. In a system configuration specifying the control panel, he merely presses the RUN button.

2. In a system configuration specifying a console typewriter, the operator must type the letter "G" on the typewriter.

Table 4-2. Update and Select Error Halts

B Address	Console Message	Significance	Operator Action
007002	: ILLEGAL CARD INPUT MEDIUM □	Leftmost character of the card-image input medium (device type), as entered by the operator, is illegal.	Correct error and reload program.
007025	: NO E CARD □	The card that was assumed to be the ECD card does not contain an E in column 6.	There are two possible actions to take: 1. If the ECD card is to be entered through the input device specified in the equipment configuration field of the Loader-Monitor communication area, ascertain that the desired ECD card is in the input device and continue the run.

Table 4-2 (cont). Update and Select Error Halts

B Address	Console Message	Significance	Operator Action
007025 (cont)			2. If the ECD card is <u>not</u> to be entered through the input device specified by the equipment configuration field in the Loader-Monitor communication area, this field (locations 227_8-232_8) may be changed to: a. Accept the ECD card from a different device or b. Select one of the five standard equipment configurations. Continue the run.
004004	; ILLEGAL FILE MEDIUM □	An illegal file media field has been detected on the Equipment Configuration Descriptor card.	Correct ECD card and reload program.
004005	: ILLEGAL LISTING MEDIUM □	The listing device (as indicated on the ECD card) has been found to be illegal.	Correct error and reload program.
004006	: DISMOUNT OPTION □	One of the input tapes is specified as the same logical device from which Update and Select was loaded.	Dismount loading tape and replace with updating tape <u>if</u> loading tape and updating tape are different physical reels. Otherwise, continue the run.
004007	: WRONG INPUT BRT □	An equality has been found on comparing the BRT revision number on the major input tape with the BRT 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 continue the run. 2. Correct the System Specific Header card and reload the program.
004010	: NO SYSTEM HEADER □	The card input file has not been found, for one of the following reasons:	The correct medium must be specified, or the System Specific Header card must be corrected and returned

Table 4-2 (cont). Update and Select Error Halts

B Address	Console Message	Significance	Operator Action
004010 (cont)		1. The wrong medium is being searched for the appropriate director deck. 2. The System Specific Header card has an incorrect file name.	to the director deck. Reload the program.
004011	: INP REC TOO LARGE □	The Update and Select program has attempted to write a record larger than 250 characters. (This conditions 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.
00cu3d	: END cu d □	Physical end of tape d has been sensed. (OPERATING SYSTEM-MOD 1 is not equipped to handle multi-reel BRT's; the output from this run is therefore not usable.) ("cu" represents the peripheral address of the tape control).	Either the director deck must be modified, or inactive units on the major input tape must be deleted.
00cu7d	: PRINT cu d□	The print routine (in off-line mode) has determined that printing is not being "stacked" on the print-image tape. ("cu" represents the peripheral address of the tape control; "d" represents the device number.)	The operator has two choices: 1. He can continue the 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 the tape is to be saved, he can replace it with a work tape, and continue the run.

Table 4-2 (cont). Update and Select Error Halts

B Address	Console Message	Significance	Operator Action
00cu1d	: RD ER cu d□	Uncorrectable read error on tape d. Several attempts have been made to read the record. ("cu" represents the peripheral address of the tape control; "d" represents the device number.)	Continue the run. The routine will again attempt to read the record correctly.
00cu1d	: RD ER cu 1□ or : RD ER cu 2□	Uncorrectable read error on the card reader. ("cu" represents the peripheral address of the card reader control; "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 in the eject stacker. Following this, he should refeed the cards, and continue the run.
00cu2d	: WR ER cu d□	Uncorrectable write error on tape d. Several attempts have been made to write the record. ("cu" represents the peripheral address of the tape control; "d" represents the device number.)	Continue the run. The routine will erase the record and attempt again to write it correctly.
00cu10	: RD ER cu 0□	Parity error has been detected on paper tape. ("cu" represents the peripheral address of the paper tape control.)	Continue the run to ignore the error.

APPENDIX A

USE OF VISIBILITY

Since the only realistic test environment for new programs is operation with other systems programs, the possibility of a new program causing problems in other parts of the system increases as the number of individual programs grows. Malfunctions in unchecked programs can cause errors which affect other programs and cause a programmer to waste time searching for errors in one program, only to find that they originated in another.

Ideally, each programmer should have his own system tape for test purposes. Such a tape would consist of all the checked-out programs plus the new programs of his own. In this way, new programs can be tested without creating problems in any other part of the system also under test. Any improper output could be assumed to originate in the new program or programs of a particular system tape. In effect, the visibility code system provides for such separate tapes.

As an example, consider that in a system under development there are three checked-out programs. For convenience, these will be called P-ONE, P-TWO, and P-THREE. A fourth program, P-FOUR, is still under test; however, it gives proper output within known limits which can be used as input to a new program, P-FIVE. For a given computer run, it is desired to test a new version of P-FOUR which incorporates new coding (this version will be called P-FOUR-M) and also to test P-FIVE. Obviously, there is a possibility that P-FOUR-M can introduce new errors, making the output completely useless for any realistic test of P-FIVE. On the other hand, the coding patches may be correct, allowing P-FOUR-M to be the final version of the program that is to be included as part of the system. In this case, P-FIVE should be tested with P-FOUR-M. By use of the visibility codes, a binary run tape could be produced using the following visibility coding:

PROGRAM	VISIBILITY		
P-ONE	A	B	C
P-TWO	A	B	C
P-THREE	A	B	C
P-FOUR		B	
P-FOUR-M	A		C
P-FIVE		B	C

In this way, the three versions of the same system exist on the same tape. The first version called for could be version A. If version-A output were not satisfactory (i.e., P-FOUR-M did not produce the desired results), P-FIVE could still be tested by calling in version B which includes P-FOUR without the corrective coding included in version A. If version-A output did include the desired output, version C could be called for and executed. In either case, the testing of P-FIVE could proceed independently of the work being done on P-FOUR. Improper output from any version could be isolated to a specific program with a high degree of certainty.

Note that the visibility assignment given above was only one of the many ways in which the desired results could be obtained.

Table A-1. Visibility Codes

Visibility Code	Octal Visibility Key	Visibility Code	Octal Visibility Key
A	40 00 00 00 00 00	T	00 00 00 20 00 00
B	20 00 00 00 00 00	U	00 00 00 10 00 00
C	10 00 00 00 00 00	V	00 00 00 04 00 00
D	04 00 00 00 00 00	W	00 00 00 02 00 00
E	02 00 00 00 00 00	X	00 00 00 01 00 00
F	01 00 00 00 00 00	Y	00 00 00 00 40 00
G	00 40 00 00 00 00	Z	00 00 00 00 20 00
H	00 20 00 00 00 00	0	00 00 00 00 10 00
I	00 10 00 00 00 00	1	00 00 00 00 04 00
J	00 04 00 00 00 00	2	00 00 00 00 02 00
K	00 02 00 00 00 00	3	00 00 00 00 01 00
L	00 01 00 00 00 00	4	00 00 00 00 00 40
M	00 00 40 00 00 00	5	00 00 00 00 00 20
N	00 00 20 00 00 00	6	00 00 00 00 00 10
O	00 00 10 00 00 00	7	00 00 00 00 00 04
P	00 00 04 00 00 00	8	00 00 00 00 00 02
Q	00 00 02 00 00 00	9	00 00 00 00 00 01
R	00 00 01 00 00 00	*	00 00 00 00 00 00
S	00 00 00 40 00 00		

APPENDIX B
PAPER TAPE OPTIONS

Update and Select may be reassembled to allow for various modifications of paper tape input. These modifications are described below.

PARITY CHECK

The Update and Select constant tagged CRDTY has a standard value of #1C77 (77 means no parity check). If even parity checking is desired, this constant should be changed to #1C00; for odd parity checking the constant should be #1C04.

SIX-LEVEL TAPE WITH ONE TRANSLATION TABLE

To read six data channels (not including parity) using a single non-standard translation table, the 64-character table beginning at the location tagged CRDTT must be changed. The revised translation table must not include a control frame indicator for "switch tables" (35_8 with an item mark), and the data channels must always be punched as the low-order six channels on the paper tape. Parity may be punched in either channel seven or channel eight. The tape may be 7/8-inch or 1-inch wide.

SIX-LEVEL TAPE WITH TWO TRANSLATION TABLES

It may at times be desired to read six data channels (not including parity) using two translation tables (so that a paper tape frame may have two different meanings depending on which translation table is being used). To accomplish this operation, the first (lower case) translation table should be set up as a 64-character table beginning at the location tagged CRDTT, while the second (upper case) translation table should be set up as a 64-character table beginning at the location tagged CRDTR.

The data channels must always be punched as the low-order six channels on the paper, and parity may be punched in either channel seven or channel eight. The tape may be 7/8-inch or 1-inch wide.

SEVEN-LEVEL TAPE

To read seven data channels (not including parity), the Update and Select constant tagged CRDMK, whose standard value is #1C00, should be changed to #1C01. In addition, the 64-character translation table must be expanded to 128 characters. This latter operation should be performed by (1) modifying the table beginning at location CRDTT to contain the internal codes

corresponding to the paper tape frames between 000_8 and 077_8; and (2) inserting the internal codes corresponding to the paper tape frames between 100_8 and 177_8 (starting at the location tagged CRDTR). The resulting 128-character translation table must not include a control frame indicator for "switch tables" (35_8 with an item mark).

The data channels must always be punched as the low-order seven channels on the paper tape, and parity may be punched in channel eight. The paper tape may be 7/8-inch or 1-inch wide.

FIVE-LEVEL TAPE

It may occasionally be desired to read five data channels (not including parity) using two translation tables (so that a paper tape frame may have two different meanings depending on which translation table is being used). To accomplish this operation, the first (lower case) translation table should be set up as a 32-character table beginning at the location tagged CRDTT, while the second (upper case) translation table should be set up as a 32-character table beginning at the location tagged CRDTR. Following this, the 32-character table starting at CRDTT should be repeated starting at location CRDTT+32, and the 32-character table starting at CRDTR should be repeated starting at location CRDTR+32.

The data channels must always be punched as the five low-order channels of the paper tape, and parity may be punched in the sixth, seventh, or eighth channel. The paper tape may be 11/16-inch, 7/8-inch, or 1-inch wide.

STANDARD VERSION OF THE PROGRAM

The standard version of Update and Select accepts paper tape input punched with six data channels. The six-bit values read from paper tape are translated to internal codes according to Table B-1.

Table B-1. Paper Tape Conversion Table

Paper Tape Code (octal)	Internal Code (octal)	Paper Tape Code (octal)	Internal Code (octal)
00	72	10	30
01	21	11	31
02	22	12	41
03	23	13	42
04	24	14	43
05	25	15	44
06	26	16	45
07	27	17	46

Paper Tape Code (octal)	Internal Code (octal)	Paper Tape Code (octal)	Internal Code (octal)
20	47	50	74
21	50	51	34
22	51	52	54
23	62	53	20
24	63	54	73
25	64	55	40
26	65	56	33
27	66	57	61
30	67	60	00
31	70	61	01
32	71	62	02
33	15	63	03
34	Delete line.	64	04
35	End field.	65	05
36	End reel or strip.	66	06
37	End line.	67	07
40	15	70	10
41	15	71	11
42	55	72	14
43	52	73	32
44	53	74	15
45	35	75	13
46	17	76	15
47	12	77	Ignore Character.

Along Line

TITLE: UPDATE AND SELECT C AND D

DATED: October 25, 1965

FILE NO: 122.3305.0016.0-025

ERRORS NOTED:

Fold

SUGGESTIONS FOR IMPROVEMENT:

Fold

FROM: NAME _____   DATE _____

COMPANY _____

TITLE _____

ADDRESS _____

_____

Along Line

Honeywell

ELECTRONIC DATA PROCESSING

CRP