HONEYWELL EDP

BASIC PROGRAMMING SYSTEM AND MOD 1 (TR)

DATA CONVERSION A AND C

GENERAL SYSTEM: SERIES 200/PROGRAMMING SYSTEMS

SUBJECT: Programming and Operating Procedures for Tape-to-Printer A and C, Card-to-Tape A and C, and Tape-to-Punch A and C, a Set of Utility Routines Known Collectively as Data Conversion A and C.

SPECIAL INSTRUCTIONS: This manual supersedes the publication entitled Tape-to-Printer Routine A and C, Order Number 006.

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FOREWORD

The generalized nature of the Data Conversion A and C routines requires familiarity with
many programs of the Series 200/Programming Systems. Relevant programming documents
are listed below. The references are organized according to the intended operating environ-
ment of the routine.

GENERAL REFERENCES

Series 200 Programmers' Reference Manual, Models 200/1200/2200 (Order No. 139)

Series 200 Programmers' Reference Manual (Model 120) (Order No. 141)

BASIC PROGRAMMING SYSTEM (Tape-to-Printer A, Card-to-Tape A, Tape-to-Punch A)
All Environments:

Easycoder A Assembly System (Order No. 490)

Easycoder B Assembly System (Order No. 011)

Simultaneous Media Conversion A Coroutine:

Simultaneous Media Conversion A and C (Order No. 021)

OPERATING SYSTEM - MOD 1 (Tape-to-Printer C, Card-to-Tape C, Tape-to-Punch C)
All Environments:

Library Processors C and D (Order No. 051)

Easycoder Assemblers C and D (Order No. 041)

Tape Loader-Monitor C (Order No. 221)

Card Loader-Monitor B (Order No. 154)

Simultaneous Media Conversion C Coroutine:

Simultaneous Media Conversion A and C (Order No. 021)

Foreground Program:

Floating Tape Loader-Monitor C and Interrupt Control D (Order No. 005)

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SECTION I

INTRODUCTION

Tape-to-Printer A and C, Card-to-Tape A and C, and Tape-to-Punch A and C are a set of three terminal conversion routines known collectively as Data Conversion A and C. Tape-to-Printer A and C is a generalized macro routine for converting a print-image file on half-inch magnetic tape to printer copy. Card-to-Tape A and C is a generalized macro routine for converting a card file to a card-image file on half-inch magnetic tape. Tape-to-Punch A and C is a generalized macro routine for creating a punched-card file from a punch-image file on half-inch magnetic tape. Each routine may be specialized for use as one of three general types of programs:

1. An independent program, which is not operated in association with any other program.

2. A Simultaneous Media Conversion (SCOPE) coroutine, which may perform a terminal conversion operation simultaneously with up to two other coroutines. (See the Simultaneous Media Conversion A and C Manual.)

3. A foreground program, which is executed in parallel with any other program under the Series 200/Operating System - Mod 1. The Series 200 hardware and Mod 1 Operating System software are combined to provide this multi-programming capability. As a foreground program, the routine functions in the interrupt mode under Interrupt Control D. When the foreground program initiates an input/output operation, Interrupt Control D delegates all processor cycles to the other (background) program. At the end of a peripheral operation, Interrupt Control D receives an interrupt signal and reassigns all processor cycles to the foreground program.

As described in the following paragraphs, the flexible design of the routines offer a wide latitude of operating environments, types of files which may be processed, and processing options from which individualized terminal conversion programs may be tailored.

The routines run in either the Series 200/Basic Programming System or the Series 200/Operating System - Mod 1. In the Basic Programming System, they are known as Tape-to-Printer A, Card-to-Tape A, and Tape-to-Punch A. These routines are specialized via a macro call to the Library Processor B (formerly Macro) and assembled by either Easycoder Assembler A or Easycoder Assembler B. As an independent program, each routine is loaded by any of the Basic Programming System loaders and is independent of any monitoring program. As a SCOPE coroutine, it is assembled and loaded as part of the Simultaneous Media Conversion A package and executed under control of the SCOPE monitor.

For operation in the Mod 1 Operating System, the routines are known as Tape-to-Printer

C, Card-to-Tape C, and Tape-to-Punch C. These routines are specialized via a macro call to the Library Processor C (formerly Library Preprocessor) or Library Processor D. The specialized routines are assembled by either Easycoder Assembler C or Easycoder Assembler D. Any Mod 1 loader-monitor (e.g., Tape Loader-Monitor C, Card Loader-Monitor B, Floating Tape Loader-Monitor C) may be used to load a Data Conversion C routine as an independent program. When used as a coroutine, each of these routines functions as an integral part of the Simultaneous Media Conversion C package, exactly as it does in the Basic Programming System. As a foreground program, a Data Conversion C routine runs in the interrupt mode in conjunction with Interrupt Control D. Interrupt Control D allows a background program, which ideally requires considerable internal processing (e.g., assembly), to run in parallel with a Data Conversion C routine.

In every operating environment, Tape-to-Printer A and C may be specialized to process Honeywell, IBM, or non-standard print files. A Honeywell file may contain blocked or unblocked fixed-length records (with or without banner characters) or variable-length records (which are always bannered). Each item in a Honeywell print file contains a control character to regulate the vertical spacing of the printer. An IBM file may also contain blocked or unblocked fixed-length records or variable-length records. IBM print records are unbannered, and the vertical spacing control character is optional. Non-standard print files do not conform to either Honeywell or IBM file specifications. Non-standard print files may contain only fixed-length records, and their constituent items must not include vertical spacing control characters.

In every operating environment, Card-to-Tape A and C may be specialized to generate Honeywell, IBM, or non-standard card-image files. The data records of all three types of files contain fixed-length items, either blocked or unblocked. A Honeywell file always begins with a header label record and ends with a trailer label record. Honeywell records may be bannered or unbannered. For IBM files, headers and trailers are optional. When headers and trailers are generated for IBM card-image files, they are delineated on tape by IBM tape-mark records. Non-standard card-image files do not conform to either Honeywell or IBM file specifications. Headers and trailers are optional for non-standard files. Non-standard records may be bannered or unbannered. The card-to-tape routine may be directed to include control characters at the end of each item in any type of file; however, this option is usually selected for Honeywell files.

Similarly, the tape-to-punch routine may be specialized to produce a card deck from a Honeywell, IBM, or non-standard punch-image file. These three types of files are identical in structure to the three card-image files described above. If the items of a Honeywell punch-image file contain control characters, Tape-to-Punch A and C is capable of interpreting these characters to set the punching mode automatically.

For Card-to-Tape A and C and Tape-to-Punch A and C, several fixed-length items may be blocked to form one card- or punch-image record as mentioned above. Each item may comprise more than one card image. In addition, the card (or punch) images on tape need not be full 80-character images. The length of the card input buffer for the card-to-tape routine is subject to programmer regulation, so that less than 80 columns can be read from each card. The length of the card output buffer for the tape-to-punch routine is likewise variable, allowing less than 80 columns of information to be punched on each card.

When the routines are specialized, certain program characteristics become permanent. For example, if a routine is specialized to process a given file type (e.g., Honeywell) in a given operating environment (e.g., foreground mode), these parameters are never changed. However, the parameters which characterize the structure of a given file (e.g., number of items per record, item length, etc.) may be modified at execution time with a control card. This parameter modification capability permits a routine to be specialized once and yet handle various formats of a given file type.

Several other processing options may be selected at specialization time. Card-to-Tape A and C and Tape-to-Punch A and C may perform a sequence check on a programmer-defined sequence field in each item. Items out of sequence will cause the routines to execute a special halt or typeout. Card-to-Tape A and C and Tape-to-Punch A and C also maintain a count of the number of cards processed. These routines provide a user own-code exit at the end of file. If desired, an end-of-file own-code routine may examine and manipulate the card count. All Data Conversion routines provide user own-code exits to allow data to be edited before it is converted to the output medium. The Card-to-Tape A and C exit occurs after each card is read but before the image is transferred to the output (tape) buffer. The Tape-to-Punch A and C exit occurs after each card image is read from the input tape and move to the punch buffer, but before the card is punched. Similarly, the Tape-to-Printer A and C exit occurs after each print image is moved to the output buffer, but before the line is printed.

The tape-to-printer routine user may bypass the printing of certain items in a file by defining a bypass condition in the library macro call. The bypass condition is the presence of a particular programmer-specified six-bit character in a programmer-specified position within an item. The macro call parameters defining the bypass condition may be modified on the control card at execution time, so that different items may be printed from the same file in different runs.

When printing IBM files, Tape-to-Printer A and C may include coding for automatically translating special IBM print characters to Honeywell print characters. In addition, provision is made for duplicating IBM channel skipping on the Honeywell Type 222 printers.

EQUIPMENT REQUIREMENTS

The tape-to-printer routine requires one Type 222 or 206 Printer and one Type 204B Tape Unit. The card-to-tape routine requires one card reader and one Type 204B Tape unit. The tape-to-punch routine requires one Type 227, 224, or 214 Card Punch and one Type 204B Tape unit.

A card reader must be available in order to utilize the control card option. The IBM Format Feature (050) and IBM Code Compatibility Feature (051) are necessary for processing IBM files.

For operation in the foreground mode, one read/write channel must be available to the Data Conversion C routine. A Type 201-0 processor must be equipped with the Program Interrupt Feature (012) in order to run a foreground program.

The exact memory sizes for the Data Conversion A and C routines vary with each specialization.

TAPE-TO-PRINTER A AND C FILE FORMATS

This section describes the three print files acceptable to the Tape-to-Printer A and C routine: Honeywell, IBM, and non-standard.

HONEYWELL FILE

Every Honeywell print file begins with a header label record and ends with a trailer label record. Data records may be:

1. Blocked or unblocked fixed-length; or

2. Variable-length.

Variable-length records are always bannered; the banner character is optional for fixed-length records. Each item in a Honeywell file contains a vertical spacing control character for the printer.

Honeywell Header Label Record

The header label record is the first record in a file. In addition to file identification data, the header label record contains parameters describing the file structure. If the specialized tape-to-printer routine does not include coding for parameter modification at execution time via a control card, the file structure parameters are extracted from the header label record of each file. If parameters are modified using a control card, the file structure parameters in the header label record are ignored. The contents of the Honeywell header label record are described below.

Characters 1-5:	Contain 1HDRΔ (octal 01 30 24 51 15), the standard Honeywell header label.
Characters 6-20:	Are not used.
Characters 21-30:	Contain the identifying name of the file.
Characters 31-40:	Are not used.
Characters 41-42:	Contain the item length in binary. These characters are irrelevant for a file of variable-length records.
Characters 43-44:	Contain the number of items per record in binary. These characters are irrelevant for a file of variable-length records.
Character 45:	Contains a record-type indicator- 00_8 = variable-length records 01_8 = fixed-length records
Characters 46-48:	Contain the length of the largest record in the file in binary.

Character 49:	Is not used.
Character 50:	Contains the length of the beginning-of-record control area, i.e., the number of characters preceding the first (vertical spacing) character of the first item in a record. As described below, this parameter is 00_8 for unbannered fixed-length records, 01_8 for bannered fixed-length records, and 04_8 for variable-length records.
Characters 51-76:	Are not used.
Character 77:	Contains 40_8, which identifies a print file.
Character 78:	Contains the number of vertical spacing control characters per item. This parameter must be at least 01; usually it is exactly 01.
Characters 79-80:	Contain the position within each item of the vertical spacing control character. As explained below, this parameter is usually 01_8 for fixed-length items and 03_8 for variable-length items.

Honeywell Data Records

There are two types of Honeywell print records: fixed-length and variable-length. A fixed-length record is defined as having a fixed number of fixed-length items. When the number of fixed-length items per record is one, the record is termed unblocked. When the number of fixed-length items per record is greater then one, the record is termed blocked. Honeywell fixed-length unblocked records (both bannered and unbannered) are illustrated in Figure 2-1. Honeywell fixed-length blocked records (both bannered and unbannered) are illustrated in Figure 2-2.

A variable-length record is defined as having a variable number of variable-length items. Although the number of variable-length items in a particular variable-length record may in fact be one, the definition of variable-length records precludes classifying these record types as blocked or unblocked. There are two other format differences between fixed-length and variable-length Honeywell print records. While fixed-length records may be bannered or unbannered, each variable-length record always begins with a banner character, followed by three characters containing a binary count of the total number of characters in the record. While each item in fixed-length record begins with a vertical spacing control character, items in variable-length records begin with two characters containing a binary count of the total number of characters in the item, followed by the vertical spacing control character. Honeywell variable-length records are illustrated in Figure 2-3.

C = Type 206 or 222 printer vertical spacing control character

Figure 2-1. Honeywell Fixed-Length Unblocked Records:
  a. Bannered
  b. Unbannered

C = Type 206 or 222 printer vertical spacing control character
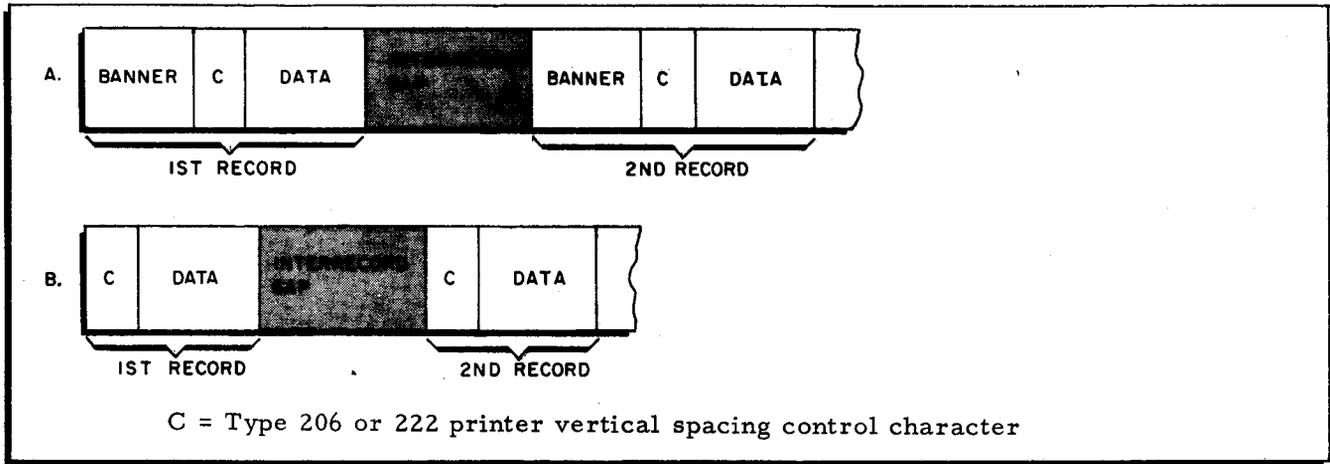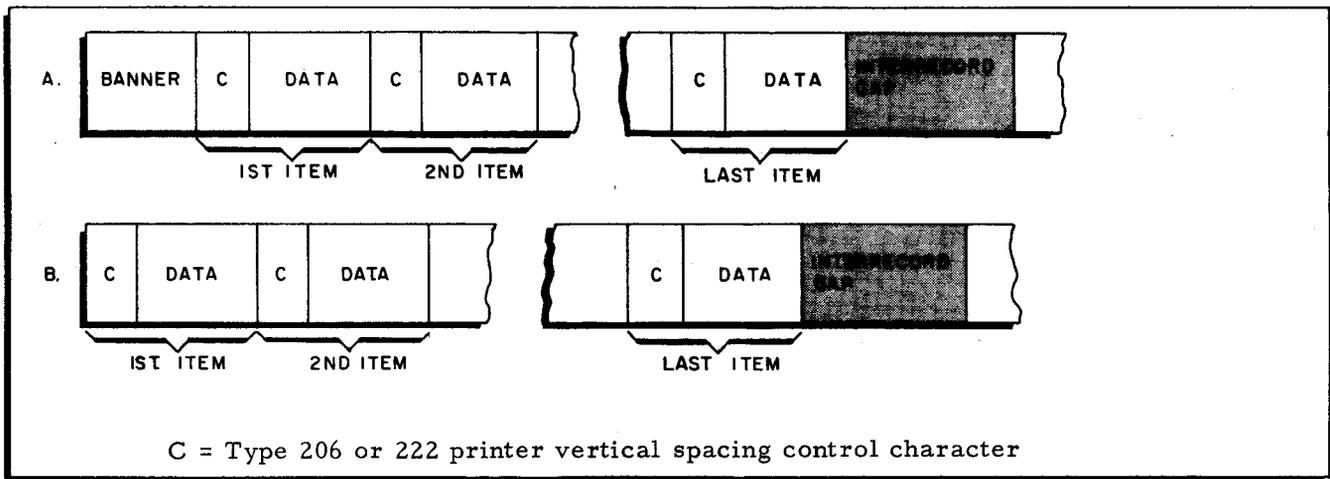
Figure 2-2. Honeywell Fixed-Length Blocked Records:
  a. Bannered
  b. Unbannered

rrr: Characters 2, 3, & 4 of each record contain the total number of characters in the record (binary).

ii : Characters 1 & 2 of each item contain the total number of characters in the item (binary).

C = Type 206 or 222 printer vertical spacing control character
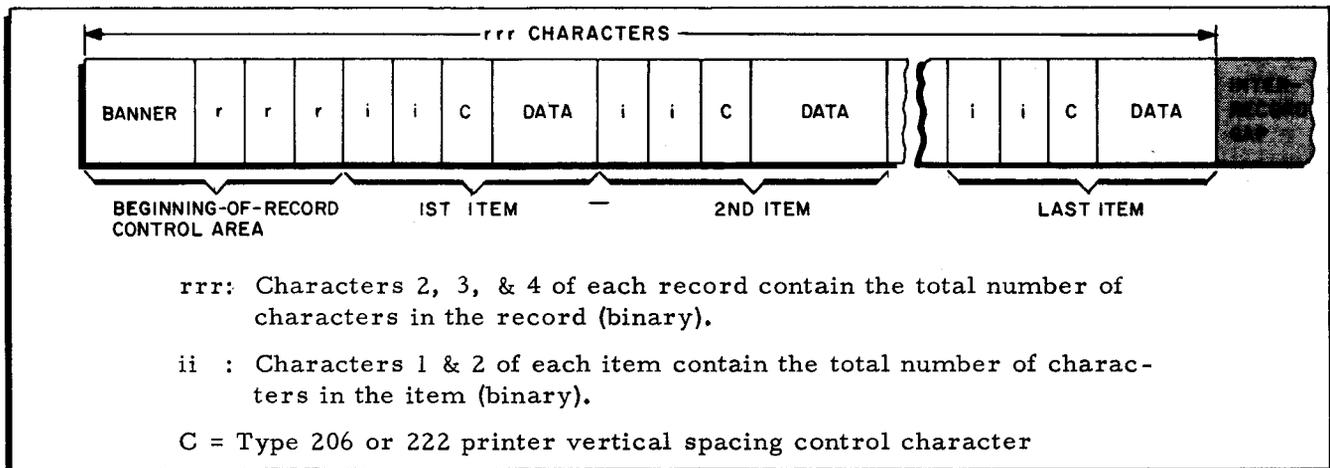
Figure 2-3. Honeywell Variable-Length Record

Honeywell Trailer Label Record

The trailer label record, which is not printed, is the last record of a Honeywell print file. The contents of the trailer label record are described below.

Characters 1-5:	Contain 1EOFΔ (octal 01 25 46 26 15), the standard Honeywell trailer label.
Characters 6-20:	Are not used.
Characters 21-30:	Contain the file name. The file name must be identical to that of characters 21-30 of the header label record.
Characters 31-80:	Are not used.

End-of-Recorded-Information Record

An end-of-recorded-information record must follow the trailer label record of the last file on tape. There must also be at least one record, usually a second ERI record, following the end-of-recorded-information record. The contents of the record are described below.

Characters 1-5:	Contain 1ERIΔ (octal 01 25 51 31 15).
Characters 6-80:	Are not used.

IBM FILE

Header and trailer label records are optional for an IBM print file. Data records may be fixed-length (blocked or unblocked) or variable-length. IBM records are always unbannered. The printer control character is optional for items in an IBM print file.

IBM Header Label Record

The header label record is optional. If present, header labels are always followed by an IBM tape mark (17_8), and the presence of tape marks must be indicated by the programmer in parameter #3 of the tape-to-printer macro call (see Section V). Unlike a Honeywell header label record, the IBM header label record contains no relevant file structure information. Parameters specific to the file structure are specified in the tape-to-printer macrocall at specialization time. If the macro call also selects the parameter modifying control routine to be included in the tape-to-printer routine, file structure parameters may be read from a control card at execution time. The actual contents of an IBM header label record are not processed by the tape-to-printer routine.

IBM Data Records

Like Honeywell records, IBM print records may be fixed-length (blocked or unblocked) or variable-length. If requested in the macro call parameter #29 (see Section V), special IBM print-image characters will be translated to corresponding Honeywell characters for proper printing on Honeywell equipment.

An IBM vertical spacing printer control character may appear as the first character of either a fixed-length or a variable-length item. When present, IBM printer control characters are automatically converted to corresponding Type 206 or 222 vertical spacing control characters. The IBM control character may specify vertical spacing according to channel punches in the carriage control paper tape for the printer. Tape-to-printer macro call parameters #12, 31, 32, 33, 34, and 35 provide compatibility with IBM channel skipping on the Type 222 printers (see Section V). (Channel skipping is not available on the Type 206 printer.)

If the items of an IBM print file do not contain vertical spacing control characters, macro call parameter #11 is used to specify fixed vertical spacing for all print items (see Section V). Note that the fixed vertical spacing parameter may be modified at execution time by means of the control card.

A variable-length IBM record does not begin with a record-length count. Neither do the variable-length items within the record begin with characters specifying the item length. Instead, each variable-length item, except the last item of the record, ends with an IBM record-mark character (72_8). IBM fixed-length unblocked records, fixed-length blocked records, and variable-length records are illustrated in Figure 2-4, 2-5, and 2-6, respectively.

C_i = Vertical spacing control character
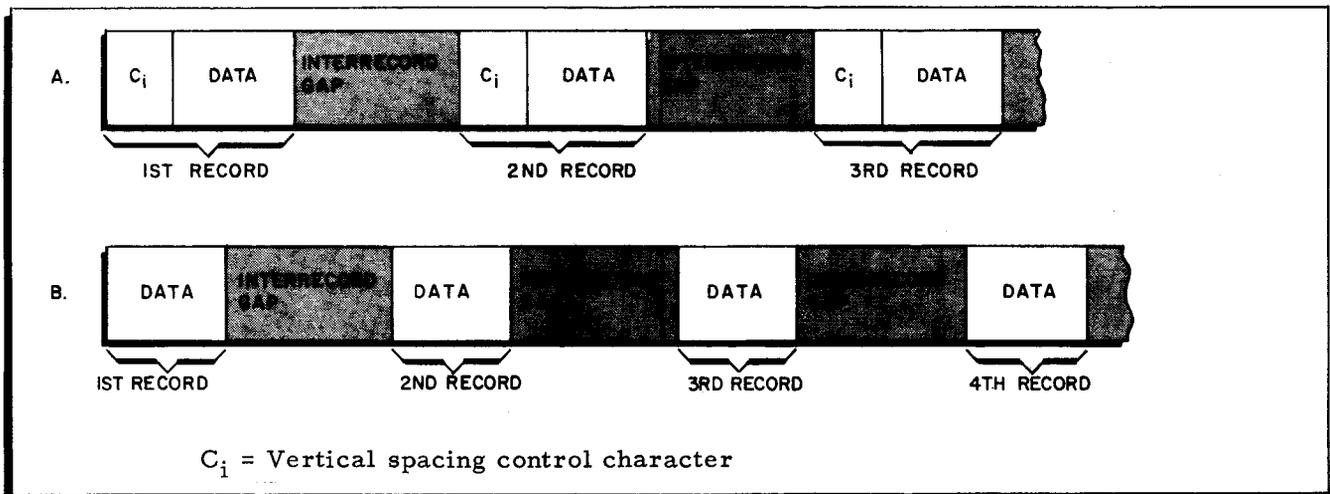
Figure 2-4. IBM Fixed-Length Unblocked Records
    a. With printer control character
    b. Without printer control character
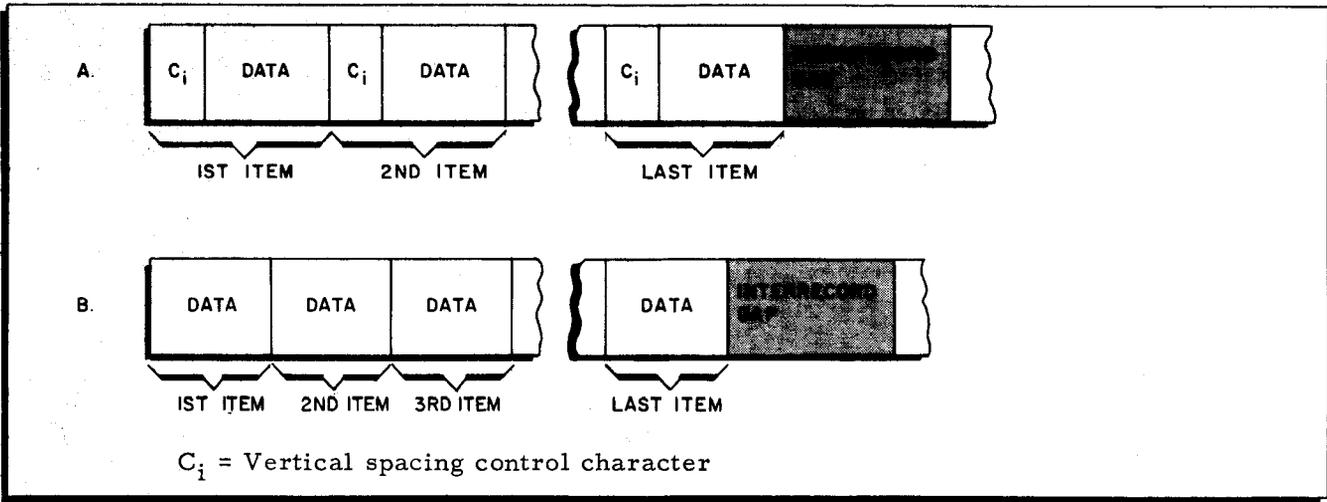
Figure 2-5. IBM Fixed-Length Blocked Record
a. With printer control characters
b. Without printer control characters
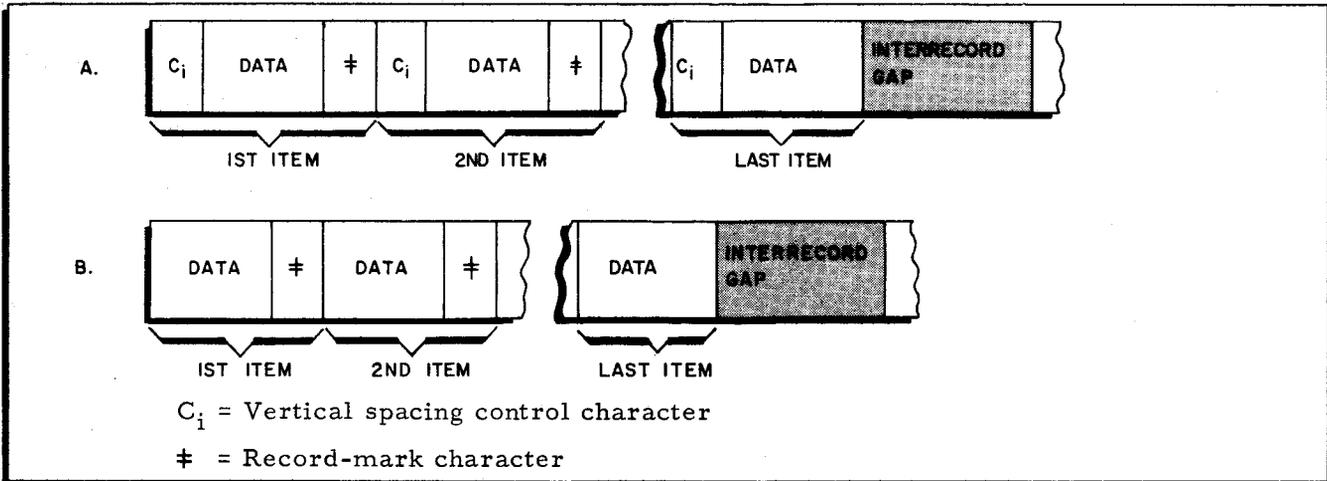
Figure 2-6. IBM Variable-Length Record
a. With printer control characters
b. Without printer control characters

IBM Trailer Label Record

The trailer label record is optional. If present, the trailer label is always immediately preceded by an IBM tape mark and immediately followed by a tape mark. The presence of tape marks must be indicated by the programmer in parameter #3 of the tape-to-printer macro call (see Section V). The contents of an IBM trailer label record are not processed by the tape-to-printer routine.

NON-STANDARD FILE

A non-standard file is one that does not conform to either Honeywell or IBM file standards, for example, a card-image file which is to be printed by the tape-to-printer routine.

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Non-standard files may contain only fixed-length data records, i.e., each record must contain a fixed number of fixed-length items. Items of a non-standard file may not contain a vertical spacing control character for the printer. Therefore, the vertical spacing of non-standard print items is regulated by the fixed vertical spacing parameter in the tape-to-printer macro call, as described for IBM records. Note again that the fixed spacing parameter is subject to modification at execution time via the control card.

Header and trailer label records are optional for non-standard files. When these records are present, their contents are not processed by the tape-to-printer routine.

FILE SUMMARY TABLE

Table 2-1 summarizes the elements of Honeywell, IBM, and non-standard files.

Table 2-1. Summary of Tape-to-Printer A and C File Structures

	HONEYWELL FILE		IBM FILE		NON-STANDARD FILE
	Fixed-Length	Variable-Length	Fixed-Length	Variable-Length	Fixed-Length
Header and Trailer labels	S	S	O	O	O
Banner character	O	S	N	N	N
Vertical print control character[1]	S	S	O	O	N
Record-count characters[2]	N	S	N	N	N
Item-count characters[3]	N	S	N	N	N
Record-mark character[4]	N	N	N	S	N
Tape-mark records[5]	N	N	O	O	N

Key

S = standard
O = optional
N = never present

Notes

1. One/item.
2. Three/record.
3. Two/item.
4. One/item except last item.
5. Follow header label record; follow and precede trailer label record.

SECTION III

CARD-TO-TAPE A AND C FILE FORMATS

This section describes the three types of card-image files generated by the Card-to-Tape A and C routine: Honeywell, IBM, and non-standard.

HONEYWELL CARD-IMAGE FILE

Every Honeywell card-image file begins with a header label record and ends with a trailer label record. The data records are fixed-length (blocked or unblocked) and may contain an optional banner character. One or more control characters may be appended to each item on the card-image tape. The mode of card reading and the error status of the constituent card images are recorded for each item in the first control character, if present. Additional control characters, if added, are of no consequence to Card-to-Tape A and C.

Honeywell Card-Image Header Label Record

The first card in a Honeywell punched-card file is the header card. An image of the header card is written on tape as the 80-character header label record. The contents of the header card and the associated header label record are listed below.

Characters 1- 5:	Contain 1HDRΔ (octal 01 30 24 51 15), the standard Honeywell header label.
Characters 6-20:	Are irrelevant to Card-to-Tape A and C.
Characters 21-30:	Contain the identifying name of the file.
Characters 31-80:	Are irrelevant to Card-to-Tape A and C.

Honeywell Card-Image Data Records

Data cards are converted to fixed-length, card-image records. A fixed-length record is defined as having a fixed number of fixed-length items. When the number of fixed-length items per record is one, the record is termed unblocked. When the number of fixed-length items per record is greater than one, the record is termed blocked. The length of an item is not constrained by the physical size of a punched card. Items in a particular file may contain more than one card image. Because Honeywell files always contain header and trailer label records, the length of each card image on tape must be at least 80 characters. Figures 3-1 and 3-2 illustrate unblocked records with a single card image per item and more than one card image per item, respectively. Figures 3-3 and 3-4 illustrate blocked records with a single card image per item and more than one card image per item, respectively.

NOTES:
1. An optional banner character may precede Honeywell records.
2. One or more optional control characters may be appended to each item.
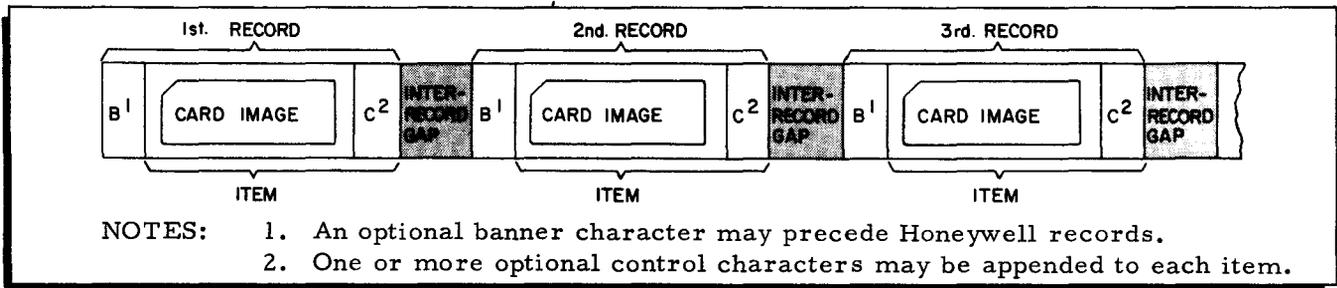
Figure 3-1. Honeywell Unblocked Data Records With One Card Image Per Item

NOTES:
1. An optional banner character may precede Honeywell records.
2. One or more optional control characters may be appended to each item.
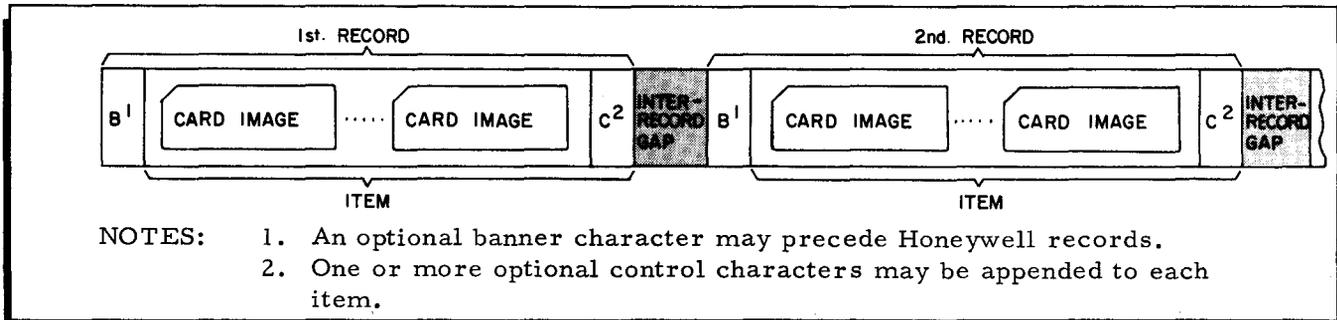
Figure 3-2. Honeywell Unblocked Data Records With More Than One Card Image Per Item

NOTES:
1. An optional banner character may precede Honeywell records.
2. One or more optional control characters may be appended to each item.
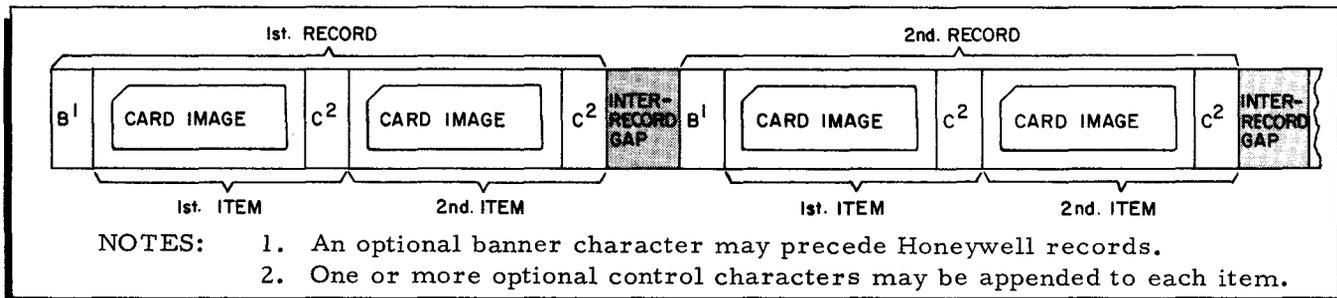
Figure 3-3. Honeywell Blocked Data Records With One Card Image Per Item

NOTES:
1. An optional banner character may precede Honeywell records.
2. One or more optional control characters may be appended to each item.
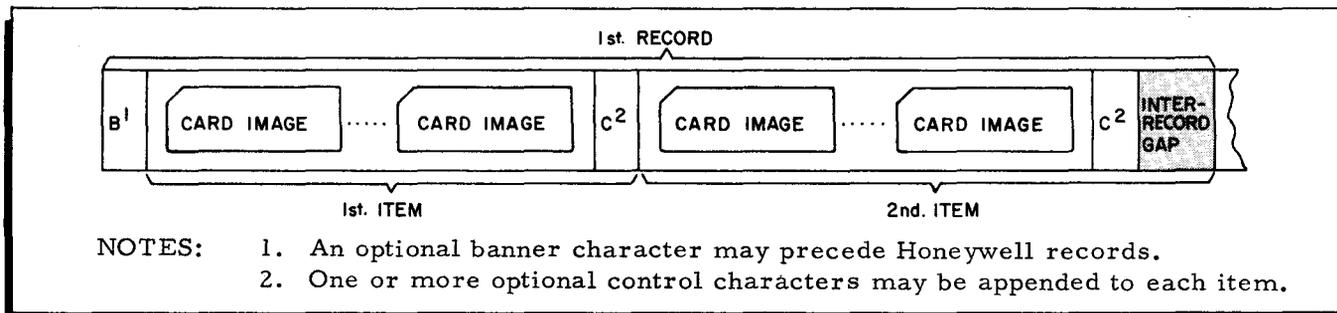
Figure 3-4. Honeywell Blocked Data Record With More Than One Card Image Per Item

File structure parameters are specified either in the card-to-tape routine macro call or on a control card at execution time. Honeywell card-image records may be bannered or un-bannered. The banner character to precede each record may be defined by the programmer in a macro call parameter. By means of another parameter, the programmer may request Card-to-Tape A and C to append a control character to each item of the generated card-image tape. The six-bit control character contains card-reading mode[1] and error information, as follows.

Bits 1-2:   Reflect the mode of card images in the item.
                                   01 = transcription mode
                                   10 = normal mode, standard code
                                   11 = normal mode, special code

Bits 3-4:   Unused.

Bits 5-6:   Reflect the error status of card images in the item.
                                   01 = One or more cards were read with an illegal
                                        punch error.
                                   10 = One or more cards were read with a hole
                                        count error.
                                   11 = All cards were read without error.

When the specialized card-to-tape routine includes coding for modifying parameters on a control card, up to eight additional control characters for each item may be appended after the first control character described above. Card-to-Tape A and C neither determines nor manipulates the contents of these additional control characters. Note that the length of an item on tape includes control characters.

Honeywell Card-Image Trailer Label Record

The last card in a Honeywell punched card file is the trailer card. An image of the trailer card is written on tape as the 80-character trailer label record. The card-to-tape routine maintains a decimal count of the number of cards converted in each file. The card count is incorporated into the trailer label record in addition to the information punched in the trailer card. Note that a user own-code routine at end of file, which is described in Section VI, may store or alter the card count before the trailer label record is written. The contents of the trailer label record are described below.

Characters 1- 5:   Contain 1EOFΔ (octal 01 25 46 26 15), the standard
                         Honeywell trailer label.

Characters 6-10:   Are irrelevant to Card-to-Tape A and C.

Characters 11-20:   ·   Contain the decimal number of cards in the file.
                         Note that this field is generated by Card-to-
                         Tape A and C and is not punched in the trailer card.

---
[1] The mode of card reading may not vary within a given file.

Characters 21-30:	Contain the file name. The file name must be identical to that of characters 21-30 of the header label record.
Characters 31-80:	Are irrelevant to Card-to-Tape A and C.

End-of-Recorded-Information Record

An ERI card must not appear in a Honeywell input deck for Card-to-Tape A and C. The number of files in the input deck is a required parameter for the routine. As soon as this number of files has been converted, Card-to-Tape A and C generates an 80-character end-of-recorded information record on tape. The contents of the end-of-recorded-information record are given below.

Characters 1- 5:	Contain 1ERIΔ (octal 01 25 51 31 15)
Characters 6-80:	Are irrelevant to Card-to-Tape A and C.

End-of-Reel Record

Card-to-Tape A and C may continue generating a Honeywell card-image file on a second output reel, if the end of the first reel is encountered. At the end of the first output reel, the routine writes an end-of-reel record followed by an ERI record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are:

Characters 1- 5:	Contain 1EORΔ (octal 01 25 46 51 15)
Characters 6-80:	Are irrelevant.

IBM CARD-IMAGE FILE

An IBM card-image file may be created with or without header and trailer label records. The data records are fixed-length (blocked or unblocked) and unbannered. Optional control characters, which are recommended for Honeywell files, may also be appended to items in IBM files.

IBM Card-Image Header Label Record

If headers and trailers are requested in the card-to-tape macro call, the first card in the file is written on tape as the header label record, whose length is determined by macro call parameter #10 (card length, see Section VI). When created, header labels must be followed by an IBM tape mark (17_8), which is requested via parameter #3 of the card-to-tape macro call (see Section VI). The actual contents of an IBM header card are irrelevant to Card-to-Tape A and C.

IBM Card-Image Data Records

Like Honeywell records, IBM card-image records are fixed-length blocked or fixed-length unblocked. Each item in an IBM record may contain more than one card image. The card image length for each file may be regulated by the programmer. For example, Card-to-Tape A and C

may create an IBM card-image file in which each item contains three 40-character card images (i.e., only 40 columns of each card are read and converted).

File structure parameters are specified either in the card-to-tape macro call or on a control card at execution time. The capability of adding control characters to each item on tape, which is described above for Honeywell files, is also available for IBM card-image files. Note that control characters must be included in the item length. Figures 3-5 and 3-6 illustrate unblocked records with a single card image per item and more than one card image per item, respectively. Figures 3-7 and 3-8 illustrate blocked records with a single card image per item and more than one card image per item, respectively.

IBM Trailer Label Record (and/or Trailer Card)

Each IBM punched card file must terminate with a trailer card which identifies the end of file. Unlike a standard Honeywell trailer card, an IBM trailer card contains a programmer-specified trailer code. The trailer code, which is punched in columns 1 through 6, is defined in macro call parameter #11 and may be changed for each file on a control card. It is essential that no card other than the trailer card contain the trailer code in the first six columns.

If macro call parameter #2 requests headers and trailers, an image of the trailer card is written on tape as the trailer label record. Tape mark records must precede and follow the trailer label record; this is accomplished via parameter #3.

End-of-Recorded-Information Record

An ERI card must not appear in an IBM input deck for Card-to-Tape A and C. The number of files in the input deck is a required parameter for the routine. As soon as this number of files has been converted, Card-to-Tape A and C generates an end-of-recorded information record on tape. The composition of this record is described above for Honeywell files.
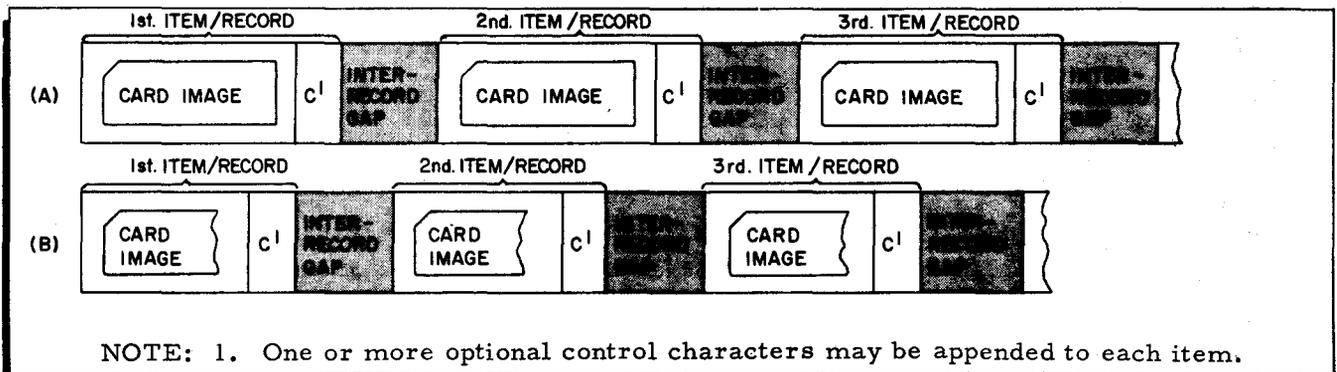
Figure 3-5. IBM Unblocked Data Records With One Card-Image Per Item
(a) 80-column images
(b) less than 80-column images

Figure 3-6. IBM Unblocked Data Records With More Than One Card Image Per Item
(a) 80-column images
(b) less than 80-column images.

Figure 3-7. IBM Blocked Data Records With One Card Image Per Item
(a) 80-column images
(b) less than 80-column images

Figure 3-8. IBM Blocked Data Records With More Than One Card Image Per Item
(a) 80-column images
(b) less than 80-column images

<u>End-of-Reel Record</u>

Card-to-Tape A and C may continue generating an IBM card-image file on a second output reel, if the end of the first reel is encountered. At the end of the first output reel, the routine writes an end-of-reel record surrounded by tape-mark records, followed by an additional readable record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are described above for Honeywell files.

<u>NON-STANDARD CARD-IMAGE FILE</u>

A non-standard file is defined as a card-image file which does not conform to either Honeywell or IBM file standards. Card-to-Tape A and C may generate non-standard files with either blocked or unblocked fixed-length records. A programmer-defined trailer card, which is described above for IBM files, must signal the end of each file in the input deck.

An ERI card must not appear in a non-standard input deck for Card-to-Tape A and C. The number of files in the input deck is a required parameter for the routine. As soon as this number of files has been converted, Card-to-Tape A and C generates an 80-character end-of-recorded information record on tape. The composition of this record is described above for Honeywell files.

Card-to-Tape A and C may continue generating a non-standard card-image file on a second output reel, if the end of the first reel is encountered. At the end of the first output reel, the routine writes an end-of-reel record followed by an additional readable record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are described above for Honeywell files.

Header and trailer label records, tape marks, banner characters and control characters are optional for non-standard files. File structure parameters are specified either in the card-to-tape macro call or on a control card at execution time.

SECTION IV
TAPE-TO-PUNCH A AND C FILE FORMATS

This section describes the three types of punch-image files which are acceptable to the Tape-to-Punch A and C routine: Honeywell, IBM, and non-standard.

HONEYWELL PUNCH-IMAGE FILE

Every Honeywell punch-image file begins with a header label record and ends with a trailer label record. The data records are fixed-length (blocked or unblocked) and may contain an optional banner character. One or more control characters may follow the data characters within each item. If present, the first control character automatically sets the punching mode. Additional control characters are of no consequence to Tape-to-Punch A and C.

Honeywell Punch-Image Header Label Record

The header label record is the first record in a Honeywell punch-image file. In addition to file identification data, the header label record contains parameters describing the file structure. If the specialized tape-to-punch routine does not include coding for parameter modification at execution time via a control card, the file structure parameters are extracted from the header label record of each file. If parameters are modified using a control card, the file structure parameters in the header label record are ignored. The Honeywell punch-image header label record must be constructed as follows.

Characters 1- 5:	Contain 1HDRΔ (octal 01 30 24 51 15), the standard Honeywell header label.
Characters 6-20:	Are not used by Tape-to-Punch A and C.
Characters 21-30:	Contain the identifying name of the file.
Characters 31-40:	Are not used by Tape-to-Punch A and C.
Characters 41-42:	Contain the item length in binary. (Item length includes control characters.)
Characters 43-44:	Contain the number of items per record (in binary).
Character 45:	Contains 01_8, which signifies that the file consists of fixed-length records.
Characters 46-48:	Contain the number of characters in each record (in binary).
Character 49:	Is not used by Tape-to-Punch A and C.
Character 50:	Contains the length of the beginning-of-record control area, i.e., the number of characters preceding the first data character in a record. This parameter is 00_8 for unbannered files and 01_8 for bannered files.

Characters 51-76:	Are not used by Tape-to-Punch A and C.
Character 77:	Contains 41_8, which identifies a card-image file.
Character 78:	Contains the number of control characters in each item.
Characters 79-80:	Contain the position within each item of the first control character (when character 78 ≠ 00_8). Since control characters follow the data characters in an item, this parameter is numerically equal to the item length (characters 41-42) minus the number of control characters (character 78), plus one.

Honeywell Punch-Image Data Records

Honeywell punch-image data records are identical in format to the Honeywell card-image data records described in Section III and illustrated in Figures 3-1 through 3-4. The salient structural properties of such data records are reiterated here.

1.   Records are fixed-length, either blocked or unblocked.

2.   Records may be bannered or unbannered.

3.   One item may comprise several card images.

4.   The length of card images on tape (i.e., the length of the punch buffer) must be at least 80 characters, since header and trailer labels are present.

5.   Each item may include up to nine control characters immediately following the data characters.

If a Honeywell file contains control characters and the tape-to-punch routine is executed as an independent or foreground program, the first control character automatically conditions the card punch. Only the two high-order bits of the first control character determine the punching mode; the four low-order bits are irrelevant to the routine. The significance of the two high-order bits of the first control character is:

01 = transcription mode
10 = normal mode, standard code
11 = normal mode, special code.

The mode of card punching cannot vary within a file. However, standard and special codes may be intermixed for normal mode punching. Tape-to-Punch A and C is insensitive to any control characters after the first.

Honeywell Punch-Image Trailer Label Record

The trailer label record is the last record of a Honeywell punch-image file. The contents of the trailer label record are described below.

| Characters 1- 5: | Contain 1EOFΔ (octal 01 25 46 26 15), the standard Honeywell trailer label. |
| Characters 6-20: | Are not used. |

Characters 21-30:   Contain the file name. The file name must be
                           identical to that of characters 21-30 of the header
                           label record.

Characters 31-80:   Are not used.

End-of-Recorded-Information Record

An end-of-recorded-information record must follow the trailer label record of the last file on tape. There must also be at least one record, usually a second ERI record, following the end-of-recorded-information record. The contents of this record are described on page 3-4.

End-of-Reel Record

Tape-to-Punch A and C may process a Honeywell punch-image file which is continued from the first input reel to a second reel. At the end of the first input reel, there must be an end-of-reel record followed by an ERI record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are described on page 3-4.

IBM PUNCH-IMAGE FILE

Tape-to-Punch A and C accepts IBM punch-image files with or without header and trailer label records. The data records are fixed-length (blocked or unblocked) and unbannered. Like Honeywell files, IBM punch-image files may contain control characters in each item.

IBM Punch-Image Header Label Record

The header label record is optional. If present, header labels are always followed by an IBM tape mark (17_8), and the presence of tape marks must be indicated by the programmer in parameter #3 of the tape-to-punch macro call (see Section VII). Unlike a Honeywell header label record, the IBM header label record contains no relevant file structure information. Parameters specific to the file structure are specified in the tape-to-punch macro call or on a control card at execution time. The actual contents of an IBM header label record are not processed by the tape-to-punch routine. It is punched as an 80-character card.

IBM Punch-Image Data Records

IBM punch-image data records are identical in structure to the IBM card-image data records described in Section III and illustrated in Figures 3-5 through 3-8. Punch-image records must be fixed-length, either blocked or unblocked. Each item in an IBM record may contain more than one card image. If the IBM file has header and trailer label records, the length of each card image on tape must be 80 characters. However, if the file does not have header and trailer label records, each card image may be less than 80 characters in length.

Tape-to-Punch A and C accepts IBM files in which each item contains control characters. File structure parameters are specified either in the tape-to-punch macro call or on a control card at execution time. The item length parameter must account for control characters, if present.

IBM Punch-Image Trailer Label Record or Terminating Record

If an IBM punch-image file has a header label record, a trailer label record is used to mark the end of file. The trailer label record must be an 80-character record surrounded by tape marks. The contents of such a record are immaterial. It is punched as an 80-character card. If header and trailer labels are absent, the programmer must define a terminating record to identify the end-of-file. The terminating record contains a programmer-defined trailer code in characters 1 through 6. The trailer code is specified in macro call parameter #11 and may be modified on a control card for each file. Again, the caution that no record except the bona fide terminating record must begin with the trailer code is obvious.

End-of-Recorded-Information Record

An end-of-recorded-information record is not necessary to identify the end of conversion data on tape. As explained in Section VII, the number of files on the input tape is a required parameter for Tape-to-Punch A and C. An attempt to process more than this number of files causes automatic termination of the tape-to-punch routine. The presence or absence of an ERI record is irrelevant to Tape-to-Punch A and C.

End-Of-Reel Record

Tape-to-Punch A and C may process an IBM punch-image file which is continued from the first input reel to a second reel. At the end of the first input reel, there must be an end-of-reel record which is surrounded by tape-mark records, followed by an additional readable record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are described on page 3-4.

NON-STANDARD PUNCH-IMAGE FILE

A non-standard file is defined as a punch-image file which does not conform to either Honeywell or IBM file standards. Tape-To-Punch A and C accepts non-standard files with either blocked or unblocked fixed-length records. The end of each file on tape is delineated by a programmer-defined terminating record, which is described above for IBM files. The number of files on the input tape is a required parameter for Tape-to-Punch A and C. For non-standard files, this parameter eliminates the need for an end-of-recorded information record. However, an input tape containing an ERI record is still acceptable, as processing terminates when the specified number of files have been punched. Header and trailer label records, tape marks, banner characters, and control characters are optional for non-standard files. File

structure parameters are specified either in the tape-to-punch macro call or on a control card at execution time.

Tape-to-Punch A and C may process a non-standard punch-image file which is continued from the first input reel to a second reel. At the end of the first input reel, there must be an end-of-reel record followed by an additional readable record. A halt for mounting the second tape is provided. The contents of the end-of-reel record are described on page 3-4.

SPECIALIZING THE TAPE-TO-PRINTER ROUTINE

Before assembly, Tape-to-Printer A and C is specialized according to the file type to be processed and the intended operating environment. As mentioned in the Introduction, either Library Processor B or Library Processor C may be used to specialize the routine. The tape-to-printer macro call is described in this section.

PROGRAM HEADER CARD

For operation as a Simultaneous Media Conversion A or C coroutine, Tape-to-Printer A and C is specialized without a program header (PROG) card and is incorporated into the Simultaneous Media Conversion package before assembly.

For operation as an independent or foreground program, the routine is specialized and assembled as a unique program whose name is assigned by the user. Therefore at specialization time, the macro instruction to the library processor must be preceded by a program header card, prepared as described in the appropriate Easycoder operating procedures.

TAPE-TO-PRINTER MACRO INSTRUCTION (CALL)

The macro call for Tape-to-Printer A and C is coded as follows:

EASYCODER
CODING FORM

PROBLEM _____ PROGRAMMER _____ DATE ____ . _____ PAGE ____ OF ____

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS
1		C	(tag)	$TPPRT	fmt, hdr, tpmrk, par, nfl, iln, ni, byp, byc, lln, fxd,
2		C			cc, efl, pcu, mda, adm, org, rwc/dv, xrwc, prpcu, tupcu,
3		C			tapadr, pfx, own-code, bl, admi, cntrl, crcu, trnsl, brca,
4		L			chan2, chan9, chan10, chan11, chan12,

Detailed descriptions of macro instructions, including the use of continuation cards, omission of parameters, and line numbering, may be found in Easycoder A Assembly System, Easycoder B Assembly System, and Library Processors C and D.

The function, application, and coding of each of the macro call parameters abbreviated above is described in the following text. Parameters preceded by an asterisk (*) may be modified by means of a control card when parameter #27 selects the control card routine. Once specialized, all other parameters and the resultant tape-to-printer coding are invariant. After the description, a summary of all parameters is presented in Table 5-2.

Parameter #1: File Format (flfmt)

This parameter selects one of the three basic file formats to be processed by the routine. An H is coded for Honeywell files, an I is coded for IBM files, and the parameter value is omitted for non-standard files.

Parameter #2: Header Labels (hdr)

An H is coded if the first record in the file is a header label record. When the presence of header labels is indicated, the routine also assumes that trailer labels are present. This parameter value is omitted when header labels are not present in the file. Note that for Honeywell files, this parameter is always H. When this parameter is H for IBM files, parameter #3 must be T (see below).

Parameter #3: Tape-Mark Records (tpmrk)

For IBM and non-standard files, a T is coded if tape-mark records follow the header label and surround the trailer label. A parameter value is omitted when tape marks are not present in the file.

*Parameter #4: Parity (par)

An O (letter) is coded when the print file is written with odd parity. An E is coded for even parity.

*Parameter #5: Number of Files (nfl)

Two decimal digits (01-99) are coded to specify the number of files on the input tape. Omission of a parameter value implies that one file is present on the input tape.

*Parameter #6: Item Length (iln)

Three decimal digits (001-999) are coded to specify the number of characters in each item (fixed-length items only). For variable-length items, this parameter is omitted. For all Honeywell files, this parameter is also omitted, since the item length appears in the header label of each fixed-length-record file.

*Parameter #7: Number of Items (ni)

Two decimal digits (01-99) are coded to specify the number of items per record (fixed-length records only). For variable-length records, this parameter is omitted. For all Honeywell files, this parameter is also omitted, since the item length appears in the header label of each fixed-length-record file.

*Parameter #8: Bypass Position (byp)

If the item bypass option is selected, three decimal digits (001-999) are coded to specify the character position within each item which will be tested for the bypass character by the tape-to-printer routine. If, upon testing, this character position is found to contain the bypass character specified in parameter #9, the item is not printed. When the bypass option is not desired, this parameter is omitted.

*Parameter #9: Bypass Character (byc)

When the bypass option is selected, any six-bit alphanumeric character may be coded for this parameter to designate the bypass character. Detection of the bypass character in the bypass position (parameter #8) of an item causes the item to be exempted from printing.

*Parameter #10: Line Length (lln)

Three decimal digits (001-132) are coded to specify the maximum character length of each printed line. Omission of a parameter value implies a line length of 120 characters. When item length exceeds line length, lines of maximum length are printed single-spaced for the item, until the last line of the item is printed. After printing of the item is completed, normal vertical spacing is executed according to either a control character within the item or parameter #11.

*Parameter #11: Fixed Spacing (fxd)

This parameter causes a fixed vertical spacing to be executed for all items of a file, instead of executing vertical spacing according to a printer control character at the beginning of each item. If fixed spacing is desired, the Hollerith code for a Type 222 printer control character is coded for this parameter. Type 222 printer control characters (PDT control character C3) are listed in Table 5-1.

As an example, the Type 222 control character 22_8 specifies skipping to head of form if end of form is sensed, and otherwise spacing two lines. The macro call parameter for such a fixed spacing would be coded B, the Hollerith equivalent of 22_8. The most frequently coded values for fixed spacing parameters are listed below.

Fixed Spacing	Parameter #11 (Hollerith)
Print, skip to head of form if end of form is sensed, otherwise space:	
1 line	A
2 lines	B
3 lines	C
4 lines	D
5 lines	E
6 lines	F
7 lines	G
8 lines	H
9 lines	I

Fixed Spacing	Parameter #11 (Hollerith)

Print and space:

1 line	1
2 lines	2
3 lines	3
4 lines	4
5 lines	5
6 lines	6
7 lines	7
8 lines	8
9 lines	9

Table 5-1. Line Spacing Characters for Type 222 Printers

Control Character C3 Configuration	Interpretation
00nnnn[1]	Print, then space the number of lines specified by nnnn (0-15).
01nnnn[1]	Print, then space to channel one of the format tape (HOF), if channel two of the format tape (EOF) is sensed; otherwise, space the number of lines specified by nnnn (0-15).
11nnnn[1]	Do not print; space the number of lines specified by nnnn (0-15).
100xxx	Print, then space to channel xxx.
101xxx	Do not print; space to channel xxx.
000[2]	Channel 3
001[2]	Channel 4
010[2]	Channel 5
011	Channel 1 (Head of form)
100[2]	Channel 6
101[2]	Channel 7
110[2]	Channel 8
111	Channel 1 (Head of form)

[1] For the Type 206 printer, nnnn may not be 0000.

[2] Not available with the Type 206 printer.

When a value is coded for this parameter, the specified fixed spacing overrides the printer control character in each item, if present. If fixed spacing is not desired, this parameter is omitted, and it is assumed that each item in the file contains a printer control character. When the items in a file (IBM or non-standard) do not contain printer control characters, this parameter must be specified.

Parameter #12: Carriage Control Compatibility (cc)

For IBM files only, a C is coded for this parameter value when simulation of IBM channel skipping is desired. The resultant coding translates those IBM printer control characters which specify channel skipping to Honeywell control characters which cause skipping to the same channel punch. Note that an IBM control character which specifies skipping to a punch in channel 2, 9, 10, 11, or 12 of the carriage control tape cannot be translated to a corresponding Honeywell control character. For such a case, each IBM channel in the group 2, 9, 10, 11, and 12 for which channel skipping is specified must be assigned a corresponding Honeywell channel number. The equivalent Honeywell channel number may be 1 (head of form), 3, 4, 5, 6, 7, or 8. A Type 222 carriage control tape is prepared, such that for every punch in the IBM tape in channel 2, 9, 10, 11, or 12, there is a punch in the equivalent Honeywell channel at the same tape position. The Honeywell equivalents of IBM channels 2, 9, 10, 11, and 12 are defined in macro call parameters #31, 32, 33, 34, and 35, respectively.

For example an IBM printer control character might specify skipping to the punch in IBM channel 2, which in turn might be line 50 on a printer form. Parameter #31 assigns IBM channel 2 a Honeywell equivalent, say channel 3 on the Type 222 paper tape loop. The programmer prepares a Type 222 carriage control paper tape in which channel 3 contains a punch at line 50 of the printer form. The carriage control simulation coding summoned by parameter #12 will translate the IBM character specifying skipping to channel 2 to a Honeywell character specifying skipping to channel 3.

Parameter #13: End-of-File Action (efl)

This parameter determines the action taken by the routine after processing each file. If an S is coded, the routine halts at the end of file. If a T is coded, the routine types END FILE t at the console typewriter (where t=logical number of the input tape) and stalls awaiting further instructions. If the type-and-stall procedure is selected, parameter #14 is used to specify the output address of the console typewriter. If a value for parameter #13 is omitted, all files are processed without intervention. The operating procedures associated with each end-of-file action are described in Section VIII.

Parameter #14: Typewriter Control Address (pcu)

If parameter #13 is T, this parameter must specify the output address of the peripheral control (two octal digits) for the Type 220-1, -2, or -3 console typewriter. If parameter #13 is not T, this parameter is omitted.

Parameter #15: Operating Mode (mde)

This parameter selects one of the operating environments described in the Introduction. To specialize the routine for operation as a foreground program, an F is coded for this parameter. An I is coded for operation as an independent program. An S is coded for operation as a Simultaneous Media Conversion A or C coroutine.

Parameter #16: Address Mode (adm)

For operation as an independent or foreground program (when parameter #15 is F or I), the digit 2, 3, or 4 is coded to specify the address mode in which the routine will be assembled. For operation as a coroutine (parameter #15 is S), this parameter is omitted.

Parameter #17: Origin (org)

For operation as an independent or foreground program, a decimal or symbolic main memory address is coded to specify the program origin of the routine (exactly as in the assembly language ORG statement). For operation as a coroutine, this parameter is omitted, as the origin is specified in the control routine of the Simultaneous Media Conversion package.

Parameter #18: Read/Write Channel (rwc/dv)

One digit (e.g., 1, 2, or 3) is coded for this parameter to indicate the read/write channel to be used by the routine. Note that for operation in the Simultaneous Media Conversion environment, the RWC number is identical to the device code for the printer (e.g., device 1 uses RWC 1).

Parameter #19: Extra Read/Write Channel (xrwc)

This parameter is coded when the routine operates in the independent mode (parameter #15 is I); it is omitted when the routine operates in any other mode. One digit (e.g., 1, 2, or 3) is coded to specify an extra read/write channel. The extra RWC is used to overlap input tape reading with the printing which is executed via the channel specified in parameter #18.

Parameter #20: Printer PCU Address (prpcu)

The address of the printer control, two octal digits, is coded for this parameter.

Parameter #21: TCU Address (tupcu)

The input address of the tape control for the input tape, two octal digits, is coded for this parameter.

*Parameter #22: Tape Address (tapadr)

This parameter is coded when the routine operates in the independent or foreground mode;

it is omitted when the routine operates as a coroutine. One octal digit (0-7) is coded to specify the logical address of the input tape.

Parameter #23: Symbolic Tag Prefix (pfx)

Three alphanumeric characters are coded for this parameter to provide a unique prefix for all symbolic tags within the specialized tape-to-printer routine. Note that when two or more tape-to-printer routines are specialized to run together as Simultaneous Media Conversion coroutines, each routine must use a different prefix for its symbolic tags.

Parameter #24: Own-Code Exit (own-code)

This parameter is coded when the programmer desires the tape-to-printer routine to exit to a user own-code routine each time an item is moved to the print buffer. The exit is made before the item is printed. When own-coding is not used, this parameter is omitted. A decimal address or symbolic tag, specifying the starting address of the own-code routine, is coded for this parameter. The same address is coded in the location field of the first instruction of the own-code routine.

Own-coding must be inserted after the program header card, immediately preceding the tape-to-printer macro instruction. An own-code routine must contain an ORG statement to set the program origin for the combined own-code and tape-to-printer routine.

> NOTE: When own-coding is included, the origin parameter (#17) for the tape-to-printer routine must be coded with the self-reference symbol (*).

A user's own-code routine must provide a return to the tape-to-printer routine and must also calculate the address of the print buffer, which is unknown until the tape-to-printer routine is assembled. The own-coding exit is accomplished by branching to the address specified in parameter #24. Following the branch instruction in the tape-to-printer routine is a NOP instruction whose A address contains the address of the print buffer. To provide a return and to determine the address of the print buffer, an own-code routine might contain the coding suggested below. Within the tape-to-printer routine, location CM is equated to the character addressing mode in which the routine is assembled, as specified in parameter #16 (2, 3, or 4). Location BUFAD will contain the address of the leftmost character in the print buffer.

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1				ORG	(program origin)	
2			(owncode)	SCR	EXIT+CM,70	owncode is parameter #24
3				SCR	TAG+CM,70	CM is equated to admode (parameter #16)
4				BA	CMC,TAG+CM	
5			TAG	MCW	0,BUFAD	
6			〉	〉	〉	
7			EXIT	B	0	return to tape-to-printer
8			BUFAD	DSA	0	
9			CMC	DSA	CM	

Parameter #25: Buffer Length (bl)

This parameter, coded as a decimal number, specifies the number of buffer locations required to accommodate the largest record in any file which will be processed by the routine.

> NOTE: For processing fixed-length, non-Honeywell files without a control card, this parameter must specify the exact record length of the file to be printed. If a control card is to be used, this parameter may specify the largest record in any file to be processed.

Parameter #26: Admode of Interrupt (admi)

This parameter is coded only when the routine operates in the foreground mode (parameter #15 is F); it is omitted when the routine operates in any other mode. The digit 3 or 4 is coded to specify the addressing mode in which Interrupt Control D operates.

Parameter #27: Control Routine (cntrl)

A C is coded to include in the specialized macro a routine for modifying parameters at execution time. If the control routine is not desired, this parameter is omitted. The control routine extracts parameters specific to each file from a control card. Note that when this parameter value is C, a control card for each file must be present at execution time. The parameter modifying control card is described below. Information on a control card overrides both parameter values specified at specialization time and information in a Honeywell header label. It is important to note that the control routine is not required to process varying formats of Honeywell files, since parameters specific to every Honeywell file are found in that file's header label. When the control routine is selected, parameter #28 must specify the peripheral address of the card reader control.

Parameter #28: Card Reader Control Address (crcu)

When parameter #27 is C, this parameter must specify the address of the card reader control (two octal digits).

Parameter #29: IBM Translation (trnsl)

For IBM files only, a T is coded to include in the specialized macro a routine for automatic translation of special IBM print characters to corresponding Honeywell characters. For IBM files which do not require the translation feature, this parameter is omitted.

*Parameter #30: Length of Beginning-of-Record Control Area (brca)

This parameter specifies (in octal) the number of characters at the beginning of a record which precede the first character of the first item. For unbannered files this parameter is 00; for fixed-length bannered files 01; for variable-length Honeywell files 04. Omission of this

parameter implies a value of 00. This parameter is usually omitted for Honeywell files, since the same information appears in the header label of each file.

Parameter #31: Honeywell Equivalent of Channel 2 (chan2)

This and the following four parameters are used in conjunction with parameter #12 for compatibility with IBM channel skipping. If the IBM carriage control tape contained a punch in channel 2, the number (1, 3, 4, 5, 6, 7, or 8) of the Honeywell channel containing a corresponding punch is coded for this parameter.

Parameter #32: Honeywell Equivalent of Channel 9 (chan9)

Same description as for parameter #31.

Parameter #33: Honeywell Equivalent of Channel 10 (chan10)

Same description as for parameter #31.

Parameter #34: Honeywell Equivalent of Channel 11 (chan11)

Same description as for parameter #31.

Parameter #35: Honeywell Equivalent of Channel 12 (chan12)

Same description as for parameter #31.

Table 5-2. Summary of Tape-to-Printer A and C Macro Call Parameters
(Parameters preceded by an asterisk may be modified by means of a control card)

Parameter Number	Function	Coded Value[1]
1	File format	H = Honeywell file I = IBM file Δ = Non-standard file
2	Header labels	H = headers and trailers are present Δ = no headers and trailers
3	Tape-mark records	T = tape-mark records are present Δ = no tape marks
4	* Parity of data records	O = odd parity E = even parity
5	* Number of files on input tape	1-99 = no. of files Δ = one file
6	* Item length	1-999 = item length Δ = variable-length items Note: Not used for Honeywell files.

Parameter Number	Function	Coded Value[1]
7	* Number of items/record	1-99 = items/record Δ = variable-length records Note: Not used for Honeywell files.
8	* Bypass position	1-999 = item position tested for bypass char. Δ = no bypass option
9	* Bypass character	Any alphanumeric character, whose presence in the bypass position will exempt the item from printing.
10	* Line length	1-132 = length of each printed line Δ = 120-character line length
11	* Fixed spacing	The Hollerith equivalent of a Type 222 printer control character specifies fixed vertical spacing for all items. Δ = space according to control character within each item.
12	Carriage Control Compatibility	C = simulation of IBM channel skipping (for IBM files only. May require values for parameters #31-35) Δ = no simulation of channel skipping.
13	End-of-File Procedure	S = halt at end of file T = type message and stall Δ = process all files without intervention
14	Typewriter Control Address	Address of the console typewriter (two octal digits) is coded when parameter #13 = T.
15	Operating Mode	F = foreground program S = Simultaneous Media Conversion coroutine I = independent program
16	Address Mode	2, 3, or 4. Not coded when parameter #15 = S.
17	Origin	A direct address is coded for for the program origin. Not coded when parameter #15 = S.
18	Read/Write Channel	1, 2, 3, etc.
19	Extra Read/Write Channel	1, 2, 3, etc. Coded only when parameter #15 = I.

Table 5-2 (cont). Summary of Tape-to-Printer A and C Macro Call Parameters

Parameter Number	Function	Coded Value[1]
20	Printer Control Address	Address of the printer control (two octal digits).
21	Tape Control Address	Input address of the tape control for input tape.
22	* Input tape address	Logical number of input tape (0-7). Not used when parameter #15 = S.
23	Prefix	Three-character prefix for symbolic tags in macro routine
24	Own-code exit	A decimal address or tag = beginning of own-coding routine. Δ = no own-coding
25	Buffer length	The decimal number of characters in the largest record processed.
26	Address mode of Interrupt Control D	3 or 4 is coded when parameter #15 = F.
27	Control routine	C = include coding for modifying parameters by means of a control card at execution time. Δ = exclude the coding
28	Card Reader Control Address	Address of the card reader control (two octal digits) is coded when parameter #27 = C.
29	IBM translation	T = automatic translation of special IBM print characters Δ = no translation
30	* Length of beginning-of-record control area	Octal number of characters preceding the first item of each record. Δ = 0 characters in the beginning-of-record control area. Note: Not used for Honeywell files.
31	Honeywell equivalent of IBM channel 2	1, 3, 4, 5, 6, 7, or 8.
32	Honeywell equivalent of IBM channel 9	1, 3, 4, 5, 6, 7, or 8.
33	Honeywell equivalent of IBM channel 10	1, 3, 4, 5, 6, 7, or 8.
34	Honeywell equivalent of IBM channel 11	1, 3, 4, 5, 6, 7, or 8.
35	Honeywell equivalent of IBM channel 12	1, 3, 4, 5, 6, 7, or 8.

[1] The symbol Δ means that a parameter value is omitted from the coding, not that a blank is actually coded as a value.

EXAMPLES OF TAPE-TO-PRINTER A AND C MACRO INSTRUCTIONS

Example 1 (Figure 5-1)

In this example, the routine is specialized to operate as an independent program and to process Honeywell files containing records of up to 500 characters. File structure information is to be obtained from a control card for each file. The card reader control address is 41. Vertical spacing is to be executed according to the printer control character within each item. Assume that only one file is present on the input tape. The routine is to be assembled in two-character addressing mode, with the program origin at location 300. The printer control, whose address is 02, will use RWC 2. The input tape, logical drive 1 on tape control 40, is to use RWC 3 as an extra read/write channel. The prefix for tags in the specialized routine is XXX.

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CODING FORM

PROBLEM __Example 1_____ PROGRAMMER _____ DATE ____ PAGE ___ OF __

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
00001			CDtag	$TPPRT	H,H,,0,	
00002	C			13	5,,1,2,300,2,3,,02,40,1,,XXX,,,500,	
00003	L			27	C,41,	

Figure 5-1. Tape-to-Printer A and C Macro Instruction for Example 1

Example 2 (Figure 5-2)

In this example, the routine is specialized to operate as a foreground program and to process Honeywell files containing records of up to 500 characters. No control cards are to be used; file structure information is to be derived from the header label for each file. Vertical spacing is to be executed according to the printer control character within each item. An input tape contains ten files to be processed without intervention. The routine is to be assembled in the three-character addressing mode, with the program origin at location 1340. Assume that the addressing mode of Interrupt Control D is also three. The address of the printer control is 02. Read/write channel 2 is to be used. The input tape is logical drive 1 on tape control 40. The prefix for symbolic tags in the specialized routine is YYY.

EASYCODER
CODING FORM

PROBLEM __Example 2_____ PROGRAMMER _____ DATE ____ PAGE ___ OF __

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
00001			CDtag	$TPPRT	H,H,,0,10,	
00002	L			15	F,3,1340,2,,02,40,1,,YYY,,,500,,3,	

Figure 5-2. Tape-to-Printer A and C Macro Instruction for Example 2

Example 3 (Figure 5-3)

In this example, the routine is specialized to operate as an independent program and to process IBM print files containing records of up to 500 characters. The IBM files are written in

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even parity with header and trailer labels and their associated tape-mark records. Vertical spacing is to be executed according to the printer control character at the beginning of each item. The printer control characters specify channel skipping. Honeywell channel 3 should be used to simulate skipping to IBM channel 9. IBM print characters should be translated to the same Honeywell characters. File structure information is to be obtained from a control card for each file. The card reader control address is 41. Assume that only one file is present on an input tape. The routine is to be assembled in two-character addressing mode, with the program origin at location 300. The printer control, whose address is 02, is to use read/write channel 2. The input tape, logical drive 1 on tape control 40, is to use RWC 3 as an extra read/write channel. The prefix for tags in the specialized routine is XXX.

EASYCODER
CODING FORM

PROBLEM _____ Example 3 _____ PROGRAMMER _____ DATE _____ PAGE ___ OF ___

CARD NUMBER	TYPE	MARK	LOCATION	OPERATION CODE	OPERANDS	
000001	C	D	(tag)	$TPPRT	I,H,T,E,	
000002	C			12	C,S,,1,2,300,2,3,02,40,1,XXX,,,500,	
000003	L			27	C,41,T,,,,3,	

Figure 5-3. Tape-to-Printer A and C Macro Instruction for Example 3

Example 4 (Figure 5-4)

In this example, the routine is specialized to operate as an independent program and to process non-standard print files containing records of up to 500 characters. The print file is written with odd parity and does not include header and trailer labels. Fixed spacing is specified for all items such that items are printed single-spaced, and the printer skips to the head of form when the end of form is sensed. File structure information is to be obtained from a control card for each file. The card reader control address is 41. Assume that only one file is present on an input tape. The routine is to be assembled in two-character addressing mode, with the program origin at location 300. The printer control whose address is 02, is to use RWC 2. The input tape, logical drive 1 on tape control 40, is to use RWC 3 as an extra read/write channel. The prefix for tags in the specialized routine is XXX.

EASYCODER
CODING FORM

PROBLEM _____ Example 4 _____ PROGRAMMER _____ DATE _____ PAGE ___ OF ___

CARD NUMBER	TYPE	MARK	LOCATION	OPERATION CODE	OPERANDS	
000001	C	D	(tag)	$TPPRT		
000002	C			4,	0,	
000003	C			11	A,,S,,1,2,300,2,3,02,40,1,XXX,,,500,	
000004	L			27	C,41,	

Figure 5-4. Tape-to-Printer A and C Macro Instruction for Example 4

TAPE-TO-PRINTER A AND C CONTROL CARD

When the routine is specialized to accept parameter modifying control cards (according to parameters #27 and 28), a control card for each file must be supplied at execution time. Each control card contains information specific to the processing of a single file. Before a file is processed, its associated control card is read from the card reader in special code. Information on a control card overrides both the information contained in a Honeywell header label and the parameter values determined at specialization time. The order of control cards in the card reader must correspond to the order of files on the input tape. The last control card must be followed by a card punched END in columns 15 through 17.

The format of the Tape-to-Printer A and C control card is described below. Note that for some control card parameters a blank field causes the previous parameter value to be retained, while for other parameters a blank field imparts a distinct value to the parameter. Therefore, a parameter which would assume an undesired value from a blank control card field must be specifically coded on the control card, even if the previous value of that parameter does not change. For example, if the line length parameter (columns 47 through 49) is left blank, the previous value for line length will be retained. However, assume that the routine is specialized to process items 100 characters long, that a control card is used for each file, and that the first file to be printed does contain 100-character items. The control card for the first file must still contain the number 100 in columns 24 through 26. If this field were left blank, the tape-to-printer routine would expect a variable-length file, even though a file of 100-character items was specified in macro call parameter #6.

Control Card Format

Columns 15-20:	Contain $TPPRT to identify the Tape-to-Printer A and C control card.
Columns 21-22: (ni)	Contain the decimal number of items per record (01-99) for fixed-length files only. A blank field signifies a variable-length file.
	NOTE: When this field is non-blank, the item length field (columns 24-26) must also be non-blank.
Columns 24-26: (iln)	Contain the decimal number of characters in each item (001-999) for fixed-length files only. A blank field signifies a variable-length file.
	NOTE: When this field is non-blank, the number of items/record (columns 21-22) must also be non-blank.
Columns 28-29:	Contain the position within each item of the vertical spacing control character. The value 1 or 3 is usually assigned to this parameter. A blank field causes the previous value to be preserved.

Column 31:	Contains the decimal number of vertical spacing control characters which precede the first data character of each item. The value 1 is usually assigned to this parameter. A blank field causes the previous value to be preserved.
Column 33: (brca)	Contains the decimal number of characters in the beginning-of-record control area. For unbannered files, this parameter is 0. For bannered fixed-length files, it is 1. For Honeywell variable-length files it is 4. A blank field causes the previous value to be preserved. Because this parameter is not usually specialized in the macrocall for a Honeywell file, it should be specified on the first control card for a Honeywell file.
Column 35: (par)	Contains a parity indicator: O = odd parity E = even parity A blank field signifies odd parity.
Column 37: (byc)	Contains any alphanumeric character to be used as the bypass character. Items containing the bypass character in the bypass position will not be printed. Note that a blank field still constitutes a valid alphanumeric character (15_8).
Columns 39-41: (byp)	Contain the bypass position (1-999), i.e., the character position within each item which will be examined for presence of the bypass character. A blank field signifies that bypassing of items is not desired.
Column 43:	Contains a fixed- or variable-length file type indicator: F = fixed-length records V = variable-length records A blank field signifies variable-length records.
Column 45: (tapadr)	Contains the logical number of the input tape (0-7). This field must not be blank.
Columns 47-49: (lln)	Contain the decimal number of characters desired for the length of a print line (1-132). A blank field causes the previous value to be preserved.
Column 51: (fxd)	Contains the Hollerith code for the Type 222 printer control character to be used for fixed spacing. A blank field signifies that fixed spacing is not desired, and that the printer control character in each item will be honored.
Columns 53-54: (nfl)	Contain the total number of files on the input tape (0-99), including the file referenced by this control card. A blank field causes the previous value to be preserved. This field may be non-blank only on the control card for the first file.

Sample Control Cards

Figure 5-5 illustrates a control card for an unbannered Honeywell file of 120-character items blocked four to a record. The input tape is on logical drive 1.

Figure 5-6 illustrates a control card for a variable-length Honeywell file in which any item whose fourth character position contains a 7 should not be printed. The input tape is on logical drive 1.

Figure 5-7 illustrates a control card for a non-standard file of unblocked 80-character items. The file is written with odd parity. Vertical printer control for all items is fixed for single-spacing with skipping to the head of form when the end of form is sensed. Logical tape 1 is the input tape.
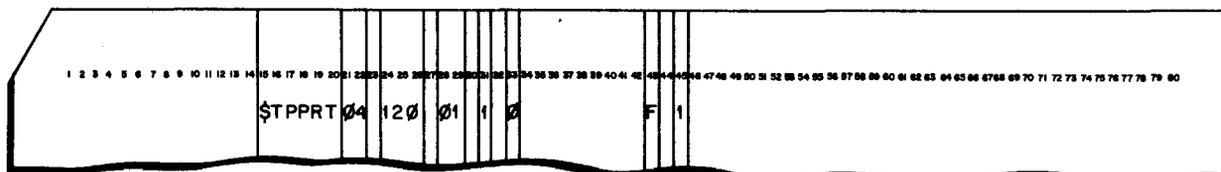
Figure 5-5. Tape-to-Printer A and C Control Card for a Fixed-Length Honeywell File
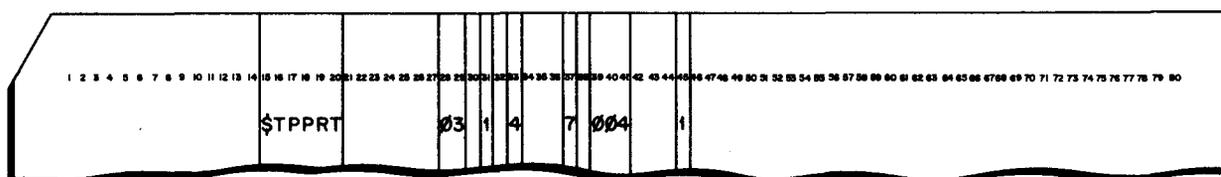
Figure 5-6. Tape-to-Printer A and C Control Card for a Variable-Length Honeywell File
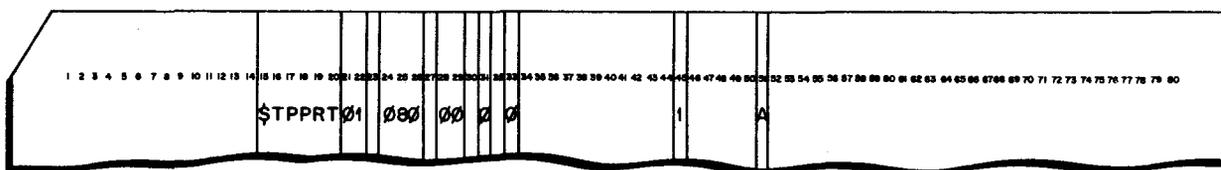
Figure 5-7. Tape-to-Printer A and C Control Card for a Non-Standard File

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SPECIALIZING THE CARD-TO-TAPE ROUTINE

Before assembly, Card-to-Tape A and C is specialized according to the file type to be
processed and the intended operating environment. As mentioned in the Introduction, either
Library Processor B or Library Processor C may be used to specialize the routine. The card-
to-tape macro call is described in this section.

PROGRAM HEADER CARD

For operation as a Simultaneous Media Conversion A and C coroutine, Card-to-Tape A
and C is specialized without a program header (PROG) card and is incorporated into the Simul-
taneous Media Conversion package before assembly.

For operation as an independent or foreground program, the routine is specialized and
assembled as a unique program whose name is assigned by the user. Therefore, at special-
ization time, the macro instruction to the library processor must be preceded by a program
header card. The program header card is prepared according to the requirements of the
Easycoder assembler which will assemble the specialized macro.

CARD-TO-TAPE MACRO INSTRUCTION (CALL)

The macro call for Card-to-Tape A and C is coded as follows:

EASYCODER
CODING FORM

PROBLEM _____ PROGRAMMER _____ DATE ____ . _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1		C	(tag)	$CDTP	flfmt, hdr, tpmrk, par, nfl, iln, ni, scfr	m, fldln,
2		C			cdln, eflck, efloc, efl, pcu, mde, adm, org	, rwc/dv,
3		C			xrwc, crcu, tupcu, tapadr, pfx, own-code,	bl, adni,
4		L			cntrl, pad, mode, ban, ctl,	
5						

Detailed descriptions of macro instructions, including the use of continuation cards, omission
of parameters, and line numbering, may be found in Easycoder A Assembly System, Easycoder
B Assembly System, and Library Processors C and D.

The function, application, and coding of each of the macro call parameters abbreviated
above is described in the following text. Parameters preceded by an asterisk (*) may be
modified by means of a control card when parameter #27 selects the control card routine. Once
specialized, all other parameters and the resultant card-to-tape coding are invariant. A tabu-
lar reference for all parameters described below is presented in Table 6-1.

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Parameter #1: File Format (flfmt)

This parameter selects the file format which the card-to-tape routine will be capable of processing. An H is coded for Honeywell files, an I is coded for IBM files, and the parameter value is omitted for non-standard files.

Parameter #2: Header Labels (hdr)

This parameter is not coded for Honeywell files. If an H is coded for this parameter, the first card in a file is written on tape as the 80-character header label and the trailer card is written as the 80-character trailer label record. If a parameter value is omitted, Card-to-Tape A and C creates a card-image file without headers and trailers. When this parameter is H for IBM files, parameter #3 must be T (see below).

Parameter #3: Tape-Mark Records (tpmrk)

If a T is coded for this parameter, tape-mark records are written following the header label record and surrounding the trailer label record. If a parameter value is omitted, no tape-mark records appear on the card-image tape. This parameter must be coded for IBM files with headers and trailers.

*Parameter #4: Parity (par)

If the letter O is coded for this parameter, the card-image data records are written with odd parity. If an E is coded, the records are written with even parity. Omission of a parameter value implies odd parity. Note that the header and trailer label records of IBM files are always written with even parity, regardless of the value of this parameter.

*Parameter #5: Number of Files (nfl)

Two decimal digits (01 through 63) may be coded to specify the number of files in the input deck. Omission of a parameter value implies one file.

*Parameter #6: Item Length (iln)

Three decimal digits (001 through 999) may be coded to specify the number of characters in each item. As noted in Section II, several card images may constitute an item, and that the item length must account for any control characters appended after the data characters. Omission of a parameter value implies 80-character items.

*Parameter #7: Number of Items (ni)

Two decimal digits (01 through 63) may be coded to specify the number of items per record. Omission of a parameter value implies one item per record (unblocked records).

*Parameter #8: Sequence Check Option (scfrm)

Three decimal digits (001 through 999) may be coded to specify the position within each item of a field upon which Card-to-Tape A and C will perform a sequence check. The sequence check field may be up to five characters in length, as defined in parameter #9. When an out-of-sequence item is detected, the routine executes a halt or console typeout which identifies the sequence error. If a value is omitted for this parameter, no sequence checks are performed.

*Parameter #9: Length of Sequence Check Field (fldln)

If parameter #8 selects the sequence check option, parameter #9 must specify the length of the field to be examined for sequence error. A decimal digit from 1 to 5 may be coded for this parameter. If no sequence checks are to be performed, this parameter is omitted.

*Parameter #10: Card Length (cdln)

This parameter specifies the maximum number of characters to be read from each card in any file to be processed by Card-to-Tape A and C. For normal mode card reading, the card length parameter may be coded with a value from 01 through 80. For transcription mode reading, this parameter may be coded with a value from 001 through 160. Omission of a parameter value implies a card length of 80 characters. The card length must be 80 characters for Honeywell files. Because this parameter fixes the maximum length of card images on tape, a version of Card-to-Tape A and C to generate some files with 80-character images and some files with 51-character images must be specialized for a card length of 80 characters. Since a card image cannot be physically greater than a record on tape, the card length parameter must be less than or equal to the tape buffer length (parameter #25).

*Parameter #11: End-of-File Check (eflck)

For IBM and non-standard files, this parameter defines the trailer code for the terminating record. Six alphanumeric (and non-blank) characters are coded for parameter #11. In the input deck, a card whose first six characters match the trailer code of parameter #11 is the terminating record which marks the end-of-file. For Honeywell files, this parameter is omitted.

Parameter #12: Own-Code Exit at End of File (efloc)

This parameter is coded when the programmer desires the card-to-tape routine to exit to a user own-code routine at end of file. When end-of-file own-coding is not used, this parameter is omitted. The value coded is the starting address of the own-code routine, written as either a symbolic tag or a decimal address. The same address is coded in the location field of the first instruction of the own-code routine.

A second own-code exit, called the standard exit, is available to the programmer via parameter #24. At assembly time, all own-coding must be inserted between the program header

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card and the specialized card-to-tape routine. The first (or only) own-code routine must contain an ORG statement to set the program origin for the combined package of own-coding and the card-to-tape routine.

> NOTE: When own-coding is included, the origin parameter (#17) for the card-to-tape routine must be coded with the self-reference symbol (*).

The own-code exit is made after the trailer card is read and error-checked, but before any trailer label record is written. Card-to-Tape A and C executes the own-code exit with a branch to the address coded for parameter #12. Immediately following the branch instruction in the card-to-tape routine is a NOP instruction with an A and B address. The A address is the address of the card buffer. The B address is the address of the rightmost location of a 10-character field which contains a decimal count of the number of cards processed. A memory map of these two instructions is given below, for the case where the card-to-tape routine is assembled in the three-character addressing mode.
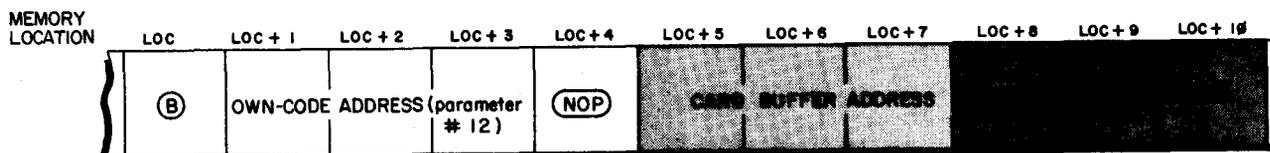
The programmer using own-coding has the responsibility for providing a return to Card-to-Tape A and C. In addition, an own-code routine should be capable of extracting the addresses of the card buffer and card count field in a general procedure, independent of the addressing mode in which the card-to-tape routine is assembled. Own-coding and Card-to-Tape A and C may then be assembled together. To provide a return and to determine the addresses of the card buffer and the card count field, an own-code routine might contain the coding suggested below.

EASYCODER
CODING FORM

PROBLEM _____ PROGRAMMER _____ DATE ___ . _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1				ORG	(Program Origin)	
2			(efloc)	SCR	EXIT+CM,70	efloc is parameter #12
3				SCR	TEMPA+CM,70	CM is equated to admode
4				SCR	TEMPB+CM,70	
5				BA	ADCONA,TEMPA+CM	
6				BA	ADCONB,TEMPB+CM	
7			TEMPA	MCW	0,CDBUF	
8			TEMPB	MCW	0,CDCNT	
9						
10						
11						
12			EXIT	B	0	return to card-to-tape
13			CDBUF	DSA	0	
14			CDCNT	DSA	0	
15			ADCONA	DSA	CM	
16			ADCONB	DSA	CM+CM	

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The symbolic tag CM must be written exactly as shown. Within the card-to-tape routine, the specific tag CM is equated to the character addressing mode in which the routine is assembled, as specified in parameter #16. Location CDBUF will contain the address of the leftmost character in the card buffer. Location CDCNT will contain the address of the rightmost location of the 10-character card count field.

Parameter #13: End-of-File Action (efl)

This parameter programs Card-to-Tape A and C for one of three procedures to be executed after each file in the input deck is converted. If a console typewriter is available, the letter T may be coded to specify the type-and-stall procedure. The routine will type END FILE t (where t = logical address of the output tape) at the console typewriter and stall to await further instructions from the operator. If the type-and-stall procedure is selected, parameter #14 is used to specify the output address of the console typewriter. If an S is coded for parameter #13, the routine executes a programmed halt at the end of each file. If a value for parameter #13 is omitted, there is no end-of-file action; all files are processed without intervention. The operating procedures associated with each end-of-file action are enumerated in Section VIII.

Parameter #14: Typewriter Control Address (pcu)

If parameter #13 is not T, this parameter is omitted. If parameter #13 is T, this parameter specifies the output address for the console typewriter (two octal digits). If this parameter is omitted when parameter #13 is T, a peripheral control address of 07_8 is implied.

Parameter #15: Operating Mode (mde)

This parameter selects one of the operating environments described in the introduction. To specialize the routine for operation as a foreground program, an F is coded for this parameter. An I may be coded for operation as an independent program. An S is coded for operation as a Simultaneous Media Conversion A or C coroutine. Omission of a parameter value implies operation as an independent program.

Parameter #16: Address Mode (adm)

For operation as an independent or foreground program (when parameter #15 is F or I), the digit 2, 3, or 4 may be coded to set the address mode in which the routine will be assembled. For operation as a coroutine (parameter #15 is S), this parameter is omitted. If this parameter is omitted when parameter #15 is F or I, admode 3 is implied.

Parameter #17: Origin (org)

For operation as an independent or foreground program, a decimal or symbolic main memory address may be coded to specify the program origin of the routine (exactly as in the

Easycoder ORG statement). For operation as a coroutine (parameter #15 = S), this parameter is omitted, as the origin is specified in the control routine of the Simultaneous Media Conversion package. If this parameter is omitted when parameter #15 is F or I, the program origin is automatically set to 1,340 (decimal). Programmers implementing one or both own-coding exits should review the relationship between the own-code routine origin and Card-to-Tape A and C origin, as noted in the description of parameter #12.

Parameter #18: Read/Write Channel (rwc/dv)

For operation as an independent or foreground program, one digit (e.g., 1, 2, or 3) may be coded for this parameter to indicate the read/write channel to be used for card reading. Omission of a parameter value implies read/write channel 1 (interlocked), for either of the operating environments mentioned above. For operation in the Simultaneous Media Conversion environment, an RWC number must be coded. Note also that the RWC number is identical to the device code for the card reader and to the logical address of the output tape. For example, if the number 1 is coded when Card-to-Tape A and C runs as a coroutine, the card reader is device 1 using RWC 1 and the card-image tape is generated on logical drive 1.

Parameter #19: Extra Read/Write Channel (xrwc)

When the routine operates in the independent mode (parameter #15 = I), this parameter may be coded to insure peripheral simultaneity. This parameter is omitted when the routine operates in any other mode. One digit (e.g., 1, 2, or 3) may be coded to specify an extra read/write channel. The extra RWC is used to overlap output tape writing with the card reading executed via the channel specified in parameter #18. If a parameter value is omitted, the routine transfers data to the output tape over the same RWC used to transfer data from the card reader.

Parameter #20: Card Reader PCU Address (crcu)

Two octal digits may be coded to specify the peripheral control unit address for the card reader. Omission of a parameter value implies an address of 41_8.

Parameter #21: TCU Address (tupcu)

Two octal digits may be coded to specify the output address of the tape control unit for the output tape. Omission of a parameter value implies an address of 00_8.

*Parameter #22: Tape Address (tapadr)

When the routine operates in the independent or foreground mode, one octal digit (0 through 7) may be coded to specify the logical address of the output tape. Omission of a parameter value implies an output tape address of logical 1, for either of the operaing environments mentioned above. For operation in the Simultaneous Media Conversion environment, this parameter is omitted.

Parameter #23: Symbolic Tag Prefix (pfx)

Three alphabetic characters may be coded for this parameter to constitute a unique prefix for all symbolic tags within the specialized card-to-tape routine. Use of this parameter prevents duplication of tags when own-coding is assembled with Card-to-Tape A and C. Note that when two or more card-to-tape routines are specialized to be assembled together as Simultaneous Media Conversion coroutines, each routine must use a different prefix for its symbolic tags. When tag prefixes are not desired, this parameter is omitted.

Parameter #24: Standard Own-Code Exit (own-code)

This parameter is coded when the programmer desires the card-to-tape routine to exit to a user own-code routine each time a card is read. The value coded is the starting address of the own-code routine, written as either a symbolic tag or a decimal address. The same address is coded in the location field of the first instruction of the own-code routine. If the standard own-code exit is not desired, this parameter is omitted.

At assembly time, both the standard own-code routine and the end-of-file own-code routine (if present) must be inserted between the program header card and the specialized card-to-tape routine. Whichever own-code routine is first in the assembly input deck must contain an ORG statement to set the program origin for the combined package of own-coding and Card-to-Tape A and C. If present, the second own-code routine may be assembled in-line after the first routine, without an ORG card. The specialized card-to-tape routine should be assembled in-line after all own-coding. This is accomplished by insuring that the origin parameter (#17) is coded with the self-reference symbol (*) at specialization time.

The own-code exit occurs after each card is read and error-checked, but before the image is moved to the tape buffer. The mechanics of the standard own-code exit are identical to those of the end-of-file own-code exit described under parameter #12. Card-to-Tape A and C contains a branch to the own-code address, followed by the same NOP instruction described for parameter #12. The description of parameter #12 includes recommended procedures for returning from the end-of-file own-code routine to Card-to-Tape A and C, and for extracting the card buffer and card count field addresses from the NOP instruction. These procedures apply equally to the standard own-code routine. Note that at a standard own-code exit, the contents of the card count field reflect the current card count at that point in the file conversion. At the end-of-file own-code exit, the card count field contains the total count of all cards processed for the file. If both own-code exits are used, they will occur in succession after the trailer card is read.

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Parameter #25: Tape Buffer Length (bl)

This parameter specifies the number of buffer locations required to accommodate the largest record in any file to be generated by the routine. The value coded may vary from 0001 through 9999. Omission of a parameter value sets the maximum tape record length to 80 characters. Because this permanent parameter fixes the maximum length for any record, it implies an upper bound for the variable parameters which specify item length (#6), number of items/record (#7), and generation of banner characters (#30). That is, the number of buffer characters must always be greater than or equal to the item length times the number of items/record for unbannered files, and this number plus one for bannered files. For example, if the buffer length is specialized as 120 characters, parameters may not be modified on a control card to block three 40-character items into one bannered record. Unbannered records, however, could be constructed with three 40-character items using this buffer length.

Parameter #26: Admode of Interrupt (admi)

This parameter is coded only when the routine operates in the foreground mode (parameter #15 is F); it is omitted when the routine operates in any other mode. The digit 3 or 4 is coded to specify the addressing mode in which Interrupt Control D is assembled.

Parameter #27: Control Routine (cntrl)

A C is coded to include in the specialized macro a routine for modifying parameters at execution time. If the control routine is not desired, this parameter is omitted. The control routine extracts parameters specific to each file from a control card. Note that when this parameter is C, a control card must precede each file to be converted. The parameter-modifying control card is described on page 6-14. Information on a control card overrides parameter values specified at specialization time.

*Parameter #28: Padding Character (pad)

In the event that the last record in the card-image file would not contain the prescribed number of fixed-length items, the routine is capable of padding the short record to preserve the fixed-length file structure. Records are automatically padded with the alphanumeric character coded for this parameter. If the padding is not desired, this parameter is omitted.

*Parameter #29: Card Reading Mode (mode)

This parameter selects the card reading mode during conversion. The following octal numbers may be coded:

        26 = normal mode, special code
        27 = normal mode, standard code
        25 = transcription mode.

Omission of a parameter value implies normal mode and special code. The same card reading mode remains in effect for the conversion of an entire file.

6-8

*Parameter #30: Banner Character (ban)

To create a bannered file, the programmer defines a banner character by coding any alphabetic character for this parameter. The banner character will precede the first data character of each record on the output tape. If this parameter is omitted, an unbannered file is generated. Recall that the buffer length (parameter #25) must be set up to accommodate bannered records.

*Parameter #31: Control Characters (ctl)

This parameter selects the control character option described in Section III. If a C is coded, the routine appends to the data portion of each item a control character containing card reading mode and error information. The item length must include the control character. If a parameter value is omitted, no control characters are generated.

The parameter-modifying control card for Card-to-Tape A and C has provision for requesting up to eight control characters in addition to the first control character generated by the routine. To include these additional control characters in the output items, the programmer must first define buffer length and item length on the control card so as to reserve space for the desired number of control characters in each item. Next, via own-coding exits, the programmer must move his additional control characters for each item into the output buffer; Card-to-Tape A and C supplies only the first control character.

Table 6-1. Summary of Card-to-Tape A and C Macro Call Parameters

(Parameters preceded by an asterisk may be modified by means of a control card.)

Parameter Number	Function	Coded Value[1]
1	File format	H = Honeywell file I = IBM file Δ = Nonstandard file
2	Header labels	H = The first card is written as the header label record and the trailer card is written as the trailer label record. Δ = The file is created without headers and trailers. NOTE: Not used for Honeywell files.
3	Tape-mark records	T = Write tape-mark records following header header label and surrounding trailer label. Δ = No tape marks. NOTE: Not used for Honeywell files.
4	*Parity of data records	O or Δ = odd parity E = even parity
5	*Number of files in the input deck	1-63 = no. of files Δ = one file

(Parameters preceded by an asterisk may be modified by means of a control card.)

Parameter Number	Function	Coded Value[1]
6	*Item length	1-999 = item length Δ = 80-character items
7	*Number of items/ record	1-63 = items/record Δ = one item/record (unblocked)
8	*Sequence check	1-999 = Perform a sequence check at this character position within each item. Δ = No sequence check.
9	*Length of sequence check field	1-5 = no. of characters in field. Δ = No sequence check.
10	*Maximum number of characters read from each card	1-80 (for normal mode) or 1-160 (for transcription mode) = no. of characters. Δ = 80 characters NOTE: Must be $\geq$ 80 for Honeywell files.
11	*End-of-file check	Six characters are coded to define the trailer code for the terminating record. NOTE: Not used for Honeywell files.
12	End-of-file own-code exit	A decimal address or tag = beginning of end- of-file own-code routine. Δ = no own-coding.
13	End-of-file procedure	S = halt at end of file T = type message and stall Δ = process all files without intervention.
14	Typewriter control address	Address of console typewriter (two octal digits) is coded when parameter #13 = T. $\Delta = 07_8$.
15	Operating mode	F = foreground program. S = Simultaneous Media Conversion coroutine. I or Δ = independent program.
16	Address mode	2 = admode 2 3 or Δ = admode 3 4 = admode 4 NOTE: Not used when parameter #15 = S.
17	Origin	Decimal address or tag = program origin. $\Delta = 1340_{10}$. NOTE: Not used when parameter #15 = S.
18	Read/write channel	1, 2, 3, etc. Δ = RWC1 (interlocked)
19	Extra read/write channel	1, 2, 3, etc. Coded only when parameter #15 = I.

Table 6-1 (cont). Summary of Card-to-Tape A and C Macro Call Parameters

(Parameters preceded by an asterisk may be modified by means of a control card.)

Parameter Number	Function	Coded Value[1]
20	Card reader control address	Address of card reader control (two octal digits). $\Delta = 41_8$.
21	Tape control address	Output address of tape control for output tape (two octal digits). $\Delta = 00_8$.
22	*Output tape address	Logical address of output tape (0-7). Δ = logical 1. NOTE: Not used when parameter #15 = S.
23	Prefix	Three-character prefix for symbolic tags in macro routine. Δ = no prefix
24	Own-code exit	A decimal address or tag = beginning of own-code routine. Δ = no own-coding.
25	Buffer length	Number of characters in largest record written by the routine (decimal). Δ = 80 characters.
26	Address mode of Interrupt Control D	3 or 4. NOTE: Not used when parameter #15 = I or S.
27	Control routine	C = include coding for modifying parameters by means of a control card at execution time. Δ = exclude the coding.
28	*Padding	Any alphanumeric = padding character for short records. Δ = no padding
29	*Card reading mode	26 or Δ = normal mode, special mode 27 = normal mode, standard code 25 = transcription mode
30	*Banner character	Any alphabetic = the banner character to appear at the beginning of each record. Δ = create unbannered file.
31	*Control characters	C = append a control character to each item. Δ = no control characters.

[1] The symbol Δ means that a parameter value is omitted from the coding, not that a blank is actually coded as a value.

EXAMPLES OF CARD-TO-TAPE A AND C MACRO INSTRUCTIONS

Independent Mode Card-to-Tape Routine for Honeywell Files (Figure 6-1)

In this example, the routine is specialized to operate as an independent program and generate Honeywell files containing records of up to 500 characters. The control routine is included, so that the file structure information, sequence check option, card reading mode, and output tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the typewriter control, card reader control, and tape control are octal 07, 41, and 00, respectively. The routine will use RWC1 (interlocked) for card reading and RWC3 for tape operations.

EASYCODER
CODING FORM

PROBLEM __Independent Mode-Honeywell File__ PROGRAMMER _____ DATE _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS
1 2 3 4 5	6	7	8 ... 14	15 ... 20	21 ... 62 63 ... 80
0 0 0 0 1	C	D	(tag)	$ CDTP	H ,
0 0 0 0 2	C			19	3 ,
0 0 0 0 3	L			25	500 , , , C ,

Figure 6-1. Card-to-Tape A and C Macro Instruction:
Independent Mode - Honeywell Files

Foreground Mode Card-to-Tape Routine for Honeywell Files (Figure 6-2)

In this example, the routine is specialized to operate as a foreground program and generate Honeywell files. No control cards are used; the routine is specialized to produce files of a specific format.

The input deck contains only one file. After the file is converted, the routine will type a message at the console typewriter and stall. The generated card-image file will consist of bannered, unblocked records. The banner character is A. Each record will contain one 80-character item, in which the eightieth character will be a control character supplied by Card-to-Tape A and C. The routine will perform a sequence check on the first five characters of each item. After each card is read, Card-to-Tape A and C will branch to an own-code routine at location TERRY. The card-to-tape routine is specialized for assembly in admode 3. Each tag in the specialized macro will assume the prefix MSF. Interrupt Control D will run in admode 3 as well. The card reader has peripheral address octal 41 and will read in normal mode, special code. The output tape is logical 1 on tape control octal 00. The typewriter control address is octal 07. The routine will use RWC1 (interlocked).

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EASYCODER
CODING FORM

PROBLEM **Foreground Mode - Honeywell File**   PROGRAMMER _____ DATE ____ . _____ PAGE ____ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 14	15 20	21 62	63 80
1	ØØØØ1	C	D	(tag)	$CDTP	H,	
2	ØØØØ2	C			8	1,5,,,,T,	
3	ØØØØ3	C			15	F,,*,	
4	ØØØØ4	C			23	MSF,TERRY,81,3,	
5	ØØØØ5	L			3Ø	A,C,	
6							

Figure 6-2. Card-to-Tape A and C Macro Instruction:
Foreground Mode - Honeywell Files

Independent Mode Card-to-Tape Routine for IBM Files (Figure 6-3)

In this example, the routine is specialized to operate as an independent program and generate IBM files containing records of up to 500 characters. The control routine is included, so that the file structure information, sequence check option, card reading mode, and output tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the card reader control and tape control are octal 41 and 00, respectively. The routine will use RWC1 (interlocked) for card reading and RWC3 for tape operations.

EASYCODER
CODING FORM

PROBLEM **Independent Mode - IBM File**   PROGRAMMER _____ DATE ____ . _____ PAGE ____ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 14	15 20	21 62	63 80
1	ØØØØ1	C	D	(tag)	$CDTP	I,H,T,E,	
2	ØØØØ2	C			19	3,	
3	ØØØØ3	L			25	5ØØ,,,C,	
4							

Figure 6-3. Card-to-Tape A and C Macro Instruction:
Independent Mode - IBM Files

Independent Mode Card-to-Tape Routine for Non-Standard Files (Figure 6-4)

In this example, the routine is specialized to operate as an independent program and generate non-standard files containing records of up to 500 characters. Files will be created in odd parity without headers and trailers. The control routine is included, so that the file structure information, sequence check option, card reading mode, and output tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the card reader control and tape control are octal 41 and 00, respectively. The routine will use RWC1 (interlocked) for card reading and RWC3 for tape operations.

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PROBLEM Independent Mode-Nonstandard File   PROGRAMMER _____ DATE ____ . _____ PAGE ____ OF ____

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 14	15 20	21 62	63 80
1 ØØØØ1	C	D	(tag)	$CDTP		
2 ØØØØ2	C			19	3,	
3 ØØØØ3	L			25	5ØØ,,,C,,	
4						

Figure 6-4. Card-to-Tape A and C Macro Instruction:
Independent Mode - Nonstandard File

CARD-TO-TAPE A AND C CONTROL CARD

When the routine is specialized to accept parameter-modifying control cards (according to parameters #27 and #28), a control card must precede each punched card file at execution time. Each control card contains information specific to the processing of a single file. Before a file is processed, its associated control card is read from the card reader in special code. Information on a control card overrides the parameter values determined at specialization time. The last card file must be followed by a card punched END in columns 15 through 17.

The format of the Card-to-Tape A and C control card is described below. Note that for some control card parameters a blank field causes the previous parameter value to be retained, while for other parameters a blank field imparts a distinct value to the parameter. Therefore, a parameter which would assume an undesired value from a blank control card field must be specifically coded on the control card, even if the previous value of that parameter does not change. For example, if the item length parameter (columns 24 through 26) is left blank, the previous value for item length will be retained. The same is not true for the parity parameter. Assume that the routine is specialized to generate an even parity file, that a control card is used for each file, and that the first file will in fact be written in even parity. The control card for the first file must still contain the letter E in column 35. If this column were left blank, the card-to-tape routine would generate an odd parity file, even though an even parity file was specified in macro call parameter #4.

Control Card Format

Columns 15-20:	Contain $CDTP to identify the Card-to-Tape A and C control card.
Columns 21-22: (ni)	Contain the decimal number of items per record (01-63). A blank field causes the previous value to be preserved.
Columns 24-26: (iln)	Contain the decimal number of characters in each item (including control characters), 001-999. A blank field causes the previous value to be preserved.
Columns 27-29: (cdln)	Contain the number of characters to be read from each card:

Columns 27-29: (cont) (cdln)	001-080 for normal mode reading; 001-160 for transcription mode reading.
	A blank field causes the previous value to be preserved.
Column 31:	Contains the number of control characters in each item (0-9); usually 0 or 1. A blank field causes the previous values to be preserved.
Column 33: (ban)	Contains the character (alphabetic) to be generated as the banner character for every record. A blank field causes unbannered records to be generated.
Column 35: (par)	Contains a parity indicator: O = odd parity; E = even parity. A blank field signifies odd parity.
Column 37: (fldln)	Contains the number of characters in the field to be sequence checked within each item (1-5). A blank field declines the sequence check option.
Columns 39-41: (scfrm)	Contain the first character position within each item of the field to be sequenced checked (001-999). A blank field declines the sequence check option.
Column 43: (ctl)	Contains a C to elect the control character option (refer to Section III). A blank field declines the option.
Column 45: (tapadr)	Contains the logical address of the output tape (0-7). This field must not be blank.
Column 51: (pad)	Contains any alphanumeric character to be used as the padding character for filling short records. A blank field signifies that short records will be padded with blank characters (15_8).
Columns 53-54: (nfl)	Contain the total number of files in the input deck (01-63), including the file referenced by this control card. A blank field causes the previous value to be preserved. This field may be non-blank only on the control card for the first file.
Columns 56-57: (mode)	Contain a card reading mode designator: 26 = normal mode, special code; 27 = normal mode, standard code; 25 = transcription mode. A blank field causes the previous value to be preserved.
Columns 59-64: (eflck)	Contain the 6-character code for identifying the end of an IBM or nonstandard input file. These columns are blank for Honeywell files.

Sample Control Cards

Figure 6-5 illustrates a control card for generating an unbannered Honeywell file with one 81-character item per record. The last character in each item is a control character. Eighty characters are read from each card in normal mode, special code. The card-image tape is written on logical 2.

Figure 6-6 illustrates a control card for generating an IBM file with two 100-character items per record. No control information should be added by the routine. Eighty characters are read from each card in normal mode, standard code. The end of the input file is marked by a card punched 1EOF△△ in columns 1 through 6. The card-image tape is written on logical 1.

Figure 6-7 illustrates a control card for generating an odd parity non-standard file with one 51-character item per record. No control information should be added by the routine. Fifty-one column cards are read in normal mode and special code. The routine is directed to perform a sequence check on characters 48 through 51 of each item. The end of the input file is marked by a card punched ENDFIL in columns 1 through 6. The card-image tape is written on logical 1.

Figure 6-5. Card-to-Tape A and C Control Card for a Honeywell File

Figure 6-6. Card-to-Tape A and C Control Card for an IBM File

Figure 6-7. Card-to-Tape A and C Control Card for a Non-standard File

Before assembly, Tape-to-Punch A and C is specialized according to the file type to be processed and the intended operating environment. As mentioned in the introduction, either Library Processor B or Library Processor C may be used to specialize the routine. The tape-to-punch macro call is described in this section.

PROGRAM HEADER CARD

For operation as a Simultaneous Media Conversion A or C coroutine, Tape-to-Punch A and C is specialized without a program header (PROG) card and is incorporated into the Simultaneous Media Conversion package before assembly.

For operation as an independent or foreground program, the routine is specialized and assembled as a unique program whose name is assigned by the user. Therefore at specialization time, the macro instruction to the library processor must be preceded by a program header card. The program header card is prepared according to the requirements of the Easycoder assembler which will assemble the specialized macro.

TAPE-TO-PUNCH MACRO INSTRUCTION (CALL)

The macro call for Tape-to-Punch A and C is coded as follows:

EASYCODER
CODING FORM

PROBLEM _____ PROGRAMMER _____ DATE ____ . _____ PAGE ___ OF ___

CARD NUMBER	Y E	M A R	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5 6 7			8 14	15 20	21 62	63 80
1		C	(taq)	$TPPCH	flfmt,, hdr,, tpmrk,, par,, nfl,, iln,, ni,, scfrm,, fldln,,	
2		C			cdln,, eflck,, efloc,, efl,, pcu,, mde,, adm,, org,, rwc/dv,,	
3		C			xrwc,, cpcu,, tupcu,, tapadr,, pfx,, own-code,, bl,, admi,,	
4		L			cntrl,, crcu,, pmode,, ban,, pchtyp,,	
5						

Detailed descriptions of macro instructions, including the use of continuation cards, omission of parameters, and line numbering, may be found in <u>Easycoder A Assembly System</u>, <u>Easycoder B Assembly System</u>, and <u>Library Processors C and D</u>.

The function, application, and coding of each of the macro call parameters abbreviated above is described in the following text. Parameters preceded by an asterisk (*) may be modified by means of a control card when parameter #27 selects the control card routine.

Once specialized, all other parameters and the resultant tape-to-punch coding are invariant. A tabular summary of all parameters described below is presented in Table 7-1.

Parameter #1: File Format (flfmt)

This parameter selects the file format to be processed by the tape-to-punch routine. An H is coded for Honeywell files, an I is coded for IBM files, and the parameter value is omitted for non-standard files.

Parameter #2: Header Labels (hdr)

An H is coded if the first record in the file is a header label record. When the presence of header labels is indicated, trailer labels must also be present. This parameter value is omitted when header labels are not present in the file. Note that this parameter is not coded for Honeywell files, as headers and trailers are standard.

Parameter #3: Tape-Mark Records (tpmrk)

For IBM and non-standard files, a T is coded if tape-mark records follow the header label and surround the trailer lable. A parameter value is omitted when tape marks are not present in the file. This parameter must be coded for IBM files with headers and trailers.

*Parameter #4: Parity (par)

The letter E is coded for this parameter when the print-image data records are written with even parity. When the data records are written with odd parity, the letter O may be coded. Omission of a parameter value implies odd parity.

*Parameter #5: Number of Files (nfl)

Two decimal digits (01 through 99) may be coded to specify the number of files on the input tape. Omission of a parameter value implies one file.

*Parameter #6: Item Length (iln)

Three decimal digits (001 through 999) may be coded to specify the number of characters in each item. Recall that the images of several cards to be punched may constitute one item. The specified item length must include control characters as well as data characters. Omission of a parameter value implies 80-character items. Note that this parameter is not coded for Honeywell files, as the item length is specified in the standard header label record.

*Parameter #7: Number of Items (ni)

Two decimal digits (01 through 99) may be coded to specify the number of items per record. Omission of a parameter value implies one item per record (unblocked records).

Note that this parameter is not coded for Honeywell files, as the number of items per record is specified in the standard header label record.

*Parameter #8: Sequence Check Option (scfrm)

Three decimal digits (001 through 999) may be coded to specify the position within each item of a field upon which Tape-to-Punch A and C will perform a sequence check. The sequence check field may be up to five characters in length, as defined in parameter #9. When an out-of-sequence item is detected, the routine executes a halt or console typeout which identifies the sequence error. If a value is omitted for this parameter, no sequence checks are performed.

*Parameter #9: Length of Sequence Check Field (fldln)

If parameter #8 selects the sequence check option, parameter #9 must specify the length of the field to be examined for sequence error. A decimal digit from 1 to 5 may be coded for this parameter. If no sequence checks are to be performed, this parameter is omitted.

*Parameter #10: Card Length (cdln)

This parameter specifies the maximum number of characters to be punched in each card in any file to be produced by Tape-to-Punch A and C. For normal mode card punching, the card-length parameter may be coded with a value from 01 to 80. For transcription mode punching, this parameter may be coded with a value from 001 to 160. Omission of a parameter value implies a card length of 80 characters. The card length must be 80 characters for files with header and trailer label records. Because this parameter fixes the maximum length of output punched cards, a version of Tape-to-Punch A and C to generate some files of 80-column cards and some files of 51-column cards must be specialized for a card length of 80 characters.

*Parameter #11: End-of-File Check (eflck)

For non-standard files and for IBM files without headers and trailers, this parameter must define the trailer code for the terminating record. Six alphanumeric (and non-blank) characters are coded for this parameter. On the input tape, a record whose first six characters match the defined trailer code is the terminating record which identifies the end of file.

Honeywell files always include the 1EOF trailer label record to mark the end of file. In IBM files with trailers, the associated tape-mark records define the end of file. Consequently, this parameter is not used for these two file types.

Parameter #12: Own-Code Exit at End of File (efloc)

This parameter is coded when the programmer desires the tape-to-punch routine to exit

to a user own-code routine at the end of file. When end-of-file own-coding is not used, this parameter is omitted. The value coded is the starting address of the own-code routine, written as either a symbolic tag or a decimal address. The same address is coded in the location field of the first instruction of the own-code routine.

A second own-code exit, called the standard exit, is available to the programmer via parameter #24. At assembly time, all own-coding must be inserted between the program header card and the specialized tape-to-punch routine. The first (or only) own-code routine must contain an ORG statement to set the program origin for the combined package of own-coding and the tape-to-punch routine.

> NOTE: When own-coding is included, the origin parameter (#17) for the tape-to-
> punch routine must be coded with the self-reference symbol (*).

The own-code exit is made after the trailer or terminating record is read from tape, but before the record is punched. Tape-to-Punch A and C executes the own-code exit by means of a branch to the address coded for parameter #12. Immediately following the branch instruction in the tape-to-punch routine is a NOP instruction with an A and B address. The A address is the address of the card buffer. The B address is the address of the rightmost location of a 10-character field which contains a decimal count of the number of cards punched.

The programmer using own-coding has the responsibility for providing a return to Tape-to-Punch A and C. In addition, an own-code routine should be capable of extracting the addresses of the punch buffer and card count field in a general procedure, independent of the addressing mode in which the tape-to-punch routine is assembled. Own-coding and Tape-to-Punch A and C may then be assembled together. To provide a return and to determine the addresses of the punch buffer and the card count field, an own-code routine might contain the coding suggested below.

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CODING FORM

PROBLEM _____ PROGRAMMER _____ DATE _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1				ORG	(Program Origin)	
2			(efloc)	SCR	EXIT+CM,7Ø efloc is parameter #12	
3				SCR	TEMPA+CM,7Ø CM is equated to admode	
4				SCR	TEMPB+CM,7Ø	
5				BA	ADCONA,TEMPA+CM	
6				BA	ADCONB,TEMPB+CM	
7			TEMPA	MCW	Ø,CDBUF	
8			TEMPB	MCW	Ø,CDCNT	
9						
10						
11						
12			EXIT	B	Ø return to tape-to-Punch	
13			CDBUF	DSA	Ø	
14			CDCNT	DSA	Ø	
15			ADCONA	DSA	CM	
16			ADCONB	DSA	CM+CM	

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The symbolic tag CM must be written exactly as shown. With the tape-to-punch routine, the specific tag CM is equated to the character addressing mode in which the routine is assembled, as specified in parameter #16. Location CDBUF will contain the address of the leftmost character in the card buffer. Location CDCNT will contain the address of the rightmost location of the 10-character card count field.

Parameter #13: End-of-File Action (efl)

This parameter programs Tape-to-Punch A and C for one of three procedures to be executed after each file on the input tape is punched. If a console typewriter is available, the letter T may be coded to specify the type-and-stall procedure. The routine will type END FILE t (where t = logical address of the input tape) at the console typewriter and stall to await further instructions from the operator. If the type-and-stall procedure is selected, parameter #14 is used to specify the output address of the console typewriter. If an S is coded for parameter #13, the routine executes a programmed halt after each file is punched. If a value for parameter #13 is omitted, there is on end-of-file action; all files are processed without intervention. The operating procedures associated with each end-of-file disposition are enumerated in Section VIII.

Parameter #14: Typewriter Control Address (pcu)

If parameter #13 is not T, this parameter is omitted. If parameter #13 is T, this parameter specifies the output address for the console typewriter (two octal digits). If this parameter is omitted when parameter #13 is T, a peripheral control address of octal 07 is used.

Parameter #15: Operating Mode (mde)

This parameter selects one of the operating environments described in the introduction. To specialize the routine for operation as a foreground program, an F is coded for this parameter. An I may be coded for operation as an independent program. An S is coded for operation as a Simultaneous Media Conversion A or C coroutine. Omission of a parameter value implies operation as an independent program.

Parameter #16: Address Mode (adm)

For operation as an independent or foreground program (when parameter #15 is F or I), the digit 2, 3, or 4 may be coded to set the address mode in which the routine will be assembled. For operation as a coroutine (parameter #15 is S), this parameter is omitted. If this parameter is omitted when parameter #15 is F or I, admode 3 is used.

Parameter #17: Origin (org)

For operation as an independent or foreground program, a decimal or symbolic main memory address may be coded to specify the program origin of the routine (exactly as in the Easycoder ORG statement). For operation as a coroutine (parameter #15 = S), this parameter is omitted (as the origin is specified in the Simultaneous Media Conversion package). If this parameter is omitted when parameter #15 is F or I, the program origin is automatically set to 1,340 (decimal). Programmers implementing one or both own-coding exits should review the relationship between the own-code routine origin and Tape-to-Punch A and C origin, as noted in the description of parameter #12.

Parameter #18: Read/Write Channel (rwc/dv)

For operation as an independent or foreground program, one digit (e.g., 1, 2, or 3) may be coded for this parameter to indicate the read/write channel to be used for card punching. Omission of a parameter value implies read/write channel 1 (interlocked) for either of the operating environments mentioned above. For operation in the Simultaneous Media Conversion environment, an RWC number must be coded. Note also that in this mode the RWC number is identical to the device code for the card punch and to the logical address of the input tape. For example, if the number 1 is coded when Tape-to-Punch runs as a coroutine, the card punch is device 1 using RWC 1 and the input tape is read from logical drive 1.

Parameter #19: Extra Read/Write Channel (xrwc)

When the routine operates in the independent mode (parameter #15 = I), this parameter may be coded to insure peripheral simultaneity. This parameter is omitted when the routine operates in any other mode. One digit (e.g., 1, 2, or 3) may be coded to specify an extra read/write channel. The extra RWC is used to overlap input tape reading with the card punching executed via the channel specified in parameter #18. If a parameter value is omitted, the routine reads the input tape over the same RWC used to transfer data to the card punch.

Parameter #20: Card Punch PCU Address (cpcu)

Two octal digits may be coded to specify the peripheral control unit address for the card punch. Omission of a parameter value implies an address of octal 01.

Parameter #21: TCU Address (tupcu)

Two octal digits may be coded to specify the input address of the tape control unit for the input tape. Omission of a parameter value implies an address of octal 40.

*Parameter #22: Tape Address (tapadr)

When the routine operates in the independent or foreground mode, one octal digit (0 to 7)

may be coded to specify the logical address of the input tape. Omission of a parameter value implies an input tape address of logical 3 for either of the operating environments mentioned above. For operation in the Simultaneous Media Conversion environment, this parameter is omitted (refer to "Parameter #18: Read/Write Channel (rwc/dv)" above).

Parameter #23: Symbolic Tag Prefix (pfx)

Three alphabetic characters may be coded for this parameter to constitute a unique prefix for all symbolic tags within the specialized tape-to-punch routine. Use of this parameter prevents duplication of tags when own-coding is assembled with Tape-to-Punch A and C. Note that when two or more tape-to-punch routines are specialized to be assembled together as Simultaneous Media Conversion coroutines, each routine must use a different prefix for its symbolic tags. When tag prefixes are not desired, this parameter is omitted.

Parameter #24: Standard Own-Code Exit (own-code)

This parameter is coded when the programmer desires the tape-to-punch routine to exit to a user own-code routine each time a card image is read from tape. The value coded is the starting address of the own-code routine, written as either a symbolic tag or a decimal address. The same address is coded in the location field of the first instruction of the own-code routine. If the standard own-code exit is not desired, this parameter is omitted.

At assembly time, both the standard own-code routine and the end-of-file own-code routine (if present) must be inserted between the program header card and the specialized tape-to-punch routine. Whichever own-code routine is first in the assembly input deck must contain an ORG statement to set the program origin for the combined package of own-coding and Tape-to-Punch A and C. If present, the second own-code routine may be assembled in-line after the first routine, without an ORG card. The specialized tape-to-punch routine should be assembled in-line after all own-coding. This is accomplished by insuring that the origin parameter (#17) is coded with the self-reference symbol (*) at specialization time.

The own-code exit occurs after each image is read, error checked, and moved to the output buffer, but before the card is punched. The mechanics of the standard own-code exit are similar to those of the end-of-file own-code exit described under parameter #12. Tape-to-Punch A and C contains a branch to the own-code address, followed by a NOP instruction with A and B address. The A address is the address of the first character of the card punch buffer. The B address is an address to which the programmer may return in order to bypass punching the card currently in the buffer. The description of parameter #12 includes recommended procedures for returning from the end-of-file own-code routine to Tape-to-Punch A and C, and for extracting the A and B addresses from the NOP instruction. These procedures

apply equally to the standard own-code routine. The example below is an own-code routine to bypass the punching of any card image with an X in column 80. If both the end-of-file and standard own-code exits are used, they will occur in succession after the trailer or terminating record is read.

EASYCODER
CODING FORM

PROBLEM __Punch Bypass_____ PROGRAMMER _____ DATE ____ . _____ PAGE ___ OF ___

CARD NUMBER	T	W		LOCATION	OPERATION CODE	OPERANDS	
1				(tag)	ORG	(program origin)	
2				(own code)	SCR	EXIT+CM,7Ø owncode is parameter #24	
3					SCR	TEMPA+CM,7Ø CM is equated to admode	
4					SCR	TEMPB+CM,7Ø	
5					BA	ADCONA,TEMPA+CM	
6					BA	ADCONB,TEMPB+CM	
7				TEMPA	LCA	Ø,4 Store Buffer Address in Index Reg. 1	
8				TEMPB	MCW	Ø,BYPASS+CM Store Exit Address in BYPASS	
9					BCE	BYPASS, 79,+X1, X	
10				EXIT	B	Ø return to punch current card	
11				BYPASS	B	Ø return to bypass current card	
12				ADCONA	DSA	CM	
13				ADCONB	DSA	CM+CM	
14							

Parameter #25:   Tape Buffer Length (bl)

This parameter specifies the number of buffer locations required to accommodate the largest record in any file to be processed by the routine. The value coded may vary from 0001 to 9999. Omission of a parameter value sets the maximum tape record length to 80 characters. The tape buffer length must not be less than 80 characters either when files with headers and trailers will be converted or when parameters will be modified with control cards.

Parameter #26:   Admode of Interrupt (admi)

This parameter is coded only when the routine operates in the foreground mode (parameter #15 is F); it is omitted when the routine operates in any other mode. The digit 3 or 4 is coded to specify the addressing mode in which Interrupt Control D is assembled.

Parameter #27:   Control Routine (cntrl)

A C is coded to include, in the specialized macro coding, a routine for modifying parameters at execution time. If the control routine is not desired, this parameter is omitted. The control routine extracts parameters specific to each file from a control card. Note that when this parameter value is C, a control card for each file must be present at execution time. The parameter-modifying control card is described on page 7-14. Information on a control card overrides both parameter values specified at specialization time and information in a Honeywell header label record. It is important to realize that the control routine is not required to

process varying formats of Honeywell files. Parameters specific to every Honeywell file are obtained from that file's header label in the absence of the control routine. When the control routine is selected, parameter #28 must specify the peripheral address of the card reader control.

Parameter #28: Card Reader Control Address (crcu)

When parameter #27 is C, this parameter must specify the address of the card reader control (two octal digits). Omission of a parameter value implies the peripheral address octal 41.

*Parameter #29: Card Punching Mode (pmode)

This parameter selects the card punching mode for conversion. The following octal numbers may be coded:

26 = normal mode, special code,
27 = normal mode, standard code,
25 = transcription mode.

The same card punching mode remains in effect for the conversion of an entire file.

If each item in a Honeywell punch-image file contains a control character, this character may be used to condition the card punch when the routine operates in the independent or foreground mode (see Section IV). To exercise the above option, this parameter is omitted, and the character controlling the punch is extracted from each item.

*Parameter #30: Length of Beginning-of-Record Control Area (ban)

This parameter specifies the number of characters at the beginning of a record which precede the first data character. For unbannered files, this parameter is 0; for bannered files, it is 1. Omission of this parameter implies a value of 0. This parameter is not used for Honeywell files, since the same information appears in the header label of each file.

Parameter #31: Punch Type (pchtyp)

This parameter specifies the Honeywell type number of the punch to be used, as follows:

214 = Type 214-1 or 214-2,
224 = Type 224,
227 = Type 227.

Omission of a parameter value implies the Type 227 punch.

Table 7-1. Summary of Tape-to-Punch A and C Macro Call Parameters
(Parameters preceded by an asterisk may be modified by means of a control card.)

Parameter Number	Function	Coded Value[1]
1	File Format	H = Honeywell file I = IBM file Δ = Non-standard file
2	Header labels	H = headers and trailers are present. Δ = no headers and trailers. NOTE: Not used for Honeywell files.
3	Tape-mark records	T = tape-mark records are present. Δ = no tape marks. NOTE: Not used for Honeywell files.
4	*Parity of data records	O or Δ = odd parity. E = even parity.
5	*Number of files on the input tape	1-99 = no. of files. Δ = one file.
6	*Item length	1-999 = item length. Δ = 80-character items. NOTE: Not used for Honeywell files.
7	*Number of items per record	1-99 = items per record. Δ = one item per record (unblocked). NOTE: Not used for Honeywell files.
8	*Sequence check	1-999 = Perform a sequence check at this character position within each item. Δ = no sequence check.
9	*Length of sequence check field	1-5 = no. of characters in field. Δ = no sequence check.
10	*Maximum number of characters punched in each card	1-80 (for normal mode) or 1-160 (for transcription mode) = no of characters. Δ = 80 characters. NOTE: Must be ≥ 80 for files with headers and trailers.
11	*End-of-file check	Six characters are coded to define the trailer code for the terminating record. NOTE: Not used for Honeywell files or for IBM files with headers and trailers.
12	End-of-file own-code exit	A decimal address or tag = beginning of end-of-file own-code routine. Δ = no own-coding.
13	End-of-file procedure	S = halt at end of file. T = type message and stall. Δ = process all files without intervention.
14	Typewriter control unit address	Address of console typewriter (two octal digits) is coded when parameter #13 = T. Δ = 07$_8$.

Parameter Number	Function	Coded Value[1]
15	Operating Mode	F = foreground program. S = Simultaneous Media Conversion coroutine. I or Δ = independent program.
16	Address Mode	2 = admode 2. 3 or Δ = admode 3. 4 = admode 4. NOTE: Not used when parameter #15 = S.
17	Origin	Decimal address or tag = program origin. $\Delta = 1,340_{10}$. NOTE: Not used when parameter #15 = S.
18	Read/write channel	1, 2, 3, etc. Δ = RWC 1 (interlocked).
19	Extra read/write channel	1, 2, 3, etc. Coded only when parameter #15 = I. Δ = no extra channel.
20	Card punch control address	Address of card punch control (two octal digits). $\Delta = 01_8$.
21	Tape control address	Input address of tape control for input tape (two octal digits). $\Delta = 40_8$.
22	*Input tape address	Logical address of input tape (0-7). Δ = logical 3. NOTE: Not used when parameter #15 = S.
23	Prefix	Three-character prefix for symbolic tags in macro routine. Δ = no prefix.
24	Own-code exit	A decimal address or tag = beginning of own-code routine (before each card is punched). Δ = no own-coding.
25	Buffer length	Number of characters in largest tape record to be read by the routine (decimal). Δ = 80 characters.
26	Address mode of Interrupt Control D	3 or 4. NOTE: Not used when parameter #15 = I or S.

Table 7-1 (Cont). Summary of Tape-to-Punch A and C Macro Call Parameters

Parameter Number	Function	Coded Value[1]
27	Control routine	C = include coding for modifying parameters by means of a control card at execution time. Δ = exclude the coding.
28	Card reader control address	Address of card reader control (two octal digits) is coded when parameter #27 = C. Δ = 41_8.
29	*Card punching mode	26 = normal mode, special code. 27 = normal mode, standard code. 25 = transcription mode. Δ = Control character is extracted from each punch-image item. (Valid only for Honeywell files in independent or foreground mode).
30	*Length of beginning-of-record control area	Number of characters preceding first data character in each record: 1 for bannered files, 0 or Δ = for unbannered files. NOTE: Not used for Honeywell files.
31	Punch type	Type number for the card punch: 214 = Type 214-1 or 214-2, 224 = Type 224, 227 or Δ = Type 227.

[1] The symbol Δ means that a parmeter value is omitted from the coding, not that a blank is actually coded as a value.

EXAMPLES OF TAPE-TO-PUNCH A AND C MACRO INSTRUCTIONS

Independent Mode Tape-to-Punch Routine for Honeywell Files (Figure 7-1)

In this example, the routine is specialized to operate as an independent program and process Honeywell punch-image files containing records of up to 500 characters. The control routine is included, so that the file structure information, sequence check option, card punching mode, and input tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the card punch control, card reader control, and tape control are octal 01, 41, and 40, respectively. The routine will use RWC1 (interlocked) for card punching on the Type 227, and will use RWC3 for tape reading.

EASYCODER
CODING FORM

PROBLEM Independent Mode - Honeywell File   PROGRAMMER _____ DATE ___ . _____ PAGE ___ OF ___

CARD NUMBER	TYPE	MARK	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 14	15 20	21 62	63 80
00001	C	D	(tag)	$TPPCH	H,	
00002	C			19	3,	
00003	L			25	500,,,C,	

Figure 7-1. Tape-to-Punch A and C Macro Instruction: Independent Mode - Honeywell Files

Foreground Mode Tape-to-Punch Routine for Honeywell Files (Figure 7-2)

In this example, the routine is specialized to operate as a foreground program and process Honeywell files containing records of up to 250 characters. No control cards are used; file structure information is obtained from the header label for each file. The input tape contains only one file. After the file has been punched, the routine will type a message at the console typewriter. A control character in each punch-image item will set the mode and code of the card punch. The routine will perform a sequence check on the first five characters of each item. Before each card is punched, Tape-to-Punch A and C will branch to an own-code routine at location EDIT. The tape-to-punch routine is specialized for assembly in admode 3. Interrupt Control D will run in admode 3 as well. The Type 214 card punch has peripheral address 01 octal. The input tape is logical 3 on tape control 40 (octal). The typewriter control address is octal 07. The routine will use RWC1 (interlocked).

EASYCODER
CODING FORM

PROBLEM Foreground Mode - Honeywell File   PROGRAMMER _____ DATE ___ . _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 ... 14	15 ... 20	21 ... 62	63 ... 80
∅∅∅∅1	C	D	(tag)	$TPPCH	H,	
∅∅∅∅2	C			8	1,5,	
∅∅∅∅3	C			13	T,,F,,*,	
∅∅∅∅4	C			24	EDIT,,25∅,,3,	
∅∅∅∅5	L			31	214,	

Figure 7-2. Tape-to-Punch A and C Macro Instruction: Foreground Mode - Honeywell Files

Independent Mode Tape-to-Punch Routine for IBM Files (Figure 7-3)

In this example, the routine is specialized to operate as an independent program and process IBM punch-image files containing records of up to 500 characters. The control routine is included, so that the file structure information, sequence check option, card punching mode, and input tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the card punch control, card reader control, and tape control are octal 01, 41, and 40, respectively. The routine will use RWC1 (interlocked) for card punching on the Type 227, and will use RWC3 for tape reading.

EASYCODER
CODING FORM

PROBLEM Independent Mode - IBM File   PROGRAMMER _____ DATE ___ . _____ PAGE ___ OF ___

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5	6	7	8 ... 14	15 ... 20	21 ... 62	63 ... 80
∅∅∅∅1	C	D	(tag)	$TPPCH	I,H,T,E,,	
∅∅∅∅2	C			19	3,	
∅∅∅∅3	L			25	5∅∅,,,C,	

Figure 7-3. Tape-to-Punch A and C Macro Instruction: Independent Mode - IBM Files

Independent Mode Tape-to-Punch Routine for Non-Standard Files (Figure 7-4)

In this example, the routine is specialized to operate as an independent program and process non-standard files containing records of up to 500 characters. Files are written in odd parity without headers and trailers. The control routine is included, so that the file structure information, sequence check option, card punching mode, and input tape address will be specified on a control card for each file. The macro routine is specialized without tag prefixes or own-coding, and will be assembled in admode 3 with the program origin at 1,340 (decimal). The peripheral addresses of the card punch control, card reader control, and tape control are octal 01, 41, and 40, respectively. The routine will use RWC1 (interlocked) for card punching on the Type 227, and will use RWC3 for tape reading.

EASYCODER
CODING FORM

PROBLEM Independent Mode - Non - Standard File _____ PROGRAMMER _____ DATE _____ PAGE ____ OF ____

CARD NUMBER	T Y P E	M A R K	LOCATION	OPERATION CODE	OPERANDS	
1 2 3 4 5 6	7	8	14	15 20	21 62	63 80
Ø Ø Ø Ø 1	C	D	(tag)	$TPPCH		
Ø Ø Ø Ø 2	C			1 9	3,	
Ø Ø Ø Ø 3	L			2 5	5 Ø Ø , , C ,	

Figure 7-4. Tape-to-Punch A and C Macro Instruction: Independent Mode - Non-Standard File

TAPE-TO-PUNCH A AND C CONTROL CARD

When the routine is specialized to accept parameter modifying control cards (according to parameters #27 and #28), a control card for each file must be supplied at execution time. Each control card contains information specific to the processing of a single file. Before a file is processed, its associated control card is read from the card reader in special code. Information on a control card overrides both the information contained in a Honeywell header label and the parameter values determined at specialization time. The order of control cards in the card reader must correspond to the order of files on the input tape. The last control card must be followed by a card with END punched in columns 15 through 17.

The format of the Tape-to-Punch A and C control card is described below. Note that for some control card parameters a blank field causes the previous parameter value to be retained, while for other parameters a blank field imparts a distinct value to the parameter. Therefore, a parameter which would assume an undesired value from a blank control card field must be specifically coded on the control card, even if the previous value of that parameter does not change. For example, if the item length parameter (columns 24 through 26) is left blank, the previous value for item length will be retained. However, assume that the routine is specialized to accept an even parity file, that a control card is used for each file, and that the first file on the input tape is written in even parity. The control card for the first file must still contain the letter E in column 35. If this column were left blank, the routine would expect an odd parity file, even though an even parity file was specified in parameter #4.

Control Card Format

Columns 15-20:	Contain $TPPCH to identify the Tape-to-Punch A and C control card.
Columns 21-22: (ni)	Contain the decimal number of items per record (01-99). A blank field causes the previous value to be preserved.
Columns 24-26: (iln)	Contain the decimal number of characters in each item (including control characters), 001-999. A blank field causes the previous value to be preserved.

Columns 27-29:
(cdln)
	Contain the number of characters to be punched in each card:
	    001-080 for normal mode punching;
	    001-160 for transcription mode punching.
	A blank field signifies 80 characters.

Column 31:	Contains the number of control characters in each item (0-9); usually 0 or 1. A blank field signifies 0 control characters.

Column 33:
(ban)
	Contains the number of characters in the beginning-of-record control area:
	    1 for bannered files;
	    0 for unbannered files.
	A blank field signifies no banner character.

Column 35:
(par)
	Contains a parity indicator:
	    O = odd parity;
	    E = even parity.
	A blank field signifies odd parity.

Column 37: (fldln)	Contains the number of characters in the field to be sequence checked within each item (1-5). A blank field eliminates the sequence check option.
Columns 39-41: (scfrm)	Contain the first character position within each item of the field to be sequence checked (001-999). A blank field eliminates the sequence check option.
Column 43: (ctl)	Contains a C if each punch-image item includes a control character. A blank field signifies that control characters are absent.
Column 45: (tapadr)	Contains the logical address of the input tape (0-7). This field must not be blank.
Columns 53-54: (nfl)	Contain the total number of files on the input tape, including the file referenced by this control card. A blank field causes the previous value to be preserved. This field may be non-blank only on the control card for the first file.

Columns 56-57:
(pmode)
	Contain a card punching mode designator:
	    26 = normal mode, special code;
	    27 = normal mode, standard code;
	    25 = transcription mode.
	A blank field signifies that the punching mode will be determined by a control character in each item. Note that this condition is permissable only for Honeywell files when the routine operates as an independent or foreground program. Column 43 must also contain C.

Columns 59-64:	Contain the six-character code for identifying the end of a nonstandard input file or an IBM input file without headers and trailers. These columns are blank for other types of files.

<u>Sample Control Cards</u>

Figure 7-5 illustrates a control card for punching a bannered Honeywell file with one 81-character item per record. The last character of each item is a control character which sets the punching mode; the first 80 characters of each item are punched on one card. The input tape is logical 3.

Figure 7-6 illustrates a control card for punching an IBM file with two 80-character items per record. The file has header and trailer label records. Each item is punched on a different card in normal mode, standard code. The input tape is logical 2.

Figure 7-7 illustrates a control card for punching an odd parity non-standard file with four 51-character items per record. Each item is punched on a different card in normal mode, special code. The routine is directed to perform a sequence check on the first three characters of each item. The input tape is logical 3. The end of the input file is identified by a record whose first six characters are END ΔΔΔ.
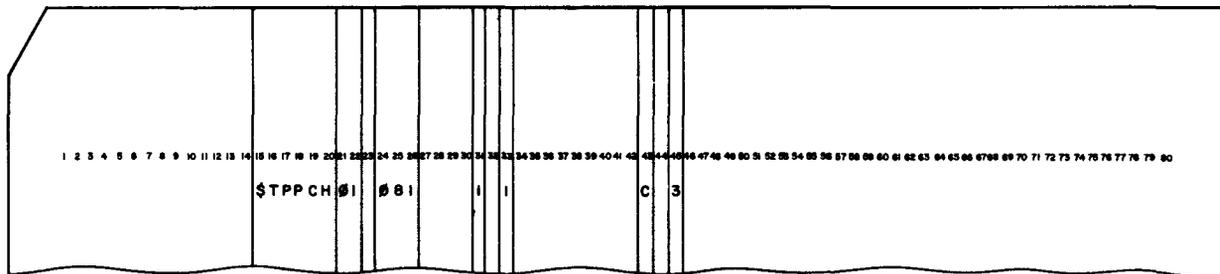
Figure 7-5. Tape-to-Punch A and C Control Card for a Honeywell File
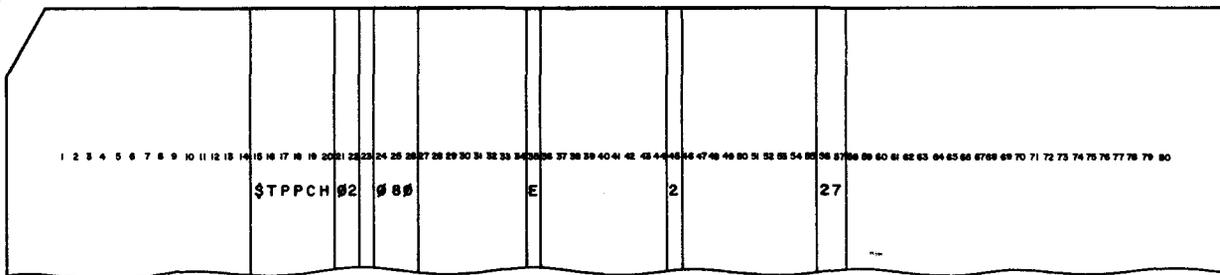
Figure 7-6. Tape-to-Punch A and C Control Card for an IBM File
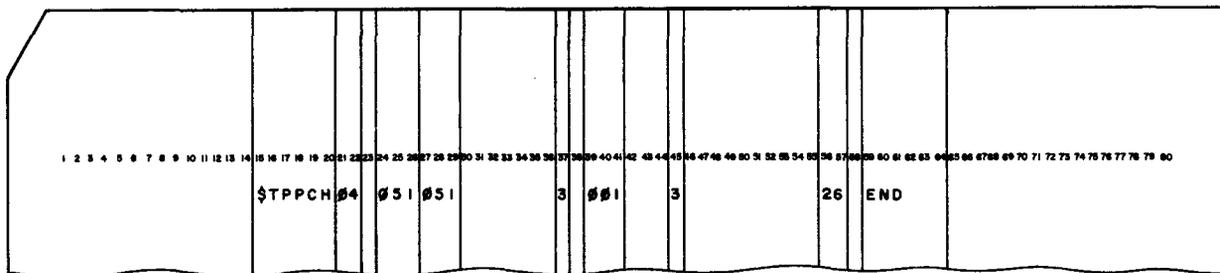
Figure 7-7. Tape-to-Punch A and C Control Card for a Non-Standard File

7-16

DATA CONVERSION A AND C OPERATING PROCEDURES

GENERAL STARTING PROCEDURE

The Data Conversion routines do not halt after loading in any operating environment. Therefore the terminal device associated with each routine must be initialized before the routine is loaded. If control cards are used, the card reader must also be initialized. For an independent or foreground program which does not use control cards, the input or output tape is mounted on the logical drive specified in parameter #22. For an independent or foreground program which uses control cards, the input or output tape is mounted on the logical drive specified in column 45 of the first control card. For a Simultaneous Media Conversion coroutine, the logical number of the input or output tape must be identical to the device code for the terminal device (parameter #18). For example, Tape-to-Printer A and C input must be on logical tape 2 when the printer is device 2.

USE OF CONTROL CARDS

When the tape-to-printer or tape-to-punch routine is loaded from cards, one control card for each file on the input tape must immediately follow the program deck in the card reader. When these routines are loaded from tape, only the control cards are placed in the card reader. When the card-to-tape routine is loaded from cards, the program deck is followed by the card files to be converted, and each card file is preceded by its control card.

Each file is processed as an independent entity, i.e., the end of file procedure is completed before the control card for the next file is read. Note that a control card may change the logical address of the input or output tape. When the control card is read and a hole-count or illegal punch error is detected, a halt or typeout is issued.

CONSOLE TYPEOUTS AND PROGRAMMED HALTS

Console typeouts and associated operator actions are explained in Tables 8-1, 8-3, and 8-5 for Tape-to-Printer A and C, Card-to-Tape A and C, and Tape-to-Punch A and C, respectively. Programmed halts and operator actions are explained in Tables 8-2, 8-4, and 8-6 for Tape-to-Printer A and C, Card-to-Tape A and C, and Tape-to-Punch A and C, respectively.

END-OF-FILE PROCEDURE

Parameter #13 selects one of the following three end-of-file dispositions:

1.   Type and stall. After each file is converted, the message END FILE t

is typed at the console typewriter (where t = logical address of input or output tape). The console typewriter address must be supplied in parameter #14. When this message is typed, the routine stalls to await an operator's typed response which causes either termination of the run or processing of another file. End-of-file options available to the operator for each operating environment are explained in Table 8-1, 8-3, or 8-5. When the type-and-stall procedure is selected, other communication between the routine and the operator is also maintained via the console typewriter. After the end-of-file typeout for the last file, a request by the operator to process another file (by typing G) will cause the input or output tape to be rewound. At this point, an independent program executes the end-of-job halt shown in Table 8-2, 8-4, or 8-6. A foreground program or coroutine exits to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively. Note that when the type-and-stall option is not selected, all communication occurs via the operator's control panel, as described in Table 8-2, 8-4, or 8-6.

2. Halt. After each file is processed, the end-of-file halt shown in Table 8-2, 8-4, or 8-6 occurs. The operator may press the RUN button to continue processing the next file. Pressing the RUN button at the halt for the last file causes the input or output tape to be rewound. The job is terminated as described above.

3. Process each file without intervention. Files are processed serially, without a halt or typeout after each file is converted. After conversion of the last file, the job is terminated as described above.

Table 8-1. Tape-to-Printer A and C Console Messages

Message	Significance	Operator Action
: END FILE t☐ (t = logical address of input tape	This message is typed at the end of every print file when parameter #13 specifies the type-and-stall option.	To terminate the run, type S. The input tape is rewound. Independent programs will execute the end-of-job halt in Table 8-2. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively. To return to the general return address of a Mod 1 loader - monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. A foreground program may not communicate with the loader. To process another file, type G. If the file just printed was the last file on the input tape, the input tape is rewound. An independent program will execute the end-of-job halt. A foreground program or a coroutine will exit to Interrupt Control D or the Simultaneous Media Conversion monitor, respectively.
: RD ERR t☐ (t = logical address of input tape)	An uncorrectable read error has been encountered. The record has been reread 64 times without success.	To reread an additional 64 times, type G. If the error is still uncorrectable, the message is typed again. To ignore the error, type G again. A line containing RDE will be printed, followed by two blank

Table 8-1 (Cont). Tape-to-Printer A and C Console Messages

Message	Significance	Operator Action
: RD ERR t□ (t = logical address of input tape) (Cont).		lines. The error line will then be printed and processing will continue. To terminate the run, type S. The input tape is rewound. An independent program will execute the end-of-job halt. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively. To return to the general return address of a Mod 1 loader-monitor, type M. This response may only be used for an independent program in the Mod 1 Operating System. The input tape is rewound.

Table 8-2. Tape-to-Printer A and C Programmed Halts
(no typewriter present)

Cause	A Address	B Address	Operator Action
This halt occurs at the end of every print file when parameter #13 specifies the halt option.	7775	0cu^{1}3t^2	To process another file, depress the RUN button. If the file just printed was the last file on the input tape, the input tape is rewound. Independent programs will then execute the end-of-job halt. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
An uncorrectable tape read error has been encountered. The record has been reread 64 times without success.	7777	0cu^{1}1t^2	To reread an additional 64 times, depress the RUN button. If the halt occurs again, depress the RUN button a second time to ignore the error. A line containing RDE will be printed, followed by two blank lines. The error line will then be printed and processing will continue.
End of job	7774	7777	None. This halt occurs for an independent program only. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
A hole-count or illegal punch error has been detected in reading a control card.	0000	0cu^{1}10	Correct card and reinsert in card reader. Depress RUN button.

NOTE: If a printer cycle check causes processing to halt, "cycle up" the printer to continue. The error line will be reprinted, preceded by a line containing "CYCLE CHECK" and two blank lines.
1.   cu = peripheral control address
2.   t = logical number of input tape (parameter #22)

Message	Significance	Operator Action
: END FILE t☐ (t = logical address of output tape)	This message is typed at the end of every card file when pa-ameter #13 specifies the type-and-stall option.	To terminate the run, type S. The output tape is rewound. Independent programs will execute the end-of-job halt in Table 8-4. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively. To return to the general return address of a Mod 1 loader-monitor, type M. The output tape is rewound. This response may only be used for an _independent_ program in the Mod 1 Operating System. A foreground program _may not_ communicate with the loader. To process another file, type G. If the file just written was the last file in the input deck, the output tape is rewound. An independent program will execute the end-of-job halt. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
: WR ER pp t☐ (pp = TCU address)	Uncorrectable write error on tape t. In the independent or foreground environment, the tape has been backspaced, the error record has been erased, and a second write has been attempted. In the Simultaneous Media Conversion environment, the routine has made three attempts to write, then skipped the area on tape and made three more attempts.	To try to rewrite again, type G. To return to the general retrun address of a Mod 1 loader-monitor, type M. The output tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: SQ ER pp XXXXX☐ (pp = TCU address)	This message is typed when parameters #8 and #9 request a sequence check and an out-of-sequence item is detected in the input deck. The item in error has the sequence check field XXXXX.	To continue and ignore the error, type G. To return to the general return address of a Mod 1 loader-monitor, type M. The output tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: END pp t☐(pp = TCU address)	The logical end of tape t has been encountered while generating a	To continue generating the file, mount another output tape as logical t and type G.

Table 8-3 (Cont). Card-to-Tape A and C Console Messages

Message	Significance	Operator Action
: END pp t☐(pp = TCU address) (Cont).	card-image file. 1EOR Δ and 1ERIΔ records have been written and the tape is rewound.	To return to the general return address of a Mod 1 loader-monitor, type M. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: RD ER cu 1☐ (cu = peripheral address of card reader)	Hole-count error during card reading. The error card is ejected or offset stacked. NOTE: If parameter #31 selects the control character option, this typeout does not occur. Instead, all error cards are accepted and the control character within each item is set to reflect the error condition. However, this typeout will occur if a hole-count error is detected when reading a control card.	To continue, depress the RUNOUT button, refeed the error card and the run-out cards, "cycle-up" the card reader, and type G. To return to the general return address of a Mod 1 loader-monitor, type M. The output tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: RD ER cu 2☐ (cu = peripheral address of card reader)	Illegal punch error during card reading. The error card is ejected or offset stacked. NOTE: If parameter #31 selects the control character option, this typeout does not occur. Instead, all error cards are accepted and the control character within each item is set to reflect the error condition. However, this typeout will occur if an illegal punch error is detected when reading a control card.	Same as above.
: INVALID CD☐	Invalid control card has been submitted.	Correct the card, refeed deck, type G.

Table 8-4. Card-to-Tape A and C Programmed Halts
(no typewriter)

Cause	A Address	B Address	Operator Action
Uncorrectable tape write error. In the independent or foreground environment, the tape has been backspaced, the error record has been erased, and a second write has been attempted. In the Simultaneous Media Conversion environment, the routine has made three attempts to write, then skipped the area on tape and made three more attempts.	7776	$0cu^1 2t^2$	Depress the RUN button to try to rewrite again.
Hole-count or illegal punch error during card reading. The error card is ejected or offset stacked. NOTE: If parameter #31 selects the control character option, this halt does not occur. Instead, all error cards are accepted and the control character within each item is set to reflect the error condition. However, this halt will occur if a card read error is detected when reading a control card.	7777	$0cu^1 10$	Depress RUNOUT button, refeed the error card and the run-out cards, "cycle-up" the card reader, and depress the RUN button.
This halt occurs at the end of every card file when parameter #13 specifies the halt option.	7775	$0cu^1 4t^2$	To process another file, depress the RUN button. If the file just written was the last file in the input deck, the output tape is rewound. An independent program will execute the end-of-job halt. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
The logical end of the output tape has been encountered while generating a card-	7773	$0cu^1 3t^2$	To continue generating the file, mount another output tape as logical t and depress the RUN button.

Table 8-4 (Cont). Card-to-Tape A and C Programmed Halts
(no typewriter)

Cause	A Address	B Address	Operator Action
image file. 1EORΔ and 1ERIΔ records have been written and the tape has been re-wound.	7773 (cont.)	0cu^{1}3t^2 (cont.)	
This halt occurs when parameters #8 and #9 request a sequence check and an out-of-sequence item is detected in the input deck. The address of the left-most character in the sequence check field of the item in error is given by the A Address register.	scfrm (parameter #8)	5000	To continue and ignore the error, depress the RUN button.
End of job.	7774	7777	None. This halt occurs for an independent program only. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
Invalid control card.	4000	4000	Correct the card, refeed deck, depress the RUN button.

NOTES:
1. cu = peripheral control address.
2. t = logical address of output tape (parameter #22).

Table 8-5. Tape-to-Punch A and C Console Messages

Message	Significance	Operator Action
: END FILE t$\square$ (t = logical address of input tape)	This message is typed at the end of every punch file when parameter #13 specifies the type-and-stall option.	To terminate the run, type S. The input tape is rewound. Independent programs will execute the end-of-job halt in Table 8-6. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.

To return to the general return address of a Mod 1 loader-monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. A foreground program may not communicate with the loader.

To process another file, type G. If the file just punched was the last file on the input tape, the tape is rewound. An independent program will execute the end-of-job halt. A |

Table 8-5 (Cont). Tape-to-Punch A and C Console Messages

Message	Significance	Operator Action
: END FILE t□ (t = logical address of input tape) (cont)		foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
: RD ER pp t□ (pp = TCU address; t = logical address of input tape)	An uncorrectable read error has been encountered on the input tape. The record has been reread 64 times without success.	To reread an additional 64 times, type G. If the error is still uncorrectable, the message is typed again. To continue and ignore the error, type G again. To return to the general return address of a Mod 1 loader-monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: WR ER dd□ (dd = peripheral address of card punch)	Card punch error.	To repunch card, type G. Error cards are are ejected or offset stacked. To return to the general return address of a Mod 1 loader-monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: SEQ ER pp t XXXXX□ (pp = TCU address; t = logical address of input tape)	This message is typed when parameters #8 and #9 request a sequence check and an out-of-sequence item is detected on the input tape. The item in error has the sequence check field XXXXX.	To continue and ignore the error, type G. To return to the general return address of a Mod 1 loader-monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: END pp t□ (pp = TCU address)	The logical end of tape t has been encountered while punching a file. The tape has been rewound.	To continue punching the file from another input tape, mount the second reel as logical t and type G. To return to the general return address of a Mod 1 loader-monitor, type M. The input tape is rewound. This response may only be used for an independent program in the Mod 1 Operating System. To terminate the run as described above, type S.
: INVALID CD□	A control card has either been constructed incorrectly or been	Correct the card, refeed deck, type G.

Table 8-5 (Cont). Tape-to-Punch A and C Console Messages

Message	Significance	Operator Action
: INVALID CD▯ (cont.)	read with a hole-count or illegal punch error.	

Table 8-6. Tape-to-Punch A and C Programmed Halts
(no typewriter)

Cause	A Address	B Address	Operator Action
Uncorrectable read error on input tape. The record has been reread 64 times without success.	7777	0cu[1]1t[2]	To reread an additional 64 times, depress the RUN button. If the halt occurs again, depress the RUN button a second time to ignore the error.
This halt occurs at the end of every punch file when parameter #13 specifies the halt option.	7775	0cu[1]3t[2]	To process another file, depress the RUN button. If the file just punched was the last file on the input tape, the tape is rewound. An independent program will execute the end-of-job halt. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
The logical end of the input tape has been encountered while punching a file. The tape has been rewound.	7773	0cu[1]3t[2]	To continue punching the file from another input tape, mount the second reel as logical t and depress the RUN button.
This halt occurs when parameters #8 and #9 request a sequence check and an out-of-sequence item is detected on the input tape. The memory address of the leftmost character of the item in error is given by the A Address register.	Leftmost item address	5000	To continue and ignore the error, depress the RUN button.
Card punch error.	7776	0cu[1]10	To repunch the image, depress the RUN button. Error cards are ejected or offset stacked.
End of job.	7774	7777	None. This halt occurs for an independent program only. A foreground program or coroutine will exit to Interrupt Control D or to the Simultaneous Media Conversion monitor, respectively.
A control card has either been constructed incorrectly or been read with a hole-count or illegal punch error.	4000	4000	Correct the card, refeed deck, depress the RUN button.

NOTES: 1. cu = peripheral control address.
2. t = logical address of input tape (parameter #22).

RUNNING IN THE BASIC PROGRAMMING SYSTEM

Operation as an Independent Program

For operation as an independent program in the Basic Operating System, a Data Conversion A routine may be assembled by Easycoder Assembler A or B. The routine is always assigned a bootstrap area beginning at location 0, and the user must not set the program origin (ORG) below location 104 (decimal). Card Loader A or Tape Loader/Search A may load the routine. If the routine is loaded from cards, it is bootstrapped into location 0. Consult the Easycoder A Assembly System manual for directions for loading the routine from a self-loading tape (SLT).

Operation as a Simultaneous Media Conversion A (SCOPE) Coroutine

ASSEMBLING AND LOADING

After specialization, a Data Conversion A routine is inserted into the Simultaneous Media Conversion deck and the unit is assembled by Easycoder Assembler A or B. The entire Simultaneous Media Conversion package is loaded by either of the Basic Programming System loaders mentioned above.

OPERATING

In the Simultaneous Media Conversion environment, Data Conversion A operating procedures are similar to the operating procedures for a standard Simultaneous Media Conversion coroutine (refer to the Simultaneous Media Conversion A and C manual). Specifically, Data Conversion A operating procedures are identical to standard SCOPE coroutine operating procedures in all but two respects:

1. Only two control characters are ever entered to start a Data Conversion A routine. (A standard coroutine may require up to two additional control characters for starting conversion).

2. In the Simultaneous Media Conversion environment, some error conditions are treated according to standard SCOPE procedures. Specifically, octal characters which constitute a control option are entered in memory by the operator. Only two control options are used with Data Conversion A to recover from an error condition. (A standard coroutine may use up to three additional error control options). Other error conditions are handled in the same manner as for other Data Conversion operating environments, rather than according to SCOPE procedures.

Simultaneous Media Conversions may be started and terminated independently by the operator. The general procedure is:

1. Depress STOP button.

2. Set SENSE switch 4 ON.

3. Depress RUN button and wait for programmed halt.

4.   Enter two characters for starting or terminating conversion into main memory
locations 0001 and 0002. For starting, the two octal characters are 4d and 74,
where d is both the terminal device code and the logical address of the input or
output tape. Recall that d is identical to parameter #18. For terminating,
the two octal characters are 4d and 04. The value of d is the same as for start-
ing the conversion.

Termination is usually automatic upon detection of the terminating record in the input file.
Manual termination may be used to end the conversion before this record is encountered. When
the conversion is terminated automatically, the input or output tape is rewound and other con-
version operations continue uninterrupted. When the conversion is terminated manually, the
tape is not rewound and other operations are interrupted for the duration of the manual termin-
ation procedure. If the routine is specialized to halt or to type-and-stall after each file is con-
verted, other operations are suspended until the associated operator action given in Tables 8-1
through 8-6 (as appropriate) is completed.

Error Procedures

For errors which are handled according to SCOPE procedures, an error condition is ident-
fied only by the stoppage of the peripheral devices involved in the conversion. In some cases,
the run can be continued simply by "cycling up" ther terminal device. In other cases, two octal
characters are entered into memory, following the same procedures as for the starting and
terminating characters described above. The options for continuing after an error condition
has occurred are given below. The variable z is equal to the sum of 4 and the terminal device
code. For example, if the printer is device 2, the control message 2640 is entered to clear an
error condition and continue.

Octal characters (z = 4 + d)	Action
2z40	Clear error condition and continue.
2z60	Clear error condition, backspace tape one record, and continue.

For errors which are handled according to Data Conversion A and C procedures, an error
condition is identified by the appropriate halt or typeout.

In the Simultaneous Media Conversion environment, Data Conversion A error conditions
are detailed in Table 8-7.

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Table 8-7. Error Procedures for the Simultaneous Media Conversion Environment

Error Condition	How Identified	Status of Conversion	Action
Printer cycle check (Tape-to-Printer A and C)	Printer stops.	Error line is still in memory.	"Cycle up" the printer. The error line will be reprinted, preceded by a line containing CYCLE CHECK and two blank lines.
Uncorrectable read error on print or punch input tape (Tape-to-Printer A and C or Tape-to-Punch A and C)	Printer or punch stops.	The bad record has not been printed or punched.	a. Enter 2z40 into memory to ignore the error, i.e., print or punch the bad record and continue. b. Enter 2z60 into memory to backspace and reread the bad record.
Punch or printer not ready for operation (e.g., out of cards or paper, jam condition, etc.) (Tape-to-Punch A and C or Tape-to-Printer A and C)	Printer or punch stops.	There is an item in memory to be printed or punched.	a. If the last item printed or punched was correct, "cycle up" the printer or punch to continue. b. To reprint or repunch the last record, enter 2z60 and "cycle up" the device to continue.
Punch error (Tape-to-Punch A and C)	Typeout (Table 8-5) or halt (Table 8-6)	See Table 8-5 or 8-6.	See Table 8-5 or 8-6.
Card reading error: hole-count or illegal punch error (Card-to-Tape A and C)	Typeout (Table 8-3) or halt (Table 8-4)	When control characters are not added, the error card is ejected or offset stacked and the halt or typeout occurs. When control characters are added, the card is accepted and the halt or typeout does not occur.	See Table 8-3 or 8-4.
Uncorrectable write error on output tape (Card-to-Tape A and C)	Typeout (Table 8-3) or halt (Table 8-4)	Card image is still in memory.	See Table 8-3 or 8-4.

RUNNING IN THE MOD 1 OPERATING SYSTEM

Operation as an Independent Program

For operation as an independent program in the Mod 1 Operating System, a Data Conversion C routine may be assembled by Easycoder Assembler C or D. Any of the Mod 1 loading programs (e.g., Tape Loader-Monitor C, Card Loader-Monitor B, Floating Tape Loader-Monitor C) may load the assembled routine. At specialization time, the routine must specify a

program origin (ORG) which accommodates the desired loader. For example, if the routine will be loaded by the Tape Loader-Monitor C, the program origin must be set at location 1,340 (decimal) or greater. The console typewriter is the only communication link between Data Conversion C and a Mod 1 loader. Via a typed message, the operator may terminate conversion at the end of a file or at a type read/write error by causing the routine to branch to the general return address of the Mod 1 loader (see Table 8-1, 8-3, or 8-5). If the routine proceeds to the end-of-job halt shown in Table 8-2, 8-4, or 8-6, the appropriate loader procedures must be executed to attain the loader halt for a console call.

Operation as a Foreground Program

For operation as a foreground program, a Data Conversion C routine is assembled by either of the assemblers mentioned above. The routine is loaded by the Floating Tape Loader-Monitor C and executed under Interrupt Control D (refer to the Floating Tape Loader-Monitor C and Interrupt Control D manual). The following operating considerations must be observed when a Data Conversion C routine is run as a foreground program.

1. When specialized for the foreground mode (parameter #15 = F), the Data Conversion routine is always the foreground program. (When specialized for the independent mode, it may operate as a background program.)

2. Memory allocation and peripheral device assignments for the Data Conversion C routine, the background program, the Floating Tape Loader-Monitor, and Interrupt Control D must be prescheduled to avoid conflict.

3. The Data Conversion C routine and the background program must not share read/write channels.

4. If the installation is equipped with the external interrupt button, this button must be used to cue the loading of Data Conversion C. Consult the manual mentioned above for detailed multiprogram operating procedures.

5. If the external interrupt button is not present, Data Conversion C must be loaded prior to the background program.

Operation as a Simultaneous Media Conversion C Coroutine

ASSEMBLING AND LOADING

After specialization, a Data Conversion C routine is inserted into the Simultaneous Media Conversion deck, and the unit is assembled by either of the Mod 1 assemblers mentioned above. The entire Simultaneous Media Conversion package is loaded by any of the Mod 1 loaders.

OPERATING

Starting, terminating, and error procedures are identical to those described for Simultaneous Media Conversion A in the Basic Programming System.

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    CARD READER PCU ADDRESS, 6-6
    " MODE, 5-6, 6-5, 7-5
    PRINTER PCU ADDRESS, 5-6
    TAPE ADDRESS, 5-6, 6-6, 7-6
    TCU ADDRESS, 5-6, 6-6, 7-6
    TYPEWRITER CONTROL ADDRESS, 5-5, 6-5, 7-5
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        LENGTH OF BEGINNING-OF-RECORD CONTROL AREA, 7-9
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BEGINNING/OF-RECORD CONTROL AREA
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    " DATA RECORDS,
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            ONE CARD IMAGE PER ITEM, 3-2
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            IMAGE PER ITEM, 3-2
        IBM BLOCKED DATA RECORDS WITH MORE THAN ONE CARD
            IMAGE PER ITEM, 3-6
        IBM BLOCKED DATA RECORDS WITH ONE CARD IMAGE PER
            ITEM, 3-6
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    " CHARACTER, 5-3
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    TAPE-TO-PRINTER MACRO INSTRUCTION (CAL), 5-1
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            PARAMETERS, 5-9
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            FILE, 6-16
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            FIXED-LENGTH HONEYWELL FILE, 5-16
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            ONE CARD IMAGE PER ITEM, 3-2
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CARD (CONT.)
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            ONE CARD IMAGE PER ITEM, 3-2
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            IMAGE PER ITEM, 3-2
        IBM BLOCKED DATA RECORDS WITH MORE THAN ONE CARD
            IMAGE PER ITEM, 3-6
        IBM BLOCKED DATA RECORDS WITH ONE CARD IMAGE PER
            ITEM, 3-6
        IBM UNBLOCKED DATA RECORDS WITH MORE THAN ONE
            CARD IMAGE PER ITEM, 3-5
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            PER ITEM, 3-5
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