File No. S360-32
Form C24-3409-2

IBM Systems Reference Library

IBM System/360 Basic Operating System
Specifications
Utility Programs

This reference publication describes the IBM System/360 Basic Operating System Utility Programs. The programs described are:

1. Eleven file-to-file programs for transferring a file from input mediums to output mediums.

2. A program to clear one or more areas of disk storage and establish pre-formatted tracks.

3. A tape compare program that compares two files from two or more tapes.

The reader should be familiar with the information presented in the publications IBM System/360 Basic Operating System Programmer's Guide (8K Disk), C24-3372, IBM System/360 Basic Operating System Assembler with Input/Output Macros (8K Disk), C24-3361. For a list of association publications, refer to the IBM System/360 Bibliography, A22-6822.

Major Revision, December 1965

This edition, Form C24-3409-2, is a major revision of and obsoletes, Form C24-3409-1. Changes are designated in three ways:

1. A vertical line appears at the left of of the affected text where only a part of the page has been changed.

2. A dot (•) appears at the left or right of the page number where the complete page should be reviewed.

3. A dot (•) appears at the left of each figure that has been changed.

Pages that have been affected are: 1-3, 5-11, 13, 17, 19, 20, 22, 27, 30, 32, 38, 46, 51-55.

Copies of this and other IBM publications can be obtained through IBM Branch Offices. Address comments concerning the content of this publication to IBM Product Publications, Endicott, New York 13764.

CONTENTS

Whatever may be the specific uses of a data processing system, there exist certain unique operations that must be performed frequently. These operations may differ in detail, depending on the particular machine configuration and data format of the individual user, while the essential function remains the same. The burden of programming these operations because of their frequent use, for each specific and perhaps non-recurring job could be prohibitive, even if advanced languages are used. Therefore, there is a need for generalized routines designed to satisfy specific functions. These routines must be flexible enough to allow the user to assign the specifications of his particular problem.

IBM supplies several types of programs that meet these requirements. Those described in this publication are grouped under the heading Utility Programs. They are designed to assist the user in day-to-day operation of his installation. With these programs certain frequently required operations, such as transferring disk-storage files from cards or tape, and printing out areas of tape or disk for program-testing purposes, can be performed without programming effort on the part of the user.

DESCRIPTION

Twelve of these utility programs are relocatable disk-resident programs that reside in the relocatable library of the IOCS supervisor. The Clear Disk program is a disk-resident program located in the core-image library. All programs are loaded into core from disk by the system loader. For further information needed to load the desired program from the relocatable library into core see the Programmer's Guide as listed on the front cover of this publication. Each program will handle a particular type of job (the tape-to-printer program will print any tape file on any single printer). A symbolic assembly is not necessary for the operation of a program. To handle a specific job, the generalized program is modified by control cards.

Control cards are free-form in that the optional parameters can be punched in any order. The programs assume a normal use for most options when a choice is not indicated in a utility-control card.

Consistency of control information is maintained by providing for all control information to be specified in a similar manner for all programs. Where the same device is used with different programs, the control information related to the device will be similar for all programs. The manner in which control information related to input and output device assignment and description is done, and the manner in which label handing is done, is compatible with IBM System/360 Basic Operating System IOCS.

MACHINE REQUIREMENTS

The minimum machine configuration required for these programs is:

- IBM System/360 processing unit with 8192 positions of core storage.

For program loading:

- IBM 2540 Card Read-Punch or
- IBM 1442 Card Reader or
- IBM 2520 Card Reader or
- IBM 2501 Card Reader
- IBM 2311 Disk Storage Drive.

For program operation:

- Input/ouput devices required by the specific program. Supported devices include:

  IBM 2540 Card Read-Punch

  IBM 1442 Card Read-Punch

  IBM 2501 Card Reader

  IBM 2520 Card Punch

  IBM 1403 Printer

  IBM 1404 Printer (continuous forms printing only)

  IBM 1443 Printer

  IBM 1445 Printer

  IBM 2311 Disk Storage Drive

IBM 2400-series tape unit (with or without the 7-track feature).

For logging and error messages:

- IBM 1403 Printer or
- IBM 1443 Printer or
- IBM 1052 Printer-Keyboard.

ORGANIZATION

This publication presents a description of a group of utility programs referred to as logical file-to-file programs. They concern the transfer of files from an input medium to an output medium. Clear Disk and Tape Compare programs are also presented. These programs are:

Tape to Tape
Tape to Disk
Tape to Card
Tape to Printer
Disk to Tape
Disk to Disk
Disk to Card
Disk to Printer
Card to Tape
Card to Disk
Card to Printer and/or Punch
Clear Disk
Tape Compare.

The Clear Disk program clears from one to five areas of disk storage. These areas can be on from one to five disk packs. Each disk pack being processed must be on-line. The area to be cleared can be as small as one track or as large as a single pack.

The Tape Compare program compares two files from two or more tapes to ensure that the files are identical. The number of reels in each of the files need not be equal.

Information pertaining to the programs is presented in three major sections:

- Control card information for all programs.
- General information that applies to the file-to-file programs only.
- Individual program descriptions.

CONTROL CARDS

Job control cards related to channel and unit assignment, label processing, and physical-device description are used with these programs. For information on job control cards see the Programmer's Guide as listed on the front cover of this publication. The required job control cards for running each of these programs are given in Figure 1. The entries for specific fields unique to the utility programs are shown in Figure 2.

Job control cards used by the utility programs are:

JOB
DATE
CONFG
ASSGN
VOL
TPLAB
DLAB
XTENT
UPSI
EXEC

Optional cards include:

LOG
NOLOG

LINKAGE EDITOR CONTROL STATEMENTS

Linkage editor control statements are required for all programs except Clear Disk.

File-to-File Utilities

The EXEC job-control card (this card must be punched //bEXEC LOADER) must be followed in the indicated order by cards containing these linkage editor control statements:

- INCLUDE xx (xx indicates the set of initials of the desired program must be punched: TT, TD, TC, TP, DT, DD, DC, DP, CT, CD, CPP.)
- INCLUDE GEN
- PHASE PHASE5, L,,EMAIN
- INCLUDE LABEL (if user label handling is to be done, this card is removed and replaced by the user routine.)
- ENTRY

Tape Compare

Refer to Linkage Editor Cards in the section Tape Compare.

GENERAL INFORMATION

This information applies to the file-to-file utility programs.

	Tape to Tape	Tape to Disk	Tape to Card	Tape to Printer	Disk to Tape	Disk to Disk	Disk to Card	Disk to Printer	Card to Tape	Card to Disk	Card to Printer Punch	Clear Disk	Tape Compare
JOB Card	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
* ASSGN Cards	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
UPSI Card	**	**	**	**	**	**	**	**	**	**	—	—	—
CONFG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
DATE Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
VOL Card (s)	Required If Label Checking	Required	Required If Label Checking	Required If Label Checking	Required	Required	Required	Required	Required If Label Checking	Required	—	Required	—
TPLAB Card (s)	Required If Label Checking	Required If Label Checking	Required If Label Checking	Required If Label Checking	Required If Label Checking	—	—	—	Required If Label Checking	—	—	—	—
DLAB Card (s)	—	Required	—	—	Required	Required	Required	Required	—	Required	—	Required	—
XTENT Card (s) (Up to 5)	—	Required	—	—	Required	Required	Required	Required	—	Required	—	Required	—
LOG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
NOLOG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
EXEC	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required

* SYSIPT must be assigned as a card reader for all programs except Clear Disk
** Required if:
Nonstandard Label Checking
User Label Checking
No Label Checking

- Figure 1. Job Control Cards (Cards Used in Each Program)

LABEL CHECKING

The IBM System/360 Basic Operating System Utility Programs process tape and disk labels in a manner consistent with System/360 Basic Operating System IOCS. For information on label checking see the Programmer's Guide as listed on the front cover of this publication.

	Tape to Tape	Tape to Disk	Tape to Card	Tape to Printer	Disk to Tape	Disk to Disk	Disk to Card	Disk to Printer	Card to Tape	Card to Disk	Card to Printer Punch	Clear Disk	Tape Compare
JOB	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	PHASE1	CLRDSK	TPCP
VOL (file name)	UIN UOUT	UIN UOUT	UIN	UIN	UIN UOUT	UIN UOUT	UIN	UIN	UOUT	UOUT	—	UOUT	—
XTENT	—	—	—	—	—	—	—	—	—	—	—	—	—
ASSGN Primary Input	SYS006	SYS006	SYS006	SYS006	SYS006	SYS006	SYS006	SYS006	SYSIPT	SYSIPT	SYSIPT	—	SYS000 SYS001
ASSGN Primary Output	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	* SYSOPT	SYSOPT	SYSOPT
ASSGN Alternate Tape Input	SYS000	SYS000	SYS000	SYS000	—	—	—	—	—	—	—	—	SYS002 SYS003
ASSGN Alternate Tape Output	SYS001	—	-	—	SYS001	—	—	—	SYS001	—	—	—	—
ASSGN Additional Input & Output Disk Drives	—	SYS002 SYS003 SYS004 SYS005	—	—	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	—	SYS002 SYS003 SYS004 SYS005	—	SYS002 SYS003 SYS004 SYS005	—
ASSGN Printer for card to Printer Punch Program	—	—	—	—	—	—	—	—	—	—	SYSLST	—	—
ASSGN Device for Logging	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG
EXEC	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	LOADER	—	LOADER

* Always the punch unit.

• Figure 2. Job Control Cards (Fields Unique to Utility Programs)

Nonstandard and User Label Handling

When nonstandard or standard user label processing is to be performed, the UPSI job-control card must set bits 0-4 as follows (0 equals off, 1 equals on). Bits 0 and 1 are switches for input-label checking.

Bit 0 — Off for standard input-label checking; on for nonstandard input-label checking or no label checking.

Bit 1 — Off if not doing user input-label checking; on if user input-label checking.

Bits 2 and 3 are switches for output-label checking.

Bit 2 — Off for standard output-label checking; on for nonstandard output-label checking or no label checking.

Bit 3 — Off if not user output-label checking; on if user output-label checking.

Bit 4 is for nonstandard output-label handling

Bit 4 Off = write tape mark separating the label from data.
On = do not write a tape mark to separate the label from the data.

Examples:

No input-label checking and label checking with standard user output-labels requires an UPSI card punched as follows:

```
//bUPSI    10010
```

No input or output label checking (unlabeled tapes assumed) with a leading tape mark on output requires the UPSI card to be punched:

```
//bUPSI    10100
```

An UPSI card is not required when there is standard label checking on input and output and no user label checking.

The user must supply his label handling routine (control section) in assembled, relocatable format. This control section must define three symbolic names as entry (ENTRY) points.

INPUT — The symbolic entry point to the input-label processing section of the user's routine.

OUTPUT — The symbolic entry point to the output-label processing section of the user's routine.

END — The symbolic entry to represent the last location +1 of the program.

After the program is loaded, control is given to the user's initialization routine through the address found in the END card (assembly program END card). The user can then perform any initialization desired prior to label checking. Upon completion of initialization, the user must branch back to the utility program. The return address is found in register 14. The user's initialization routine may consist of only the return branch instruction. All other entries made to the user's routine will be made through the symbolic names INPUT or OUTPUT. The user's routine will be entered from the IOCS label processing routines. At the completion of user label checking, control must be transferred to the IOCS routine via the LBRET macro as explained in the assembler manual listed on the front cover of this publication.

MULTI-SECTION FILES

Tape input or tape output, or both, may have multiple-reel files. The multiple reels must belong to the same data files, and the control-card parameters used to process the first reel are used to process each successive reel. The same fields will be checked in each reel. Multiple-reel files will be rewound and unloaded.

SEQUENCE NUMBERING

Sequence numbering of card ouput can be indicated in the utility modifier card. A field up to ten characters long can be punched into each card. This field is numbered starting from 1 (with high-order zeros), and is increased by 1 for each succeeding card. If a sufficiently long field is not defined to number all of the cards, the number wraps around to zero without an error indication. The sequence number overlays any data selected into the sequence area of the card. Sequence checking also can be performed for card input to assure ascending sequence of the specified field. If a card is out of sequence, a message is printed and processing continues.

PRINTER OUTPUT

Printer output can be in 120-, 132-, or 144-character line length, depending on the printer being used. Printer output can be in one of two formats: Display or List.

Data Display

The data-display format provides a visual picture of the data file. Fixed, variable, and undefined records can be handled, and the field-select option cannot be used. Every byte of data in the file appears in the print-out. Only portions of the print line are used for data. The first twenty positions (columns 1-20) are reserved for information describing the file, such as: block size, block number, and record number. Data is normally displayed in hexadecimal form but may optionally be displayed in alphameric form. A heading line can be printed. A scale line prints at the top and bottom of each page. If record length is specified (fixed length), each logical record starts on a new line. The input block size prints only if the input length is not equal to the specified block size. Single spacing is used between lines of print, but a blank line is left between blocks.

Data List

The data-list format provides a simple edited listing of the file. The entire print line is available for data output. Output is restricted to one line per logical record. Fields can be selected to be unpacked, converted to hexadecimal representation, and format the page.

Page numbers normally print at the bottom of each page but may be suppressed. A heading line can optionally be printed.

AVAILABLE I/O AREA

These programs take advantage of up to 65,536 positions of main storage. The maximum amount of storage available as I/O area is the area beginning at the end of the program being run and extending to the end of the available storage. The available storage area is reduced by:

- Field Selection
- Reblocking
- Supervisor.

Tape to Tape	Not less than 1400 bytes.
Tape to Disk	Not less than 1100 bytes.
Tape to Card	Not less than 1900 bytes.
Tape to Printer	Not less than 800 bytes.
Disk to Tape	Not less than 1100 bytes.
Disk to Disk	Not less than 800 bytes.
Disk to Card	Not less than 1600 bytes.
Disk to Printer	Not less than 500 bytes.
Card to Tape	Not less than 2000 bytes.
Card to Disk	Not less than 1700 bytes.
Card to Printer and/or Punch	Not less than 1400 bytes.
Clear Disk	Not less than 3,400 bytes.
Tape Compare	Not less than 1,000 bytes

The minimum I/O areas are based on a supervisor of 4150 bytes. This supervisor includes support for an IBM System/360 Model 30 with the following features:

- IBM 2400 series Magnetic Tape.
- IBM 1052 Printer-Keyboard.
- Detection of channels 9 and 12 on printer.
- One selector channel.
- Ten Logical system units (SYS000-SYS009).
- A patch area of 150 bytes.

Field Select

The field-select option is generated in upper core storage. The instructions necessary to move and process each field defined reduce the available I/O area.

Reblock

The reblock option is generated in upper core storage. The I/O area is reduced by the number of instructions necessary to move one record.

Note: The reblock and field-select options limit the I/O area as does field select.

Supervisor

The origin location of the utility program can immediately follow the supervisor. A large supervisor, therefore, reduces the I/O area.

Minimum I/O Area

Before reduction of the I/O area, caused by the type of user processing to be performed, the programs ensure the user of the following minimum I/O areas.

I/O Assignment

The method of I/O assignment determines the maximum block size that can be processed. The available I/O area and the type of job determine the method of assignment.

Copy

The maximum block size to be processed and the available I/O area determine if one or two I/O areas are assigned. Two I/O areas allow for overlap of I/O operation if channel assignment permits.

Field Select, Reblock, Reblock and Field Select

The maximum block size to be processed and the available I/O area determine which of these will be assigned:

2 input and 2 output areas.
1 input and 2 output areas.
2 input and 1 output areas.
1 input and 1 output areas.

The first three conditions permit overlap of I/O operations if channel assignment permits.

LOGICAL FILE-TO-FILE UTILITIES

Eleven utility programs are provided for the transfer of data files from any of the normal input devices to any of the normal output devices. These programs are:

Tape to Tape
Tape to Disk
Tape to Card
Tape to Printer
Disk to Tape
Disk to Disk
Disk to Card
Disk to Printer
Card to Tape
Card to Disk
Card to Printer and/or Punch

A file can be transferred between unlike storage mediums (tape to disk), like mediums (tape to tape), or in the case of disk to disk, the files can be transferred from one area to another area of the same unit, or from one disk pack to another disk pack.

A file can be transferred from an input medium to an output medium with these options:

COPY. This type of transfer indicates that the file is to be transferred from an input medium to an output medium without change to the format of the records or the file.

REBLOCK. The input file is transferred from an input medium to an output medium with only the block size being changed.

FIELD SELECT. Fields within each input record are rearranged, dropped, or converted to zoned or packed decimal through the choice of this option.

REBLOCK AND FIELD SELECT. This is a combination of the reblock and field-select options. The format of the record is rearranged by moving, dropping, or converting fields within a record along with changing the block size.

Printer output allows the user to show the output in one of three ways:

DISPLAY. This option allows the user to display a byte-for-byte representation of the information.

LIST. This option gives an edited representation of the information.

LIST AND FIELD SELECT. This is a combination of the list and field-select options.

Note: Forms are formatted by shipping channel 12 to channel 1.

The file-to-file utility programs will handle fixed-length, variable-length, and undefined-length records; however, only fixed-length records can be reblocked or field selected.

FIELD SELECT

With the choice of this option, a field in each input record can be moved to a different relative location in the corresponding output record. Those areas of the output record that are not filled with selected fields are blank. A selected field can be moved in the following ways:

- Moved without change.
- Moved and converted from zoned to packed decimal.
- Moved and converted from packed to zoned decimal.
- Moved and converted to hexadecimal for printer output.

Converting a field causes the output field to be smaller or larger than the input field. A field converted to hexadecimal representation for printer output requires twice the amount of area required for input.

When field-select is used, only those bytes in the input record that are selected will be transferred to the output record. It is therefore possible with field-select to ignore certain fields and have them dropped from the output record. As a result of dropping fields or changing field formats, it is possible to have output records of a length different from the input records.

The utility programs generate the necessary instructions for this option. This technique provides optimum performance for the user.

Key Fields

A field can be selected from or placed into the key portion of a disk record. The field that is selected must be completely contained within the key field or data field. A field that is placed in a key field or data field must be placed entirely in the key portion or the data portion of the record.

UTILITY-MODIFIER CARD

This card is used with the logical file-to-file programs, and allows the user to describe the input file that is to be processed and the output file that is desired. If the card is punched and optional parameters are left out, assumed values for those omitted will be used.

When a file is to be copied without change, it is possible to use the program without the presence of a utility-modifier card. All record formats (fixed-length, variable-length, undefined) may be copied as long as maximum block sizes do not exceed the assumed values of the particular program.

The assumed values the program makes are unique to each program and are given in the discussion of each program.

The general format of the utility-modifier card is:

```
//bUxxbTt,Ff,A=(input),B=(output),Ix,Ox,Sx,
Px,Rx,Q=(x,y)
```

Figure 3 shows detailed information of the entries in the utility-modifier card.

```
//bUxxb
```

//bU --	Identifies this as a utility-modifier control card. (The letter b indicates one blank space.)
xx --	These are the initials of the program and can be omitted if this card is to be used with more than one program.
b --	One blank space.

Following these identifiers the desired parameters are indicated. Each parameter must be followed by a comma except the last parameter, which must be followed by at least one blank. The optional parameters [Ix,Ox,Sx,Px,Rx,Q=(x,y)] can be omitted from the utility-modifier card, and assumed values are made. Commas need not be punched to indicate omitted parameters.

Tt

The first parameter, indicated by Tt in the general format, describes the type of function to be performed. This parameter (and succeeding parameters) must be followed by a comma if another parameter is to follow. The letter T is punched to identify this parameter and is followed by one or two additional punches to indicate the type of function to be performed.

TC	Copy.
TF	Field Select.
TR	Reblock.
TRF	Reblock and Field Select.

For printer output programs:

TD	Data Display (a byte-for-byte representation of the file).
TL	List (an edited representation of the file).
TLF	List and Field Select

For printed and punched output with the Card-to-Printer and/or Punch program:

TB	Both print and punch.
TBF	Both print and punch with Field Select.

Ff

The second parameter indicated by Ff in the general format describes the format of the records to be processed.

The letter F is punched to identify this parameter, and is followed by an additional letter to indicate the exact record format.

FF	Fixed-length records.
FV	Variable-length records.
FU	Undefined-length records.

A=(INPUT RECORD AND/OR BLOCK LENGTH)

The third parameter indicated in the general format is the input-file description, and is entered in one of three forms:

```
A=(n,m)
A=(K=l,D=l)
A=(g)
```

A=(n,m)

This form is indicated for fixed-length input records without key fields. The letter A and symbol = identify this as the input-file description parameter. The (n,m) indicates that the input record length and

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR TRF TD TL TLF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
		D	Display
		L	List
		LF	List and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(K=l, D=l)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=l, D=l)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.

Figure 3. Utility-Modifier Card Parameters (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(K=l,D=l)	B=	This letter and symbol indicate this is the output-description parameter.
		(K=l,D=l)	For fixed-length disk output records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
Optional	Ix Ox Sx Px Rx Q=(x,y)		These parameters are unique to each program and are explained under the discussions of the individual programs.

Figure 3. Utility-Modifier Card Parameters (Part 2 of 2)

input block length should be punched, separated by a comma and enclosed in parentheses. If an input record length is 50 characters long and the block length is 250 characters long, the input parameter must be punched A=(50,250), and must be followed by a comma to separate this parameter from the one following.

A=(K=l,D=l)

This form of the input-file description parameter is indicated for fixed-length disk records when key fields are present. The letter A and symbol = identify this as the input-file description. The (K=l,D=l) indicates that the letter K and symbol = are followed by the length of the key, and that the letter D and symbol = are followed by the length of the data field. These must be separated by a comma and enclosed within parentheses. If a disk-input record has a key length of 10 and a data field length of 60, the input parameter must be punched A=(K=10,D=60), and must be followed by a comma to separate this parameter from the one to follow.

A=(g)

Variable or undefined input records must be indicated in this form. The letter A and the symbol = identify this as the input file description. The (g) indicates that the maximum input-block length is to be punched in parentheses. If a file of variable or undefined records contains a maximum block length of 300, the input parameter must be punched A=(300), and must be followed by a comma to separate this parameter from the one following.

B=(OUTPUT RECORD AND/OR BLOCK LENGTH)

The fourth parameter indicated in the general format is the output-file description, and is entered in one of four forms, similar to the input parameter.

The four forms are:

B=(a,b)
B=(K=l,D=l)
B=(h)
B=(p)

B=(a,b)

This form is indicated for fixed-length records without key fields. The letter B and the symbol = identify this as the output-file description parameter. The (a,b) indicates that the output record length and the output block length should be punched, separated by a comma and enclosed in parentheses. If an output record length is 50 characters long and the block length is 250 characters long, the output parameter must be punched B=(50,250), and must be followed by a comma if another parameter is to follow.

B=(K=l,D=l)

This form of the output-file description parameter is indicated for fixed-length disk records when key fields are present. The letter B and symbol = identify this as the output file description. The (K=l,D=l) indicates that the letter K and symbol = are followed by the length of the key, and the letter D and symbol = are followed by the length of the data field. These must be separated by a comma and enclosed within parentheses. If a disk output record has a key length of 10 and a data-field length of 60, the output parameter must be punched B=(K=10,D=60), and must be followed by a comma if another parameter is to follow.

B=(p)

This form of the output-file description parameter is indicated for printer output programs. The letter B and the symbol = identify this as the output-file description. The (p) indicates the size of the print line (120,132, or 144).

B=(h)

Variable or undefined output records must be indicated in this form. The letter B and the symbol = identify this as the output file description. The (h) indicates that the maximum output-block length is to be punched within parentheses. If an output file of variable or undefined records is to contain a maximum block length of 300, the output parameter must be punched B=(300), and must be followed by a comma if another parameter is to follow.

Parameter Combinations

The record-format, input-file-description, and output-file-description parameters allow for these possible forms in which they can be presented:

```
FF,A=(n,m),B=(a,b)
FF,A=(K=l,D=l),B=(a,b)
FF,A=(n,m),B=(K=l,D=l)
FF,A=(K=l,D=l),B=(K=l,D=l)
FV,A=(g),B=(h)
FU,A=(g),B=(h)
```

Note: The remaining parameters

Ix,Ox,Sx,Px,Rx, and Q=(x,y) are unique to each program and are explained under the discussions of the individual programs.

For printer output, there are four additional forms:

```
FF,A=(n,m),B=(p)
FF,A=(K=l,D=l),B=(p)
FV,A=(g),B=(p)
FU,A=(g),B=(p)
```

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file programs to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. For binary records, this number is relative to the record as it appears in core, not on the card. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

When a field is to be selected from a key field (disk input), the letter K followed by a comma and the starting position of the field to be selected must be placed in parentheses.

```
Example:   //bFSb(K,r),s,t
```

When a field is to be placed into a key field (disk output), the letter K followed by a comma and the starting position of the field in the output record must be placed in parentheses.

```
Example:   //bFSbr,s,(K,t)
```

When a field is to be selected from a key field (disk input) and is to be placed into a key field (disk output), the starting position of the field in the input record and output record must be preceded by the letter K and a comma, and enclosed in parentheses.

```
Example:   //bFSb(K,r),s,(K,t)
```

The other operations: pack, unpack, and convert-to-hexadecimal, are defined in the field-length portion of the parameter. These operations are independent of whether the field source or destination is a key.

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

p identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

HEXADECIMAL

When a program has printed output, the field selected may be printed in hexadecimal representation. This operation is indicated as follows:

```
r,(X,n),t
```

X identifies the hexadecimal operation;
n is the size of the input field. Only the field length of the input is necessary for this operation since the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

PRINT HEADER

A heading line can be printed out, for programs with print output. A maximum of two cards can be used to indicate the heading

line desired. The second card need not be entered if the first card contains all of the desired information. The first card is punched //bH1b (followed by the information to be printed in print positions 1-74). The second card is punched //bH2b (followed by the information to be printed in the rest of the heading line).

END

This card must be the last of the utility-control cards inserted in the program deck. The card is punched:

```
      //bEND
```

//b	Indicates that this is a utility-modifier control card (b indicates one blank space).
END	Indicates the last utility- modifier control card.

EXAMPLES

The following are examples of utility-modifier-card and field-select-card preparation (card-to-tape, tape-to-tape, and disk-to-disk programs) for creating a file for testing, from a payroll file.

CARD TO TAPE

The input file contains 8 fields. The fields numbered 1,2,7,8,4, and 3 are to be moved in that order, to the output area, and fields 2,4,7, and 8 are to be packed while being moved.

1. Name in positions 1-15.
2. Hourly rate in positions 16-20.
3. Number of dependents is 21-22.
4. Earnings to date in positions 23-30.
5. Address in positions 32-66.
6. Date of service in positions 67-71.
7. Hours worked in positions 72-74.
8. Weekly earnings in positions 75-80.

The utility-modifier card is punched:

```
//bUCTbTF,FF,A=(80,80),B=(80,80)
```

The field-select card is punched:

```
//bFSb1,15,1/16,(P,5,3),16/72,(P,3,2),19/
75,(P,6,4),21/23,(P,8,5),25/21,2,30
```

Tape to Tape

The input-file format is the same as the card-to-tape program. If an exact copy is to be made of the card-to-tape input file, a field-select card is not needed.

The utility-modifier card is punched:

```
//bUTTbTC,FF,A=(80,80),B=(80,80)
```

DISK TO DISK

The input file contains 9 data fields and a key field. The first field (1) is the key field and is to be transferred to the output key field. Field 2 is to be dropped. Fields 3, 4, 9, 10, 6, and 5, in that order, are to be transferred to the output record. Fields 4, 5, 6, 9, and 10 are to be packed while being moved.

1. Man number in positions 1-10 of the ten-position key field.
2. Department number in positions 1-5.
3. Name in positions 6-20.
4. Hourly rate in positions 21-25.
5. Number of dependents in positions 26-27.
6. Earnings to date in 28-35.
7. Address in positions 37-71.
8. Date of service in positions 72-76.
9. Hours worked in positions 77-79.
10. Weekly earnings in positions 80-85.
11. Positions 86-100 unused.

Utility-modifier card is punched:

```
//bUDDbTF,FF,A=(K=10,D=100),B=
(K=10,D=31)
```

Field-select control cards are punched:

```
//bFSb(K,1),10,(K,1)/6,15,1/21,(P,5,3),16/
77,(P,3,2),19/80,(P,6,4),21

//bFSb28,(P,8,5),25/26,(P,2,2),30
```

KEY FIELDS

Disk processing begins in the area of disk indicated in the XTENT card as the lower limit, and continues consecutively until the upper limit is reached. A maximum of 5 XTENT's can be indicated. A field can be selected from, or placed into, the key portion of a disk record. The field that is selected must be completely contained within the key field or data field. A field that is placed in a key field or a data field must be placed entirely in the key portion or data portion of the record. Disk files without keys are handled without consideration to the key field, and can be thought of as being similar to tape files.

Disk files with key fields require information unique to key-field processing. The records must be fixed-length and unblocked or one of the following types of records defined as an undefined record:

Fixed-length blocked
Variable-length blocked or unblocked
Undefined

The records defined as undefined records with keys are restricted to being copied and are valid for disk-to-disk and disk-to-printer programs only.

DISK FILES WITH KEY FIELDS (FIXED-LENGTH UNBLOCKED)

Key fields are only valid for:

- Disk input
- Disk output
- Disk input and disk output
- Disk input and printer output (printer output is capable of printing key fields).

Disk to Card or Tape

To transfer data from disk to card or tape, field-select must be used to transfer the key field to a data field for output. Depending upon the output desired, certain information is required.

Tape output

1. Field-select must be used.
2. Reblocking and field-select together can be specified for blocked output records.

Card output

1. Field-select must be used.
2. Reblocking and field-select together are not valid since disk input is unblocked and card output must be unblocked.

Card or Tape to Disk

When transferring data from card or tape to disk, field-select must be used to create the key field for output. Depending upon the output desired, certain information is required.

Card Input

1. Field-select must be used.
2. Reblocking and field-select together are not valid since card input and disk output must both be unblocked.

Tape Input

1. Field-select must be used.
2. Reblocking and field-select together must be specified when the input is blocked.

Disk to Printer

When printing a disk file, it is possible to print the key fields by either the display or list print format.

Display: The key field must be specified on the utility-modifier card in the format (K=1,D=1). This will cause the key and data field both to be printed out.

List: Field-select can be used to select a field from the key for printing. If field-select is not used, the key and data must fit on the print line.

Disk to Disk

When transferring records from disk to disk, with these key field conditions, the following functions can be performed:

Copy: The file is transferred without change.

Field-select: The file can be transferred with:

Data fields dropped or rearranged.
Record length changed.
Key fields changed.

KEY FIELDS ON INPUT AND NO KEY FIELDS ON OUTPUT.

Field-select: Field Select must be used to:
Either remove the key field from the data, or
Remove the key field and drop or rearrange data fields.

Remove the key field and change the record length.

Reblock and Field-select: This function can be used to do those options under field-select and provide blocked output records.

NO KEY ON INPUT AND KEY ON OUTPUT (UNBLOCKED INPUT).

Field-select: Field-select must be used to:
Create key fields,
Create key fields and drop or rearrange data fields,
Create key fields and change the record length.

NO KEY ON INPUT AND KEY ON OUTPUT (BLOCKED INPUT).

Reblock and Field-select: This function must be used to do those options under field-select and provide unblocked output.

DISK FILES WITH KEY FIELDS (UNDEFINED)

Copy and Display are the only valid functions that can be performed. The undefined-with-keys format is valid only for the disk-to-disk program and the disk-to-printer program.

The only valid function for the disk-to-disk program is Copy. The key and data in the input-disk file will appear without change in the output-disk file.

JOB DELIMITERS

A job delimiter card is required for the card to tape, card to disk, and card to printer/punch programs. This card is punched as follows:

/* (columns 1-2, remainder of card must be blank)

This card must follow the input card data to separate one job from the following job. If no job follows, the card may be omitted.

TAPE TO TAPE

The tape-to-tape program transfers a file from one or more tape reels to one or more other reels. These files may be copied, reblocked, field selected, or reblocked and field selected. If the reblock or field-select options are used, the input records must be fixed length.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FU,A=(1000),B=(1000),IU,OU
```

The format and entries for the utility-modifier card for this program are:

```
//bUTTbTt,Ff,A=(input),B=(output),Ix,Ox
```

Figure 4 shows detailed information of the entries in the utility-modifier card for the tape-to-tape program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
TT	The initials of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file programs to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
Rewind Option for input Ix	IR IN IU IM	I	The first letter in these forms identifies this parameter.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.
		M	Multiple-reel input.
Rewind Output Ox	OR ON OU	O	The first letter in these forms identifies this parameter.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.

Figure 4. Tape-to-Tape Utility-Modifier Card

The tape-to-disk program transfers a file from one or more tape reels to a maximum of five disk units. These files may be copied, field selected, reblocked, or reblocked and field selected. If the field-select or reblock options are to be used, the input records must be fixed length.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FU,A=(1000),B=(1000),IU,OY
```

The format and entries for the utility-modifier card for this program are:

```
//bUTDbTt,Ff,A=(input),B=(output),Ix,Ox
```

Figure 5 shows detailed information of the entries in the utility-modifier card for the tape-to-disk program.

Entry	Explanation
//bU	These entries identify this card as the utility-modier card.
TD	The initials of the program. These initials can be omitted if the card is used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file programs to transfer fields from an input record to the same or to a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

When a field is to be placed into a key field (disk output), the letter K followed by a comma and the starting position of the field in the output record must be placed in parentheses.

Example: //bFSbr,s,(K,t)

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(K=1,D=1)	B=	This letter and symbol indicate this is the output-description parameter.
		(K=1,D=1)	For fixed-length disk output records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
Rewind Input Ix	IR IN IU IM	I	The first letter in these forms identifies these parameters.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.
		M	Multiple-reel input.
Disk Check Ox	OY ON	O	The first letter in these forms identifies these parameters.
		Y	Write-disk check.
		N	Do not write-disk check.

Figure 5. Tape-to-Disk Utility-Modifier Card

TAPE TO CARD

The tape-to-card program transfers the contents of a tape file to a card file. The output file may be punched in either extended binary coded decimal or column binary. Each logical output record must fit in one card (i.e., 80 bytes for extended BCD or 160 bytes for column binary). Unless only a portion of the input record is transferred through the field-select or reblock-and-field-select option, the input record size will be restricted to 80 or 160. Input records to this program must be fixed length.

These files may be copied, reblocked, field selected, or reblocked and field selected. Blocked input records must be reblocked.

SEQUENCE-NUMBERING

Sequence-numbering of the output to this program may be requested. A field up to ten characters in length will be punched into each card. This field will be numbered starting fron one (with high-order zeros) and will be increased by one for each succeeding card. In the event that a sufficiently long field is not defined to number all of the cards, the numbers will wrap around to zero with no error indication. The sequence number will overlay any data selected into the sequence area of the card.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FF,A=(80,80),B=(80,80),IU,O1
```

The format and entries for the utility-modifier card for this program are:

```
//bUTCbTt,FF,A=(input),B=(output),Ix,Ox,
Q=(x,y)
```

Figure 6 shows detailed information of the entries in the utility-modifier card for the tape-to-card program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
TC	The initials of the program. These initials can be omitted if the card is used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or to a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field-selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. For binary records this number is relative to the record as it appears in core, not on the card. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format	FF	F	The leading F of this form identifies this as the format parameter.
		F	The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
Rewind Input Ix	IR IN IU IM	I	The first letter in these forms identifies these parameters.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.
		M	Multiple-reel input.
Output Mode Ox	O1 O2	O	The first letter in these forms identifies these parameters.
		1	EBCDIC punching.
		2	Binary punching.
Sequence Numbering Q=(x,y)	Q=(x,y)	Q=	The letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) parts of this parameter must be enclosed in parentheses. Absence of this parameter indicates no sequence numbers.

Figure 6. Tape-to-Card Utility-Modifier Card

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

The tape-to-printer program can display a tape file in two different formats: data-display and data-list. Data-display provides a byte-for-byte representation of the data file where every byte appears in the listing. This format can handle fixed, variable, and undefined records. Data-list provides a simple edited representation of the file. Input records to this must be fixed length, and the field-select option may be used.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTD,FU,A=(1000),B=(120),IU,OX,S1,PY,
R1
```

The format and entries for the utility-modifier card for this program are:

```
//bUTPbTt,Ff,A=(input),B=(output),Ix,Ox,
Sx,Px,Rx
```

Figure 7 shows detailed information of the entries in the utility-modifier card for the tape-to-printer program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
TP	The inititals of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operations;
n is the size of the input field;
m is the size of the output field.

HEXADECIMAL

When a program has printed output, the field selected may be printed in hexadecimal representation. This operation is indicated as follows:

```
r,(X,n),t
```

X identifies the hexadecimal operation;
n is the size of the input field. Only the field length of the input is necessary for this operation since the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TD TL TLF	T	The initial T identifies this as the type of function parameter.
		D	Display
		L	List
		LF	List and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
Output Description	B=(p)	B=	This letter and symbol indicate this is the output-description parameter.
		(p)	For printer output, the size of the print line (120, 132, or 144) must be entered.
Rewind Input Ix	IR IN IU IM	I	The first letter in these forms identifies these parameters.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.
		M	Multiple-reel input.

Figure 7. Tape-to-Printer Utility-Modifier Card (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Print Output Ox	OX OC	O	The first letter in these forms identifies these parameters.
		X	Hexadecimal printout.
		C	Character printout.
			The type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.
Spacing Option Sx	S1 S2 S3	S	The first letter in these forms identifies these parameters.
		1	Single spacing.
		2	Double spacing.
		3	Triple spacing.
Page Numbering Px	PY PN	P	The first letter in these forms identifies these parameters.
		Y	Number pages.
		N	Do not number pages.
First Record Printed Rx	Rx	R	The first letter in these forms identifies this parameter.
		x	This represents the position of the first logical record to be printed; x-1 will be bypassed.

Figure 7. Tape-to-Printer Utility-Modifier Card (Part 2 of 2)

The disk-to-tape program transfers a file from one or more disk units to one or more tape units. These files may be copied, reblocked, field selected, or reblocked and field selected. If the field-select or reblock options are to be used, the input records must be fixed-length.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FU,A=(1000),B=(1000),OU
```

The format and entries for the utility-modifier card for this program are:

```
//bUDTbTt,Ff,A=(input),B=(output)
Ox
```

Figure 8 shows detailed information of the entries in the utility-modifier card for the disk-to-tape program.

Entry	Reason
//bU	These entries identify this as a utility-modifier card.
DT	The initials of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or to a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

When a field is to be selected from a key field (disk input), the letter K followed by a comma and the starting position of the field to be selected must be placed in parentheses

```
Example: //bFSb(K,r),s,t
```

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(K=l,D=l)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=l,D=l)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
Rewind Output Ox	OR ON OU	O	The letter in these forms identifies these parameters.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.

Figure 8. Disk-to-Tape Utility-Modifier Card

DISK TO DISK

The disk-to-disk program transfers a file between disk units, or between areas of the same unit. A maximum of six drives can be assigned by assigning one as input, one as output, and the remaining as both input and output. Using the same device for input and output can cause a reduction in performance.

Files can be copied, reblocked, field selected, or reblocked and field selected. If the field-select or reblock options are to be used, the input records must be fixed length.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FU,A=(1000),B=(1000),OY
```

The format and entries for the utility-modifier card for this program are:

```
//bUDDbTt,Ff,A=(input),B=(output),Ox
```

Figure 9 shows detailed information of the entries in the utility-modifier card for the disk-to-disk program.

Entry	Reason
//bU	These entries identify this as a utility-modifier card.
DD	The initials of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or to a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

When a field is to be selected from a key field (disk input), the letter K followed by a comma and the starting position of the field to be selected must be placed in parentheses

Example: //bFSb(K,r),s,t

When a field is to be selected from a key field (disk input) and is to be placed into a key field (disk output), the starting position of the field in the input record and output record must be preceded by the letter K and a comma and enclosed in parentheses.

Example: //bFSb(K,r),s,(K,t)

When a field is to be placed into a key field (disk output), the letter K followed by a comma and the starting position of the field in the output record must be placed in parentheses.

Example: //bFSbr,s,(K,t)

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
	A=(K=1,D=1)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=1,D=1)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(K=1,D=1)	B=	This letter and symbol indicate this is the output description parameter.
		(K=1,D=1)	For fixed-length disk output records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
Disk Check Ox	OY ON	O	The first letter in these forms identifies these parameters.
		Y	Write-disk check.
		N	Do not write-disk check.

Figure 9. Disk-to-Disk Utility-Modifier Card

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

r,(U,n,m),t

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

The disk-to-card program transfers the contents of a disk file to a card file. The output file may be punched in either extended binary coded decimal or column binary. Each logical-output record must fit on one card (i.e., 80 bytes for extended BCD or 160 bytes for column binary). Unless only a portion of the input record is transferred through the field-select option, the input-record size will be restricted to 80 or 160. Input records to this program must be fixed length.

Files in this program may be copied, reblocked,field selected, or reblocked and field selected. Blocked input records must be reblocked.

SEQUENCE-NUMBERING

Sequence-numbering of the output to this program may be requested. A field up to ten characters in length will be punched into each card. This field will be numbered starting from one (with high-order zeros), and will be increased by one for each succeeding card. In the event that a sufficiently long field is not defined to number all of the cards, the numbers will wrap around to zero with no error indication. This option is independent of field-select. The sequence number will overlay any data selected into the sequence area of the card.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FF,A=(80,80),B=(80,80),O1
```

The format and entries for the utility-modifier card for this program are:

```
//bUDCbTt,Ff,A=(input),B=(output),Ox,
Q=(x,y)
```

Figure 10 shows detailed information of the entries in the utility-modifier card for the disk-to-card card program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
DC	The initials of the program. These initials can be omitted if the card is used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. For binary records this number is relative to the record as it appears in core, not on the card. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF	F	The leading F of this form identifies this as the format parameter.
		F	The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(K=I,D=I)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=I,D=I)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
Output Mode Ox	O1 O2	O	The first letter in these forms identifies these parameters.
		1 2	EBCDIC punching Binary punching
Sequence-Numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.

Figure 10. Disk-to-Card Utility-Modifier Card

When a field is to be selected from a key field (disk input), the letter K followed by a comma and the starting position of the field to be selected must be placed in parentheses.

Example: //bFSb(K,r),s,t

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

r,(P,n,m),t

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

r,(U,n,m),t

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

DISK TO PRINTER

The disk-to-printer program can display a disk file in two different formats: data-display and data-list. Data-display provides a visual picture of the data where every byte appears in the printed output. This format can handle fixed, variable, and undefined records. Data-list provides a simple edited list of the file. The input file can come from a maximum of five disk units.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

The format and entries for the utility-modifier card for this program are:

```
//bUDPbTt,Ff,A=(input),B=(output),Ox,Sx,
Px,Rx
```

Figure 11 shows detailed information of the entries in the utility-modifier card for the disk-to-printer program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
DP	The initials of the program. These initials can be omitted if the card is used for more than one program.
b	This indicates one blank

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	

When a field is to be selected from a key field (disk input), the letter K followed by a comma and the starting position of the field to be selected must be placed in parentheses.

Example: //bFSb(K,r),s,t

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

r,(U,n,m),t

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TD TL TLF	T	The initial T identifies this as the type of function parameter.
		D	Display
		L	List
		LF	List and Field Select
Format Ff	FF FV FU	F	The leading F of these three possible forms identifies this as the format parameter.
		F	The second F of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(K=I,D=I)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=I,D=I)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.
Output Description	B=(p)	B=	This letter and symbol indicate this is the output-description parameter.
		(p)	For printer output, the size of the print line (120, 132, or 144) must be entered.
Printer Output Ox	OX OC	O	The first letter in these forms identifies these parameters.
		X	Hexadecimal printout.
		C	Alphameric printout. The type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.

Figure 11. Disk-to-Printer Utility-Modifier Card (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Spacing Sx	S1 S2 S3	S	The first letter in these forms identifies these parameters.
		1	Single spacing.
		2	Double spacing.
		3	Triple spacing.
Page-numbering Px	PY PN	P	The first letter in these forms identifies these parameters.
		Y	Number pages.
		N	Do not number pages.
First Record Printed Rx	Rx	R	The first letter in these forms identifies this parameter.
		x	This represents the position of the first logical record to be printed; x - 1 records will be bypassed.

Figure 11. Disk-to-Printer Utility-Modifier Card (Part 2 of 2)

HEXADECIMAL

When a program has printed output, the field selected may be printed in hexadecimal representation. This operation is indicated as follows:

r,(X,n),t

X identifies the hexadecimal operation; n is the size of the input field. Only the field length of the input is necessary for this operation since the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

The card-to-tape program transfers the contents of a card file from cards to tape. The cards may be punched in extended binary coded decimal or column binary. The input records must be fixed-length unblocked, and each logical record must fit on one card. The maximum size record is 80 bytes, or 160 bytes for binary records. The assumed values for record and block size will be 80.

These files may be copied, reblocked, field selected, or reblocked and field selected.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FF,A=(80,80),B=(80,80),I1,OU
```

The format and entries for the utility-modifier card for this program are:

```
//bUCTbTt,Ff,A=(input),B=(output),Ix,Ox,
Q=(x,y)
```

Figure 12 shows detailed information of the entries in the utility-modifier card for the card-to-tape program.

Entry	Reason
//bU	These entries identify this card as the utility-modifier card.
CT	The initials of the program. These initials can be omitted if the card is used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. For binary records this number is relative to the record as it appears in core, not on the card. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(U,n,m),t
```

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF	F	The leading F of this form identifies this as the format parameter.
		F	The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
Binary Input Ix	I1 I2	I	The first letter in these forms identifies these parameters.
		1 2	EBCDIC input. Binary input.
Rewind Output Ox	OR ON OU	O	The first letter in these forms identifies these parameters.
		R	Rewind.
		N	Do not rewind.
		U	Rewind and unload.
Sequence Numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be included in parentheses.

Figure 12. Card-to-Tape Utility-Modifier Card

The card-to-disk program transfers the contents of a card file from cards to an area of disk. The cards may be punched in extended binary coded decimal or in column binary. The input records must be fixed-length unblocked, and each logical record must fit on one card. The maximum-size input record is 80 bytes, or 160 for binary. The assumed values for input record and block size will be 80.

These files may be copied, reblocked, field selected, or reblocked and field selected.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, the following parameters are assumed:

```
//bUbTC,FF,A=(80,80),B=(80,80),I1,OY
```

The format and entries for the utility-modifier card for this program are:

```
//bUCDbTt,FF,A=(input),B=(output),Ix,Ox,
Q=(x,y)
```

Figure 13 shows detailed information of the entries in the utility-modifier card for the card-to-disk program.

Entry	Reason
//bU	These entries identify this as a utility-modifier card.
CD	The initials of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record to the same or to a different relative location of the output record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to be selected. For binary records this number is relative to the record as it appears in core, not on the card. , (comma) separates the entries in the parameter. s indicates the length of the field in bytes. , separator. t indicates the starting position relative to one, of the output record. / (slash) separates selected fields.

When a field is to be placed into a key field (disk output), the letter K followed by a comma and the starting position of the field in the output record must be placed in parentheses.

Example: //bFSbr,s,(K,t)

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

```
r,(P,n,m),t
```

P identifies the pack operation;
n is the size of the input field;
m is the size of the output field.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TR TF TRF	T	The initial T identifies this as the type of function parameter.
		C	Copy
		F	Field Select
		R	Reblock
		RF	Reblock and Field Select
Format Ff	FF	F	The initial F of this form identifies this as the format parameter.
		F	The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(K=1,D=1)	B=	This letter and symbol indicate this is the output-description parameter.
		(K=1,D=1)	For fixed-length disk output records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
Binary Input Ix	I1 I2	I	The first letter in these forms identifies these parameters.
		1	EBCDIC input.
		2	Binary input.
Disk Check Ox	OY ON	O	The first letter in these forms identifies these parameters.
		Y	Wrtie-disk check.
		N	Do not write-disk check.
Sequence-numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.

Figure 13. Card-to-Disk Utility-Modifier Card

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

r,(U,n,m),t

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

CARD TO PRINTER AND/OR PUNCH

Input records to this program must be fixed length and unblocked. Card input and output can be either EBCDIC or column binary, except when both printing and punching. For both printing and punching it must be EBCDIC. Sequence checking will be performed without sequence generation.

CARD TO PRINTER

The card-to-printer program can produce printed output in two formats.

DISPLAY

The card-to-printer program with the display option transfers the contents of a card file to a printer with each record being placed on one print line. The field-select option cannot be performed with display. In this format the first 20 positions of the print line are reserved for information describing the file.

LIST

The input records to this program are transferred to the printer with each record being printed on a line. The field-select option may be used. The full print line is available for printing. When hexadecimal printout is called for, the output-record size is bound by the size of the print line.

CARD TO PUNCH

The card-to-punch program can accept input records punched in either EBCDIC or column binary. Output records may also be in either EBCDIC or column binary. The records may be copied or field selected.

CARD TO PRINTER AND PUNCH

This program allows EBCDIC input and output records. Printed output is in the list format.

UTILITY-MODIFIER CARD

This card contains information required for the operation of this program. If this card is omitted from the program, both printing and punching will be performed, and the following parameters are assumed:

Card to Punch:

```
//bUbTB,FF,A=(80,80),B=(80,80),Il,Ol
```

Card to Printer:

```
//bUbTB,FF,A=(80,80),B=(120),Il,OC
```

The format and entries for the utility-modifier card are:

Card to Punch:

```
//bUCPbTt,FF,A=(n,m),B=(a,b),Ix,Ox,Q=(x,y)
```

Card to Printer:

```
//bUCPbTt,FF,A=(n,m),B=(p),Ix,Ox,Q=(x,y)
```

Card to Printer and Punch:

```
//bUCPbTt,FF,A=(n,m),B=(a,b),Ix,Q=(x,y)
```

Figure 14 shows detailed information of the entries in the utility-modifier card for the card-to-printer and/or punch program.

Entry	Reason
//bU	These entries identify this as a utility-modifier card.
CP	The initials of the program. These initials can be omitted if the card is to be used for more than one program.
b	This indicates one blank space.

FIELD-SELECT CARD

The field-select control card provides the information for the file-to-file program to transfer fields from an input record. As many field-select cards as necessary may be used. Each card need not be filled even if additional field-select cards follow. The field selected must be complete on one card. The format and contents of this card are:

```
//bFSbr,s,t/r,s,t
```

Contents	Explanation
//bFSb	//b identify this card as a control card. FS identify this as a field-select control card. b indicates one blank space.

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TD TL TLF TB TBF	T	The initial T identifies this as the type of function parameter.
		C	Copy (punch output only)
		F	Field Select (punch output only)
		D	Display
		L	List
		LF	List and Field Select
		B	Both print and punch
		BF	Both print and punch with field select
Format Ff	FF	F	The initial F of this form identifies this as the format parameter.
		F	The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(p)	B=	This letter and symbol indicate this as the output-description parameter.
		(p)	For printer output, the size of the print line (120, 132, or 144) must be entered.
Binary Input Ix	I1 I2	I	The first letter in these forms identifies these parameters.
		1	EBCDIC input.
		2	Binary input.
Printer or Punch Output Ox	O1 O2 OX OC	O	The first letter in these forms identifies these parameters.
		1	EBCDIC output (punch only).
		2	Binary output (punch only).
		X	Hexadecimal output (printer only).
		C	Character output (printer only). For printer output, the type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.
Sequence- numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.

Figure 14. Card-to-Printer and/or Punch Utility-Modifier Card

r,s,t/ r indicates the starting position relative to one, of the field in the input record to be selected. For binary records this number is relative to the record as it appears in core, not on the card.
, (comma) separates the entries in the parameter.
s indicates the length of the field in bytes.
, separator.
t indicates the starting position relative to one,of the output record.
/ (slash) separates selected fields.

HEXADECIMAL

When a program has printed output, the field selected may be printed in hexadecimal representation. This operation is indicated as follows:

r,(X,n),t

X identifies the hexadecimal operation;
n is the size of the input field. Only the field length of the input is necessary for this operation since the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

PACK

When the input field is to be packed before it is placed in the output record, the field-select parameter will appear in this form:

r,(P,n,m),t

P identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

UNPACK

When the input field is to be unpacked before it is placed in the output record, the field-select parameter will appear in this form:

r,(U,n,m),t

U identifies the unpack operation;
n is the size of the input field;
m is the size of the output field.

The clear-disk program clears one or more areas of IBM 2311 disk storage, and establishes a preformatted track containing an indicated base throughout the area cleared. The control information for the operation of this program is entered in three types of control cards, inserted at a fixed point in the program deck.

The first type of control cards (job control cards) define channel and unit assignment, physical-device description, and areas of disk to be processed.

The second type of control card contains the information unique to this program. This control card is the utility modifier card.

The third type of card is an END card.

The area to be cleared can be as small as one track or up to a maximum of a complete disk pack. As many as five areas can be designated to be cleared with one run of this program. When an area of disk is cleared, fixed-length blocks containing count, key, and data areas are established on the disk. The information defining the key and data areas is indicated in the utility modifier card, or, if a utility modifier card is not entered, values are assumed. The count area is generated with:

Cylinder number (2 bytes)

Head number (2 bytes)

Record number (1 byte)

Key length (1 byte)

Data length (2 bytes).

The key and data areas defined, with the exception of the first eight bytes of the data portion of the track descriptor record (RO), are filled with a user defined character. The first eight bytes of the track descriptor record (RO) are written:

Bytes 1-2	The cylinder number
Bytes 3-4	The head number
Byte 5	The record number (always zero)
Bytes 6-7	The number of unused bytes on the track
Byte 8	Binary zero.

Label checking determines if the area to be cleared contains all or part of an unexpired file. Expired labels for the area to be cleared are deleted from the VTOC.

UTILITY MODIFIER CARD

The utility modifier card allows three parameter entries. The first parameter defines the length of the key and data block.

The second parameter defines the fill character.

The third parameter allows the option to read disk check or not read disk check. The format and entries for this parameter are:

$$//bUCLbB=(K=1,D=1)\begin{matrix}C\\X\end{matrix}'a',O\begin{matrix}Y\\N\end{matrix}$$

If the Utility modifier card is omitted, the assumed values are:

```
//bUCLbB=(K=0,D=100),X'00',OY
```

//bU — These entries identify this as a utility modifier card.

CL — These letters indicate this is the Clear Disk program and can be omitted.

b — Indicates one blank space.

Parameter	Entry	Explanation
B=(K=1,D=1)	B=	Identifies this parameter
	(K=1, D=1)	Indicates the length of the key and data block in bytes. If a key length is not desired, the key portion must be zero.
C'a' or	C'a'	C is punched followed by the fill character (EBCDIC) enclosed in apostrophes.
X'aa'	X'aa'	The letter X is punched followed by the hexadecimal fill character enclosed in apostrophes.
OY or	O	Identifies this as the output parameter.

ON	Y	Indicates read-disk check.
	N	Indicates do not read-disk check.

END CARD

This must be the last control card. The card is punched:

```
//bEND
```

//b	Indicates that this is a utility control card (b indicates one blank space).
END	Indicates that this is the last control card.

The tape-compare program compares two files from two or more tapes to ensure that the files are identical. The number of reels in each of the files need not be equal.

The program does not perform tape positioning, therefore the tapes are assumed to be positioned at the beginning of the file upon commencement of the run.

If the user desires to position the tapes through programming, he has the facilities within the user exit routine.

Tapes containing fixed or variable record lengths may be compared. When the tape-compare program is initiated it will normally run to completion regardless of the number of unequal compares that may occur. Unless a user exit has been specified for an unequal compare, any physical records that do not match will be written on SYSOPT, along with an index of the byte(s) that do not match, and the physical record number. No editing is performed on unprintable characters. If the exit has been specified, the tape-compare program yields control through that exit.

Input areas are assigned to each tape from a common area of storage. The number of areas assigned to each tape depends on the maximum size of the physical input records. If the space is available, a maximum of two input areas are assigned to each tape, otherwise one input area is assigned to each tape.

If the tape files to be compared extend over more than one reel, the additional reels are also compared. If two tape drives are assigned for each file, the program can alternate between the two, eg: Primary, Alternate, Primary, etc. If only primary tape drives are assigned, (and there are multiple reels per file) the operation waits for a new tape reel to be mounted on the primary tape drive.

The compare operation may be terminated at any time by pressing the 1052 request key or the console stop key. A compare operation for a new file can be initiated by supplying the correct control card and following the restart procedure.

LABEL PROCESSING

All volume labels in a standard label environment are skipped without checking. The first header and the first trailer file labels are checked to ensure that the file names are identical. Additional header, trailer, and user labels are bypassed. If the file names are not identical, both labels are printed and the program continues.

When an end-of-volume (EOV) trailer label is sensed, the following action is taken:

- If the number of reels specified has not been processed, the compare continues on the next reel for the associated file.
- If the number of reels specified has been processed, the job will be terminated.

When an end-of-file (EOF) trailer label is sensed, the job is terminated.

NON-STANDARD OR UNLABELLED FILES

For unlabeled files, tape marks will be assumed to indicate an end-of-volume condition except when the first record read from the tape is a tape mark, in which case the tape mark is ignored. An end-of-file condition will be assumed when a tape mark has been detected and the reel count has been depleted. In any case, a compare operation may be restarted by supplying the correct control card and following the restart procedures.

For non-standard labels, if the first record from the tape is a tape mark, the tape mark is ignored. If a tape mark follows the non-standard label, the reel count in the utility modifier card must be a one; otherwise, the data immediately following the label will not be compared. For every non-standard label (with the following tape mark) detected for this file, the operator must supply another utility modifier card with a reel count of 1 and restart the operation. Other tape marks will be assumed to indicate an end-of-volume condition except when the reel count has been depleted, in which case the condition is assumed as an end-of-file condition. In any case, a compare operation may be restarted by supplying the correct control card and following the restart procedures.

JOB CONTROL CARDS

Upon initial program loading the symbolic names, channel addresses, and tape characteristics for the tape compare program are defined via Job Control cards. These items once defined, cannot be changed during the

running of the program. If the required units for the program are not defined, the program will be terminated.

The following job-control cards are used for system assignment.

JOB card Required. Unique identification: TPCP

ASSGN cards Required as follows:

SYSIPT	Must be assigned as a card reader.
SYSLOG	Must be assigned for diagnostic messages.
SYSOPT	Must be assigned for writing records that do not match (must be a printer or printer keyboard).
SYS000	Must be assigned as the primary tape unit for one of the tape files to be compared. This tape file will be referred to as primary file A.
SYS001	Must be assigned as the primary tape unit for the other file to be compared. This tape file will be referred to as primary file B.
SYS002	May be assigned as the alternate tape unit for file A.
SYS003	May be assigned as the alternate tape unit for file B.

CONFG card Optional
DATE card Optional
LOG card Optional
NOLOG card Optional
EXEC LOADER card Required (must be last job-control card)

LINKAGE-EDITOR CARDS

The linkage-editor cards follow the job-control cards in the following order. They are required as follows:

PHASE TPCP,S,-800	This card contains a linkage-editor control statement. It gives the name of the phase (TPCP) and the location where it is to be loaded. The second parameter (End of Supervisor) indicates that the phase will originate one byte beyond the end of the supervisor. The third parameter (-800) may be omitted, but if it is used, it allows 800 more bytes to be utilized for I/O area from the transient portion of the supervisor. However, using this transient area forecloses the use of various I/O macros. For instance, if a storage print is taken via the SYSDUMP macro, the data in this 800-byte area is obscured with the macro program.
INCLUDE EXIT	This card signals the linkage editor to include an exit module from the relocatable library. The user can substitute his own exit routine in place of the INCLUDE EXIT card.
INCLUDE TPCP	This card signals the linkage editor to load the TPCP program from the relocatable library. This gives control to the TPCP program.

UTILITY CONTROL CARD

Utility assignment for the tape-compare program is made by a utility control card. There is only one card used. It is read by the main-line phase of the program. The control card parameters are as follows:

//bTPCPbRECSIZ=(m),LABELS,REELS=(n),ALTA,ALTB,EXIT

//b (Required)	indicates control card
TPCP (Required)	identifies tape compare control card
b (Required)	one blank space
RECSIZ (Required)	identifies record size parameter
=(m) (Required)	maximum physical record size in bytes. It must be less than or equal to 5 digits and be enclosed within parentheses. This is needed for the assignment of input areas. If any physical input record exceeds this maximum during main line processing, the excess is truncated, and a message is printed on SYSOPT.

LABELS (Optional)	This entry indicates that the tapes are labeled according to IBM System/360 Standards. If this parameter is omitted, the tapes are assumed to be either unlabeled, or not labeled according to IBM System/360 Standards. In the latter case, the labels are treated as data.
REELS (Optional)	identifies reel count parameter to follow
=(n) (Optional)	this entry specifies the maximum number of reels per file to be compared. It must be enclosed in parentheses. If this parameter is omitted, n=1 will be assumed. n set to zero is an error. (Maximum value of n is 255.) If the tape file extends over more than one reel, this parameter must be used to cause the additional reels to be compared.
ALTA (Optional)	This entry indicates an alternate unit for tape file A. If this entry is omitted, it is assumed that there is only a primary unit for tape file A.
ALTB (Optional)	This entry indicates an alternate unit for tape file B. If this entry is omitted, it is assumed that there is only a primary unit for tape file B.
EXIT (Optional)	This entry indicates that the user wishes the tape compare program to branch to a routine supplied by him when an unequal compare is detected. If this entry is omitted, no branch will be made and unequal compare records will be written on SYSOPT.

USER EXIT ROUTINE

If the user supplies an exit routine, the storage required for the routine is taken from the I/O area. When the user-exit routine is specified in the utility control card, the tape-compare program branches to the label EXIT. This label must be defined in the user's program as a CSECT or an ENTRY. Control is then transferred to the user's exit routine on two occasions:

1. After the program is loaded and before tape compare processing takes place. On this occasion, the user may perform any user-exit routine initialization and then transfer control to the tape-compare program by issuing the following instructions.

```
        L    REG,VCON   (load a register with
        .               a V-type data con-
        .               stant)
        BR   REG        (branch to the ad-
        .               dress in the general
        .               register)
        .
        .
        .
VCON    DC   V(TPCP)    (V-type data constant)
```

2. During tape-compare processing whenever two records are not equal. On this occasion, the user exit-routine program flow may be as follows:

   a. Obtain the file A description parameter from register 0.

   b. Obtain the file B description parameter from register 1.

   c. Obtain the number of the mismatched record from register 10.

   d. Perform user processing.

   e. Return control to the tape-compare program through register 14 (containing the return address).

On any occasion it is the user's responsibility to distinguish between the two entries to the exit routine and to establish his own save ares if his registers must be saved. The only registers not available for the user exit routine are 12 and 13.

File A Description Parameter (Register 0)

The first two bytes of register 0 contain the 2-byte address of the file A I/O area.

The second two bytes of register 0 contain the 2-byte length of the physical record.

File B Description Parameter (Register 1)

The first two bytes of register 1 contain the 2-byte address of the file B I/O area.

The second two bytes of register 1 contain the 2-byte length of the physical record.

INDEX

IBM S/360 Printed in U. S. A. C24-3409-2

IBM

International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, N. Y. 10601

READER'S COMMENT FORM

IBM System/360 Basic Operating System
Specifications
Utility Programs C24-3409-2

- Your comments, accompanied by answers to the following questions, help us produce better publications for your use. If your answer to a question is "No" or requires qualification, please explain in the space provided below. All comments will be handled on a non-confidential basis. Copies of this and other IBM publications can be obtained through IBM Branch Offices.

	Yes	No
• Does this publication meet your needs?	☐	☐
• Did you find the material:		
Easy to read and understand?	☐	☐
Organized for convenient use?	☐	☐
Complete?	☐	☐
Well illustrated?	☐	☐
Written for your technical level?	☐	☐

- What is your occupation? _____
- How do you use this publication?

As an introduction to the subject?	☐	As an instructor in a class?	☐
For advanced knowledge of the subject?	☐	As a student in a class?	☐
For information about operating procedures?	☐	As a reference manual?	☐

Other _____

- Please give specific page and line references with your comments when appropriate. If you wish a reply, be sure to include your name and address.

COMMENTS:

- Thank you for your cooperation. No postage necessary if mailed in the U. S. A.

C24-3409-2

Staple

Fold

Fold

FIRST CLASS
PERMIT NO. 170
ENDICOTT, N. Y.

BUSINESS REPLY MAIL
NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY . . .

IBM Corporation
P. O. Box 6
Endicott, N. Y. 13764

Attention: Product Publications, Dept. 171

Fold

Fold

Cut Along Line

IBM S/360 Printed in U. S. A. C24-3409-2

Additional Comments:

IBM

International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, N. Y. 10601