File No. S360-32
Form C24-3465-3

DOS
TOS

IBM

Systems Reference Library

IBM System/360
Disk and Tape Operating Systems
Utility Programs
Specifications

This reference publication describes the IBM System/360 Disk and Tape Operating Systems Utility Programs. The programs described are:

1. Seventeen 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 preformatted tracks.

3. A program to clear one or more areas of a data cell and establish preformatted tracks.

4. A program that compares two files from two or more tapes to ensure that the files are identical.

The reader should be familiar with these IBM System/360 Basic Operating System publications:

IBM System/360 Tape Operating System, Supervisor and Input/Output Macros, Form C24-3432; IBM System/360 Disk Operating System, Supervisor and Input/Output Macros, Form C24-5037; IBM System/360 Tape Operating System, Data Management Concepts, Form C24-3430; IBM System/360 Disk Operating System, Data Management Concepts, Form C24-3427; IBM System/360 Tape Operating System, System Control and System Service Programs, Form C24-3431; IBM System/360 Disk Operating System, System Control and System Service Programs, Form C24-5036. For titles and abstracts of other associated publications, see the IBM System/360 Bibliography, Form A22-6822.

D. Albert

Fourth Edition, March 1967

This is a minor revision of C24-3465-2 incorporating changes released in the following Technical Newsletters.

Form Number	Pages	Date
N21-5024	8, 29, 31, 66, 69, 81, 105, 112, 115, and 116	November 15, 1966
N21-5047	1 and 89	December 7, 1966
N21-5044	9, 10, 30, 36, 49, 67, 70, 85, 87, 88, and 103	February 1, 1967

Specifications contained herein are subject to change from time to time. Any such change will be reported in subsequent revisions or Technical Newsletters.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

A form is provided at the back of this publication for reader's comments. If the form has been removed, comments may be addressed to IBM Corporation, Programming Publications, Rochester, Minnesota 55901

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

All twenty of the programs described in this publication are disk resident. Six of these disk-resident utilities are also available as tape-resident utility programs (see Organization). The disk-resident utilities are located in the relocatable library of the IOCS supervisor, with the exception of the Clear Disk and Clear Data Cell programs that are found in the Core Image Library. Each of these programs can be cataloged in the Core Image Library for permanent residence. When the programs are located in the relocatable library, greater flexibility is offered when user routines are handled. Execution time for the programs is faster when executed from the Core Image Library as the linkage-editor function need not be performed. When the same utility is used frequently, it is to the user's advantage to have the program permanently resident in the core image library.

All programs are loaded into core by the system loader. Each tape-resident program functions identically to its disk-resident counterpart and all are described as one in this publication. For further information needed to load the desired program into core, see the publications as listed on the front cover of this publication. Each program handles a particular type of job (the tape-to-printer program). A symbolic assembly is not necessary for the operation of a program. These utility programs process either consecutive or split-cylinder type files. For more information on these file arrangements, see the Supervisor and I/O Macros publication listed on the front cover of this publication. Output records from sequential files (consecutive or split-cylinder) produced by the System/360 Operating System can be processed by these utility programs. However, these records must not be a combination of records to be printed and punched.

All utility control cards are shown in this publication as beginning with //. However, to remain compatible with IBM System/360 Operating System Utility Programs ./ is acceptable.

To handle a specific job, the generalized program is modified by control cards. Control cards are free-form in that 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 is 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 handling is done, is compatible with IBM Disk and Tape Operating Systems IOCS.

MACHINE REQUIREMENTS

The minimum machine configuration required for these programs is:

- IBM System/360 processing unit with 16K positions of core storage.

For control statement loading:

- IBM 1442 Card Reader or
- IBM 2501 Card Reader or
- IBM 2520 Card Read-Punch or

- IBM 2540 Card Read-Punch or
- IBM 2400 Series Tape Drive

For Program Residence:

- IBM 2311 Disk Storage Drive or
- IBM 2400-Series Tape Unit

For program operation;

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

  IBM 1442 Card Read-Punch

  IBM 2501 Card Reader

  IBM 2520 Card Read-Punch

  IBM 2540 Card Read-Punch

  IBM 1403 Printer

  IBM 1404 Printer (continuous-forms printing only)

  IBM 1443 Printer

  IBM 2311 Disk Storage Drive

  IBM 2321 Data Cell Drive

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

For logging and error messages:

- IBM 1403 Printer or
- IBM 1404 Printer (continuous forms only) or
- IBM 1443 Printer or
- IBM 2400-Series Tape Unit or
- IBM 1052 Printer-Keyboard.

CONTROL STATEMENT CONVENTIONS

The conventions used in this publication to illustrate control statements are as follows:

1. A parameter is a variable, with its identifying character, that is given a constant value for a specific purpose (i.e. ...,Sx,... where Sx is a parameter within possibly a string of parameters; S being the identifier, and x, the variable).
2. DASD means a Direct Access Storage Device such as a disk or data cell drive.
3. Uppercase letters and punctuation marks represent information that must be coded exactly as shown.
4. Lowercase letters represent information that must be supplied by the programmer. The letter b always indicates one blank space. Where a parameter variable is concerned, lower case letters represent constants that must be supplied and the lowercase x represents an optional parameter.
5. Options contained within braces { } represent alternatives, one of which must be chosen.
6. An ellipsis (a series of three periods) indicates that a variable number of items may be included.

ORGANIZATION

The programs described in this publication and their resident devices are:

Card to Disk (disk)

Card to Printer and/or Punch (tape and disk)

Card to Tape (tape and disk)

Data Cell to Data Cell (disk)

Data Cell to Disk (disk)

Data Cell to Printer (disk)

Data Cell to Tape (disk)

Disk to Card (disk)

Disk to Data Cell (disk)

Disk to Disk (disk)

Disk to Printer (disk)

Disk to Tape (disk)

Tape to Card (tape and disk)

Tape to Data Cell (disk)

Tape to Disk (disk)

Tape to Printer (tape and disk)

Tape to Tape (tape and disk)

Clear Data Cell (disk)

Clear Disk (disk)

Tape Compare (tape and disk)

The first seventeen programs are known as file-to-file programs and transfer a file from an input device to an output device.

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

- Job-Control, system-assignment, and checkpoint record information that applies to all programs.
- General information that applies to the file-to-file programs only.
- Individual program descriptions, alphabetically arranged, with a sample control statement stream for each program. The collection of control statement sets makes up a diverse set of examples and may be cross referenced for different applications.

CONTROL STATEMENTS

JOB CONTROL

Job-Control statements related to channel and unit assignment label processing, and physical-device description are used with these programs. For information on Job-Control statements, see the System Control and System Service publications as listed on the front cover of this publication. The required Job-Control statements 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.

LINKAGE-EDITOR CONTROL STATEMENTS

The required linkage-editor control statements for each program are given in Figure 3. Each of the 17 file-to-file utility programs is contained in five phases. Phases 2 and 5 are the same for all programs and

	File to File Programs	Tape Compare Program	Clear Disk	Clear Data Cell
JOB	Required	Required	Required	Required
LBLTYP	Required only if tape label checking from the relocatable library	Not Used	Not Used	Not Used
VOL	Required if label processing	Not Used	Required	Required
TPLAB	Required if tape label processing	Not Used	Not Used	Not Used
DLAB	Required for DASD label processing	Not Used	Required for DASD label handling	Required for DASD label handling
XTENT	Required for DASD (Direct Access Storage Device)	Not Used	Required for DASD	Required for DASD
ASSGN	Required if devices are different from those assigned at IPL time	Required if devices are different from those assigned at IPL time	Required if devices are different from those assigned at IPL time	Required if devices are different from those assigned at IPL time
UPSI	Optional	Optional	Optional	Optional
EXEC	Required	Required	Required	Required
/*	Required for card input program *	Not Used	Not Used	Not Used
/&	Required	Required	Required	Required

* This card must immediately follow the data cards for card input programs. In addition, card columns 3-80 of the card must be entirely blank, otherwise the card will be ignored and treated as data.

Figure 1. Job-Control Statements Used in Each Program

	File to File Programs	Tape Compare Program	Clear Disk	Clear Data Cell
VOL (filename)	UIN for input file UOUT for output file	Not Used	UOUT	UOUT
ASSGN device for logging operator messages	SYSLOG	SYSLOG	SYSLOG	SYSLOG
ASSGN utility control statement input device	SYSIPT	SYSIPT	SYSIPT	SYSIPT
ASSGN device for logging programmer messages	SYSLST	SYSLST	SYSLST	SYSLST
ASSGN Primary tape and card input and alternate tape input	SYS004	SYS004	Not Used	Not Used
ASSGN Primary tape and printer output and alternate tape output	SYS005	SYS005	Not Used	Not Used
ASSGN linkage editor *	SYSLNK SYS001 SYS002**	SYSLNK SYS001 SYS002**	SYSLNK SYS001 SYS002**	SYSLNK SYS001 SYS002**
ASSGN card output device	SYS006	Not Used	Not Used	Not Used
ASSGN DASD input and or output device***	SYS000- SYSnnn	Not Used	SYS000- SYSnnn	SYS000- SYSnnn

* These programmer units are available when not in use by the linkage editor.
** This unit is available for TOS only.
*** SYSnnn can be no greater than the greatest physical unit block assigned and must not conflict with the assignment of any other device.

Figure 2. Job-Control Statement File Names and Assignments

	File to File Programs	Tape Compare Program	Clear Disk	Clear Data Cell
PHASE	Required	Required	Not Used	Not Used
INCLUDE	Required	Required	Not Used	Not Used
ENTRY	Required	Required	Not Used	Not Used

Figure 3. Linkage-Editor Control Statements

need only to be loaded in two relocatable modules for all 17 programs. The module names for phases 2 and 5 are IJWGEN and IJWLAB respectively. Figure 4 contains the 85 phase and 59 module names for the seventeen programs. The contents of the modules for all programs are given in Appendix A. When programs are cataloged into the Core Image or Relocatable Library these phase or module names must be used. The following are sample control statements that can be used to execute a program. A prime example of the control cards used when executing a tape-to-tape program that is resident in the relocatable library is:

```
//bJOB            User-defined job name.

//bLBLTYP         Defines the reserved label
                  area. (Used only if tape
                  label checking from the
                  relocatable library.)

//bASSGN          Assigns the input and out-
                  put devices.

//bOPTION LINK    Indicates that the program
                  is to be link-edited.

bINCLUDE IJWTT    Identifies the tape-to-
                  tape modules to be
                  link-edited.

bPHASEbTPTP5,
IJWTTCS2,NOAUTO   Gives the name of the last
                  phase of the program and the
                  main-storage address where
                  it is to be loaded by using
                  the operand in the previous
                  control card followed by
                  CS2.
```

PROGRAM	PHASE NAMES 1 THROUGH 5	MODULE NAMES 1, 2 CARD	TOS*	DOS*
Card to Disk	CDDK-CDDK2-CDDK3-CDDK4-CDDK5	IJWCD-IJWCD1-IJWCD3-IJWCD4-IJWGEN-IJWLAB		IJJCPD0
Card to Printer and/or Punch	CDPP-CDPP2-CDPP3-CDPP4-CDPP5	IJWCP-IJWCP1-IJWCP3-IJWCP4-IJWGEN-IJWLAB	IJJCP0	
Card to Tape	CDTP-CDTP2-CDTP3-CDTP4-CDTP5	IJWCT-IJWCT1-IJWCT3-IJWCT4-IJWGEN-IJWLAB	IJJCP0	
Data Cell to Data Cell	DCDC-DCDC2-DCDC3-DCDC4-DCDC5	IJWMM-IJWMM1-IJWDD3-IJWDD4-IJWGEN-IJWLAB		IJJCPD0
Data Cell to Disk	DCDK-DCDK2-DCDK3-DCDK4-DCDK5	IJWMD-IJWMD1-IJWDD3-IJWDD4-IJWGEN-IJWLAB		IJJCPD0
Data Cell to Printer	DCPR-DCPR2-DCPR3-DCPR4-DCPR5	IJWMP-IJWMP1-IJWDP3-IJWDP4-IJWGEN-IJWLAB		IJJCPD0
Data Cell to Tape	DCTP-DCTP2-DCTP3-DCTP4-DCTP5	IJWMT-IJWMT1-IJWDT3-IJWDT4-IJWGEN-IJWLAB		IJJCPD0
Disk to Card	DKCD-DKCD2-DKCD3-DKCD4-DKCD5	IJWDC-IJWDC1-IJWDC3-IJWDC4-IJWGEN-IJWLAB		IJJCPD0
Disk to Data Cell	DKDC-DKDC2-DKDC3-DKDC4-DKDC5	IJWDM-IJWDM1-IJWDD3-IJWDD4-IJWGEN-IJWLAB		IJJCPD0
Disk to Disk	DKDK-DKDK2-DKDK3-DKDK4-DKDK5	IJWDD-IJWDD1-IJWDD3-IJWDD4-IJWGEN-IJWLAB		IJJCPD0
Disk to Printer	DKPR-DKPR2-DKPR3-DKPR4-DKPR5	IJWDP-IJWDP1-IJWDP3-IJWDP4-IJWGEN-IJWLAB		IJJCPD0
Disk to Tape	DKTP-DKTP2-DKTP3-DKTP4-DKTP5	IJWDT-IJWDT1-IJWDT3-IJWDT4-IJWGEN-IJWLAB		IJJCPD0
Tape to Card	TPCD-TPCD2-TPCD3-TPCD4-TPCD5	IJWTC-IJWTC1-IJWTC3-IJWTC4-IJWGEN-IJWLAB	IJJCP0	
Tape to Data Cell	TPDC-TPDC2-TPDC3-TPDC4-TPDC5	IJWTM-IJWTM1-IJWTD3-IJWTD4-IJWGEN-IJWLAB		IJJCPD0
Tape to Disk	TPDK-TPDK2-TPDK3-TPDK4-TPDK5	IJWTD-IJWTD1-IJWTD3-IJWTD4-IJWGEN-IJWLAB		IJJCPD0
Tape to Printer	TPPR-TPPR2-TPPR3-TPPR4-TPPR5	IJWTP-IJWTP1-IJWTP3-IJWTP4-IJWGEN-IJWLAB	IJJCP0	
Tape to Tape	TPTP-TPTP2-TPTP3-TPTP4-TPTP5	IJWTT-IJWTT1-IJWTT3-IJWTT4-IJWGEN-IJWLAB	IJJCP0	

* Include as part of module name.

Figure 4. Phase and Module Names for the File-to-File Programs

bINCLUDE IJWLAB	Link-edits the dummy label module. If the operand is omitted from this statement, the text of the user's routine must be present on SYSIPT and followed by the /* statement. (If SYSRDR and SYSIPT are the same device, the user's routine must be inserted after the INCLUDE statement.) If a user's routine is supplied from the relocatable library, that module's unique name must be entered in place of the IJWLAB operand.
bENTRY	Defines the end of the last input object module.
//bEXEC LNKEDT	Executes the linkage-editor program.
//bVOL //bTPLAB	Tape volume-label information. Used only if label checking. If running a disk program, the complete job control set VOL, DLAB, and XTENT must be used.
//bEXEC	Defines the end-of-job control cards and signals the start of program execution.

Utility control information (assuming SYSIPT and SYSRDR are assigned to the same device).

/&	Defines the end-of-job.

Note: To catalog this program from the relocatable to the core image library the preceding job stream can be used with the following changes:

- //bOPTION LINK changed to //bOPTION CATAL
- //bEXEC changed to //bEXEC MAINT
- Delete utility assignment information.

On a tape resident system, the result of this job is a new resident tape, which would be generated on SYS002.

If the user routine option is desired, the program(s) should not be deleted from the relocatable library after cataloging into the core image library since it will be necessary to linkage edit the user's routine with the utility program. A prime example of the control cards used when executing a tape-to-tape program from the Core Image Library for a distinct job is:

//bJOB	User-defined job name.
//bVOL	Tape volume label information (only if label checking).
//bTPLAB	Tape file label information (only if label checking).
//bASSGN	Input and output device assignments.
//bUPSI	User defined label processing.
//bEXEC TPTP	Program execution card.

Utility control statements as needed (assuming SYSIPT and SYSRDR are assigned to the same device).

//bEND	Defines the end of utility control cards.
/&	Defines the end-of-job.

CHECKPOINT RECORDS

When any utility program encounters a checkpoint record, the record is ignored and bypassed.

LOGICAL FILE-TO-FILE UTILITIES

Seventeen 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:

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

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 or data cell to data cell, the files may be transferred from one area to another area of the same unit. Throughout the general discussion of the file-to-file programs, any reference to DASD information can be equally applied to disk or data cell.

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 two 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.

For the CARD TO PRINTER and/or PUNCH programs, two other combinations are:

BOTH PRINT AND PUNCH. This is a combination of copy and list for the card to printer and/or punch program.

BOTH PRINT AND PUNCH WITH FIELD SELECT. This is a combination copy and list with field select in the card-to-printer and/or punch program.

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

If fields are selected from variable-length records, a portion of the record must be described as the fixed portion of the record and only on the fixed portion can field-select be employed. A field cannot be selected into the first four bytes of the output record. The fixed portion of a variable-length record is the initial section of a record that is common to all records. The first four bytes of the fixed portion of a variable-length record is the record length field.

LABEL CHECKING

The IBM System/360 Disk and Tape Operating Systems Utility Programs process tape and DASD labels in a manner consistent with Disk and Tape Operating Systems IOCS. For information on label checking see the Supervisor and Input/Output publication as listed on the front cover of this publication.

NONSTANDARD AND USER LABEL HANDLING

It is possible to process tape files containing no labels or IBM standard labels without providing a user routine. When any 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 or no input-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 or no output-label checking.

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

Bit 4 is for nonstandard or no 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.

A user label routine must be supplied only if bits 1 or 3 of the UPSI byte are ON.

Examples:

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

```
//bUPSI 10010
```

No label checking on input or output with a leading tape mark on the 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.

When an UPSI card is supplied to a program the byte is propagated from job step to job step, unless another UPSI card is supplied to reset the bits. All of the UPSI bits are set to 0 following each job performed unless a new statement is supplied. When rightmost bits are not set by an UPSI statement, they are assumed to be zero.

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

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

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

IJWLABND 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 before 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 IJWLABIN or IJWLABOU. To return from IJWLABIN and IJWLABOU user-label processing to IOCS label processing, use the LBRET macro instruction (see the Supervisor and I/O Macros publication). The user's routine will be entered from the IOCS label-processing routines.

The user's routine must be assembled with a 16K assembler. This routine has access to all IOCS macros, except those which use the transient area (CANCEL, EOJ, FETCH, OPEN, CLOSE).

For further information concerning communication with the IOCS Open and Close routine, see the Supervisor and I/O Macros publications as listed on the front cover of this publication.

UTILITY MESSAGE ROUTINES

The message routine of the utility programs is available to the user. The entry point to the message routine is located at the symbolic address, IJWxxxMS, where xxx can be found in Figure 5. The user's routine may not have access to register 4 and must supply registers 0, 1, and 7 with the following information.

Reg 0 The length of the message.
Reg 1 The address of the first byte of the message.
Reg 7 The return address to the user's routine.

No diagnostics will be performed on the contents of the input parameters found in these registers.

If the first character of a message is nonblank, the message will be printed on SYSLST and SYSLOG, and a reply is requested from SYSLOG. The reply, or answer byte given, must be one character located at the

symbolic address IJWxxxAN on return from the message routine (xxx can be found in Figure 5). If the first character of a message is blank, the message is printed only on SYSLST. In either case, the first character of the message is not printed.

If a message is printed that requires a reply and SYSLOG is a printer, a X'FF' is in the answer byte (IJWxxxAN) on return from the message routine.

If SYSLST and SYSLOG are the same printer and the message was designated to SYSLST and SYSLOG, the message will only appear once.

MULTI-FILE VOLUMES (TAPE)

The utility programs may be used to build multi-file volumes and read from them at later dates. File positioning will be performed by logical IOCS if the files are labeled with IBM standard labels. The filename, volume-sequence, and file-sequence numbers must be placed in the TPLAB card so that this positioning may be performed.

xxx	MEANING
CD1	Card to Disk Program
CT1	Card to Tape Program
DC1	Disk to Card Program
DD1	Disk to Disk Program
DM1	Disk to Data Cell Program
DP1	Disk to Printer Program
DT1	Disk to Tape Program
MD1	Data Cell to Disk Program
MM1	Data Cell to Data Cell Program
MP1	Data Cell to Printer Program
MT1	Data Cell to Tape Program
TC1	Tape to Card Program
TD1	Tape to Disk Program
TM1	Tape to Data Cell Program
TP1	Tape to Printer Program
TT1	Tape to Tape Program
TCP	Tape Compare Program

Figure 5. Answer Byte or Entry Point Completions

File positioning will not be performed for output files, nonstandard labeled files, or unlabeled files. The positioning performed must be by the use of the Magnetic Tape Command (MTC). Reference information on the MTC can be found in the System Control and Service Publication (TOS/360) listed on the front cover of this publication.

When using the utility programs to process multi-file tape input volumes the no-rewind-option (IN) parameter, found in the utility modifier statement, must be specified.

MULTI-VOLUME FILES (TAPE)

Input or output files to these programs can consist of multiple volumes. The multiple volume must belong to the same data files, and the control statement entries used to process the first volume are used to process each successive volume. The same fields are checked in each volume. Each tape reel of a multi-volume tape file is unconditionally rewound and unloaded if no alternate tape drive has been assigned. In all other cases the volume will be treated as specified by the input or output parameter in the utility modifier statement. When alternate tape drives are specified and processing is completed on a particular file the last drive processed will become the primary drive. If a new job is executed at this time the last drive processed will then become the primary drive unless a reassignment of tape drives is made.

RECORD SKIPPING

Any number of logical records (up to 99,999,999) may be bypassed before processing is to be performed. This number can be indicated in a utility modifier statement parameter. The number indicated in the parameter will be the first record to be processed.

Record skipping cannot be performed for the Copy function (TC), and if specified for the Copy function it will be ignored. If it is desired to skip records at the beginning of a file, and copy the remainder, the Reblock function (TR) must be indicated, and the input-description and output-description parameters must contain identical values.

SEQUENCE NUMBERING

Sequence generation on card output can be indicated in the utility modifier statement. 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 written on SYSLST 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. Examples of these formats appear in Appendix F.

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 printout. 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 as fixed length or variable 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. The excess is not printed when the specified maximum length block size is exceeded. Single spacing is used between lines of print.

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. Data-list mode allows character printing only unless a hexadecimal field is selected through a field select entry.

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 1,024K 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.

FIELD-SELECT

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

REBLOCKING

The reblock routines are generated in upper 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.

Card to Disk	Not less than 6,000 bytes.
Card to Printer and/or Punch	Not less than 4,500 bytes.
Card to Tape	Not less than 6,400 bytes.
Data Cell to Data Cell	Not less than 5,500 bytes.

Data Cell to Disk	Not less than 5,500 bytes.
Data Cell to Printer	Not less than 5,000 bytes.
Data Cell to Tape	Not less than 5,800 bytes.
Disk to Card	Not less than 5,200 bytes.
Disk to Data Cell	Not less than 5,500 bytes.
Disk to Disk	Not less than 5,500 bytes.
Disk to Printer	Not less than 5,000 bytes.
Disk to Tape	Not less than 5,800 bytes.
Tape to Card	Not less than 6,000 bytes.
Tape to Data Cell	Not less than 5,400 bytes.
Tape to Disk	Not less than 5,400 bytes.
Tape to Printer	Not less than 5,100 bytes.
Tape to Tape	Not less than 5,900 bytes.
Clear Data Cell	Enough to clear three tracks at one time.
Clear Disk	Enough to clear one track at one time.
Tape Compare	Not less than 6,000 bytes.

The preceding core sizes are based on a supervisor of 6,144 bytes.

I/O AREA ASSIGNMENT

If the utility program can assign two input or output areas, overlap of the I/O operations can be performed whenever channel assignment permits. The utility program determines the method of I/O area assignment based on the maximum block size, the available I/O area, and the type of job being processed.

For the copy and both print and punch functions, the I/O area assignments may be:

2 input/output areas
1 input/output area

For the field select, reblock, reblock and field select, list, list and field select, data display, and both print and punch with the field select function, the I/O area assignments may be:

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

FIRST-CHARACTER FORMS CONTROL

When first-character forms control is used, the first character of the data record is considered to be the forms-control character and is printed unless excluded by field selection. For fixed-length records, the forms-control character is the first character of the logical record. For variable-length records, the forms-control character is the first character following the record-length field. First-character forms control is invalid for records with key fields or data display. This option allows a choice of four standards by which forms control can be regulated:

$$S \begin{Bmatrix} A \\ B \\ C \\ D \end{Bmatrix}$$

The type of first-character forms-control character to be recognized can be indicated in the S parameter of the tape, disk, and data cell to printer programs.

TYPE A

Indication of Type A allows the user to use the character that is the command-code portion of the System/360 Channel Command Word used in printing a line or spacing the forms. If the character is not one of the following characters, single spacing after printing is performed and no error indication is given. Printing occurs only for command codes which include a print in the operation.

8-Bit Code	Punch Combination	Function
00000001	12,9,1	Write (no automatic space)
00001001	12,9,8,1	Write and space 1 line after printing
00010001	11,9,1	Write and space 2 lines after printing
00011001	11,9,8,1	Write and space 3 lines after printing
10001001	12,0,9	Write and skip to channel 1 after printing
10010001	12,11,1	Write and skip to channel 2 after printing

8-Bit Code	Punch Combination	Function
10011001	12,11,9	Write and skip to channel 3 after printing
10100001	11,0,1	Write and skip to channel 4 after printing
10101001	11,0,9	Write and skip to channel 5 after printing
10110001	12,11,0,1	Write and skip to channel 6 after printing
10111001	12,11,0,9	Write and skip to channel 7 after printing
11000001	12,1	Write and skip to channel 8 after printing
11001001	12,9	Write and skip to channel 9 after printing
11010001	11,1	Write and skip to channel 10 after printing
11011001	11,9	Write and skip to channel 11 after printing
11100001	11,0,9,1	Write and skip to channel 12 after printing
00001011	12,9,8,3	Space 1 line immediately
00010011	11,9,3	Space 2 lines immediately
00011011	11,9,8,3	Space 3 lines immediately
10001011	12,0,8,3	Skip to channel 1 immediately
10010011	12,11,3	Skip to channel 2 immediately
10011011	12,11,8,3	Skip to channel 3 immediately
10100011	11,0,3	Skip to channel 4 immediately
10101011	11,0,8,3	Skip to channel 5 immediately
10110011	12,11,0,3	Skip to channel 6 immediately
10111011	12,11,0,8,3	Skip to channel 7 immediately
11000011	12,3	Skip to channel 8 immediately
11001011	12,0,9,8,3	Skip to channel 9 immediately
11010011	11,3	Skip to channel 10 immediately
11011011	12,11,9,8,3	Skip to channel 11 immediately
11100011	0,3	Skip to channel 12 immediately
00000011	12,9,3	No op

TYPE B

Type B allows the user to use the d-modifier character of the IBM 1401 carriage-control instruction used in printing a line or spacing forms with a 1401 system. Printing occurs only for the d-modifiers which include a print in the operation. If the character read is not one of the valid characters, the line will be printed after single spacing and no error indication will be given. The codes are as follows.

d	immediate skip to	d	skip after print to
1	channel 1	A	channel 1
2	channel 2	B	channel 2
3	channel 3	C	channel 3
4	channel 4	D	channel 4
5	channel 5	E	channel 5
6	channel 6	F	channel 6
7	channel 7	G	channel 7
8	channel 8	H	channel 8
9	channel 9	I	channel 9
0	channel 10	?	channel 10 (EBCDIC or BCDIC)
#	channel 11	.	channel 11
@	channel 12	¤	channel 12 (EBCDIC or BCDIC)

d	immediate space	d	after print-space
J	1 space	/	1 space
K	2 spaces	S	2 spaces
L	3 spaces	T	3 spaces

TYPE C

Type C allows the use of the following codes as first-character forms-control characters. If the character read is not one of the valid characters, the line will be printed with single spacing after printing and no error indication will be given.

Code	Space or Skip Action
plus (EBCDIC or BCDIC)	Suppress space and print.
blank	Print and single space
zero	Double space, print, and space
-	Triple space, print, and space
1-9 or J-R	Immediate skip, to channel 1-9, (that is, 1 or J=skip to channel 1; 2 or K=skip to channel 2; etc), print (and then space).

TYPE D

Type D allows the use of the ASA FORTRAN first character forms control set. If the character read is not one of the valid characters, the line will be printed with single spacing before printing and no error indication will be given.

Code	Space or Skip Action
blank	Space one line before printing
0	Space two lines before printing
-	Space three lines before printing
+ (EBCDIC or BCDIC)	Suppress space before printing
1	Skip to Channel 1 before printing
2	Skip to Channel 2 before printing
3	Skip to Channel 3 before printing
4	Skip to Channel 4 before printing
5	Skip to Channel 5 before printing
6	Skip to Channel 6 before printing
7	Skip to Channel 7 before printing
8	Skip to Channel 8 before printing
9	Skip to Channel 9 before printing
A	Skip to Channel 10 before printing
B	Skip to Channel 11 before printing
C	Skip to Channel 12 before printing

SYSLST/SYS005 Carriage Control

When separate printers are assigned to SYSLST and SYS005, or the same device is assigned to both, consideration must be given to determine the controlling factor in carriage control skipping. The following shows the possible printer assignments and the determining carriage control factors.

PRINTER ASSIGNMENT	CONTROL FACTORS
SYSLST as a separate printer.	LINECT (line count) operand in the SET command.
SYS005 as a separate printer.	Sensing either channel 12 or the proper first character forms control character.
SYSLST and SYS005 as the same printer.	First character forms control character or if none is present the LINECT operand in the SET command. Channel 12 will not be detected.

FIRST CHARACTER STACKER-SELECT CONTROL

First Character Stacker-Select Control can be specified for the tape and disk to card programs. The stacker-select control character must be the first character of the data portion of the record and is punched unless excluded by field-select. These characters cause the indicated action, and any other character will cause the selection of pocket 1.

Character	Action
V	Select pocket 1
W	Select pocket 2

UTILITY-MODIFIER STATEMENT

This statement 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 statement is present and optional parameters are left out, assumed values are used.

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

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

The general format of the utility-modifier statement is:

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

Figure 6 shows detailed information of the entries in the utility-modifier state-statement.

//bUxxb

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

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,Px,Q=(x,y),Rx,Sx] can be omitted from the utility-modifier statement, and assumed values are made. Commas should not be entered to indicate omitted parameters.

Tt

The first parameter, indicated by Tt in the general format, describes the type of function to be performed. The letter T is entered to identify this parameter and is followed by one or two additional characters to indicate the type of function to be performed. This parameter is required in all utility modifier statements.

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 for input and output. This parameter is required in all utility modifier statements.

The letter F is entered 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. This parameter is required in all utility

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR TRF TD TL TLF TB TBF	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
		B	Both print and punch
		BF	Both print and punch with 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 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. For field select with variable-length input records, the fixed portion of each input record (the letter n) and the maximum 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 DASD 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 undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable-length output records, the fixed portion of each output record (the letter n) and the maximum output block length (the letter m) 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 DASD 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=(g)	B=	This letter and symbol indicate this is the output-description parameter.

Figure 6. Utility-Modifier Statement Parameters (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
		(g)	For undefined output records or variable input records without field select, the maximum block length must be enclosed in parentheses.
	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, 144) must be entered.
	B=(n,p)	B=	This letter and symbol indicate this is the output description parameter.
		(n,p)	For field select of variable length records with printer output records, the fixed portion of each output record (the letter n) and the size of the print line(the letter p) must be enclosed in parentheses and separated by a comma.
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 6. Utility-Modifier Statement Parameters (Part 2 of 2)

modifier statements 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 records without key fields and variable-length input records with field select 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 or the fixed portion of variable-length records (the letter n) and input-block length or maximum block length (the letter m) for variable records should be entered, separated by a comma, and enclosed in parentheses. If a fixed input record length is 50 characters long and the block length is 250 characters long, the input parameter must be entered 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 DASD 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 DASD-input record has a key length of 10 and data field length of 60, the input parameter must be entered A=(K=10,D=60), and must be followed by a comma to separate this parameter from the one to follow.

A=(g)

Undefined input records and variable-length records without field select 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 entered in parentheses. If a file of undefined records contains a maximum block length of 300, the input parameter must be entered 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=(n,m)
B=(K=l,D=l)
B=(g)
B=(p)
```

B=(n,m)

This form is indicated for fixed-length records without key fields and variable-length records with field select without key fields. The letter B and the symbol = identify this as the output-file description parameter. The (n,m) indicates that the output record length or the fixed portion of variable length records (the letter n) and the output block length or maximum block length (the letter m) for variable-length records should be entered, separated by a comma and enclosed in parentheses. If a fixed-length output record length is 50 characters long and the block length is 250 characters long, the output parameter must be entered 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 DASD 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 DASD output record has a key length of 10 and a data-field length of 60, the output parameter must be entered 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=(n,p)

This form of the output-file description parameter is indicated for printer output programs with field select of variable-length records. The letter n indicates the last print position that may be used for field selection. If copy variable is to be performed, the variable portion of the record will follow the nth print position. The last print position (the letter n) and the size of the print line (the letter p) must be enclosed in parentheses and separated by a comma.

B=(g)

Undefined output records and variable-length records without field select must be indicated in this form. The letter B and the symbol = identify this as the output file description. The (g) indicates that the maximum output-block length is to be entered within parentheses. If an output file of undefined records is to contain a maximum block length of 300, the output parameter must be entered 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=(n,m)
FF,A=(K=1,D=1),B=(n,m)
FF,A=(n,m),B=(K=1,D=1)
FF,A=(K=1,D=1),B=(K=1,D=1)
FV,A=(n,m),B=(n,m)
FV,A=(g),B=(g)
FU,A=(g),B=(g)
```

Note: The optional parameters [Ix,Ox,Px, Q=(x,y),Rx, and Sx] are unique to each program and are explained under the discussions of the individual programs.

For printer output, there are five additional forms:

```
FF,A=(n,m),B=(p)
FF,A=(K=1,D=1),B=(p)
FV,A=(g),B=(p)
FU,A=(g),B=(p)
FV,A=(n,m),B=(n,p)
```

FIELD SELECT STATEMENT

With the choice of this option, a field in each input record or the fixed portion for variable-length records 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 X'40'. 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 as that 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. The section of a variable-length record that is not defined as the fixed portion can be copied onto 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.

A KEY FIELD can be selected from or placed into the key portion of a DASD 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. Fields are selected, or placed, relative to one of the first byte of either the key, or data field.

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. Field-select can be performed on any portion of fixed-length records; however, only fields within the fixed portion of each variable-length record can be selected.

The fixed-length portion of a variable-length record is the initial section of a record that is common to all records. The first four bytes of this fixed portion is always the record-length indication.

For nonprinter programs involving variable-length records, the record length is generated into the first four bytes of each output record. The generation of this field prohibits field selection from being performed in this area. When performing field selection with non-printer, variable- or fixed-length records, the r and t in the field selection parameter (r,s,t) are relative to the first byte of the record, which includes the 4-byte record length indication.

For printer programs (list mode) involving variable-length records, the record-length indication is not generated into the output record unless field selected. When printer output field selecting of variable-length records is performed, the r in the field selection parameter (r,s,t) is relative to the first byte of the record including the 4-byte record length indication, and the t is relative to the first print position of the print line. The remainder of the variable-length record can be copied onto the output record if indicated in the field-select statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 main storage, not on the statement.
	, (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 (DASD 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 (DASD 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 (DASD input) and is to be placed into a key field (DASD 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 (invalid for printer output), 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 because the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

COPY VARIABLE

When the section of a variable-length record not defined as the fixed portion, is to be copied, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered as one of the following:

- Before the first field to be selected
- Between selected fields
- Following selected fields

Examples:
```
//bFSbCV/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as defined in the output description parameter.

PRINT HEADER

A heading line can be printed, for programs with printer output. Header lines are ignored if first-character forms control is specified. A maximum of two statements can be used to indicate the heading line desired. The second statement need not be entered if the first statement contains all of the desired information. The first statement is entered //bH1b (followed by the information to be printed in print positions 1-74). The second statement is entered //bH2b (followed by the information to be printed in the rest of the heading line).

END

This statement must be the last of the utility-control statements in the program.

```
//bEND
```

//b	Indicates that this is a control statement.
END	Indicates the last utility-modifier control statement.

EXAMPLES

The following are examples of utility-modifier-statement and field-select statement preparation (one card-to-tape, two tape-to-tape, and one disk-to-disk) for creating a file of fixed-length records 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 31-66.
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 statement is entered as:

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

The field-select statement is entered as:

```
//bFSbl,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 input file, a field-select statement is not needed.

The utility-modifier statement is entered as:

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

TAPE TO TAPE

The input file contains variable-length records. The minimum length logical record is twenty-four bytes, and the maximum block length is 300 bytes. The fixed portion of the logical record is defined as 24 bytes and consists of two ten-byte fields and the record-length field. The two ten-byte fields are to be interchanged, and the variable portion of each logical record is to be copied.

The utility modifier statement is entered as:

```
//bUTTbTF,FV,A=(24,300),B=(24,300)
```

The field-select statement is entered as:

```
//bFSb5,10,15/15,10,5/CV
```

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 statement is entered as:

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

Field-select control statements are entered as:

```
//bFSb(K,1),10,(K,1)/6,15,1/21,(P,5,3),16
```

KEY FIELDS

DASD processing begins in the area of DASD indicated in the XTENT statement as the lower limit, and continues consecutively until the upper limit or EOF is reached. A field can be selected from, or placed into, the key portion of a DASD 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. DASD 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 identified as an undefined record:

Fixed-length blocked
Variable-length blocked or unblocked
Undefined.

The records identified as undefined records with keys are restricted to being copied or displayed and are valid for DASD-to-DASD and DASD-to-printer programs only.

DASD FILES WITH KEY FIELDS (FIXED-LENGTH UNBLOCKED)

Key fields are only valid for:

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

DASD to Card or Tape

To transfer data from DASD 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 because disk input is unblocked and card output must be unblocked.

Card or Tape to DASD

When data is transferred from card or tape to DASD, 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, because 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.

DASD to Printer

When a DASD file is printed, 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.

DASD to DASD

When records from DASD to DASD are transferred, 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.

DASD 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 DASD-to-DASD program and the DASD-to-printer program.

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 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.

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

UTILITY-MODIFIER STATEMENT

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

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

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

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

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

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
CDb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identifies this as a field-select control statement.
r,s,t/	r indicates the starting position relative to one, of the field in the input record to the 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.

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 TF TR 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=	The letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) 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.
Card Input Ix	I1 I2	I	The first letter in these forms identifies this parameter.
		1	EBCDIC input.
		2	Binary input.
Disk Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-disk check.
		N	Do not write-disk check.
Sequence-numbering Q=(x,y)	Q=(x,y)	Q=	This first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card (relative to one) for sequence-numbering (1 or 2 digits).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 7. Card-to-Disk Utility-Modifier Statement

CONTROL STATEMENT STREAM

A sample control statement input stream for running the card-to-disk program from the relocatable disk resident library follows; device and file descriptions are peculiar to the job being run.

```
 //bJOBbEXAMPLE
 //bASSGNbSYSLNK,X'190'
 //bASSGNbSYS001,X'180'
 //bASSGNbSYS004,X'00A'
 //bASSGNbSYS009,X'191'
 //bOPTIONbLINK
 bINCLUDEbIJWCD
 bPHASEbCDDK5,IJWCDCS2,NOAUTO
 bINCLUDEbUSERLABR (module name for user's
   label processing routine)
 bENTRY
 //bEXECbLNKEDT
 //bUPSIb00010000 (standard and user-standard
   labels on input and output)
 //bVOLbSYS009,UOUT
 //bDLABb'DISKbFILEb...bl006801',b...bC
                (col. 54↑)    (col. 72↑)
 b...b0001,66030,66030,'bSYSTEMbCODEb'
(col.16↑)
 //bXTENTb128,0,000120004,000140007,
   '006801',SYS009
 //bEXEC
 //bUCDbTF,FF,A=(80,80),B=(K=26,D=80)
 //bFSbl,80,1/30,26,(K,1)
 //bEND
   (data cards on SYS004)
 /*
 /&
```

Input records to this program must be fixed length and unblocked. Card input and output can be either EBCDIC or binary, except when both printing and punching. For both printing and punching it must be EBCDIC. Card to Punch requires the 1/2-4/ burst mode switch of the 2821 to be in 2-4, or burst setting, to allow maximum throughput speed on the 2540.

CARD TO PRINTER

The card-to-printer program can produce printed output in two formats (display and list). Sequence checking is performed on the input.

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. When hexadecimal printout is called for, the entire card is printed on two lines.

LIST

The input records to this program are transferred to the printer with each record being fully printed. 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 binary. Output records may also be in either EBCDIC or binary. The records may be copied or field selected. Sequence fields are generated but input is not checked.

CARD TO PRINTER AND PUNCH

This program allows EBCDIC input and output records. Printed output is in the list format. Sequence fields are generated but input is not checked.

UTILITY-MODIFIER STATEMENT

This statement contains information required for the operation of this program. If this statement 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,S2,Rl
```

Card to Printer:

```
//bUbTB,FF,A=(80,80),B=(120),Il,OC,PY,S2,Rl
```

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

Card to Punch:

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

Card to Printer:

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

Card to Printer and Punch:

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

Figure 8 shows detailed information of the entries in the utility-modifier statement for the card-to-printer and/or punch program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
CPb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement provides the information for the file-to-file program to transfer fields from an input record. As many field-select statements as necessary may be used. If punched in cards

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TB TBF TC TD TF TL TLF	T	The initial T identifies this as the type of function parameter.
		B	Both print and punch.
		BF	Both print and punch with Field Select
		C	Copy (punch output only)
		D	Display
		F	Field Select (punch output only)
		L	List
		LF	List 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 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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) 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.
Card Input Ix	I1 I2	I	The first letter in these forms identifies this parameter.
		1	EBCDIC input.
		2	Binary input.
Printer or Punch Output Ox	O1 O2 OX OC	O	The first letter in these forms identifies this parameter. For printer output, the type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.
		1	EBCDIC output (punch only).
		2	Binary output (punch only).
		X	Hexadecimal output (printer only).
		C	Character output (printer only).
Page Numbering Px	PY	P	The first letter in these forms identifies this parameter.
	PN	Y	Number pages.
		N	Do not number pages.

Figure 8. Card-to-Printer and/or Punch Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Sequence-numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the position of a field in a card (relative to one) for sequence-numbering (1 or 2 digits).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by-passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.
Spacing and Stacker Control Sx	S1 S2 S3	S	This letter in these forms identifies this parameter.
		1	Printer output: Single spacing. Punch output: Select stacker 1. Printer and Punch: Printer control only.
		2	Printer output: Double spacing. Punch output: Select stacker 2. Printer and Punch: Printer control only.
		3	Printer output: Triple spacing. Punch output: Invalid Printer and Punch: Printer control only.

Figure 8. Card-to-Printer and/or Punch Utility-Modifier Statement (Part 2 of 2)

each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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, because 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.

Note: Field selections when running card to printer and/or punch will be reflected both on printer output as well as punched output.

CONTROL STATEMENT STREAM

A sample control-statement input stream for running the card-to-printer and/or punch program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'00C'   (Reader)
//bASSGNbSYS005,X'00E'   (Printer)
//bASSGNbSYS006,X'00D'   (Punch)
//bEXECbCDPP
//bEND                   (Assumed values)
  (Data cards on SYS004)
/*
/&
```

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 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.

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

UTILITY-MODIFIER STATEMENT

This statement 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),Il,OU,Rl
```

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

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

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

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
CTb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a card-to-tape program from the disk resident relocatable library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bLBLTYPbTAPE
//bASSGNbSYSLNK,X'190'
//bASSGNbSYS001,X'180'
//bOPTIONbLINK
bINCLUDEbIJWCT
bPHASEbCDTP5,IJWCTCS2,NOAUTO
bINCLUDEbIJWLAB
bENTRY
//bEXECbLNKEDT
//bUPSIb00101000 (unlabeled output with no
  tape mark at start of file)
//bASSGNbSYS004,X'00C'  (reader)
//bASSGNbSYS005,X'182'  (tape drive)
//bASSGNbSYS005,X'183',ALT (alternate tape
  drive)
//bEXEC
//bUCTbTR,FF,A=(80,80),B=(80,800),OR
//bEND
  (Data goes in SYS004)
/*
/&
```

PARAMETER	POSSIBLE FORMS	ENTIRES	EXPLANATION
Function Tt	TC TF TR 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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma.
Card Input Ix	I1 I2	I	The first letter in these forms identifies this parameter..
		1	EBCDIC input.
		2	Binary input.
Rewind Output Ox	OR ON OU	O	The first letter in these forms identifies this parameter. The rewind option for the output tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
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 (relative to one) for sequence-numbering (1 or 2 digits).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be included in parentheses.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by-passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 9. Card-to-Tape Utility-Modifier Statement

The data-cell-to-data-cell program transfers a file between any number of assigned data-cell units or between areas of the same unit. 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 or variable length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 10 shows detailed information of the entries in the utility-modifier statement for the data cell to data cell program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
MMb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards, each card need not be filled even if additional field-select statements follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 (data-cell 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 (data-cell input) and is to be placed into a key field (data-cell 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 (data-cell 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

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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 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. For field select with variable-length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
	A=(K=I,D=I)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=I,D=I)	For fixed-length data cell 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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable-length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(K=I,D=I)	B=	This letter and symbol indicate this is the output description parameter.
		(K=I,D=I)	For fixed-length data cell 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=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Data Cell Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-data cell check (forced for this program).
		N	Do not write-data cell check (ignored for this program).
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by-passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 10. Data-Cell-to-Data Cell Utility-Modifier Statement

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.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a data cell-to-data cell program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS010,X'193'
//bUPSIb00000000  (standard labels)
//bVOLbSYS010,UIN
//bDLABb'DCbFILEb...b1010203',b...bC
                (col. 54↑)     (col. 72↑)
 b...b0001,66005,66130,'DATAbCELLb1bb'
(col.16↑)
 //bXTENTb1,0,419000006,419000419,'010203',SYS01
 //bVOLbSYS010,UOUT
 //bDLABb'DATAbCELLbOUTPUTb...b1000123',b...bC
                          (col. 54↑)     (col. 72↑)
 b...b0001,66130,66150,'DATAbCELLb2bb'
 //bXTENTb1,0,519000006,519000419,'000123',SYS01
 //bEXECbDCDC
 //bUMMbTF,FF,A=(80,80),B=(K=10,D=70),ON
 //bFSb75,6,(K,1)/1,70,1
 //bEND
 /&
```

The data-cell-to-disk program transfers a file between any number of assigned data cells and disks.

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 or variable length.

UTILITY-MODIFIER STATEMENT

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

```
//bUbTC,FU,A=(1000),B=(1000),Oy,Rl
```

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

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

Figure 11 shows detailed information of the entries in the utility-modifier statement for the data cell-to-disk program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
MDb	The initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement.
FS	identify this as a field-select control statement.
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 (data cell 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 (data cell 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 TF TR 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
	A=(K=l,D=l)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=l,D=l)	For fixed-length data cell 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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	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 data field. These two fields must be separated by a comma and enclosed in parentheses.
	B=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Disk Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-disk check.
		N	Do not write-disk check.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 11. Data-Cell-to-Disk Utility-Modifier Statement

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.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a data cell-to-disk program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS010,X'193'
//bASSGNbSYS015,X'191'
//bUPSIb00000000  (standard labels)
//bVOLbSYS010,UIN
//bDLABb'EXAMPLEbFILEb...bl010203',b...bC
                    (col.54 ↑)     (col. 72↑)
  b...b0001,66100,66205,'DATAbCELLbbbb'
(col.16↑)
  //bXTENTb1,0,412000200,412000419,'010203',SYS01
  //bVOLbSYS015,UOUT
  //bDLABb'DISKbFILEbEXAMPLEb...bl000123',b...bC
                        (col. 54↑)     (col. 72↑)
  b...b0001,66205,66315,'DISKbOUTPUTbb'
(col.16↑)
  //bXTENTb1,0,000150002,000153009,'000123',SYS01
  //bEXECbDCDK
  //bUMDbTC,FF,A=(K=10,D=100),B=(K=10,D=100),OY
  //bEND
  /&
```

The data-cell-to-printer program can display a data-cell 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 one or more data-cells. If data list is used, input records must be fixed or variable length.

UTILITY-MODIFIER STATEMENT

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

```
//bUbTD,FU,A=(1000),B=(120),OX,Sl,Py,Rl
```

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

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

Figure 12 shows detailed information of the entries in the utility-modifier statement for the data cell-to-printer program.

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

FIELD-SELECT STATEMENT

The field-select control statement 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. This is valid only for data list mode. As many field-select statements as necessary may be used. If punched in cards, each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

```
//bFS/br,s,t/r,s,t/r,s/t
```

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 print position relative to one, of the print line. / (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 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 because 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 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(K=I, D=I)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=I, D=I)	For fixed-length data cell 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 undefined input records or variable input records without field select, 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.
	B=(n,p)	B=	This letter and symbol indicate this is the output description parameter.
		(n,p)	For field select of variable length records with printer output records the fixed portion of each output record (the letter n) and the size of the print line (the letter p) must be enclosed in parentheses and separated by a comma.
Printer Output Ox	OX OC	O	The first letter in these forms identifies this parameter. The character printout is forced for data list. The type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.
		X	Hexadecimal printout.
		C	Character printout.
Page-numbering Px	PY PN	P	The first letter in these forms identifies this parameter.
		Y	Number pages. (Forced for data display.)
		N	Do not number pages. (Forced for first character forms control.)
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 12. Data-Cell-to-Printer Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Spacing Sx	S1 S2 S3 SA SB SC SD	S	The first letter in these forms identifies this parameter.
		1	Single spacing. (Forced for data display.)
		2	Double spacing.
		3	Triple spacing.
		A	Type A first character forms control.
		B	Type B first character forms control.
		C	Type C first character forms control.
		D	Type D first character forms control.

Figure 12. Data-Cell-to-Printer Utility-Modifier Statement (Part 2 of 2)

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.
2. Between selected fields.
3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a data cell-to-printer program from the core image library follows; devices and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS010,X'193'
//bASSGNbSYS005,X'00E'
//bVOLbSYS010,UIN  (assume standard labels)
//bDLABb'bEXAMPLEbFILEb...bl001101',b...bC
                        (col. 54↑)    (col. 72↑)
b...b0001,66031,67001,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTbl,0,312001000,312009419,'001101',SYS01
//bXTENTbl,1,316000000,316000012,'001101',SYS01
//bEXECbDCPR
//bUMPbTL,FF,A=(K=20,D=90),B=(120),OC,S2,PN
//bHlbLISTbOFDATAbCELLbFILE
//bEND
/&
```

The data cell-to-tape program transfers a file from one or more data cells to one or more tape reels. 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 or variable-length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 13 shows detailed information of the entries in the utility-modifier statement for the data cell-to-tape program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
MTb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 (data cell 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 TF TR 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(K=I,D=I)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=I,D=I)	For fixed-length data cell 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 undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Rewind Output	OR ON OU	O	The letter in these forms identifies this parameter. The rewind option for the output tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 13. Data-Cell-to-Tape Utility-Modifier Statement

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a data cell-to-tape program from the disk resident relocatable library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bLBLTYPbTAPE
//bASSGNbSYS010,X'193'
//bASSGNbSYS005,X'182'
//bASSGNbSYSLNK,X'190'
//bASSGNbSYS001,X'180'
//bUPSIb01000000  (user-standard input, and
  standard output labels)
//bOPTIONbLINK
bINCLUDEbIJWMT
bPHASEbDCTP5,IJWMTCS2,NOAUTO
bINCLUDEbULABROUT  (user label processing
  routine)
bENTRY
//bEXECbLNKEDT
//bVOLbSYS005,UOUT
//bTPLABb'EXAMPLEbFILEbbbbb01020300010001000101b66031b66150'
//bVOLbSYS010,UIN
//bDLABb'DATAbCELLbTObTAPEb...b1000123',b...bC
                        (col. 54↑)    (col. 72↑)
b...b0001,66130,66150,'bbDATAbCELLbb'
(col.16↑)

//bXTENTb,1,0,912006400,912006419,'000123',SYS010
//bEXEC
//bUMTbTRF,FF,A=(K=10,D=100),B=(110,440),ON
//bFSb(K,1),10,1/1,100,11
//bEND
/&
```

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 binary. Each logical-output record must fit on one card (80 bytes for extended BCD or 160 bytes for 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 STATEMENT

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

```
//bUbTC,FF,A=(80,80),B=(80,80),O1,R1,S2
```

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

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

Figure 14 shows detailed information of the entries in the utility-modifier statement for the disk-to-card program.

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
DCb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 field.

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

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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=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 a parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma.
Output Mode Ox	O1 O2	O	The first letter in these forms identifies this parameter.
		1	EBCDIC punching
		2	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 (relative to one) for sequence-numbering (1 or 2 digits).
		,	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by-passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.
Stacker Select Sx	S1	S	The first letter in these forms identifies this parameter.
	S2	1	Select pocket 1
	S3	2	Select pocket 2
		3	First character stacker select

Figure 14. Disk-to-Card Utility-Modifier Statement

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.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a disk-to-card program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS006,X'00D'
//bASSGNbSYS009,X'191'
//bVOL,SYS009,UIN  (standard labels assumed)
//bDLABb'DISKbFILEb...b1112233',b...bC
                (col. 54↑)    (col. 72↑)
b...b0001,66150,66155,'bDISKbTObCARD'
(col.16↑)
//bXTENTb1,0,000140000,000144002,'112233',SYS00
//bEXECbDKCD
//bEND
/&
```

The disk-to-data-cell program transfers a file between any number of assigned data cells and disks.

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 or variable length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 15 shows detailed information of the entries in the utility-modifier statement for the disk-to-data-cell program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
DMb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If cards are punched each card need not be filled even if additional field-select statements follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 (data-cell 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 (data-cell 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

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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. For field select with variable length records the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
	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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(K=I,D=I)	B=	This letter and symbol indicate this is the output description parameter.
		(K=I,D=I)	For fixed-length data cell 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=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Data Cell Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-data cell check (forced for this program).
		N	Do not write-data cell check (ignored for this program).
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be by-passed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 15. Disk-to-Data-Cell Utility-Modifier Statement

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.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running the disk-to-data cell program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bPAUSEbMOUNT PACK 352336 ON 190 AND CELL
  362431 ON BIN 4 OF 193
//bASSGNbSYS004,X'190'
//bASSGNbSYS005,X'193'
//bVOLbSYS004,UIN  (standard labels assumed)
//bDLABb'DISKbFILEb...bl352336',b...bC
                (col. 54↑)    (col. 72↑))
 b...b0001,65001,66365,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTbl,0,000055001,000063002,'352336',SYS004
//bVOLbSYS005,UOUT
//bDLABb'BACK-UPbFILEb...bl362437',b...bC
                  (col. 54↑)    (col. 72↑)
 b...b0001,65001,66365,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTbl,0,401004305,401004416,'362437',SYS005
//bEXECbDKDC
//bUDMbTC,FU,A=(960),B=(960),OY
//bEND
/&
```

The disk-to-disk program transfers a file between disk units, or between areas of the same unit. 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 or variable length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 16 shows detailed information of the entries in the utility-modifier statement for the disk-to-disk program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
DDb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement.

The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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 record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
	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=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(K=I,D=I)	B=	This letter and symbol indicate this is the output description parameter.
		(K=I,D=I)	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=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Disk Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-disk check.
		N	Do not write-disk check.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 16. Disk-to-Disk Utility-Modifier Statement

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.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a disk-to-disk program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bPAUSEbMOUNTbPACKbONbDRIVEb191
//bASSGNbSYS004,X'191'
//bASSGNbSYS005,X'191'
//bVOLbSYS004,UIN  (standard labels assumed)
//bDLABb'DISKbINPUTb...b1222333',b...bC
                  (col. 54↑)    (col. 72↑)
  b...b0001,63124,66182,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTb1,0,000091003,000093002,'222333',SYS0(
//bVOLbSYS005,UOUT
//bDLABb'DISKbOUTPUTb...b1222333'b...bC
                  (col. 54↑)  (col. 72↑)
  b...b0001,63129,66189,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTb1,0,000041003,000043002,'222333',SYS0(
//bEXECbDKDK
//bUDDbTR,FF,A=(80,80),B=(80,960),OY
//bEND
/&
```

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. If data list is used, input records must be fixed or variable length.

An option is available to this program to specify the number of logical records in a file to be bypassed before beginning to print.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 17 shows detailed information of the entries in the utility-modifer statement for the disk-to-printer program.

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
DPb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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. This is valid only for data-list mode. As many field-select statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 print position relative to one, of the print line. / (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 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 because 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 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(K=1,D=1)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select 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.
	B=(n,p)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,p)	For field select of variable length records with printer output records, the fixed portion of each output record (the letter n) and the size of the print line (the letter p) must be enclosed in parentheses and separated by a comma.
Printer Output Ox	OX OC	O	The first letter in these forms identifies this parameter. The type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.
		X	Hexadecimal printout. (For data display only).
		C	Alphameric printout. (Forced for data list mode)
Page-numbering Px	PY PN	P	The first letter in these forms identifies this parameter.
		Y	Number pages (Forced for data display).
		N	Do not number pages. (Forced for first character forms control.)
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 17. Disk-to-Printer Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Spacing Sx	S1 S2 S3 SA SB SC SD	S	The first letter in these forms identifies this parameter.
		1	Single spacing. (Forced for data display)
		2	Double spacing.
		3	Triple spacing.
		A	Type A first character forms control.
		B	Type B first character forms control.
		C	Type C first character forms control.
		D	Type D first character forms control.

Figure 17. Disk-to-Printer Utility-Modifier Statement (Part 2 of 2)

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a disk-to-printer program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'191'
//bASSGNbSYS005,X'00E'
//bUPSIb00000000  (standard labels)
//bVOLbSYS004,UIN
//bDLABb'DISKbFILEb...b1333333',b...bC
                  (col. 54↑)     (col. 72↑)
 b...b0001,64185,66359,'bSYSTEMbCODEb'
(col.16↑)
 //bXTENTb1,0,000122004,000124005,'333333',SYS004
 //bEXECbDKPR
 //bUDPbTL,FF,A=(80,400),B=(132),S1
 //bEND
 /&
```

The disk-to-tape program transfers a file from one or more disk units to one or more tape reels. 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 or variable-length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 18 shows detailed information of the entries in the utility-modifier statement for the disk-to-tape program.

Entry	Reason
//bU	These entries identify this as a utility-modifier statement.
DTb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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
```

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	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 undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Rewind Output Ox	OR ON OU	O	The letter in these forms identifies this parameter. The rewind option for the output tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 18. Disk-to-Tape Utility-Modifier Statement

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

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a disk-to-tape program from the core image library follows; devices and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'191'
//bASSGNbSYS005,X'183'
//bUPSIb00100000 (tapemark at beginning of
  unlabeled output file)
//bVOLbSYS004,UIN
//bDLABb'DISKbFILEb...bl333333',b...bC
                (col. 54↑)     (col. 72↑)
  b...b0001,64185,66359,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTbl,0,000122004,000124005,'333333',SYS00
//bEXECbDKTP
//bUDTbTR,FF,A=(80,800),B=(80,80),OR
//bEND
/&
```

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 binary. Each logical output record must fit in one card (80 bytes for extended BCD or 160 bytes for 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 is punched into each card. This field is 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. The sequence number will overlay any data selected into the sequence area of the card.

UTILITY-MODIFIER STATEMENT

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

```
//bUbTC,FF,A=(80,80),B=(80,80),IU,O1,R1,S2
```

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

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

Figure 19 shows detailed information of the entries in the utility-modifier statement for the tape-to-card program.

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
TCb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards, each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 TF TR TRF	T C F R RF	The initial T identifies this as the type of function parameter. Copy Field Select Reblock Reblock and Field Select
Format Ff	FF	F F	The leading F of this form identifies this as the format parameter. The second F of the form must be indicated for fixed-length records.
Input Description	A=(n,m)	A= (n,m)	This letter and symbol indicate this is the input-description parameter. 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=(n,m)	B= (n,m)	This letter and symbol indicate this is the output-description parameter. For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma.
Rewind Input Ix	IR IN IU	I R N U	The first letter in these forms identifies this parameter. Rewind both before and after data transfer. Do not rewind either before or after data transfer. Rewind before and rewind and unload after data transfer.
Sequence Numbering Q=(x,y)	Q=(x,y)	Q= x , y	The letter and symbol identify this parameter. This represents the first position of a field in a card (relative to one) for sequence-numbering (1 or 2 digits). Separator. 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.
First Record Rx	Rx	R x	The first letter in this form identifies this parameter. This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.
Stacker Control Sx	 S1 S2 S3	 S 1 2 3	 The first letter in these forms identifies this parameter. Select pocket 1 Select pocket 2 First character stacker control.
Output Mode Ox	O1 O2	O 1 2	The first letter in these forms identifies this parameter. EBCDIC punching Binary punching

Figure 19. Tape-to-Card Utility-Modifier Statement

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.

CONTROL STATEMENT STREAM

A sample control-statement input stream for running a tape-to-card program from the tape resident relocatable library follows; devices and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYSLNK,X'180'
//bASSGNbSYS001,X'181'
//bASSGNbSYS002,X'182'
//bLBLTYPbTAPE(01) (01) indicates one VOL-
  TPLAB set)
//bOPTIONbLINK
bINCLUDE IJWTC
bPHASEbTPCD5,IJWTCCS2,NOAUTO
bINCLUDE
.
.
.
(user label processing routine on SYSIPT)
.
.
.
bENTRY
//bEXECbLNKEDT
//bASSGNbSYS004,X'183'
//bASSGNbSYS006,X'00D'
//bUPSIb01000000 (standard and user-standard
  labels)
//bVOLbSYS004,UIN
//bTPLABb'bDATAbFILEb638bbb00012100010001
  000101b66040b66090'
//bEXEC
//bUTCbTRF,FF,A=(70,700),B=(80,80),IN,S1,
  01,R380
//bFSb1,70,1/1,10,71
//bEND
/&
```

The tape-to-data cell program transfers a file from one or more tape reels to any number of assigned data cells. 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 or variable length.

UTILITY-MODIFIER STATEMENT

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,R1
```

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

```
//bUTMbTt,Ff,A(input),B(output),Ix,Ox,Rx
```

Figure 20 shows detailed information of the entries in the utility-modifier statement for the tape-to-data cell program.

Entry	Explanation
//bU	These entries identify this as the utility-modifier statement.
TMb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 (data-cell 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
```

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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 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 (theletter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records, the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records, the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(K=I,D=I)	B=	This letter and symbol indicate this is the output-description parameter.
		(K=I,D=I)	For fixed-length data cell 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=(g)	B=	This letter and symbol indicate this is the output description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Rewind Input Ix	IR IN IU	I	The first letter in these forms identifies this parameter. The rewind option for the input tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
Data Cell Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-data cell check (forced for this program).
		N	Do not write-data cell check (ignored for this program).

Figure 20. Tape-to-Data-Cell Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 20. Tape-to-Data-Cell Utility-Modifier Statement (Part 2 of 2)

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

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT CONVENTIONS

A sample control statement input stream for running a tape-to-data cell program from the disk resident relocatable library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bLBLTYPbTAPE
//bASSGNbSYSLNK,X'190'
//bASSGNbSYS001,X'180'
//bASSGNbSYS004,X'182'
//bASSGNbSYS014,X'193'
//bUPSIb10000000(output standard label
  checking with unlabeled input)
//bOPTIONbLINK
bINCLUDEbIJWTM
bPHASEbTPDC5,IJWTMCS2,NOAUTO
bINCLUDEbIJWLAB
bENTRY
//bEXECbLNKEDT
//bVOLbSYS014,UOUT
//bDLABb'DATAbCELLbFILEb...b1000111',b...bC
                        (col. 54↑)      (col. 72↑)
b...b0001,66105,66130,'16KbDISKbbbbb'
(col.16↑)
//bXTENTb1,0,601008006,601009419,'000111',SYS0]
//bEXEC
//bUTMbTRF,FF,A=(110,440),B=(K=10,D=100),OY
//bFSb1,10,(K,1)/11,100,1
//bEND
/&
```

The tape-to-disk program transfers a file from one or more tape reels to a maximum of n disk units where n is the number of disk units assigned. 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 or variable length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 21 shows detailed information of the entries in the utility-modifier statement for the tape-to-disk program.

Entry	Explanation
//bU	These entries identify this statement as the utility-modifier statement.
TDb	The initials of the program. These initials can be omitted if the statement is used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements follow. The field selected must be complete on one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Function Tt	TC TF TR 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 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records, the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	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=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Rewind Input Ix	IR IN IU	I	The first letter in these forms identifies this parameter. The rewind option for the input tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind and unload both before and after data transfer.

Figure 21. Tape-to-Disk Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Disk Check Ox	OY ON	O	The first letter in these forms identifies this parameter.
		Y	Write-disk check.
		N	Do not write-disk check.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 21. Tape-to-Disk Utility-Modifier Statement (Part 2 of 2)

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.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.
2. Between selected fields.
3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT CONVENTIONS

A sample control statement input stream for running a tape-to-disk program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'182'
//bASSGNbSYS007,X'191'
//bUPSIbl1000000 (nonstandard input label
  checking, assume nonstandard user label
  routine has been cataloged as the fifth
  phase of this program in the core image
  library)
//bVOLbSYS007,UOUT
//bDLABb'DISKbFILEb...bl000123',b...bC
                  (col. 54↑)    (col. 72↑)
 b...b0001,66030,66430,'bCODEbx21-3Ab'
(col.16↑)
//bXTENTbl,0,000017006,000017009,'000123',SYS007
//bXTENTbl,1,000086000,000089009,'000123',SYS007
//bEXECbTPDK
//bUTDbTR,FV,A=(320),B=(600),OY,IN
//bEND
/&
```

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 Program must be fixed or variable length, and the field-select option may be used. An option is available to this program to specify the number of logical records in a file to be bypassed before beginning to print.

UTILITY-MODIFIER STATEMENT

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

```
//bUbTD,FU,A=(1000),B=(120),IU,OX,PY,Rl,Sl
```

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

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

Figure 22 shows detailed information of the entries in the utility-modifier statement for the tape-to-printer program.

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
TPb	The inititals of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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. This is valid only for data list mode. As many field-select statements as necessary may be used. If punched in cards each card need not be filled even if additional field-select cards follow. The field selected must be complete in one statement. The format and contents of this statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 print line. / (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.

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 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, 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.
	B=(n,p)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,p)	For field select of variable length records with printer output records, the fixed portion of each output record (the letter n) and the size of the print line (the letter p) must be enclosed in parentheses and separated by a comma.
Rewind Input	IR IN IU	I	The first letter in these forms identifies this parameter. The rewind option for the input tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
Print Output Ox	OX OC	O	The first letter in these forms identifies this parameter.
		X	Hexadecimal printout. (For data display only)
		C	Character printout. (Forced for data list)
			The type of output indicated by the field-select parameter (hexadecimal or character) overrides this parameter.

Figure 22. Tape-to-Printer Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Spacing Option Sx	S1 S2 S3 SA SB SC SD	S	The first letter in these forms identifies this parameter.
		1	Single spacing. (Forced for data display)
		2	Double spacing.
		3	Triple spacing.
		A	Type A first character forms control.
		B	Type B first character forms control.
		C	Type C first character forms control.
		D	Type D first character forms control.
Page Numbering Px	PY PN	P	The first letter in these forms identifies this parameter.
		Y	Number pages. (Forced for data display)
		N	Do not number pages. (Forced for first character forms control)
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 22. Tape-to-Printer Utility-Modifier Statement (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 because the output length will always be assumed to be twice as large. X and n are enclosed in parentheses and separated by a comma.

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.
2. Between selected fields.
3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a tape-to-printer program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'182'
//bASSGNbSYS005,X'00E'
//bUPSIb10000000 (no label checking)
//bEXECbTPPR
//bUTPbTLF,FV,A=(37,98),B=(40,132),PN,OC,S2
//bFSb1,37,1/CV
//bEND
/&
```

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- or variable-length.

UTILITY-MODIFIER STATEMENT

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

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

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

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

Figure 23 shows detailed information of the entries in the utility-modifier statement for the tape-to-tape program.

Entry	Reason
//bU	These entries identify this as the utility-modifier statement.
TTb	The initials of the program. These initials can be omitted if the statement is to be used for more than one program.

FIELD-SELECT STATEMENT

The field-select control statement 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 statements as necessary may be used. If punched in cards 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 statement are:

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

Contents	Explanation
//bFSb	//b identify this as a control statement. FS identify this as a field-select control statement.
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 TF TR TRF	T	The first letter in these forms identifies this 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 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. For field select with variable length records the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For undefined input records or variable input records without field select, the maximum block length must be enclosed in parentheses.
Output Description	B=(n,m)	B=	This letter and symbol indicate this is the output-description parameter.
		(n,m)	For fixed-length output records, the output record length (the letter n) and the output block length (the letter m) must be enclosed in parentheses and separated by a comma. For field select with variable length records, the letter n indicates the size of the fixed portion of each record, and the letter m indicates the maximum block size.
	B=(g)	B=	This letter and symbol indicate this is the output-description parameter.
		(g)	For undefined output records or variable output records without field select, the maximum block length must be enclosed in parentheses.
Rewind Option for input Ix	IR	I	The first letter in these forms identifies this parameter. The rewind option for the input tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.
First Record Rx	Rx	R	The first letter in this form identifies this parameter.
		x	This represents the position of the first logical input record to be output (x-1 records will be bypassed). If the file is to be copied, the function parameter must be indicated to be reblocked and the input and output file description parameters must contain identical values.

Figure 23. Tape-to-Tape Utility-Modifier Statement (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Rewind Output Ox	OR ON OU	O	The first letter in these forms identifies this parameter. The rewind option for the output tape is active both before and after data transfer.
		R	Rewind both before and after data transfer.
		N	Do not rewind either before or after data transfer.
		U	Rewind before and rewind and unload after data transfer.

Figure 23. Tape-to-Tape Utility-Modifier Statement (Part 2 of 2)

COPY VARIABLE

When the section of a variable-length record, not defined as the fixed portion, is to be transferred to the output record, the letters CV (copy variable) must be present in the field-select control statement. If this entry is made when processing records that have been defined as fixed length, an error will be indicated. The CV entry can be entered:

1. Before the first field to be selected.

2. Between selected fields.

3. Following selected fields.

Examples:

```
//bFSbCV/r,s,t/r,s,t
//bFSbr,s,t/CV/r,s,t
//bFSbr,s,t/r,s,t/CV
```

The variable section of the record is placed in the output record following the fixed portion of the record as described in the output description parameter.

CONTROL STATEMENT STREAM

A sample control statement input stream for running a tape-to-tape program from the core image library follows; device and file descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'180',X'A8'
//bASSGNbSYS005,X'181'
//bVOLbSYS005,UOUT
//bTPLABb'bEXAMPLEbFILEbbbb000123000100010001
  01b66031b67031'
//bUPSIb10000000 (unlabeled input and stand-
  ard output labels)
//bEXECbTPTP
//bUTTbTR,FF,A=(100,100),B=(100,1000),OU,IR
//bEND
/&
```

The clear-data cell program clears one or more areas of IBM 2321 Data Cell Drive, and establishes preformatted tracks containing an indicated base throughout the area cleared. The control information for the operation of this program is entered in three types of control statements.

The first type of control statements (job control) define channel and unit assignment, physical-device description, and areas of the data cell to be processed.

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

The third type of statement is an END card.

The area to be cleared can be as small as one track or up to a maximum of a complete data cell. Any number of areas can be designated to be cleared with one run of this program. When an area of data cell is cleared, fixed-length blocks containing count, key, and data areas are established on the data cell. The information defining the key and data areas is indicated in the utility modifier statement, or, if a utility modifier statement 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 (R0), are filled with a user-defined character. The first eight bytes of the data portion of the track descriptor record (R0) 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 whether 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 (Volume Table of Contents).

UTILITY-MODIFIER STATEMENT

The utility-modifier statement 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 write-data cell check or not write-data cell check. The format and entries for this parameter are:

$$\text{//bUCMbB=(K=1,D=1)},\begin{Bmatrix}\text{C'c'}\\ \text{X'xx'}\end{Bmatrix},\text{O}\begin{Bmatrix}\text{Y}\\ \text{N}\end{Bmatrix}$$

If the utility-modifier statement is omitted, the assumed values are:

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

//bU	These entries identify this as a utility modifier statement.
CMb	These letters indicate this is the Clear Data Cell program and can be omitted.

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 length must equal zero.

Parameter	Entry	Explanation
C'c'	C'c'	C is entered and followed by the fill character (EBCDIC) enclosed in apostrophes.
X'xx'	X'xx'	The letter X is entered and followed by the hexadecimal fill character enclosed in apostrophes.
OY	O	Identifies this as the output parameter.
or		
ON	Y	Indicates write-data cell check (forced for this program).
	N	Indicates do not write-data cell (ignored for this program).

END STATEMENT

This must be the last control statement. The statement is entered:

```
//bEND
```

//b	Indicates that this is a utility control statement.
END	Indicates that this is the last control statement.

This program is resident in the core image library in three phases:

```
CLDC
CLDC2
CLDC3
```

The following is the job control statement input stream necessary to execute this program from the core image library; device and extent descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS008,X'193'
//bVOLbSYS008,UOUT
//bDLABb'bFILEbLABELb...b1000012',b...bC
                    (col. 54↑)    (col. 72↑)
b...b0001,66020,66120,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTb1,0,405000000,405000419,'000012',SYS008
//bEXECbCLDC
//bUCMbB=(K=0,D=900),C'X'
//bEND
/&
```

The clear-disk program clears one or more areas of IBM 2311 Disk Drive, and establishes preformatted tracks containing an indicated base throughout the area cleared. The control information for the operation of this program is entered in three types of control statements.

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

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

The third type of statement 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. Any number of 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 statement, or, if a utility modifier statement 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 (R0), are filled with a user-defined character. The first eight bytes of the data portion of the track descriptor record (R0) 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 whether 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 (Volume Table of Contents).

UTILITY-MODIFIER STATEMENT

The utility-modifier statement 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 write disk check or not write disk check. The format and entries for this parameter are:

```
//bUCLbB=(K=1,D=1),{C'c'  },O{Y}
                   {X'xx'}   {N}
```

If the utility modifier statement is omitted, the assumed values are:

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

//bU These entries identify this as a utility modifier statement.

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

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 length must be zero.
C'c' or	C'c'	C is entered and followed by the fill character (EBCDIC) enclosed in apostrophes.
X'xx'	X'xx'	The letter X is entered and followed by the hexadecimal fill character enclosed in apostrophes.

Parameter	Entry	Explanation
OY or	O	Identifies this as the output parameter.
ON	Y	Indicates write-disk check.
	N	Indicates do not write-disk check.

END STATEMENT

This must be the last control statement. The statement is entered:

```
//bEND
```

//b Indicates that this is a utility control statement.

END Indicates that this is the last control statement.

This program is resident in the core image library in three phases:

```
CLRD
CLRD2
CLRD3
```

The following is the job control statement input stream necessary to execute this program from the core image library; device and extent descriptions are peculiar to the job being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS012,X'191'
//bVOLbSYS012,UOUT
//bDLABb'bDISKbLABELb...b1001221'b...bC
                    (col. 54↑)    (col. 72↑)
bbb...b0001,66030,66040,'bSYSTEMbCODEb'
(col.16↑)
//bXTENTb1,0,000031000,000093009,'001221',SYS012
//bEXECbCLRDSK
//bUCLbB=(K=38,D=480),X'55',ON
//bEND
/&
```

The tape-compare program can be either a core image or relocatable library program that 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 prepositioning of the tape is necessary before the compare operation, the user may position the tapes by specifying that the tapes are unlabeled and by using the magnetic tape command (MTC) as found in the System Control and Service Publication listed on the front cover.

Tapes containing fixed, variable, or unknown 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 SYSLST, 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 from a common area of storage. The number of areas assigned to each file depends on the maximum size of the physical input records. If the space is available, two input areas are assigned, otherwise, one input area is assigned to each file.

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, for example, Primary, Alternate, Primary, etc. In this case, tape reels are not rewound and unloaded. 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 external-interrupt key. A compare operation for a new file can be initiated by supplying the correct control statement and following the restart procedures. This applies only when SYSIPT is assigned as a card reader. The program will automatically be terminated upon detection of the /* or /& control statement. The following job in SYSRDR will then be run.

RESTART PROCEDURES

A restart procedure is available to allow the user to control the program when the external interrupt feature is incorporated in the supervisor. The restart procedure is:

- Press the interrupt key, a message is printed, and the compare in process will be interrupted.
- The user can continue the current compare, start a new compare, or terminate the job by responding to the message with the appropriate character.

Any other information concerning the messages can be found in the appendix of this manual or the 16K Operating Guide.

LABEL PROCESSING

All volume labels are skipped without comparing. 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.

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 compare is terminated, and the user is given the option to restart or terminate the job.

NON STANDARD OR UNLABELED FILES

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 statement 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 statement 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.

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 card and following the restart procedures.

JOB-CONTROL STATEMENTS

Upon initial program loading the symbolic names, channel addresses, and tape characteristics for the tape-compare program are defined via Job-Control statements. 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 statements are used for system assignment.

JOB Card	Required. Unique identification:
TPCP	
ASSGN Cards	Required as follows:
SYSLOG	Must be assigned for diagnostic messages.
SYSLST	Must be assigned for writing records that do not match (printer or tape).
SYSIPT	Must be assigned for reading tape compare control statements (reader or tape).
SYS004	Must be assigned as the primary and alternate tape units for one of the tape files to be compared. This tape file will be referred to as file A.
SYS005	Must be assigned as the primary and alternate tape unit for the other file to be compared. This tape file will be referred to as file B.

LINKAGE EDITOR

The program can be entered into either the Relocatable or the Core Image Library. If the program is in the relocatable library, the link edit phase must be performed.

The following are the job-control and linkage-editor control-statement streams that must be used to execute the tape compare program when it is resident on the Relocatable or the Core Image Library with and without exit routines.

Executing the program when it is resident in the Relocatable Library without a user's exit routine.

```
//bJOB
//bASSGN
//bOPTION LINK
bPHASE TPCP,*,NOAUTO
bINCLUDE IJWTCP
bINCLUDE IJJCP0 (for TOS) bINCLUDE IJJCPD0
  (for DOS)
bINCLUDE IJWXIT
bINCLUDE IJWTPCP
bENTRY
//bEXEC LNKEDT
//bEXEC
//bTPCP ...
 .
 .
/&
```

Executing the program when it is resident in the Relocatable Library with a user exit routine:

```
//bJOB
//bASSGN
//bOPTION LINK
bPHASE TPCP,*,NOAUTO
bINCLUDE IJWTCP
bINCLUDE IJJCP0 (for TOS) bINCLUDE IJJCPD0
  (for DOS)
bINCLUDE (If the operand is omitted from
        this statement the text of the
        user's routine must be present
        on SYSIPT and followed by /*
        control statement. If the rou-
        tine is in the Relocatable Li-
        brary, it must have a user-
        assigned module name unique to
        the system as the operand.)
```

```
bINCLUDE IJWTPCP
bENTRY
//bEXEC LNKEDT
//bEXEC
//bTPCP ...
   .
   .
   .
/&
```

Executing the program when it is on the Core Image Library:

```
//bJOB
//bASSGN
//bEXEC TPCP
//bTPCP
  .
  .
  .
/&
```

UTILITY-CONTROL-STATEMENT

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

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

//b (Required)	indicates control statement.
TPCPb (Required)	identifies tape-compare control statement
RECSIZ (Required)	identifies record size parameter.
=(m) (Required)	maximum physical record size in bytes. It must be enclosed in parentheses. This is needed for the assignment of input areas. If any physical input record exceeds this maximum, the excess is truncated and not compared.
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 are written.

USER-EXIT ROUTINE

If the user supplies an exit routine, the storage required for the routine is taken from the input area. If the exit routine is specified the main-line phase branches through general register 15 to the location IJWXIT1 (defined as an entry point in the user's exit routine) when an unequal compare is sensed. Return to the tape-compare program is through a general register 14.

The user has access to all physical and logical IOCS macro instructions to perform input/output, etc. The locations of the records that do not compare equally are supplied by general registers.

During user-exit routine processing, program flow is as follows:

1. Obtain the address of the file A description parameter list from register 0.
2. Obtain the address of the file B description parameter list from register 1.
3. Obtain the number of the mismatched record from register 10.
4. Perform user processing.
5. Return control to the tape-compare program through register 14 (containing the return address).

File A Description Parameter List (Register 0)

The address of an eight-byte parameter list is found in register 0. The first four bytes of the list contain the address of the file A input area. The second four bytes contain the length of the physical record.

File B Description Parameter List (Register 1)

The address of an eight-byte parameter list is found in register 1. The first four bytes of the list contain the address of the file B input area. The second four bytes contain the length of the physical record.

CONTROL STATEMENT STREAM

Two sample control statement input streams for running respectively, from the disk-resident core image and relocatable libraries follow; device and file descriptions are peculiar to the jobs being run.

```
//bJOBbEXAMPLE
//bASSGNbSYS004,X'181'
//bASSGNbSYS005,X'182'
//bASSGNbSYS005,X'183',ALT
//bEXECbTPCP
//bTPCPbRECSIZ=(300),REELS=(2),ALTB
/&
and,

//bJOBbEXAMPLE
//bASSGNbSYSLNK,X'180'
//bASSGNbSYS001,X'181'
//bOPTIONbLINK
bPHASEbTPCP,*,NOAUTO
bINCLUDEbIJWTCP
bINCLUDEbIJJCPD0
bINCLUDEbIJWXIT
bINCLUDEbIJWTPCP
bENTRY
//bEXECbLNKEDT
//bASSGNbSYS004,X'183'
//bASSGNbSYS005,X'184'
//bPAUSEb OPERATOR PLACE TAPE A ON DRIVE 183
          AND TAPE B ON DRIVE 184
//bPAUSEb RESTART JOB BY REPLYING 2 TO EOF
          MESSAGES
//bEXEC
//bTPCPbRECSIZ=(2000)
//bTPCPbRECSIZ=(2000)
//bTPCPbRECSIZ=(2000)
//bTPCPbRECSIZ=(2000)
/&
```

APPENDIX A: MODULE CONTENTS

File to File Utility Programs

Common Modules

IJJCP0 (for TOS) IJJCPD0 (for DOS)
Text for Phase 1, Part 2

IJWGEN
Phase 2 text

IJWLAB
Phase 5 text

Unique Program Modules

IJWxx
PHASE xxxx, *, NOAUTO
INCLUDE IJWxx1
INCLUDE IJJCP0 (for TOS) INCLUDE IJJCPD0 (for DOS)
PHASE xxxx2, *, NOAUTO
INCLUDE IJWGEN
PHASE xxxx3, { IJWGENP2 / xxxx2 }, NOAUTO
(IJWGENP2 is for printer output)
INCLUDE IJWxx3
PHASE xxxx4, xxxx3, NOAUTO
INCLUDE IJWxx4

IJWxx1
Text for Phase 1, Part 1

IJWxx3
Phase 3 text

IJWxx4
Phase 4 text

Note: xxxx represents the phase names and xx the module identification.

Tape Compare Module Contents

IJJCP0 (for TOS) IJJCPD0 (for DOS)
Text of Phase 1, Part 2

IJWXIT
Text for dummy user routine (Phase 1, Part 3)

IJWTCP
Text for Phase 1, Part 1

IJWTCP2
Text for Phase 2

IJWTCP3
Text for Phase 3

IJWTPCP
PHASE TPCP2, *, NOAUTO
INCLUDE IJWTCP2
PHASE TPCP3, TPCP2, NOAUTO
INCLUDE IJWTCP3

Clear Disk and Clear Data Cell Module Contents

Common Modules

```
IJJCPD0
Text for Phase 1, Part 2
```

```
IJWCLD2
Text for Phase 2
```

```
IJWCLD3
Text for Phase 3
```

Clear Disk Modules

```
IJWCLD1
Text for Phase 1, Part 1
```

```
IJWCLD
PHASE  CLRDSK,*,NOAUTO
INCLUDE  IJWCLD1
INCLUDE IJJCPD0
PHASE  CLRD2,*,NOAUTO
INCLUDE  IJWCLD2
PHASE  CLRD3,CLRD2,NOAUTO
INCLUDE  IJWCLD3
```

Clear Data Cell Modules

```
IJWCLM1
Text for Phase 1, Part 1
```

```
IJWCLM
PHASE  CLDC,*,NOAUTO
INCLUDE  IJWCLM1
INCLUDE IJJCPD0
PHASE  CLDC2,*,NOAUTO
INCLUDE  IJWCLD2
PHASE  CLDC3,CLDC2,NOAUTO
INCLUDE  IJWCLD3
```

APPENDIX B: FILE-TO-FILE PROGRAM MESSAGES

The following are file-to-file program messages that appear on the device assigned to SYSLST. This device can be either a printer or tape unit. The messages are divided into three groups:

- Diagnostic messages
- Processing messages
- Informational messages

A job is terminated when a diagnostic message is received; the operator is informed of this condition on the SYSLOG device. When informational and processing messages are received, processing continues.

RESPECTIVE ORDER OF DIAGNOSTIC MESSAGES FOR THE FILE-TO-FILE PROGRAMS

Note: Whenever xxx precedes a message, it indicates in which field definition the error occurred, e.g. card 1 and 2 each have 5 field definitions: for a format error in the third definition, xxx would be printed as 003; for a format error on the fifth definition of card 2, xxx would be printed as a cumulative 010.

MESSAGE	REASON	ACTION
END CARD MISSING	No END statement supplied (// END), or non-control statement read before END.	The job is terminated.
x INVALID FORMAT. UTILITY MODIFIER CARD	Format specifications for utility-modifier statement were not followed, or all required parameters were not supplied as follows:	

x:	Decoded message
A:	Error in input format specifications (A parameter).
B:	Error in output format specifications (B parameter).
F:	Error in record format specifications (F parameter).
I:	Invalid input option (I parameter).
J:	Invalid type of job (J parameter).
M:	Missing required parameter (F,A,B parameters must be present).
N:	Invalid type of program (U identifier // U not found, or xx representing the program type is not valid).
O:	Invalid output option (O parameter).
P:	Invalid page number option (P parameter).
Q:	Error in sequence checking specifications (Q parameter).
R:	Error in starting record specifications (R parameter).
S:	Invalid spacing option (S parameter).
T:	T parameter missing (type of job parameter).
U:	Undefined parameters (parameter identifier not valid).

MESSAGE	REASON	ACTION
FIELD SELECT CARD MISSING	Field-select was indicated on utility-modifier statement, but no field-select statement was supplied.	
xxx INVALID FORMAT FIELD SELECT CARD	Format specifications for field-select statement were not followed. (000 indicates no fields for field select were indicated but CV was present.)	
FIELD SELECT CARD NOT EXPECTED	Field-select was not indicated on utility-modifier statement, but field-select statement was supplied.	
INVALID CONTROL CARD	A control statement (with //b in the first 3 columns) was read which was not a utility modifier, field select, print header, or END statement.	
INVALID INPUT DEVICE AT SYS004	The device assigned to SYS004 is not valid for this program.	
INVALID OUTPUT DEVICE AT SYS005	The device assigned to SYS005 is not valid for this program.	
UNDEFINED FORMAT CAN ONLY DISPLAY	Data display is the only mode that can be indicated for undefined records in printer output programs.	
xxx CANNOT FIELD SELECT INTO 1st 4 CHARACTERS	The indicated field cannot be selected into the record length field of a variable-length record.	
INVALID OUTPUT DEVICE AT SYS006	The device assigned to SYS006 is not valid for this program.	
UNDEFINED FORMAT CAN ONLY COPY	Copy is the only format that can be indicated for undefined records in non-printer program.	
INCORRECT PROGRAM	Utility-modifier statement punched with the wrong program initials, such as DT for a disk to card program.	The job is terminated. Note that all succeeding messages may not have a valid meaning.
x INVALID FORMAT UTIL MOD CARD	x: Utility-modifier statement error	The job is terminated.
	A: For non DASD input a key field was used. B: For nonprinter output, a printer B format was used; for non DASD output a key field was used. K: For non DASD input or output a key field was used.	
FIXED LENGTH RECORD FORMAT REQUIRED	Card input or card output was not fixed length.	

MESSAGE	REASON			ACTION
INVALID JOB FOR THIS PROGRAM	Program	Valid Types	Invalid Types	
	Undefined records			
	a. TP,DP and MP	*D	C,B,BF,F,L, LF,R,RF.	
	b. DD,DM,DT, MD,MM,MT, TD,TM, and TT.	C	B,BF,D,F,L, LF,R,RF.	
	Fixed-length records without key fields.			
	a. CP	B,BF,C,*D, F,L,LF	R,RF	
	b. MP,TP, and DP	D,L,LF	B,BF,C,F,R, RF	
	c. CD,CT,DC, DD,DM,DT, MD,MM,MT, TC,TD,TM and TT.	C,F,R, RF	B,BF,D,L,LF	
	Fixed-length records with key fields.			
	a. CD,DC	F	B,BF,C,D,L, LF,R,RF	
	b. DT,MT,TM, and TD.	F,RF	B,BF,C,D,L, LF,R,	
	c. DD,MM,DM, and MD	C,F	B,BF,D,L,LF, R,RF	
	d. DP and MP	*D,L,LF	B,BF,C,F,R,RF	
	Variable-length records without key fields.			
	a. MP,TP, and DP	*D,L,LF	B,BF,C,F,R RF	
	b. DD,DM,DT, MD,MM,MT, TD and TT.	C,F,R, RF	B,BF,D,L,LF	
	* If first-character-forms-control is specified (S parameter) data display is invalid.			

MESSAGE	REASON	ACTION
INVALID INPUT RECORD LENGTH	a. Card input. Record length was greater than 80 (EBCDIC) or 160 (binary). b. Tape input. Record length was greater than 4096. c. DASD input without key. Block length was not a multiple of the record length. d. DASD record length exceeds 3,625 for disk or 2,000 for data cell.	
NON-STANDARD LABEL INVALID INPUT	DASD programs do not allow nonstandard labels.	
NON-STANDARD LABEL INVALID OUTPUT		
INVALID INPUT OPTION	Option is incorrect for the program. No option for DASD input.	
INVALID OUTPUT OPTION	Option is incorrect for the program.	
INVALID CARD SEQUENCE	Card Programs. The length parameter specified is over 10 characters, or the starting position plus the length exceeds 80 characters.	
I/O AREA CANNOT BE ASSIGNED	Not enough main storage to assign the specified input/output areas.	
FIELD SELECT MUST BE SPECIFIED	When the output record length differs from the input record length, field-select must be used. For printer programs, list function, the input record length cannot exceed the size of the print line. For DASD programs with key fields (except DASD-to-printer or DASD-to-DASD), field select must be specified.	
xxx INVALID UNPACK OUTPUT LENGTH	The parameter values specified are invalid.	
xxx INVALID PACK OUTPUT LENGTH		
xxx RECORD CAPACITY EXCEEDED BY PACK	The xxxth field-select parameter specifies a field not entirely contained within the input or output record.	
xxx RECORD CAPACITY EXCEEDED BY UNPK		
xxx RECORD CAPACITY EXCEEDED BY FS		
xxx RECORD CAPACITY EXCEEDED BY HEX		

MESSAGE	REASON	ACTION
xxx FIELD SELECT PARAMETER FOR NONEXISTENT KEY	A key field was specified in the field-select statement, but no key was indicated in the utility-modifier statement.	
INVALID OUTPUT RECORD LENGTH	a. Card output. Record length was greater than 80 (EBCDIC) or 160 (binary). b. Tape output. Record length was greater than 4096. c. Printer output. Record length was greater than 144. d. DASD output. The output block length is greater than 3,625 for disk, and 2,000 for data cell.	
INVALID INPUT KEY LENGTH	For a DASD input the key length is greater than 255.	
INVALID OUTPUT KEY LENGTH	For a DASD output the key length is greater than 255.	
INVALID INPUT BLOCK LENGTH	a. For card input, the block and record length was not equal. b. Tape input--for fixed length record processing, the input block length was not a multiple of the record length; otherwise, the block length was not 4 greater than the fixed portion. c. DASD input, the input block length is greater than 3,625 for disk, and 2,000 for data cell.	
INVALID OUTPUT BLOCK LENGTH	a. Block length is not a multiple of the record length. b. For DASD, the output block length is greater than 3,625 for disk or 2,000 for data cell. c. For the copy function, the block lengths must be equal.	
INVALID INPUT DATA LENGTH	DASD input programs with key require data length plus key length to be less than or equal to 3605 for disk, or 1984 for data cell.	
INVALID OUTPUT DATA LENGTH	DASD output programs with key require data length plus key length to be less than or equal to 3605 for disk, or 1984 for data cell.	
xxx FS INPUT LENGTH EQUALS ZERO	Input field length has been specified as zero.	
xxx PACK INPUT LENGTH EQUALS ZERO		
xxx UNPK INPUT LENGTH EQUALS ZERO		

MESSAGES	REASON	ACTION
xxx HEX INPUT LENGTH EQUALS ZERO		
xxx CANNOT PROCESS HEX PARAMETER	Hexadecimal indicator valid only for print output programs.	
xxx CANNOT PROCESS PACK PARAMETER	Cannot pack a field for print output programs.	
USER ROUTINE NOT PRESENT	User label checking is specified on the UPSI statement, but a user label routine is not present.	

RESPECTIVE ORDER OF FILE-TO-FILE PROCESSING MESSAGES

Messages (on SYSLST)	Format	Function	Primary Condition	Associated Conditions	Processing
BLOCK NO. xxxxxx, INPUT AREA OVERFLOW	F, V, or U	Copy	Input block length is longer than that specified in the utility modifier statement.	None	The specified input block size is copied and the remainder is truncated. If the records are variable length, the count field is not corrected.
BLOCK NO. xxxxxx, INPUT AREA UNDERFLOW	F	Copy	Input block length is shorter than that specified in the utility modifier statement.		Only the actual block size is copied (no padding).
BLOCK NO. xxxxxx, INPUT AREA UNDERFLOW	F	R, F, RF, L, or LF		The actual block size is a multiple of the specified record size but less than the specified block size.	Processing is performed as specified for the short block. This message is not issued if the starting record number in the record-skipping parameter has not been encountered.
BLOCK NO. xxxxxx, INPUT AREA UNDERFLOW BLOCK NO. xxxxxx, RCD. NO. xx RECORD AND REMAINDER OF BLOCK DROPPED	F	R, F, RF, L, or LF		The last logical record of the input block is less than the specified record size.	Processing is normal up to the short record. The record is dropped and processing continues. This message is not issued if the starting record number in the record-skipping parameter has not been encountered. The short record is counted as one.

MESSAGES			REASON		ACTION
Message (on SYSLST)	Format	Function	Primary Condition	Associated Conditions	Processing
BLOCK NO. xxxxxx, INPUT AREA OVERFLOW	V	R, F, RF, L, or LF	Input block length is longer than that specified in the utility modifier statement.	The last position of the specified block is the last position of a logical record.	The overflow records from the input block are truncated. This message is issued even if the first record to be processed has not been reached. The truncated records are not counted.
BLOCK NO. xxxxxx, INPUT AREA OVERFLOW BLOCK NO. xxxxxx, RCD. NO. xx RECORD AND REMAINDER OF BLOCK DROPPED.	V	R, F, RF, L, LF		The last logical record in the specified block size is not complete within the block.	The input block (and the last logical record) are truncated. The truncated record is dropped. The second message is not issued if the starting record number in the record skipping parameter has not been encountered. The dropped part of the block is counted as one.
BLOCK NO. xxxxxx, RCD. NO. xx RECORD AND REMAINDER OF BLOCK DROPPED	V	R, F, RF, L, or LF	An input logical record contains an invalid length field. A record length field is invalid if it is less than 5 or is not equal to the number of bytes read.		Processing of the current block cannot proceed and the block is dropped. This message is issued even if the record-skipping parameter number has not been reached. The part of the block is counted as one.
BLOCK NO. xxxxxx, RCD. NO. xx, SHORT VARIABLE LENGTH RECORD DROPPED	V	F, RF, or LF	The length of a logical input record is less than that specified as the fixed portion of the variable-length records.		The record is dropped and processing continues with the next record, if present. This message is not issued if the record-skipping parameter has not been encountered. The dropped record is counted as one.

MESSAGES			REASON	ACTION	
Messages (on SYSLST)	Format	Function	Primary Condition	Associated Conditions	Processing
BLOCK NO. xxxxxx, OUTPUT AREA OVERFLOW	V	R, F, RF, L, or LF	A generated output record exceeds the block size specified in the utility modifier statement.		The generated block is truncated. The block count and record count are corrected and the block written out.
BLOCK NO. xxxxxx, KEY LENGTH IS xxx	F or V	C,R,F, RF,L, or LF	The key length for this block is invalid, or it differs from the key length specified in the utility modifier statement.	a. For undefined records, the message should not occur. b. For fixed-length records with no key fields specified, or variable length records, only the data portions are processed. c. For fixed-length records with key fields specified, the actual and specified key length differ. Both key and data fields are processed as specified (i.e., if the actual key is less than that specified, the difference is made up with data bytes, if greater, the excess is treated as data bytes.)	Processing, con-continues, with the output record formatted as specified in the utility modifier statement (if valid specification.)

RESPECTIVE ORDER OF FILE-TO-FILE INFORMATIONAL MESSAGES	
Control parameter diagnostics are followed by logging messages in this order.	
MESSAGE	ACTION
CARD TO DISK CARD TO PRINTER/PUNCH CARD TO TAPE DATA CELL TO DATA CELL DATA CELL TO DISK DATA CELL TO PRINTER DATA CELL TO TAPE DISK TO CARD DISK TO DATA CELL DISK TO DISK DISK TO PRINTER DISK TO TAPE TAPE TO CARD TAPE TO DATA CELL TAPE TO DISK TAPE TO PRINT TAPE TO TAPE } UTILITY	Identifies the particular utility program. The program continues processing.
INPUT { FIXED PORTION xxxx / KEY LENGTH xxxx / DATA LENGTH xxxxx / RECORD LENGTH xxxx / BLOCK LENGTH xxxx }	Processing continues. (x represents a digit.)
OUTPUT { FIXED PORTION xxxx / KEY LENGTH xxxx / DATA LENGTH xxxxx / RECORD LENGTH xxxx / BLOCK LENGTH xxxx }	
INPUT { CARD BCD / CARD BINARY / NO REWIND, UNLOAD / REWIND / REWIND, UNLOAD }	
OUTPUT OPTION { BCD, CHARACTER / CARD BCD / CARD BINARY / DISK WRITE CHECK / NO DISK WRITE CHECK / PRINT CHARACTER / PRINT HEX / NO REWIND, UNLOAD {WRITE TAPE MARK} / REWIND {WRITE TAPE MARK} / REWIND, UNLOAD {WRITE TAPE MARK} }	
{ x INPUT, x OUTPUT / x INPUT/OUTPUT } AREAS ASSIGNED	
RECORD FORMAT { FIXED / VARIABLE / UNDEFINED }	

MESSAGE	ACTION
TYPE { COPY / DATA DISPLAY / FIELD SELECT / LIST / LIST, FIELD SELECT / PRINT AND PUNCH / PRINT, PUNCH, FIELD SELECT / REBLOCK / REBLOCK, FIELD SELECT }	Processing continues. (x represents a digit.)
STARTING SEQUENCE COLUMN xx	
SEQUENCE LENGTH xx	
STARTING RECORD NUMBER xxxxxxxx	
REPLY x	This message is printed to indicate the reply given to a diagnostic printed on SYSLOG. The action taken is indicated by the letter x. Processing continues.
1ST CHARACTER FORMS CONTROL TYPE { A / B / C / D }	Processing continues.
xx ERRORS FOUND IN CONTROL CARDS	
CARD SEQUENCE ERROR, CURRENT SEQ xxxxxxxxxx LAST SEQ xxxxxxxxxx	
END OF DATA	END OF DATA will not be printed for first-character forms-control.
FILE MARK WRITTEN IN XT. NO. B1 C1 C2 H1 H2 R xxx xxx xxx xxx xxx xxx xxx	For DASD output programs, the decimal value of the XTENT sequence number and the address of the file mark (written at the end of the file) are logged. The headings represent bin (B1), subcell (C1), strip (C2), cylinder (H1), track (H2), and record (R) numbers for data cell. For disk, they represent cylinder (C2), track (H2), and record (R) numbers.
NUMBER OF { INPUT / OUTPUT } BLOCKS PROCESSED xxxxxx	Processing continues.
SPECIFIED STARTING RECORD NO. LARGER THAN TOTAL NO. OF LOGICAL INPUT RECORDS	
END OF JOB	

APPENDIX C: TAPE COMPARE PROGRAM MESSAGES

The following are tape compare diagnostic messages that appear on the device assigned to SYSLST. This device can be either a printer or a tape unit.

MESSAGE	REASON	ACTION
INVALID INPUT DEVICE AT SYS004	The device assigned to SYS004 is not valid for this program.	The job is terminated.
INVALID OUTPUT DEVICE AT SYS005	The device assigned to SYS005 is not valid for this program.	

The following are informational or diagnostic messages that appear on the device assigned to SYSLST. This device can be either a printer or a tape unit.

MESSAGES	REASON	ACTION
CLEAR DATA CELL UTILITY CLEAR DISK UTILITY	The name of the program is logged for identification.	Processing continues.
UTILITY CONTROL CARDS	This heading message immediately precedes the logging of the control cards.	
INVALID CARD	Valid utility control cards begin with //bU; //bEND; or with ./bU; ./bEND.	The job is terminated.
INVALID PARAMETER	Valid parameters begin with B, C, X, and O. None of these parameter identifiers may be repeated with the control card, nor may C and X appear together.	
INVALID FORMAT	The format of at least one of the above parameters is incorrect; e.g., the key and data lengths must be specified as B=(K=1 to 3 digits, D=1 to 4 digits).	
INVALID KEY LENGTH	The key length must be ≥ 0 and ≤ 255.	
INVALID DATA LENGTH	The data length must be greater than 0. If a key length specification is greater than 0, the key length plus the data length must be $\leq$ 1984 for data cell, or $\leq$ 3605 for disk. If a key length specification is equal to 0, the data length must be $\leq$ to 2000 for data cell, or $\leq$ 3625 for disk.	
INVALID OUTPUT PARAMETER	Valid output parameter values are OY or ON.	
I/O AREA NOT ENOUGH FOR SPECIFIED RECORD SIZE	The block size specified in the utility modifier statement exceeds the main storage available.	
SPECIFIED PARAMETERS	This heading message identifies the specified utility modifier statement parameters.	Processing continues.
ASSUMED PARAMETERS	This heading message identifies the assumed utility modifier statement parameters.	

MESSAGES	REASON	ACTION
NO END CARD	Either no END card was supplied (//bEND), or a non-control statement was read before END.	

Informational messages are logged in this order.

```
KEY LENGTH - xxx
DATA LENGTH - xxxx
FILL CHARACTER - {X'xx'}
                 {C'x' }
OUTPUT PARAMETER - x
RECORDS/TRACK - xx

   XTENT      BB          LOWER LIMIT                    UPPER LIMIT
SEQ. NO.                 C1   C2   H1   H2          C1   C2   H1   H2
   xxx        xxx        xxx  xxx  xxx  xxx         xxx  xxx  xxx  xxx
   xxx        xxx        xxx  xxx  xxx  xxx         xxx  xxx  xxx  xxx
    .          .          .    .    .    .           .    .    .    .
    .          .          .    .    .    .           .    .    .    .
    .          .          .    .    .    .           .    .    .    .

END OF JOB
```

The following are messages that appear on the device assigned to SYSLOG. Note that Default is the program action taken when the 1052 is not available to the system. Also note that in the tape compare program, a normal end-of-job occurs only after a /* or /& card has been read.

FILE-TO-FILE OPERATOR MESSAGES				
Number	Message	Cause	Action	Default
8001D	IS IT EOF	Tape input is specified as unlabeled and a tape mark is encountered during the process of transferring data.	a. Type Y (upper case) if end of file. b. Type N (upper case) if end of volume.	End of file is assumed.
8002A	PUNCH CHECK	A punch check occurred on the card read punch . (2520 or 2540).	Run cards out of punch, discard the last few cards (i.e., for the 2520, one punched and two blank cards; for the 2540, two punched and two blank), ready the punch, and key in any character to continue.	Processing continues. The card in error and the following card are repunched at the point the punch check occurred.
TAPE COMPARE OPERATOR MESSAGES				
Number	Message	Cause	Action	Default
8003A	ALTA OR ALTB PARAMETER SPECIFIED TWICE	As indicated in the message.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate the job.	Job is terminated
8004I	// TPCP RECSIZ=(nnnnn)	Supplied control statement is printed.	Processing continues.	None
8005A	// TPCP RECSIZ= FORMAT IS INCORRECT	Control statement format is invalid.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Number	Message	Cause	Action	Default
8006A	RECORD SIZE OR REEL COUNT PARAMETER MISSING	As indicated in the message.	a. Supply control statement on SYSIPT with indicated parameter and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8007A	ILLEGAL RECORD SIZE OR REEL COUNT PARAMETER	Record size is greater than 5 digits, or reel count exceeds 255.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8008A	LEADING ZERO IN RECORD SIZE OR RECORD COUNT PARAMETER	A leading zero is invalid in a parameter in the control statement.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8009A	INVALID CHARACTER IN RECORD SIZE OR REEL COUNT PARAMETER	A non-numeric character is invalid in the indicated parameter in the control statement.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Number	Message	Cause	Action	Default
8010A	PARAMETERS CONTAIN AN INVALID CHARACTER OR SEPARATORS ARE MISSING	Invalid character present in, or separators missing from, optional parameters.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8011D	NO I/O AREA AVAILABLE	Record size specified exceeds I/O area capacity.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8012A	USER EXIT SPECIFIED BUT NONE SUPPLIED	As indicated in the message.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated.
8013A	ILLEGAL TPMK DETECTED ON FILE x	Unexpected tape mark encountered on File A or B: labeled files were specified and a tape mark preceded the label, or two tape marks preceded either the first data record or the trailer label.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Number	Message	Cause	Action	Default
8014A	VOLUME LABEL MISSING ON FILE x	Label handling was specified, but a volume label was not found on File A or B.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8015A	HEADER LABEL MISSING ON FILE x	A header label is missing, but was specified as present on File A or B.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8016A	TRAILER LABEL MISSING ON FILE x	Label handling was specified, but a trailer label was not found on File A or B.	a. Supply correct control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8017D	EOF ON UNLABELED FILES	A tape mark was detected on an unlabeled file and the reel count is depleted.	a. Supply control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Number	Message	Cause	Action	Default
8018D	EOF ON FILE A AND NOT ON B	File A is shorter than File B for labeled files.	a. Supply control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8019D	EOF ON FILE B AND NOT ON A	File B is shorter than File A for labeled files.	a. Supply control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8020A	CHANGE REEL ON PRIMARY A	An alternate reel was not assigned to primary A.	Change the reel and type any character to continue processing.	Processing continues.
8021I	SWITCHING TO ALTERNATE A	Primary reel is completed and processing continues with alternate reel.	Processing continues.	None
8022A	CHANGE REEL ON PRIMARY B	An alternate reel was not assigned to primary B.	Change the reel and type any character to continue processing.	Processing continues.
80231I	SWITCHING TO ALTERNATE B	Primary reel is completed and processing continues with alternate reel.	Processing continues.	None
8024D	REEL COUNT DEPLETED	The reel count was depleted on a labeled file and no EOF trailer label has been sensed.	a. Supply control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Number	Message	Cause	Action	Default
8025A	RESTART WAS REQUESTED	The interrupt key was pressed during execution.	a. Type a blank to continue processing. b. Supply new control statement on SYSIPT and type 2 to restart. c. Type any character other than blank or 2 to terminate job.	Job is terminated
8026D	EOF ON LABELED FILES	An end of file trailer label has been detected on both files.	a. Supply control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated
8027A	CONTROL CARD MISSING	TPCP control statement was omitted.	a. Supply TPCP control statement on SYSIPT and type 2 to continue processing. b. Type any character other than 2 to terminate job.	Job is terminated

Note that the same data was used for both examples.

DATA DISPLAY EXAMPLE (DOS or TOS)

```
TAPE TO PRINT UTILITY
INPUT BLOCK LENGTH 00150
OUTPUT BLOCK LENGTH 00120
INPUT OPTION REWIND
OUTPUT OPTION PRINT HEX
2 INPUT,2 OUTPUT AREAS ASSIGNED
RECORD FORMAT VARIABLE
TYPE DATA DISPLAY
STARTING RECORD NUMBER  00000001
8001D IS IT EOF
REPLY Y
NUMBER OF INPUT BLOCKS PROCESSED  000017
NUMBER OF OUTPUT BLOCKS PROCESSED 000017
END OF JOB
```

Job descriptive (logging) messages as it appeared on symbolic device SYSLST

```
THIS IS A SAMPLE OF THE HEADING INFORMATION LINE THAT MAY BE USED IF THE  USER DESIRES.  DATA DISPLAY WITH CHARACTER
 BL SZ   BL NO   RC NO....5....1....5....2....5....3....5....4....5....5....5....6....5....7....5....8....5....9....5.....
      77       1       1  (   I  5ID000165I000165I00000000165000001651DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      75       2       2  .   G  8AD275228A275228A000002752280027522 8ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      84       3       3  M   &  1AD685901A685901A00000685901086859 01ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      64       4       4      '  2ED636222E636222E00000636222886362 22EDDDDDDDDDDDDDDDDDDDD
      98       5       5  S      9ED342279E342279E00000342279523422 79EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      80       6       6  &   )  8ID421248I421248I00000421248304212 48IDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      62       7       7  =   0  9AD811989A811989A00000811989208119 89ADDDDDDDDDDDDDDDD
     129       8       8  A   3  3GD255753G255753G00000255753832557 53GDDDDDDDDDD
                       9  +  7AD999977A999977A000009999777199997 7ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
      54       9      10  6   2  2ID598232I598232I00000598232555982 32IDDDDDDDDD
      86      10      11  O   K  9AD326429A326429A00000326429393264 29ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
     101      11      12  V   /  6ID011476I011476I00000011476080114 76IDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
                          D
      94      12      13      -  8GD174538G174538G00000174538701745 38GDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
     126      13      14  =   5  3GD150333G150333G00000150333411503 33GDDDDDDDDDDDD
                      15  E  5ED570315E570315E000005703157657031 5EDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
     144      14      16  -   -  2ED259782E259782E00000259782402597 82EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
                      17  2  0CD774700C774700C000007747006477470 0CDDDDDDDDD
      65      15      18  A   '  1CD018351C018351C00000018351720183 51CDDDDDDDDDDDDDDDDDDDDDD
      79      16      19      .  4CD736544C736544C00000736544427365 44CDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
     101      17      20  V   /  1CD056811C056811C00000056811420568 11CDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
                          D
 END OF DATA
```

```
 PAGE   1BL NO   RC NO....5....1....5....2....5....3....5....4....5....5....5....6....5....7....5....8....5....9....5.....
```

Printer output as it appeared on symbolic device SYS005

DATA LIST EXAMPLE (DOS or TOS)

```
TAPE TO PRINT UTILITY
INPUT BLOCK LENGTH 00150
OUTPUT BLOCK LENGTH 00132
INPUT OPTION REWIND
OUTPUT OPTION PRINT CHARACTER
2 INPUT,2 OUTPUT AREAS ASSIGNED
RECORD FORMAT VARIABLE
TYPE LIST
STARTING RECORD NUMBER  00000001
8001D IS IT EOF
REPLY Y
NUMBER OF INPUT BLOCKS PROCESSED  000017
NUMBER OF OUTPUT BLOCKS PROCESSED 000020
END OF JOB
```

Job descriptive (logging) messages as it appeared on symbolic device SYSLST

```
THIS IS A SAMPLE OF THE HEADING INFORMATION LINE THAT MAY BE USED IF THE  USER DESIRES.  DATA LIST  WITH CHARACTER
 I   5ID000165I000165I0000000016500000165IDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 G   8AD275228A275228A000002752280275228ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 &   1AD685901A685901A000006859010868590 1ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 *   2ED636222E636222E000006362228863622 2EDDDDDDDDDDDDDDDDDDD
     9ED342279E342279E000003422795234227 9EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 )   8ID421248I421248I000004212483042124 8IDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 0   9AD811989A811989A000008119892081198 9ADDDDDDDDDDDDDDDDD
 3   3GD255753G255753G000002557538325575 3GDDDDDDDDDD
 +   7AD999977A999977A000009999777199997 7ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 2   2ID598232I598232I000005982325559823 2IDDDDDDDDD
 K   9AD326429A326429A000003264293932642 9ADDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 /   6ID011476I011476I000000114760801147 6IDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 -   8GD174538G174538G000001745387017453 8GDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 5   3GD150333G150333G000001503334115033 3GDDDDDDDDDDDD
 E   5ED570315E570315E000005703157657031 5EDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 -   2ED259782E259782E000002597824025978 2EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 2   0CD774700C774700C000007747006477470 0CDDDDDDDDD
 *   1CD018351C018351C000001835172018351 CDDDDDDDDDDDDDDDDDDDD
 .   4CD736544C736544C000007365444273654 4CDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 /   1CD056811C056811C000005681142056811 CDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
 END OF DATA

PAGE  1
```

Printer output as it appeared on symbolic device SYS005

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

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
[International]

READER'S COMMENT FORM

IBM System/360
Disk and Tape Operating Systems
Utility Programs
Specifications

C24-3465-3

- 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. Comments and suggestions become the property of IBM.

	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.

COMMENTS:

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

fold fold

FIRST CLASS
PERMIT NO. 387
ROCHESTER, MINN.

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

POSTAGE WILL BE PAID BY . . .

IBM Corporation
Systems Development Division
Development Laboratory
Rochester, Minnesota 55901

Attention: Programming Publications, Dept. 425

fold fold

IBM

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

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
[International]

IBM S/360 Printed in U.S.A. C24-3465-3