File No. S/360-32
Form C24-3363-2

IBM

Systems Reference Library

IBM System/360 Basic Programming Support
Specifications
Utility Programs

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

1. Eleven file-to-file programs for transferring a file from input mediums to output mediums.
2. A disk initialization program that prepares from one to five disk packs for use on an IBM 2311 Disk Drive.
3. A program to clear one or more areas of disk storage and establish preformatted tracks.
4. A program that produces a printout of storage and registers.
5. Two multiple utility programs that allow the transfer of pre-formatted records from multiple input to multiple output devices concurrently.
6. A tape initialization program that will write standard IBM Volume labels on any number of tapes supplied.
7. A tape compare program that compares two files from two or more tapes.
8. A program that establishes an alternate track for a defective track.

The reader should be familiar with the information presented in the publications: IBM System/360 Basic Programming Support, Programmer's Guide (8K Tape), C24-3354; IBM Basic Operating System/360, Programmer's Guide (8K Disk), C24-3372. For a list of associated publications, refer to the IBM System/360 Bibliography, A22-6822.

Major Revision, September 1965

This edition C24-3363-2 is a major revision of and obsoletes C24-3363-1 and Technical Newsletters N24-0308 and N24-0329.

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

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

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

Affected pages are: 5, 6, 7, 8, 11, 12, 16, 17, 24, 31, 34, 39, 42, 45, 47, 50, 53, 54, 60, 61, 62, 67, 69, - index.

Copies of this and other IBM publications can be obtained through IBM Branch Offices. A form has been provided at the back of this publication for readers' comments. If the form has been detached comments may be directed to:

IBM Programming Publications, Endicott, New York 13764

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

Each program handles a particular type of job (e.g., the tape-to-printer program will print any tape file on any single printer). No symbolic assembly is necessary for the operation of a program. To handle a specific job, the generalized program is modified by control information entered by cards or the printer keyboard.

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

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

MACHINE REQUIREMENTS

The minimum machine configuration required for these programs is:

- IBM System/360 Processing Unit with 8192 positions of core storage. (16K for the Multiple Disk-to-Printer Program).

For program loading:

- IBM 2540 Card Read-Punch, or
- IBM 2520 Card Read-Punch, or
- IBM 1442 Card Reader, or
- IBM 2501 Card Reader.

For program operation:

- Input/Output devices required by the specific program.
- IBM 1052 Printer-Keyboard (for Multiple Utility and Multiple Disk to Printer programs.

Supported devices include:

- IBM 2540 Card Read-Punch (required for Multiple Utility Program).
- IBM 1442 Card Read-Punch
- IBM 2520 Card Punch
- IBM 1403 Printer
- IBM 1404 Printer
- IBM 1443 Printer
- IBM 2311 Disk Storage Drive
- IBM 2400-series tape unit (with or without the 7-track feature)

For logging and error messages:

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

Note: The Multiple Utility Program requires that the tape units be attached to the selector channel and the unit record I/O devices be attached to the multiplexor channel.

ORGANIZATION

This publication consists of a description of five groups of programs. The first is a group of 11 file-to-file utility programs that are concerned with the transfer of files from an input medium to an output medium.

The second group is composed of two disk-oriented programs and a storage print-out program.

The third group is two multiple utility programs that contain functions that can be run concurrently.

The fourth group is composed of two tape oriented programs. Initialize Tape and Tape Compare.

The fifth is a program that assigns an alternate track to defective tracks that are encountered during processing.

This publication is divided into two sections. The first section consists of general information, and is divided into three parts. The first part is control-card information, and applies to all programs. The second part is general information related to I/O devices. The third part is information applying to the eleven file-to-file programs. The second section of this publication is a discussion of the individual programs.

GENERAL INFORMATION

This information applies to more than one of these utility programs. The first part, Control Cards pertains to all programs. The second part applies to programs with related I/O devices. The remaining information applies to file-to-file programs.

CONTROL CARDS

There are job-control cards used with these programs related to channel and unit assignment, label processing, and physical-device description. These control cards are provided to each utility program in a manner consistent with IBM System/360 Basic Programming Support Programmer's Guide (8K Tape), C24-3354, and IBM Basic Operating System/360 Programmer's Guide (8K Disk), C24-3372. The required job-control cards for running each of these programs is given in Figure 1. The entries for specific fields unique to the utility programs are shown in Figure 2.

Job control cards used by the utility programs are:

JOB
DATE
CONFG (May not specify greater than 64K.)
ASSGN
VOL
TPLAB
DLAB
XTENT
EXEC

Optional: LOG
NOLOG

LABEL-CHECKING

The IBM System/360 Utility Programs process standard IBM System/360 labels for tape and disk. There are two types of standard labels: volume labels, which identify a physical storage unit like a reel of tape or a disk pack; and file labels, which identify the beginning and end of a logical file. A file label is a header label, that immediately precedes the file, and a trailer label, which immediately follows a file, or a portion of the file.

The volume label is checked on each volume of input to be sure it is the correct volume for the operation.

When standard-label processing is requested, the program checks the header labels on the input file to see if the correct file is on line. The output files are checked, and if the label has expired, a new label is written from information provided on the file label card.

Error indications are made for wrong-volume sequence, wrong-label identification, and unexpired files. An option is given to change the volume and either retry or bypass the indicated error, and continue. If label-checking is to be done and a volume label is not present the job is terminated.

Note: Standard disk labels must have a unique file name for each file.

USER STANDARD TAPE LABELS

If user standard labels are to be processed, the user must include his own assembled label-processing routine within the utility-program object deck. In addition to the user supplying his own label-processing routine, he must include two cards in absolute text. These two cards are necessary to make I/O area assignments. The first card enables the user to turn a switch on; the second card contains the two-byte address indicating the end of the user-label routine. These cards are punched as follows:

- The first column of the switch card contains a 12-2-9 punch and is immediately followed by REPbb0009DAbbbbFF00 (b indicates one blank space).
- The first column of the address card contains a 12-2-9 punch and is immediately followed by REPbb0009F0bbbbxxxx (b indicates one blank space and xxxx is the hexadecimal address equivalent of the last byte +1 of the user-supplied routine).

	Tape to Tape	Tape to Disk	Tape to Card	Tape to Printer	Disk to Tape	Disk to Disk	Disk to Card	Disk to Printer	Card to Tape	Card to Disk	Card to Printer Punch	Clear Disk	Initialize Disk	Storage Print	Multiple Utility	Multiple Disk to Printer	Initialize Tape	Tape Compare	Alternate Track Assignment
JOB Card	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Not Used	Required	Required	Required	Required	Required
ASSGN Cards	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Not Used	Required	Required	Required	Required	Required
UPSI Card	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
CONFG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
DATE	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Not Used	Required	Required	Required	Required	Required
VOL Card(s)	Required If Label Checking	Required If Label Checking	Required If Label Checking	Required If Label Checking	Required If Label Checking	Required	Required	Required	Required If Label Checking	Required	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
TPLAB Card(s)	Required If Tape Label Checking	Required If Tape Label Checking	Required If Tape Label Checking	Required If Tape Label Checking	Required If Tape Label Checking	Not Used	Not Used	Not Used	Required if Tape Label Checking	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
DLAB Card(s)	Not Used	Required	Not Used	Not Used	Required	Required	Required	Required	Not Used	Required	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
XTENT Card(s) (Up to 5)	Not Used	Required	Not Used	Not Used	Required	Required	Required	Required	Not Used	Required	Not Used	Required	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
LOG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Not Used	Optional	Optional	Optional	Optional	Optional
NOLOG Card	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Not Used	Optional	Optional	Optional	Optional	Optional
EXEC	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	Not Used	Required	Required	Required	Required	Required

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

	Tape to Tape	Tape to Disk	Tape to Card	Tape to Printer	Disk to Tape	Disk to Disk	Disk to Card	Disk to Printer	Card to Tape	Card to Disk	Card to Printer Punch	Clear Disk	Initialize Disk	Storage Print	Multiple Utility	Multiple Disk to Printer	Initialize Tape	Tape Compare	Alternate Track Assignment
JOB	TAPTAP	TAPDSK	TAPCAR	TAPPRT	DSKTAP	DSKDSK	DSKCAR	DSKPRI	CARTAP	CARDSK	CDPRPN	CLRDSK	INTDSK	NOT USED	MUT8K	MDKPRN	INITTP	TPCP	ATASGN
VOL (File name)	UIN UOUT	UIN UOUT	UIN	UIN	UIN UOUT	UIN UOUT	UIN	UIN	UOUT	UOUT	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
ASSGN Primary Input	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	SYSIPT	NOT USED	NOT USED	NOT USED	**	(A)SYSIPT (B)SYS000 (C)SYS002	NOT USED	SYSIPT SYS000	NOT USED
ASSGN Primary Output	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	SYSOPT	* SYSOPT	SYSOPT	SYSOPT	NOT USED	**	(A)SYSOPT (B)SYS001 (C)SYS003	SYS000	SYSOPT (To Print Unmatched Records)	SYSOPT
ASSGN Alternate Tape Input	SYS000	SYS000	SYS000	SYS000	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	**	NOT USED	NOT USED	SYS001 SYS002	NOT USED
ASSGN Alternate Tape Output	SYS001	NOT USED	NOT USED	NOT USED	SYS001	NOT USED	NOT USED	NOT USED	SYS001	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	SYS001-SYS015	NOT USED	NOT USED
ASSGN Additional Input & Output Disk Drives	NOT USED	SYS002 SYS003 SYS004 SYS005	NOT USED	NOT USED	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	NOT USED	SYS002 SYS003 SYS004 SYS005	NOT USED	SYS002 SYS003 SYS004 SYS005	SYS002 SYS003 SYS004 SYS005	NOT USED	NOT USED	(A)SYS004 (B)SYS005 (C)SYS006	NOT USED	NOT USED	NOT USED
ASSGN Printer for Card to Printer and/or Punch	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	SYSLST	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
ASSGN Device for Logging	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG	NOT USED	SYSLOG	SYSLOG	SYSLOG	SYSLOG	SYSLOG

* Always the punch unit

** The assignment of I/O devices for this program is:

Primary Tapes	Alternate Tapes	Unit Record Devices
(A)SYS000	(A)SYS001	(A)SYS006
(B)SYS002	(B)SYS003	(B)SYS007
(C)SYS004	(C)SYS005	(C)SYS008

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

Initialization Routine

The END card of the user's routine must transfer control to a user's initialization routine. The initialization routine must perform these three steps.

1. Load the following bytes in storage with these addresses:

Core Location	Address
2722 and 2723	The address of the user's input header-label routine.
2726 and 2727	The address of the user's output header-label routine.
2724 and 2725	The address of the user's input trailer-label routine.
2728 and 2729	The address of the user's output trailer label routine.

2. Perform any user-label routine initialization

3. Issue the following to load the utility transfer card:

```
SVC 1

DC C'LD'
```

Label Processing

The user must use three sources of information found in the utility communication area, when preparing his label routine. The sources are:

1. A one-byte switch located in core location 2734 that must be modified during object time. Bits 0, 1, 2, and 3 of this byte are used during program execution to indicate:

   Bit 0 Exit to user-input header-label routine.

   Bit 1 Exit to user-input trailer-label routine.

   Bit 2 Exit to user-output header-label routine.

   Bit 3 Exit to user-output trailer-label routine.

   When the user sets one of these bits to 0, it indicates the exit is not to be taken. When the bit is set to 1, it indicates the exit to the user's routine is to be taken.

   When the user does not wish to check further labels, he must set the appropriate bit to 0. The program-label routine bypasses additional user labels until the tape mark is sensed. The program sets the bit to 1 before the next label set is to be checked.

2. 2730 and 2731 - The bytes where the return address from the user routine to the main line is found.

3. 2732 and 2733 - The bytes in the communication area where the starting address of the label I/O area is found.

The user will also be provided with the core storage location at which the user's program will begin. This will be supplied by the time of program availability.

Registers 0-6 are available for the user's-label routine. If the contents of the registers are needed, the user's routines must save them before it exits to the utility program, and must restore them on return from the utility program. Each of the user's label-handling routines must begin with a BALR and USING instruction to establish his base register for that routine. The entry address of the user's routine (supplied during initialization) must direct the utility program to the BALR instruction.

The standard volume-, header-, and trailer-label routines of the program deck perform all processing on VOL1, HDR1, EOV, and EOF labels. The I/O area for these routines must be used for the I/O area of the user routine. The beginning address of the label I/O area can be found in bytes 2732 and 2733.

Input Header-Label Processing

After processing the HDR1 label, phase-3 of the program bypasses any additional HDR labels until a user header label (UHL) is found. The program (phase-3) exits to the user's-input header-label routines, whose entry address is found at core locations 2722 and 2723. When the user's routine completes processing the label, he must return control to phase-3 of the program.

The user obtains the address he is to return to from the communication area. The utility program reads the next label and, if it is a user's header label (UHL), returns control to the user's-label routine. If at any time bit zero of the defined switch at core location 2734 is off (0),

phase-3 will bypass the UHL labels until it reaches the tape mark. When this bit is turned off, control is not returned to the user's header-label routine until the next header-label check for another volume (if one is present).

Input Trailer-Label Processing

After end-of-volume (EOV) and end-of-file (EOF) processing is completed by the program's label routine, the next label is read and an exit is made to the user-input trailer-label routine. When the user's routine has completed processing, control is given back to the main line in the program through the return address. The program reads the next label, and if bit-1 of the switch in the communication area is on (1), returns control to the user's routine. If the bit is off(0), the program bypasses all additional trailer labels until a tape mark is sensed.

The label I/O area of the program must be used by the user's label routine for label processing. Any time user-input trailer-label processing is to be stopped, bit-1 of the switch must be turned off(0). Control is not returned to the user's-input trailer-label routine until the next volume is reached, if one is present.

Output Header-Label Processing

After processing the HDR1 output header label, the program exits to the user's-output header-label routine. The user returns control to the main line of the program through the return address when the user's processing is complete. The utility-program label routine writes the user's header label (UHL). Control is returned to the user's-output header-label routine if bit-2 of the switch is on (1). If the bit is off (0), the program writes a tape mark.

Processing of a label must be done in the I/O area of the utility-program label routine. The user's routine must turn bit-2 of the switch off(0) when it has processed the last label. Control is not returned to the user's-output header-label routine until the next input header-label check for the next volume, if one is present.

Output Trailer-Label Processing

After end-of-volume (EOV) or end-of-file (EOF) processing, the program exits to the user's-output trailer-label routine. The user's routine can then interrogate the first three bytes of the I/O area to determine whether an EOV or EOF condition exists. After processing is complete, the user's routine obtains the return address from the communications area, and the utility-program label routine writes the trailer label. Control is returned to the user's routine if bit-3 of the defined switch is on (1). If the bit is off (0), the program writes a tape mark.

The user's routine must process labels in the I/O area of the utility-program label routine. When the user's-output trailer-label routine has processed the last label, bit-3 of the switch must be turned off(0). Control is not returned to the user's-output trailer-label routine until the next output trailer-label check on the next volume, if one is present.

NONSTANDARD TAPE LABEL

If the user wishes to process nonstandard labels, he must insert his own nonstandard label-processing object deck in the utility object deck. In addition to the user supplying his own label routine, he must include two cards punched in absolute text. These two cards are necessary to make I/O area assignments. The first card enables the user to turn a switch on, and the second card contains the two-byte address indicating the end of the user-label routine. These cards are punched as follows:

- The first column of the switch card contains a 12-2-9 punch and is immediately followed by REPbb0009DAbbbbFF00 (b indicates one blank space).
- The first column of the address card contains a 12-2-9 punch, and is immediately followed by REPbb0009F0bbbbxxxx (b indicates one blank space and xxxx is the hexadecimal address equivalent of the last byte +1 of the user supplied routine).

The user's routine must contain a transfer card to transfer control to a user's initialization routine. The initialization routine must perform these three steps:

1. Load the following bytes in core with these addresses:

Core Location	Address
2532 and 2533	Entry address to the input header-label routine.
2534 and 2535	Entry address to the output header-label routine.

2536 and 2537	Entry address to the input trailer-label routine.
2538 and 2539	Entry address to the output EOF trailer-label routine.
2540 and 2541	Entry address to the output EOV trailer-label routine.

2. Perform any nonstandard-routine initialization.

3. Issue the following to load the utility transfer card.

```
SVC  1

DC C'LD'
```

A one-byte switch, located in core location 2521, will be modified by the user during label processing. Bit-0 of the byte must be set to zero at an end-of-volume, or to 1 for an end-of-file.

All registers except twelve, thirteen, and fifteen are available for the nonstandard label-routine use. The user's routine must save any registers if it is required, as the utility routines use the registers.

Each of the user's label-handling routines must begin with a BALR and USING instruction to establish his base register for that routine. The entry address of the user's routine (supplied during initialization) must direct the utility program to the BALR instruction.

Label Processing

The utility program will exit to the user routine immediately at the beginning of each tape reel. When the user's nonstandard-label routine is finished processing and is ready to return control to the main line, it must branch to the address at storage location 2544 and 2545 to return to the main line of the program. When this branch is taken, it is assumed that all label processing including the tape-mark processing is complete.

When the input trailer-label routine is entered, the program has read the tape mark following the data file. The user's nonstandard-label routine must perform all input and output necessary for label processing, including obtaining the necessary label information. Label information cannot be entered through job control as in the standard-label routine.

Physical IOCS of the supervisor supplied in the independent utility programs can be used to perform the physical I/O. Linkage to the physical I/O is performed according to the standard IOCS interface.

USER STANDARD DISK LABELS

If user standard disk labels are to be processed at least one header and one trailer label must be processed. The user must include his assembled label-processing routine with the utility program object deck. User Disk Input and User Disk Output routines must be assembled independently.

Initialization Routine

The END card of the user's routine must transfer control to the user's initialization routine. The initialization routine must perform three steps:

1. Load the following registers.

Register	Content
0	The entry address of the user's disk label routine.
1	The four letters, USER, to indicate the presence of the user routine.

2. Perform any user-label routine initialization.

3. Issue the following to load the utility transfer card:

```
SVC  1
DC   C'LD'
```

Label Processing

Three general registers contain information required by the user's label routine:

Register	Contents	
0	0	The letter 0 indicates that the exit is from the utility OPEN Routine.
	F	The letter F indicates that the exit is from the utility CLOSE Routine. The last XTENT is being processed.

V The letter V indicates that the exit is from the utility End of Volume routine

Note: The contents referred to are in the low order byte of the register.

1 The starting address of the label I/O area.

14 The return address from the user routine to the utility program.

When user label checking is to be discontinued, the user routine sets Register 1 to a value of 0. The utility program then ignores the user routine until the next OPEN, CLOSE, or End of Volume.

The user will be provided with the core storage location at which the user's program begins. This will be supplied before program availability.

All registers except 12 and 13 are available for the user's label routine. If the contents of the registers are needed, the user's routine saves them, and then restores them when control is returned from the utility program. The user's label routine must begin with a BALR and a USING instruction to establish the base register for that routine. The entry address of the user's routine (supplied during initialization) directs the utility program to the BALR instruction.

The standard volume- and header-label routines of the program deck process all VOL1 labels and labels in the VTOC. The I/O area for these routines is used for the I/O area of the user routine. The beginning address of the label I/O area is in Register 1.

Output Header-Label Processing

After processing VOL1 labels and labels in the VTOC, phase-3 of the program exits to the user's label routine. (Register 0 contains the letter 0 at this time to indicate an exit from the OPEN routine). The user generates the user header label in the I/O area specified by Register 1, and returns control to the utility program at the return address in Register 14. The utility program label routine writes the user header label. Control is returned to the user's label routine unless Register 1 has been changed to a value of 0, or 8 user labels have been written. Control is not returned to the user's header label routine until the next header label check for another volume, if any.

Output Trailer-Label Processing

After processing of user header labels, the program exits to the user trailer label routine. (Register 0 now contains V or F to indicate End of Volume or End of File respectively.) The user creates the trailer-label in the specified I/O area (Register 1), and returns control to the utility program. The utility program writes the user trailer-label. Control is returned to the user's label routine unless Register 1 has been given a value of 0. If the value of Register 1 is 0, or if 8 user labels have been written, the program terminates user label processing. Control is not returned to the user label routine until the next header-label check for another volume (if any).

Input Header-Label Processing

After processing VOL1 labels and labels in the VTOC, phase-3 of the program reads the first user header label. The program (phase-3) exits to the user's input label routine. When the user's routine has processed the label, control must be returned to the utility program.

The user obtains the return address from Register 14. The utility program reads the next label and returns control to the user's label routine. If at any time Register 1 has been given a value of 0 by the user's routine, or all user header labels have been checked, phase-3 terminates user header label processing. Control is not returned to the user's label routine until the next header-label check for another volume (if present).

Input Trailer-Label Processing

After processing of user trailer-labels, phase-3 of the program exits to the user input label routine. (Register 0 now contains V or F to indicate End of Volume of End of File respectively.) When the user's routine has processed the label, control must be returned to the utility program. The user obtains the return address from Register 14. The utility program reads the next label and returns control to the user's routine. If at any time Register 1 has been given a value of 0 by the user's routine, or all user trailer labels have been checked, phase-3 terminates user trailer-label processing. Control is not returned to the user label routine until the next label check for another volume, if present.

MULTI-SECTION FILES

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

Note: Multi-file reels are not supported by these utility programs.

SEQUENCE-NUMBERING

Sequence-numbering of card output can be indicated in the utility-modifier card. 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 without an error indication. The sequence number will overlay any data selected into the sequence area of the card. Sequence-checking also can be performed for card input to assure ascending sequence of the specified field. If a card is out of sequence, a message is printed, and processing continues.

PRINTER OUTPUT

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

Data Display

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

In data display mode, page numbers are always printed.

Data List

Data list 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 is printed in character mode unless hexadecimal field select is used.

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

AVAILABLE I/O AREA

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

- Tape Label Processing
- Field Selection
- Reblocking

Label Processing

The type of label processing performed, the program that is run, and the size of label-card images reduce the I/O area available. The label-card images are placed in the highest addressable position of main storage.

If the TPLAB cards are omitted from job control, the available I/O area is not reduced by standard label routines. The size of the label routines vary with the type of label processing required.

Input

Label processing on input files presents three considerations as to storage required

- Trailer-label routines are in main storage at all times.
- Header-label routines for multiple-volume input are in main storage at all times.
- Header-label routines for single-reel input are executed and dropped from storage. This area of storage is then available for I/O.

The phase-3 input-label routine requires no more than 800 bytes of storage.

Output

Header-label and trailer-label routines are present in main storage at all times. This area cannot be used as an I/O area. The phase-3 output-label routine requires no more than 800 bytes of storage.

Note: Both input and output labeling require no more than 1,300 bytes of storage.

Field Select

When the field-select option is chosen, the routine is generated in upper storage. The instructions necessary to move and process each field defined cause the available I/O area to be reduced relatively.

Reblock

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

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

Minimum I/O Area

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

Tape to Tape	Not less than 3,300 bytes
Tape to Disk	Not less than 2,450 bytes
Tape to Card	Not less than 3,400 bytes
Tape to Printer	Not less than 2,800 bytes
Disk to Tape	Not less than 2,750 bytes
Disk to Disk	Not less than 2,500 bytes
Disk to Card	Not less than 3,200 bytes
Disk to Printer	Not less than 2,150 bytes

Card to Tape	Not less than 3,700 bytes
Card to Disk	Not less than 3,150 bytes
Card to Printer and/or Punch	Not less than 3,000 bytes
Clear Disk	Not less than one full track
Multiple Utilities	Not less than 1,350 bytes
Multiple Disk to Printer	Not less than 3,800 bytes
Tape Compare	Not less than 2,500 bytes

Note: The storage print program will not destroy more than 192 bytes of main storage.

I/O Assignment

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

Copy

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

Field Select; Reblock; Reblock and Field Select

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

1. 2 input and 2 output areas.
2. 1 input and 2 output areas.
3. 2 input and 1 output areas.
4. 1 input and 1 output areas.

Conditions 1 through 3 permit overlap of I/O operation if channel assignment permits.

LOGICAL FILE-TO-FILE UTILITIES

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

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

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

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

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

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

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

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

Printer output allows the user to show the output in one of 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.

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

FIELD SELECT

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

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

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

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

Fields may be moved into the output area so as to overlay previously moved fields. The part of the previously moved field is replaced by the new data.

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

Key Fields

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

UTILITY-MODIFIER CARD

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

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

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

The general format of the utility-modifier card is:

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

If a utility-modifier card is used, all entries which are not optional must be punched in this order:

```
//bUXXbTt,Ff,A=(input),B=(output)
```

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

```
//bUXXb
```

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

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

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 of the first possible form must be indicated for fixed-length records.
		V	The letter V must be indicated for variable-length records.
		U	The letter U must be indicated for undefined records.
Input Description	A=(n,m)	A=	This letter and symbol indicate this is the input-description parameter.
		(n,m)	For fixed-length input records, the input record length (the letter n) and the input block length (the letter m) must be enclosed in parentheses and separated by a comma.
	A=(K=l, D=l)	A=	This letter and symbol indicate this is the input-description parameter.
		(K=l, D=l)	For fixed-length disk input records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	A=(g)	A=	This letter and symbol indicate this is the input-description parameter.
		(g)	For variable or undefined input records, the maximum block length must be enclosed in parentheses.

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

Tt

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

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

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATION
Output Description	B=(a,b)	B=	This letter and symbol indicate this is the output-description parameter.
		(a,b)	For fixed-length output records, the output record length (the letter a) and the output block length (the letter b) must be enclosed in parentheses and separated by a comma.
	B=(K=1,D=1)	B=	This letter and symbol indicate this is the output-description parameter.
		(K=1,D=1)	For fixed-length disk output records with keys, the letter K and symbol = must precede the length of the key field. The letter D and symbol = must precede the length of the data field. These two fields must be separated by a comma and enclosed in parentheses.
	B=(h)	B=	This letter and symbol indicate this is the output-description parameter.
		(h)	For variable or undefined output records, the maximum block length must be enclosed in parentheses.
	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) is entered.
Optional	Ix Ox Sx Px Rx Q=(x,y)		These parameters are unique to each program and are explained under the discussions of the individual programs.

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

For printer output programs:

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

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

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

Ff

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

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

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

A=(INPUT RECORD AND/OR BLOCK LENGTH)

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

A=(n,m)
A=(K=1,D=1)
A=(g)

A=(n,m)

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

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

A=(K=1,D=1)

This form of the input-file description parameter is indicated for fixed-length disk records when key fields are present. The letter A and symbol = identify this as the input-file description. The (K=1,D=1) indicates that the letter K and symbol = are followed by the length of the key, and that the letter D and symbol = are followed by the length of the data field. These must be separated by a comma and enclosed within parentheses. If a disk-input record has a key length of 10 and a data field length of 60, the input parameter must be punched A=(K=10,D=60), and must be followed by a comma to separate this parameter from the one to follow.

A=(g)

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

B=(OUTPUT RECORD AND/OR BLOCK LENGTH)

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

The four forms are:

B=(a,b)
B=(K=1,D=1)
B=(h)
B=(p)

B=(a,b)

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

B=(K=1,D=1)

This form of the output-file description parameter is indicated for fixed-length disk records when key fields are present. The letter B and symbol = identify this as the output file description. The (K=1,D=1) indicates that the letter K and symbol = are followed by the length of the key, and the letter D and symbol = are followed by the length of the data field. These must be separated by a comma and enclosed within parentheses. If a disk output record has a key length of 10 and a data-field length of 60, the output parameter must be punched B=(K=10,D=60), and must be followed by a comma if another parameter is to follow.

B=(p)

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

B=(h)

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

Parameter Combinations

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

FF,A=(n,m),B=(a,b)
FF,A=(K=1,D=1),B=(a,b)
FF,A=(n,m),B=(K=1,D=1)
FF,A=(K=1,D=1),B=(K=1,D=1)
FV,A=(g),B=(h)
FU,A=(g),B=(h)

Note: The remaining parameters

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

For printer output, there are four additional forms:

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

FIELD-SELECT CARD

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

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

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

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

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

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

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

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

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

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

PACK

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

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

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

UNPACK

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

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

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

HEXADECIMAL

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

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

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

PRINT HEADER

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

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

END

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

```
      //bEND
```

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

EXAMPLES

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

CARD TO TAPE

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

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

The utility-modifier card is punched:

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

The field-select card is punched:

```
//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 card-to-tape input file, a field-select card is not needed.

The utility-modifier card is punched:

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

DISK TO DISK

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

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

Utility-modifier card is punched:

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

Field-select control card is punched:

```
//bFSb(K,1),10,(K,1)/6,15,1/21,(P,5,3),16/
77,(P,3,2),19/80,(P,6,4),21
//bFSb28,(P,8,5),25/26,(P,2,2),30
```

KEY FIELDS

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

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

Fixed-length blocked
Variable-length blocked or unblocked
Undefined

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

DISK FILES WITH KEY FIELDS (FIXED-LENGTH UNBLOCKED)

Key fields are only valid for:

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

Disk to Card or Tape

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

Tape output

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

Card output

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

Card or Tape to Disk

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

Card Input

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

Tape Input

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

Disk to Printer

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

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

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

Disk to Disk

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

Copy: The file is transferred without change.

Field-select: The file can be transferred with:

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

KEY FIELDS ON INPUT AND NO KEY FIELDS ON OUTPUT.

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

Remove the key field and change the record length.

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

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

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

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

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

Disk Files with Key Fields (Undefined)

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

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

TAPE TO TAPE

The tape-to-tape program transfers a file from one or more tape reels to one or more other reels. These files may be copied, reblocked, field selected, or reblocked and field selected. If the reblock or field-select options are used, the input records must be fixed length. A tape mark is written preceding the data portion of an output file.

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

PACK

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

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

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

UNPACK

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

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

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

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

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

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

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

PACK

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

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

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

UNPACK

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

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

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

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

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

TAPE TO CARD

The tape-to-card program transfers the contents of a tape file to a card file. The output file may be punched in either extended binary coded decimal or binary. Each logical output record must fit in one card (i.e., 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 will be punched into each card. This field will be numbered starting fron one (with high-order zeros) and will be increased by one for each succeeding card. In the event that a sufficiently long field is not defined to number all of the cards, the numbers will wrap around to zero with no error indication. The sequence number will overlay any data selected into the sequence area of the card.

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

PACK

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

r,(P,n,m),t

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

UNPACK

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

r,(U,n,m),t

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

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

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

UNPACK

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

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

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

HEXADECIMAL

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

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

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

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

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

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

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

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

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

PACK

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

r,(P,n,m),t

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

UNPACK

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

r,(U,n,m),t

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

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

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

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

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

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

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

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

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

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

PACK

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

r,(P,n,m),t

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

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

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

UNPACK

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

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

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

The disk-to-card program transfers the contents of a disk file to a card file. The output file may be punched in either extended binary coded decimal or binary. Each logical-output record must fit on one card (i.e., 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 CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

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

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

PACK

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

r,(P,n;m),t

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

UNPACK

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

r,(U,n,m),t

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

DISK TO PRINTER

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

UTILITY-MODIFIER CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

UNPACK

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

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

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

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

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

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

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

HEXADECIMAL

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

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

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

CARD TO TAPE

The card-to-tape program transfers the contents of a card file from cards to tape. The data portion of the output tape is preceded by a tape mark. 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 CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

PACK

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

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

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

UNPACK

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

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

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

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

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

The card-to-disk program transfers the contents of a card file from cards to an area of disk. The cards may be punched in extended binary coded decimal or in 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 CARD

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

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

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

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

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

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

FIELD-SELECT CARD

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

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

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

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

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

PACK

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

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

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

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

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

UNPACK

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

r,(U,n,m),t

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

CARD TO PRINTER AND/OR PUNCH

Input records to this program must be fixed length and unblocked. Card input and output can be either EBCDIC or binary, except when both printing and punching. For both printing and punching it must be EBCDIC.

CARD TO PRINTER

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

DISPLAY

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

LIST

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

CARD TO PUNCH

The card-to-punch program can accept input records punched in either EBCDIC or binary. Output records may also be in either EBCDIC or binary. The records may be copied or field selected. Input cards cannot be sequence checked. Selection of pocket 1 is forced.

CARD TO PRINTER AND PUNCH

This program allows EBCDIC input and output records. Printed output is in the list format. Input cards cannot be sequence checked.

UTILITY-MODIFIER CARD

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

Card to Punch:

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

Card to Printer:

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

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

Card to Punch:

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

Card to Printer:

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

Card to Printer and Punch:

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

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

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

FIELD-SELECT CARD

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

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

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

Figure 14. Card-to-Printer and/or Punch Utility-Modifier Card (Part 1 of 2)

PARAMETER	POSSIBLE FORMS	ENTRIES	EXPLANATIONS
Spacing Option Sx	S1	S	The first letter in these forms identifies these parameters.
	S2	1	Single spacing .
	S3	2	Double spacing.
		3	Triple spacing.
Page Numbering Px	Px	P	The first letter in these forms identifies these parameters.
	PN	y	Number pages.
		N	Do not number pages.
Sequence-numbering Q=(x,y)	Q=(x,y)	Q=	The first letter and symbol identify this parameter.
		x	This represents the first position of a field in a card for sequence-numbering (1 or 2 characters).
		'	Separator.
		y	This represents the length of the field (maximum 10). The (x,y) portion of this parameter must be enclosed in parentheses.

● Figure 14. Card-to-Printer and/or Punch Utility-Modifier Card (Part 2 of 2)

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

HEXADECIMAL

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

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

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

PACK

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

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

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

UNPACK

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

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

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

The initialize-disk program prepares from one to five complete disk packs for use on IBM 2311 disk drives. The preparation of a pack consists of the following:

- VTOC Label Check
- Home-Address Generation
- Surface Analysis and Track Descriptor (RO) Record Generation
- Volume-Label Creation
- IPL and VTOC Format Creation

Two types of control information are required for the operation of this program. The first is job-control cards related to channel and unit assignment, and physical-device description. The second is label control information for VTOC and volume label creation.

HEADER-LABEL CHECK

Before a pack is initialized, it is checked to see if any labels present in the VTOC are expired. If the file has not expired, a message is printed. If the user still wishes to initialize the disk pack after receiving the message, he can bypass the label and continue to process. If the user does not wish to bypass the pack(s) with unexpired labels, the pack or packs are deleted from the job.

HOME-ADDRESS GENERATION

Five bytes of the seven-byte home address are written by this program in binary representation. The five bytes written are: a flag one-byte long, the cylinder-number 2-bytes long, and the head-number 2-bytes long. The flag byte is transmitted to the flag byte of each record on the track, and indicates the condition of the track. Bits 0-5 are written as zero. Bit 6 is written as a zero if it is a good track, or a one, if it is a bad track. Bit 7 is written as a zero if it is not an alternate track, and one if it is an alternate track.

If the home-address cannot be written on a track, a message is printed to identify each home-address that cannot be written. If a home-address cannot be written for every track of a pack, that pack is deleted from the job.

SURFACE ANALYSIS AND TRACK DESCRIPTOR RECORD GENERATION

Surface analysis is performed first on the alternate cylinders (200, 201, and 202). When a track on an alternate cylinder is found to be defective, the track is flagged as defective and cannot be assigned as an alternate track. Surface analysis is then performed on all remaining tracks. If a track is detected to have a defective surface area upon which data cannot be written, an alternate track is established to record the data. A message is printed to notify the user of defective tracks.

When a defective area is encountered, the program will set bit six of the flag byte of the home address to 1. This indicates a bad track. The address of an alternate track, on an alternate cylinder, will be written in the first 4 bytes of the count portion of the track-descriptor record on the defective track.

The first four bytes of the count portion of the track-descriptor record on the alternate track are changed to the two-byte cylinder and two-byte head-address of the original defective track.

Processing is terminated after detection of the thirty-first defective track (30 alternate tracks). The defective tracks are logged to provide a record of the condition of each pack processed. When analysis has shown that a track is not defective, the track descriptor record (RO) is written. The track-descriptor record is the first record that follows the home address, and is divided into two parts, count and data.

Eight bytes of the eleven-byte count field are written by this phase. The eight bytes are: The cylinder-number 2-bytes

long, the head number 2-bytes long, the record number 1-byte long, the key length 1-byte long, and the data length 2-bytes long. The eight byte data field is written with the cylinder-number (2 bytes), the head-number (2 bytes), the record number which is zero (1 byte), the number of bytes remaining on the track, namely 3625 (2 bytes), and one byte of binary zeros.

If the track-descriptor record cannot be written on a track, a message is printed to identify the error. The program continues analysis and RO generation to log any other defective tracks. The pack on which the error occurs is deleted from the job.

VOLUME-LABEL CREATION

Through the use of a control card unique to this program, a volume label is created in the standard format (VOL1) for each pack processed. The volume label is written on cylinder zero, track zero, record three of each disk pack. Seven additional (VOL2-VOL8) user volume labels can be created, if desired, and will be placed in records four through ten.

IPL AND VTOC FORMAT CREATION

IPL-FORMAT CREATION

This program formats two IPL records. These records are written on cylinder zero, track zero, records one and two. Record one is written with a 24-byte data field of binary zeros. Record two is written with a 144-byte data field of binary zeros.

VTOC-FORMAT CREATION

The initialize-disk program pre-formats the volume table of contents (VTOC). The location on the disk in which the VTOC is to be placed is indicated in a control card.

The standard location of the VTOC is on cylinder zero immediately following the volume label(s), and extending to the end of the cylinder. However, the VTOC can appear on any cylinder (excluding alternate cylinders), but cannot exceed cylinder boundaries. A VTOC placed anywhere other than in the standard location can be any number of tracks desired on the cylinder. The first record begins in the first record of the first track, and the last record appears as the last record of the last track specified.

Each record of the VTOC contains a 44-byte key field and a 96-byte data field written as binary zeros.

The first two records of the VTOC are reserved for two specific records. The first record is the Volume Table of Contents -- Data Set Control Block (VTOC-DSCB) label (format 4), and the second record is for the Space-Management (format 5) label.

The first four bytes of the key field of the space-management label are written as a hexadecimal five. The first byte of the data field is written in hexadecimal representation F5.

LABEL CONTROL SET

Two types of control cards must be supplied for each pack initialized. The two control cards are called a Label Control Set. The control cards are:

- VTOC control card.
- Volume-Label control card.

VTOC Control Card

The VTOC control card provides the control information necessary for the creation of the VTOC. The card is punched in one of the two following formats. The first format is the standard and the second is for other than standard.

```
//bVTOCbSTANDARD
```

//bVTOCb	Identifies the card as a VTOC control card (b indicates one blank space).
STANDARD	Indicates that the VTOC is to appear in the first cylinder following the last volume label, and is to extend to the end of the cylinder.

```
//bVTOCbSTRTADR=(ccchhh), EXTENT=(n)
```

//bVTOCb	Identifies this card as a VTOC control card (b indicates one blank space).
STRTADR=	Indicates this parameter contains the beginning address of the VTOC.
(ccchhh)	Indicates the beginning address (the cylinder and head numbers) must be punched within parentheses.
EXTENT=	Indicates this parameter contains the number of tracks in the VTOC.

(n) Indicates the number of tracks in the VTOC must be punched within parentheses.

Volume-Label Control Cards

The volume-label control card contains the information for the creation of the volume label. A VOL1 volume-label control card must be supplied for each pack. The VOL2 through VOL8 control cards for user volume labels can be supplied for each pack when user volume labels are desired. The VOL2 through VOL8 cards must be entered in sequence.

VOLn must appear in columns 1-4 of each card (n is the number of the control card, 1-8). Columns 5 through 80 contain the additional fields in the label.

Label-Control Set

A label-control set must be supplied for each pack assigned. Each set is read and assigned to the packs in the order in which the packs are assigned (SYSOpt, SYS002,SYS003,SYS004,SYS005).

Packs that are deleted from the job because of a bad-pack condition have the control set for that pack bypassed. Errors that occur because of incorrect control cards cause the WAIT state to be entered to allow correction of the label-control set. A message is printed indicating the status of each pack.

END Card

An END card must follow the last card of the last label-control-set.

```
//bEND
```

The clear-disk program clears one or more areas of IBM 2311 disk storage, and establishes a pre-formatted track containing an indicated base throughout the area cleared. For each track cleared, records are formated to the end of the track. The maximum number of records depends on the size of the records.

The track-descriptor record is the first record on each track and follows the home address, and is divided into two parts, count and data.

Eight bytes of the eleven-byte field are written by this phase. The eight bytes are: the cylinder-number (2 bytes), the head-number (2 bytes), the record-number (1 byte), the key-length (1 byte), and the data-length (1 byte). The eight byte data field is written with the cylinder-number (2 bytes), the head-number (2 bytes), the record-number which is zero (1 byte), the number of bytes remaining on the track, namely 3625 (2 bytes), and one byte of binary zeros.

The control information for the operation of this program is entered in two types of control cards, inserted at a fixed point in the program deck.

The first type of control card is the job-control card, which defines channel and unit assignment, and physical-device description and areas of disk to be processed.

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

The area to be cleared can be as small as one track or up to a maximum of a complete disk pack. As many as five areas can be designated to be cleared with one run of this program. When an area of disk is cleared, fixed-length blocks containing count, key, and data areas are established on the disk. The information defining the key and data areas is indicated in the utility-modifier card, or, if a utility-modifier card is not entered, assumed values are made. 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 are filled with a user-defined character. Label-checking is done to determine if the area to be cleared contains all or part of an unexpired file. Expired labels for the area to be cleared are deleted from the VTOC.

UTILITY-MODIFIER CARD

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

The second parameter defines the fill character.

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

```
//bUCLbB=(K=1,D=1),C'a',OY
//bUCLbB=(K=1,D=1),C'a',ON
//bUCLbB=(K=1,D=1),X'aa',OY
//bUCLbB=(K=1,D=1),X'aa',ON
```

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

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

//bU	These entries identify this as a utility-modifier control card.
CL	These letters indicate this is the clear-disk program and they can be omitted.
b	Indicates one blank space.

Parameter	Entry	Explanation
B=(K=1,D=1)	B=	Identifies this parameter
	(K=1,D=1)	Indicates the length of the key and data block in bytes. If a key length is not desired the key portion must be zero.

Parameter	Entry	Explanation
C'a' or	C'a'	C is punched followed by the desired fill character (EBCDIC) enclosed in apostrophes.
X'aa'	X'aa'	The letter X is punched followed by the desired hexadecimal fill character enclosed in apostrophes.
OY or ON	O	Identifies this as the output parameter.
	Y	Indicates read-disk check.
	N	Indicates do not read-disk check.

STORAGE PRINT

This program produces a printout of storage and registers to aid the user in locating the reason(s) for a program malfunction.

CONTROL INFORMATION

The only item of control information that must be provided for this program is the address of the printer to be used. See IBM System/360 Basic Programming Support, Operating Guide: Utility Programs 8K, C24-3392 for details.

PROGRAM ORGANIZATION

The storage-print program is divided into three major sections. Each section consists of one or more overlays. The three main sections of the program are: initial print, register print, and main print.

INITIAL PRINT

The initial-print section prints the contents of storage that is to contain the program for displaying the rest of storage. The contents of the area taken by the initial overlay cannot be printed out, and if desired, must be manually displayed. This overlay extends from hexadecimal address 80 to 140. (Use of the IPL key overlays hexadecimal addresses 0 to 17.) This section prints the first 16 words from storage at the rate of one word per line, the next 32 words at four words per line, and then 8 words per line until enough storage has been printed to contain the remainder of the program. The address limits of the area printed by initial-print are displayed

REGISTER AND LOW-STORAGE PRINT

Registers

If the floating point feature is present, the floating point registers are printed in hexadecimal representation. The registers (0-15) are printed in hexadecimal representation on two lines, 8 registers to a line. The first line is preceded by REG0 and contains the contents of registers 0-7. The second line is preceded by REG8 and contains the contents of registers 8-15.

Low Storage

Storage below hexadecimal address 80 contains permanently assigned fields that can be used to determine the status of a program. This area is printed in a special form (Figure 15) to facilitate identification of fields. Various subfields are printed in hexadecimal bits or decimal. The line to be printed following the register printout contains the channel status word (CSW) and channel address word (CAW) separated into their various sections.

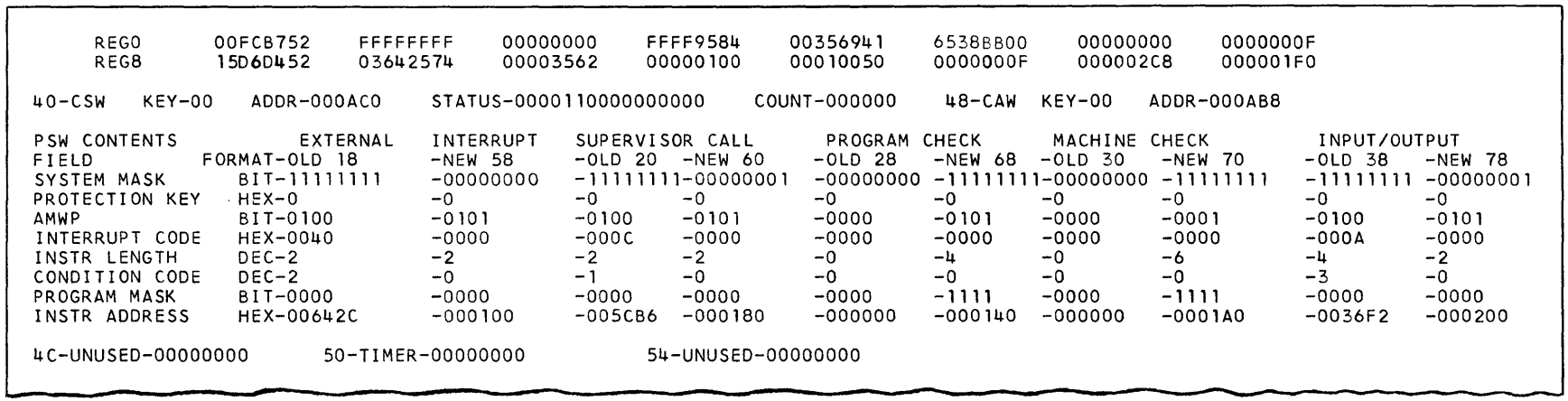
The section of printing that follows is in chart form depicting the old and new program status word (PSW) for the five types of interrupt. Each program-status word is broken down into its component parts.

The line that follows shows bytes 4C-57, which are made up of unused bytes and the timer. The value of the timer is the value that existed at execution of the initial-print section.

Main Print

Remaining storage is printed by this section. Eight words are printed on each line in hexadecimal. The storage address of the first byte of each line is printed to the left of the line.

If an area of storage produces one or more lines that contain the same word throughout, the lines are suppressed. A message is printed indicating the area of storage and the repeated word.



```
     REG0      00FCB752    FFFFFFFF    00000000    FFFF9584    00356941    6538BB00    00000000    0000000F
     REG8      15D6D452    03642574    00003562    00000100    00010050    0000000F    000002C8    000001F0

40-CSW   KEY-00   ADDR-000AC0    STATUS-0000110000000000    COUNT-000000    48-CAW  KEY-00   ADDR-000AB8

PSW CONTENTS          EXTERNAL   INTERRUPT   SUPERVISOR CALL      PROGRAM CHECK      MACHINE CHECK         INPUT/OUTPUT
FIELD          FORMAT-OLD 18     -NEW 58     -OLD 20  -NEW 60    -OLD 28   -NEW 68  -OLD 30   -NEW 70     -OLD 38   -NEW 78
SYSTEM MASK      BIT-11111111    -00000000   -11111111-00000001   -00000000 -11111111-00000000 -11111111   -11111111 -00000001
PROTECTION KEY   HEX-0           -0          -0       -0          -0        -0       -0        -0          -0        -0
AMWP             BIT-0100        -0101       -0100    -0101       -0000     -0101    -0000     -0001       -0100     -0101
INTERRUPT CODE   HEX-0040        -0000       -000C    -0000       -0000     -0000    -0000     -0000       -000A     -0000
INSTR LENGTH     DEC-2           -2          -2       -2          -0        -4       -0        -6          -4        -2
CONDITION CODE   DEC-2           -0          -1       -0          -0        -0       -0        -0          -3        -0
PROGRAM MASK     BIT-0000        -0000       -0000    -0000       -0000     -1111    -0000     -1111       -0000     -0000
INSTR ADDRESS    HEX-00642C      -000100     -005CB6  -000180     -000000   -000140  -000000   -0001A0     -0036F2   -000200

4C-UNUSED-00000000       50-TIMER-00000000          54-UNUSED-00000000
```

Figure 15. Low Storage Printout

This program allows:

Three utility operations to be performed simultaneously, or

Two utility operations to be performed simultaneously, or

A single utility operation.

The operations that can be performed are:

Card to Tape
Tape to Printer
Tape to Card

Any combination of these operations (e.g. three tape-to-printer operations or two card-to-tape and a tape-to-printer operation etc.) can be performed. Once the operations to be performed are assigned, they can be started and ended any time during the running of the program. However, only those operations originally assigned can be performed during the program execution.

After program assignment, a message is printed to indicate the available I/O area.

Each of the operations transfers a file of information from an input device to an output device. The appropriate unit record device and a separate tape drive must be on-line for each operation being performed.

The primary purpose of this program is to transfer preformatted records although one field can be selected (field select) from an input record and written as the output record. If an entire input record exceeds the length of the capacity of the output record (e.g. card or print line capacity) a field must be selected for output. If first character forms control is indicated, the forms control character (the first character of the data record) can be omitted from printing by not including the first character of the data record in the field selected for output. Records must be fixed length and can be blocked or unblocked on tape.

The multiple utilities make efficient use of main storage when assigning I/O areas. Active tape I/O areas are assigned contiguously, allowing for a maximum available I/O area. When possible, two tape areas are assigned for each operation to allow overlap of processing. The unit record areas assigned are fixed length.

LABEL HANDLING

If labeled files are to be processed, the labels are read and typed. To indicate label handling in the tape-to-card or tape-to-printer operations, the label must be on the tape in the format indicated in Figure 16. The first card (data) of a card-to-tape operation must be punched HDR1 in the first four columns followed by the image of the remainder of the tape label to be written. No further header labels can be written. The sequence field of the HDR1 label must be numeric (columns 32-35). If the field contains characters other than numeric the field is punched as 001 and sequencing continues consecutively. Diagnostics are not performed on the contents of the sequence field.

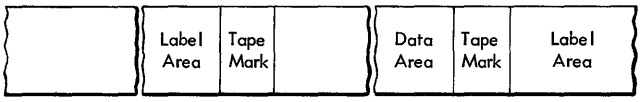


Figure 16. Label Format

JOB CONTROL

Upon initial program loading, I/O physical-device description, and channel-and-unit assignments for each of the operations to be performed must be defined through job-control cards. Two tape drives, if available, can be assigned for the same operation, when processing multiple reel files. Once defined, job-control information cannot be changed during the running of the program. If the devices necessary for processing of the three operations are not defined at initial program loading, that operation cannot be performed during that run.

When a binary field is to be referred to or positioned, it must be as it appears in main storage and not as it appears on a card (e.g. 40 card columns of binary require 80 positions of main storage).

SYSTEM ASSIGNMENT

The following job-control cards are used for system assignment (at program loading time). Refer also to Figures 1 and 2.

JOB card	Required. Unique identification: MLTUTL
ASSGN	Required as follows:

1.	SYSLOG	Must be assigned as a 1052 Printer-Keyboard
2.	SYS000	Must always be assigned for the primary tape unit for operation A.
3.	SYS006	Must always be assigned for the unit record device for operation A.
4.	SYS002	Must be assigned for the primary tape unit for operation B.
5.	SYS004	Must be assigned for the primary tape unit for operation C.
6.	SYS007	Must be assigned for the unit record device for operation B.
7.	SYS008	Must be assigned for the unit record device for operation C.
8.	SYS001	Must be assigned for the alternate tape for operation A.
9.	SYS003	Must be assigned for the alternate tape for operation B.
10.	SYS005	Must be assigned for the alternate tape for operation C.

UPSI	Not used
CONFG	Required
DATE	Required
VOL	Not used
TPLAB	Not used
DLAB	Not used
EXTENT	Not used
LOG	Optional
NOLOG	Optional
EXEC	Required

Note: The Card-to-Tape operation will come to an end-of-job upon sensing a /* Job Control Card or last card.

PROGRAM ASSIGNMENT

Following the loading of the system assignment phase of the program, a read is issued to the printer-keyboard to allow the assignment of the operations to be performed.

Note: All printer-keyboard entries are made with the keyboard in upper case shift, except commas and numeric characters.

The assignments must be made as follows:

PRG=(nn,nn,nn)

ENTRY	EXPLANATION
PRG=	Type these entries to indicate the assignment phase.
(nn,nn,nn)	Type the initials of the operations to be performed. They must be enclosed in parentheses and separated by commas.

The initials of the operations are:

TP	to indicate Tape to Printer
CT	to indicate Card to Tape
TC	to indicate Tape to Card
NA	This entry is made to indicate a possible assignment has not been made (not assigned).

Operations can be assigned in any desired combination. The program defines the first possible operation as A, the second possible operation as B, and the third as C.

Examples:

Three tape to printer operations:
PRG=(TP,TP,TP)

The card to tape, tape to printer and tape to card operations:
PRG=(CT,TP,TC)
Two tape to card operations:
PRG=(TC,TC,NA)
A single tape to printer operation:
PRG=(NA,NA,TP)

When the program assignment is complete, an end-of-block character must be entered to return control to the program.

UTILITY-CONTROL ASSIGNMENT

This class of control information is unique to the multiple utility program and is entered from the IBM 1052 Printer-Keyboard. The utility control assignment information that is keyed into this program is contained in a start entry and three commands.

Start (START)
End (END)
Continue (CP)
Finish (FP)

These entries are to be made during the redefinition phase of the program. The redefinition phase can be entered during program execution by pressing the Request Key on the IBM 1052 Printer-Keyboard. The redefinition phase is also entered at the completion of a Start or End command.

START

When an operation(s) is to be initiated and the read has been issued to the printer-keyboard, the operator must enter the letters START immediately followed by A, B, or C (e.g. STARTA). These entries indicate which of the assigned operations are to be started. The parameters that follow these entries are unique to the individual operations.

TAPE TO PRINTER

The format and entries for this operation are:

```
STARTfbTt,A=(n,m),F=(r,s,t),Rr,Ss,Pp,Lx
```

Tt

This parameter defines the type of forms-control to be used and is required only if more parameters are to follow.

When first-character forms-control is employed, the first character of the data record is considered to be the forms-control character and is printed unless excluded by the selection of a field within the record. This parameter allows a choice of four standards by which forms control can be regulated:

A,B,C, or L

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. A check will not be made to determine the validity of the character. The codes are as follows:

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
10001001	12,11,1	Write and skip to channel 2 after printing
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 with a 1401 system. If the character read is not one of the valid characters, the line will be printed with single spacing and no error indication will be given or if the user provides a spacing parameter (Ss) the program will substitute this value for invalid characters. 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
#	channel 11	.	channel 11
@	channel 12	¤	channel 12

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.

Code	Space or Skip Action
ampersand	Suppress space
blank	Single space
zero	Double space
- (B-bit)	Triple space
1-9 or J-R	Skip after print to channel 1-9 (that is, 1 or J=skip to channel 1; 2 or K=skip to channel 2; etc.)

Type L

The records are to be listed, and there is no first-character forms-control. The records are single-spaced unless otherwise indicated with the START Command. The program will skip to channel one upon detecting channel 12.

A=(n,m)

The input record and block length are indicated through this parameter. The entries A= identify the parameter, the entries (n,m) indicate the input record length and the input block length enclosed in parentheses and separated by a comma. If this parameter is omitted, A=(120,600) is assumed. The maximum assumed block size is 600. This assumed maximum block size allows 120-,240,360-,480-, and 600-character blocks to be processed.

F=(r,s,t)

This parameter allows the user to select one field (field selection) for printing from each record in a file. If this parameter is omitted, the record length must be less than or equal to the length of the print line. The F= identifies this parameter, and the (r,s,t) defines the field to be selected from each record for printing.

Entry	Explanation
r	The starting location of the field in the input record relative to one.
,	Separator.
s	The length of the field to be selected.
,	Separator.
t	The starting location of the field in the print line relative to one.

The entries r,s,t must be enclosed in parentheses.

Rr

The parameter Rr allows four input-tape rewind options:

Entry	Explanation
RU	Rewind and unload at the end of a function.
RR	Rewind and do not unload.
RN	Do not rewind and unload.
RM	When processing multiple-tape reels, each reel will be rewound and unloaded when complete.

If this parameter is omitted, a value of RU is assumed.

Ss

This parameter defines printer spacing. The entries that can be made are:

Entry	Explanation
S1	No blank lines between lines of print (single spacing).
S2	One blank line between lines of print (double spacing).
S3	Two blank lines between lines of print (triple spacing).

If the Ss option is not chosen, S1 is assumed.

Pp

This parameter defines the page-number option and is valid only if first-character forms-control is not chosen (TL). The entries that can be made are:

Entry	Explanation
PY	Print page numbers.
PN	Do not print page numbers.

If this parameter is omitted, PY is assumed.

Lx

This parameter indicates if labels are present.

Entry	Explanation
LY	Labels are present on the tape.
LN	Labels are not present on the tape.

If this parameter is omitted a value of LY is assumed.

END OF BLOCK

When all desired parameters have been entered, the end-of-block character is entered from the keyboard. If the end-of-block character is entered immediately after STARTfb, the assumed values are:

TL,A=(120,600), RU,S1,PY,LY

Records 120,240,360,480, or 600 bytes long can be processed with the assumed values.

HEADING LINE

When the read that follows a start command is issued to the printer-keyboard, a heading line can be entered for the function being initiated. The entry to the printer-keyboard must be an H followed by one blank space, and the image of the heading line desired cannot be longer than 100 characters. This option is valid only if first-character forms-control is not specified.

CARD TO TAPE

The format and entries for this operation are:

STARTfbA=(n,m),F=(r,s,t),Cc,Rr,Lx

A=(n,m)

The output record and block length are indicated through this parameter.

A=	Identifies the parameter.
(n,m)	The output record length n, and the output block length m are enclosed in parentheses and separated by a comma. The output records can be blocked. If omitted, this parameter is assumed to be A=(80,80).

F=(r,s,t)

This parameter allows the user to select a field (field selection) from each record in a file. The F= identifies this parameter, and the (r,s,t) defines the field to be selected from each input card.

r	The starting location of the field in the input record, relative to one.
,	Separator
s	The length of the field to be selected.
,	Separator
t	The starting location of the field in the output record, relative to one.

These entries must be enclosed in parentheses. If the parameter is omitted, the complete record is written on tape.

Cc

This parameter allows the user to indicate the type of card input:

C1	Input is punched in EBCDIC.
C2	Input is punched in Binary.

If this parameter is omitted, C1 is assumed.

Rr

This parameter allows the user three rewind options for the output tape:

RR	Rewind the tape at the end of the function.
RU	Rewind and unload.
RN	Do not rewind and/or unload.

If this parameter is omitted, a value of RU is assumed.

Lx

This parameter indicates whether or not labels are present:

Entry	Explanation
LY	The first card is an HDR1 label image card and the label expiration date is checked.
LN	The first card is not an HDR1 label image card and the label expiration date is not checked.

If this parameter is omitted, LY is assumed.

Note: If LY is entered, the tape must contain a VOL1 volume label as the first record on the tape.

This parameter causes the first four characters of VOL1 and the expiration date to be checked and the HDR1 card and all labels present to be logged.

END OF BLOCK

When all desired parameters have been entered, an end-of-block character is entered. If the end-of-block character is entered immediately after STARTBb, the assumed values are A=(80,80),C1,RU,LY.

TAPE TO CARD

The format and entries for this operation are:

STARTfbA=(n,m),F=(r,s,t),Rr,Cc,Lx

A=(n,m)

The input record and block length are indicated through this parameter.

A=	Identifies the parameter
(n,m)	The input record length n, and the input block length m, are enclosed in parentheses and separated by a comma. If omitted, this parameter is assumed to be A=(80,400).

F=(r,s,t)

This parameter allows the user to select a field (field selection) from each record in a file. If this parameter is omitted, the record length must be less than or equal to 80 (160 binary). The F= identifies this parameter, and the (r,s,t) defines the field to be selected from each record. Records 80, 160, 240, 320 or 400 bytes long can be processed with these assumed values.

r	The starting location of the field in the input record, relative to one.
,	Separator.
s	The length of the field to be selected.
,	Separator.
t	The starting location of the field in the output record, relative to one.

These entries must be enclosed in parentheses. If this parameter is omitted, the entire record is punched (maximum record length is 80, or 160 in binary).

Rr

The parameter Rr allows the user four input-tape rewind options:

RU	Rewind and unload at the end of a function.
RR	Rewind and do not unload.
RN	Do not rewind and/or unload.
RM	When processing multiple- tape reels, each reel will be rewound and unloaded when complete.

If this parameter is omitted, a value of RU is assumed.

Cc

This parameter allows the user to indicate his choice of card output:

C1	Cards are to be punched in EBCDIC.
C2	Cards are to be punched in binary.

If this parameter is omitted, C1 is assumed.

Lx

This parameter indicates if labels are present.

Entry	Explanation
LY	Labels are present on the tape.
LN	Labels are not present on the tape.

If this parameter is omitted a value of LY is assumed.

END OF BLOCK

When all desired parameters have been entered, the end-of-block character is entered. If the end of block character is entered immediately after STARTfb, the assumed values are A=(80,400),RU,C1,LY. If the end-of-block character is not entered after STARTfb (more parameters are to follow), the A=(n,m) parameter must be entered. Records 80,160,240,320 and 400 bytes long can be processed with these assumed values.

UTILITY COMMANDS

ENDfb

This entry causes the function indicated by f (A, B or C) to be terminated even though the job is not complete. A read is initiated to the printer-keyboard following this command, which allows another command to be entered.

CP (Continue)

The Continue command is entered by keying in the comand CP on the printer-keyboard. This command must be issued to the program to execute the currently assigned job(s) described in Start commands, or to return to the main line of the program after an END command. To cause another read to be initiated following this command, the request key must be pressed.

FP (Finish)

The Finish command is entered by keying in the command FP on the printer-keyboard. This causes the program to perform and end-of-job routine on the functions being processed.

The program then returns to the main line and the message WAIT (carrier return) TYP is printed. Any utility-control assignment entry may be made at this time.

Note: An end-of-block character (EOB) must be entered following each command.

The multiple disk-to-printer program allows up to three disk-to-printer functions to run concurrently. It is possible to run the program while doing any one, two, or three of the functions. A new function can be started at any time while other functions are in process. When the job of any function is complete, a new job may be initiated for that function.

Because of the overlap nature of System/360, this program approaches the goal of allowing three jobs to be done for the price (in time) of one.

FUNCTIONAL CAPABILITY

One printer and one disk unit must be on-line for each separate function being performed. Each of the disk-to-print functions available is identical, in that each has the same range of capabilities. Each function, however, is independently initialized according to control information provided, and thus, different disk-to-printer jobs may be run concurrently.

Each of the disk-to-printer functions is capable of printing fixed length records with or without key fields. Records may be either blocked or unblocked. Data is printed in character mode. If key fields are present, the records must be unblocked. A portion (field) of a record may be selected for printing if the entire record is not desired. Each record will produce only one line of output and therefore, if the record length plus key length exceeds the print line capacity, a field must be selected for printing.

Files contained in more than one disk area may be processed as indicated by XTENT cards. File label checking is performed on each disk-pack to ensure that the correct file is on-line. Printer spacing options, page number options, and print heading line options are available.

If one or two functions have been defined and are underway, it is possible to assign another function to the list of current functions at any time. When a function is in process, it is possible to end that function at any desired time.

The multiple disk-to-printer program makes efficient use of core storage when assigning I/O areas. Active I/O areas are assigned contiguously, allowing for a maximum available I/O area. When possible, two disk input areas are assigned for each function to allow overlap of input with processing and output.

SYSTEM ASSIGNMENT

Upon initial program loading, the device, channel, and unit assignment for each of the disk-to-printer functions must be defined via JOB control cards. These items, once defined, cannot be changed during the running of the program. If the disk and printer for a function are not defined, that function cannot be performed during the run.

The following JOB control cards are used for system assignment (at program loading time). Refer also to Figures 1 and 2.

JOB card	Required. Unique identification: MDKPRN
ASSGN cards	Required as follows:

1.	SYSLOG	Must be an IBM 1052 Printer-Keyboard.
2.	SYSIPT	Must be assigned for reading utility control cards.
3.	SYS000	Must be assigned as the primary disk unit for function A.
4.	SYS001	Must be assigned as the alternate disk unit for function A.
5.	SYS002	Must be assigned as the primary disk unit for function B.
6.	SYS003	Must be assigned as the alternate disk unit for function B.
7.	SYS004	Must be assigned as the primary disk unit for function C.
8.	SYS005	Must be assigned as the alternate disk unit for function C.
9.	SYS006	Must be assigned as the printer for function A.
10.	SYS007	Must be assigned as the printer for function B.
11.	SYS008	Must be assigned as the printer for function C.

UPSI card	Not used
CONFG card	Required
DATE card	Required
LOG card	Optional
NOLOG card	Optional
EXEC card	Required

UTILITY ASSIGNMENT

When a new job (or jobs) is to be initiated, the operator presses the External Interrupt Key thereby initiating the following series of events:

1. Processing of each job continues until all current blocks have been completely processed.
2. The size of the available I/O area and the names of the functions which can be initiated are printed.
3. A read command is sent to the card reader.

FUNCTION ASSIGNMENT

The following UTILITY Control Cards are used for function assignment. This set of cards is called a Function Assignment set.

FUNCTION ASSIGNMENT CARD 1
//bMDPbSTARTfbTt,A=(n,m),FS=(r,s,t),Sx,Px

The STARTf Utility Control Card indicates that a new function is to be added to the current function list. (This card is required for each function defined.)

//bMDP (Required)

This entry identifies a Multiple Disk-to-Print control card.

bSTARTf (Required)

This entry identifies this card as the START Utility card and specifies the function that is to be added to the current function list.

Entry	Explanation
bSTARTA	Function A
bSTARTB	Function B
bSTARTC	Function C

Tt

This parameter defines the first-character forms-control character to be recognized, and is required only if more parameters are to follow.

When first-character forms-control is employed, the first character of the data record is considered to be the forms-control character and is printed unless excluded by the selection of a field within the record. This parameter allows the run a choice of two standards by which forms control can be regulated:

A or C

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. A check is made to determine that a write command (X'01') was given. The codes are as follows:

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
10001001	12,11,1	Write and skip to channel 2 after printing
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 C: Type C first-character forms-control allows the use of the following control characters:

Code	Space or Skip Action
ampersand	Suppress space
blank	Single space
zero	Double space
-(B-bit)	Triple space
1-9 or J-R	Skip after print to channel 1-9 (that is, 1 or J=skip to channel 1; 2 or K=skip to channel 2; etc.)

The single, double, or triple space refers to the appearance of the page. For example, zero causes one line to be skipped before the printing of the record. Any character not defined will result in single spacing with no error indication.

Other options available when first character forms control is not specified are:

1. Spacing--single, double, or triple spacing between every record (line) may be specified.
2. Page numbers--an incremented page number will be placed on every page if specified.
3. Heading line--a heading line containing characters provided by the user may be put on each page.

A=(n,m) (Required)

This parameter specifies the input record and block length.

Entry	Explanation
A=	Identifies the input file
(n,m)	The input record length n, and the input block length m, are enclosed in parentheses and separated by a comma.

If key fields are present, the parameter becomes A=(K=l,D=l).

Entry	Explanation
K=l	Key length
D=l	Data length

For example, if a disk-input record has a key length of 9 and a data field length of 60, the input parameter must be punched A=(K=9,D=60).

FS=(r,s,t) (Optional)

This parameter defines the field to be selected for printing from each record in a file. If this parameter is omitted, the record length (key length plus data length) must be less than, or equal to, the length of the print line.

Entry	Explanation
FS=	Identifies the Field Select Parameter.
r	Starting location of the field in the input record, relative to one.
s	Length of field to be selected.

Entry	Explanation
t	Starting location of the field in the print line, relative to one.

The parameter must be in parentheses and separated by commas. If the field being selected is from a key field, the entry is (Kr,s,t). The field must be completely contained within the key field or data field.

Sx (Optional)

This parameter defines printer spacing. The entries that can be made are:

Entry	Explanation
S1	Single spacing
S2	Double spacing
S3	Triple spacing

If this parameter is omitted, a value of S1 is assumed.

Px (Optional)

This is the page-numbering option. Valid values of x are:

Entry	Explanation
Y	Print page numbers
N	Do not print page numbers

If this parameter is omitted, a value of PY is assumed.

FUNCTION ASSIGNMENT CARD 2 //bDLAB

The DLAB card contains disk file label information and is required for each function defined. A continuation card may be used if necessary.

FUNCTION ASSIGNMENT CARD 3 XTENT

The XTENT card must be used to describe the logical section of the disk file to be printed. One or more XTENT cards are required. Up to five may be supplied per file. The file name must be punched UIN.

FUNCTION ASSIGNMENT CARD 4 //bH1b (Optional)

This card contains print header information. The H1 card contains an image of the Print Header line for print positions 1-74. This information is printed at the top of each page.

FUNCTION ASSIGNMENT CARD 5 //bHb (Optional)

The H2 card contains an image of the Print Header line for print positions 75-144. This information is printed at the top of each page.

After processing the Function Assignment cards, the program reads the next card. A new function assignment set or one of the Utility Command Cards (next section) may be supplied at this time.

When assigning a new function, Function Assignment cards 1, 2, and 3 are required and must appear in that order. Cards 4 and 5, if used, must follow card 3.

UTILITY COMMANDS

The following UTILITY Command cards are used to enter commands to the program.

UTILITY COMMAND CARD 1 //bCP

The CONTINUE Utility Command card causes the program to return to the execution of the current functions. No further reads will be initiated to the card reader until the EXTERNAL INTERRUPT Key is pressed.

UTILITY COMMAND CARD 2 //bENDf

The END Utility Command card indicates that the function "f" is to be deleted from the current function list. This card is entered when it is desired to terminate a function that is in process.

Explanation:

//b	(Required) indicates a control card.

ENDf

(Required) identifies the END Utility Command Card and indicates the function that is to be deleted from the current function list. Values of f are:

Entry	Explanation
A	Function A
B	Function B
C	Function C

After processing the ENDf card, the program reads the next card. Thus, it is possible to define a new job to replace the deleted function.

UTILITY COMMAND CARD 3 //bFP

The FINISH Utility Command card indicates all functions are to be deleted from the current function list. This card is entered when it is desired to terminate all functions that are in process.

After processing this card, the program enters the WAIT state. New functions can be defined by supplying the control cards (see FUNCTION ASSIGNMENT) in the card reader and pressing the Interrupt Key.

If a FINISH card is read and there are no active functions, a message will be printed identifying this condition before the program enters the WAIT state.

DISK LABEL CHECKING

Each disk-pack is checked for the presence of a Volume label. If a Volume label is found, the program searches the VTOC (Volume Table of Contents) for the defined label as specified on the DLAB card.

The File label information is printed.

Each XTENT card is checked to make sure it refers to the correct file.

If a Volume label or File label is not found or the XTENT card is not within the defined file, the condition is logged and the program continues. The function is deleted from the current function list and is available for reassignment.

In order to perform IBM standard label checking on tapes, IBM standard Volume labels must be present. This program places Volume labels on tape. The Initialize Tape program prepares up to eight Volume labels, one dummy header label (HDR1 followed by binary zeros), and a tape mark on any number of tapes supplied. No label checking is performed. The user has two options for creating the Volume labels on tape.

1. A single control card can be used to provide (for example) the starting Volume serial number, the owner name and address code, and the protection code. This information will be written on the first tape supplied. Each succeeding tape will have the same Volume label written on it with the exception that the serial number will be incremented by one.

2. From one to eight Volume label image cards can be used as a set to write unique Volume label(s) on each tape initialized. This card is the exact image of the 80 character label. This option should be used when the volume serial number field contains any alphameric values.

Following the Volume label(s), a dummy Header label is written, followed by a tape mark. This completes initialization. The tapes may then be either rewound or rewound and unloaded as the user specified.

As each tape is initialized, its Volume label(s) and the tape unit number is printed.

The program cycles through the tape drive units that are on line performing the initialization that is specified. The number of units on line is specified by the user through the ASSGN cards of the Job Control set. The maximum number of tape drives used is sixteen. At the completion of a cycle, the program will do one of the following:

1. Terminate the job if the rewind option was specified.

2. If the tapes have been rewound and unloaded, the program will attempt a new cycle through the assigned tape drives.

JOB CONTROL CARDS

Upon initial program loading, symbolic names, channel addresses and tape characteristics for the initialize tape program must be defined via Job Control Cards. These items, once defined, cannot be changed during the running of the program. If the required units for the program are not defined, the program will be terminated.

The following Job Control Cards are used for system assignment: Refer also to Figures 1 and 2.

JOB card	Required. Unique identification: INITTP
ASSGN cards	Required as follows:
SYSLOG	Must be assigned for output messages.
SYS000	Must be assigned as first output tape unit.
SYS001-SYS015	Optional. May be assigned as additional output tape units.
UPSI card	Not used
CONFG card	Required
DATE card	Required
LOG card	Optional
NOLOG card	Optional
EXEC card	Required

UTILITY CONTROL CARDS

Utility assignment for the Initialize Tape Program is made by Utility Control Cards. The control cards and their associated parameters are as follows:

```
//bINITTPbCARD,REWIND,SERIAL=(XXXXXX),P,
CODE=(XXXXXXXXXX)
```

//b	(Required) Indicates control card
INITTP	(Required) Identifies an initialize tape control card.
b	(Required) One blank space.
CARD	(Optional) This parameter indicates that the card image option is wanted. If this option is specified, Volume label image cards must be supplied. If this parameter is omitted, it will be

assumed that volume information for every tape initialized is to be taken from this control card.

REWIND — (Optional) This parameter indicates that each tape is to be rewound at the completion of initialization. If this parameter is omitted, it is assumed that the tapes are to be rewound and unloaded at the completion of initialization.

CARD IMAGE OPTION NOT SPECIFIED

The following parameters are examined if the card image option is not specified:

SERIAL=(XXXXXX) — (Required) This is a six-character numeric field representing the starting value for volume serial number. This number is incremented by one for each additional tape initialized after the first.

P — (Optional) This parameter indicates that the Volume Security field of all volumes are to be given a protection value of one. If this parameter is omitted, each volume will be given a protection value of zero.

CODE=(XXXXXXXXXX) — (Required) This is a ten-character alphameric value representing the owner name and address code. (Must be present.)

CARD IMAGE OPTION SPECIFIED

If the card image option is specified, the following control cards are required:

1. From one to eight Volume label image cards. These cards are an exact image of the 80 character label. These cards must be in ascending sequence (VOL1, VOL2, VOL3...etc).

2. //bEND--This card is used to separate the Volume label image cards for different tapes. When this card is read, the program stops reading cards from the card reader until it finishes initializing the tape on the current output unit. If eight Volume label image cards are supplied for a given tape, the //bEND card may be omitted.

Following the Volume label information, a dummy header label (consisting of HDR1 followed by binary zeros) followed by a tape mark will be written on the current output unit. The tape on the current output unit will then be rewound, or rewound and unloaded (based on the REWIND parameter). At this point, the program checks to see if there are any more additional output units, the tape on the next higher unit (SYS000, SYS001, etc.) will be initialized. If there are no more additional units, one of the following actions will be taken:

1. Terminate the job if the rewind option was specified.

2. If the rewind option was not specified, the program waits until a new tape is mounted on the first output unit (SYS000) at which time tape initialization will begin a new cycle of the output units.

If the program reads the last card from the reader before completing a cycle of assigned units, the tape on the current unit is completed and the job is terminated.

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

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

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 SYSOPT along with an index of the byte(s) that do not match, and the physical record number. No editing is performed on unprintable characters. If the exit has been specified, the tape compare program yields control through that exit.

Input areas are assigned to each tape from a common area of storage. The number of areas assigned to each tape depends on the maximum size of the physical input records. If the space is available, a maximum of two input areas are assigned to each tape; otherwise one input area is assigned to each tape. (Two areas allow overlap of processing and physical I/O if channel assignments permit.)

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 drives (eg: Primary, Alternate, Primary...etc). If only primary tape drives are assigned, (and there are multiple reels per file) the operation waits for a new 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 card and pressing the External Interrupt key again.

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 termiated.

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

NON-STANDARD OR UNLABELLED FILES

Tape marks will be assumed to indicate an end-of-file condition except when the first record read from the tape is a tape mark, in which case the tape mark is ignored. However, a compare for the next file may be initiated by supplying the correct control card and pressing the external interrupt key.

JOB CONTROL CARDS

Upon initial program loading (by card reader), the symbolic names, channel addresses and tape characteristics for the Tape Compare Program are defined via Job Control Cards. These items, once defined, cannot be changed during the running of the program. If the required units for the program are not defined, the program will be terminated.

The following Job Control Cards are used for system assignment. (Refer to Figures 1 and 2.)

JOB card	(Required) Unique Identification: TPCP
ASSGN cards	Required as follows:
SYSLOG	Must be assigned for diagnostic messages.
SYSOPT	Must be assigned for writing records that do not match.
SYSIPT	Must be assigned as the primary tape unit for one of the tape files to be compared. This tape file is referred to as file A.

SYS000	Must be assigned as the primary tape unit for the other file to be compared. This tape file is referred to as file B.
SYS001	May be assigned as the alternate tape unit for file A.
SYS002	May be assigned as the alternate tape unit for file B.
UPSI card	Not used
CONFG card	Required
DATE card	Required
LOG card	Optional
NOLOG card	Optional
EXEC card	Required

UTILITY CONTROL CARD

Utility assignment for the Tape Compare Program is made by a Utility Control Card. There is only one card used. The Control Card and its associated parameters are as follows:

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

//b	(Required) Indicates control card
TPCP	(Required) Identifies Tape Compare control card
b	(Required) One blank space
RECSIZ	(Required) Identifies record size parameter
=(m)	(Required) Maximum physical record size in bytes. This is needed for the assignment of input areas, and must be enclosed in parentheses. If any physical input record exceeds this maximum, the excess is truncated.
LABELS	(Optional) This entry indicates that the tapes are labeled according to IBM System/360 standards. Labels and data must be separated by a tape mark. If this parameter is omitted, the tapes are assumed to be unlabeled or not labelled according to IBM System/360 standards. In the later 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 compare.
ALTA	(Optional) This entry indicates an alternate unit for tape file A has been assigned. 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 has been assigned. 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

The user supplied exit routine must start at a memory location above the Tape Compare Program. Linkage to the exit routine is communicated to the Tape Compare Program via a communication region. The length of the user-exit routine must also be placed in the communication region.

The user-exit routine must be placed before the last card of the Utility object deck. The transfer card of the user exit routine object deck must turn control to the routine's initialization. Initialization must perform the following:

a) Perform any user exit routine initialization.

b) Load register 0 with the two byte entry address of the user-exit routine. Load register 1 with the address location following the end of the user-exit routine.

c) Issue the following:

```
SVC   1
DC    C'LD'
```

to load the utility transfer card.

During user-exit routine processing action is as follows:

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

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

c) Perform user processing.

d) Return control to the Tape Compare Program through register 14 (containing the return address).

Definitions:

File A — File A is the file contained on the tape reels mounted on SYSIPT and SYS001.

File B — File B is the file contained on the tape reels mounted on SYS000 and SYS002.

FILE A DESCRIPTION PARAMETER (REGISTER 0)

The first two bytes of register 0 will contain the two byte address of the File A I/O area. The second two bytes of register 0 will contain the two byte length of the physical record.

FILE B DESCRIPTION PARAMETER (REGISTER 1)

The first two bytes of register 1 will contain the two byte address of the File B I/O area. The second two bytes of register 1 will contain the two byte length of the physical record.

This program is designed to assign an alternate track to a defective track on an IBM 2311 disk pack at any time other than when initializing the pack.

When a defective track is encountered the Format 4 record of the Volume Table Of Contents (VTOC) is checked to determine the next alternate track to be assigned. If an alternate track is not available the condition is logged and the job is terminated.

If an alternate track is assigned, the records contained on the defective track are transferred to the alternate track beginning with the data portion of record zero (R0) and continuing with the count, key, and data of R1 through Rn. The record in error is transferred to the alternate track as read. The address of the alternate track is written in the track descriptor record (R0) of the defective track. This address is used as a pointer to the proper alternate track.

If the track is defective in the Home Address or the track descriptor (R0) record area, the error cannot be corrected and the program terminates.

A defective area in the Address Marker, the gap preceding the Count field or the Count field of a record causes the record to be bypassed and it is not formatted on the alternate track.

When defective areas are within the key and/or data fields the record is formatted with the key and data as read.

When the defective areas are found in the gap following the count field the key and data cannot be recovered. The records are formatted on the alternate track with key and data fields of EBCDIC A.

When the defective area is in the gap following the key the data cannot be recovered. The record is formatted with the key as read and a data field of EBCDIC A.

When the defective area is in the gap following the data field and preceding the next address marker the record is formatted with key and data as read.

An indication is given to show where errors occur and the action taken. Invalid records can be printed on the printer or printer-keyboard assigned to the logging device, if desired.

Surface analysis is performed on the track in error after all records have been transferred to the alternate track. If the error is permanent, bit 6 of the flag byte in the home address is set to 1 to indicate that this is a bad track.

If the error is only temporary the data is transferred back to the originally defective track and the flag byte of the original track is reset to indicate a good track. A record that was written on the alternate track in error will be transferred back in error. The flag byte of the assigned alternate is set to indicate that this track is unassigned and the VTOC Format 4 record is modified to indicate the address of the highest alternate track assigned.

If the track is permanently bad, the data remains on the alternate track and the job is completed.

The control information for the operation of this program is entered in two types of control cards inserted at a fixed point in the program deck.

The first type of control cards is the job-control cards which define channel and unit assignment and physical device description.

The second type of control card contains the information unique to this program. This control card is called Utility Modifier card.

UTILITY MODIFIER CARD

The Utility Modifier card allows two entries. The first entry is the address of the defective track, and the second entry is to indicate if the invalid record is to be printed. The first entry must be entered when running the program. If the second entry is omitted, the invalid records are printed. The format and possible entries for this program are:

```
//bUATbR=(ccccchhh),OY
//bUATbR=(ccccchhh),ON
```

//bU	These entries identify this as a utility modifier card.
AT	These letters indicate that this is the Alternate Track Assignment program. These entries (AT) can be omitted.
b	The letter b indicates one blank space.

Parameter	Entry	Explanation
R=(ccchhh)	R=	Identifies this parameter.
	(ccchhh)	Indicates the physical location of the bad track. (cccc denotes the cylinder number and hhh denotes the head number.) These numbers must be enclosed in parentheses.
OY or ON	O	Identifies this as the output parameter.
	Y	Indicates the record found to be in error is to be printed.
	N	Indicates the record found to be in error is not to be printed.

IBM S/360 Printed in U. S. A. C24-3363-2

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

READER'S COMMENT FORM

IBM System/360 Basic Programming Support Specifications
Utility Programs

C24-3363-2

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

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

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

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

Other _____

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

COMMENTS:

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

Staple

Fold

Fold

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

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

POSTAGE WILL BE PAID BY . . .

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

Attention: Programming Publications, Dept. 157

Fold

Fold

Cut Along Line

IBM S/360 Printed in U. S. A. C24-3363-2

Additional Comments:

IBM

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