Honeywell

LEVEL 66
GCOS
BULK MEDIA CONVERSION

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BULK MEDIA CONVERSION ADDENDUM C

SERIES 60 (LEVEL 66)/6000

GCOS

SOFTWARE

SUBJECT:

Correction to the Series 60 (Level 66)/6000 Bulk Media Conversion Manual

SPECIAL INSTRUCTION:

This third addendum to DD11, Rev. 0, dated April 1974 contains a single page to correct the omission of a backup page of Addendum B. Insert the attached page into the manual according to the collating instructions on the back of this cover.

NOTE: Insert this cover after the manual cover to indicate updating of the document with Addendum C.

SOFTWARE SUPPORTED:

Series 60 Level 66 Software Release 3
Series 6000 Software Release I

DATE:

March 1977

ORDER NUMBER:

DD11C, Rev. 0

20941
3678
Printed in U.S.A.

COLLATING INSTRUCTIONS

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2-13, 2-14	2-13, 2-14

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3/77

DD11C

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BULK MEDIA CONVERSION ADDENDUM B

SERIES 60 (LEVEL 66)/6000 GCOS

SOFTWARE

SUBJECT:

Additions and Changes to the Series 60 (Level 66)/6000 Bulk Media Conversion Manual

SPECIAL INSTRUCTIONS:

This is the second addendum to DD11, Rev. 0, dated April 1974. Insert the attached pages into the manual according to the collating instructions on the back of this cover. Change bars in the margins indicate technical additions and changes; asterisks indicate deletions. These changes will be incorporated into the next revision of the manaul.

NOTE: Insert this cover after the manual cover to indicate updating of the document with Addendum B.

SOFTWARE SUPPORTED:

Series 60 Level 66 Software Release 3
Series 6000 Software Release I

DATE:

August 1976

ORDER NUMBER:

DD11B, Rev. 0

19231
21077
Printed in U.S.A.

COLLATING INSTRUCTIONS

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DD11B

SERIES 60 (LEVEL 66)/6000

GCOS

BULK MEDIA CONVERSION

SUBJECT

General Usage of Bulk Media Conversion by Control Cards, Program Usage and Structure, and Operator Information

SPECIAL INSTRUCTIONS

This manual replaces the *Bulk Media Conversion* manual, Order No. BP30, for Series 6000 System users. Order No. BP30 must be used by Series 600 System users and by Series 6000 System users who are on prior software releases.

SOFTWARE SUPPORTED

Series 60 (Level 66) Software Release 2
Series 6000 Software Release H

INCLUDES UPDATE PAGES ISSUED AS ADDENDUM A IN JANUARY 1975.

ORDER NUMBER

DD11, Rev. 0

April 1974

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PREFACE

This manual is restricted to a description of bulk media conversion. Included are discussions of various subprograms that make up the Bulk Media Conversion (BMC) program and detailed examples of programmer use of the different types of media conversion. An understanding of the BMC program requires that the users have some familiarity with the programming features as described in the General Comprehensive Operating Supervisor and the File and Record Control manuals.

The Series 60 Level 66 is hereafter referred to as the Series 60. The information in the manual refers to both Series 6000 and Series 60, unless otherwise specifically stated.

The following documents are referenced in this manual:

Series 60 (Level 66)/6000 General Comprehensive Operating Supervisor, Order No. DD19

Series 60 (Level 66)/6000 File and Record Control, Order No. DD07

Series 60 (Level 66)/6000 Control Cards, Order No. DD31

Series 60 (Level 66)/6000 System Startup and Operation, Order No. DD33

Series 60 (Level 66) Operator's Reference Manual, Order No. DC78 or Series 6000 Operator's Reference Manual, Order No. DA33

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File No.: 1733, 1P33

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SECTION I

INTRODUCTION

Two types of media conversion are available to users of software systems:

1. System Media Conversion--processes many low-volume sets of data with different formats.

2. Bulk Media Conversion (BMC)--processes large volumes of data in a single format.

System media conversion programs are General Comprehensive Operating Supervisor (GCOS) system programs, executed in both slave and master mode, that are used to process low-volume input and output. Bulk media conversion is performed, as a result of specific program requests, by the BMC program executed as a user slave program.

Bulk media conversion enables the user to perform peripheral-to-peripheral operations by calling the BMC program through the use of control cards. The information contained on these cards is used to set up File and Record Control file control blocks and buffer areas. Once the file control blocks and buffer locations are established, the BMC program is initiated and, using the File and Record Control facility, processes the data. BMC uses MME GEINOS for output to the printer.

SECTION II

GENERAL USAGE

The BMC program performs media conversion for either input or output that exceeds the volume limits set for the System Media Conversion routines of the General Comprehensive Operating Supervisor, because BMC has no volume limitations. Multiple files and multiple report codes can be processed and mixed printer/punch images can be present on the input device.

The BMC program performs media conversion for the following peripherals:

Card reader
Magnetic disk (linked files)
Magnetic tape subsystem
Printer
Card punch

Generally, BMC is used when large amounts of data are to be converted from one of the above listed peripheral devices to another. For example, where a data processing job has a large amount of output to be printed, the output could be saved on magnetic tape and a subsequent BMC activity used for printing the data. Memory and peripherals used by the data processing program could be released, and only the memory needed for the BMC program would be retained, with a tape unit and one printer being retained as peripherals.

BMC can be used for multiple file processing; however, the input files must be contiguous and from a single input device.

Another use of BMC could be for creating multiple copies of output files; for example, the multiple printing of compilation listings. During the compilation, the P* file (printer listing file) could be placed on a separate tape. This tape could then be printed by BMC as many times as needed.

The BMC program can be executed either as an activity within a job or as the only activity of the job. In either case, the BMC call card and the BMC control cards are the same. These cards are discussed below.

BMC CALL CARD

The $ CONVER control card is used to call BMC. Its format is as follows:

1	8	16
$	CONVER	Options

The $ CONVER options are shown below (implied options are underlined; if no option is specified, these options are used):

DUMP - Give BMC memory dump if BMC activity terminates abnormally.

NDUMP - Program registers, upper SSA, and slave program prefix are dumped if BMC activity terminates abnormally.

NSPIN - Do not spinoff CONVER activity.

SPIN - Spinoff CONVER activity (subject to conditions specified below).

NJREST - Do not restart this job.

NREST - Do not restart this job with the current activity.

JREST - Enable job restart.

REST - Enable activity restart.

NOTE: The activity restart options (NJREST, NREST, JREST, and REST) allow the user to exercise control over the job/activity restart cycle which occurs following a system interruption.

The DUMP/NDUMP option is self-explanatory. The SPIN/NSPIN option requires further explanation. Large files to be converted to reports on the printer or on punched cards can be spunoff and run independently while subsequent activities of the same job are executed without waiting for the end of the CONVER activity. However, a spinoff occurs only when:

1. The BMC activity is not the last activity of the job.
2. The NSPIN option does not appear on the $ CONVER card.
3. Save (S) or Continue (C) has not been specified on the IN and/or OT file.
4. The IN file is not an input data file read by system input.
5. The IN file is a permanent file ($ PRMFL or a $ FILE created by using NEW option) or a $ TAPE file. If $ TAPE is speicified for the IN file, it must have been used in a previous activity. If $ FILE is specified (created by NEW option in previous activity) with the OLD option for the IN file, the FMS entry is released after the BMC job is completed.
6. Sufficient resources are available in the SYSOUT buffer to allow use of a blink (5 links) for a control file.

NOTE: Options of the $ CONVER card are not carried over with a spinoff activity.

On its execution report, the spunoff CONVER activity has the same $ IDENT record as its parent job and is cross-referenced to it by the message:

```
$$ JOB SPUNOFF FROM S#xxxxx
```

The execution report of the parent job indicates that a spinoff has occurred by the message:

```
**************************************
*CONVER ACTIVITY SPUN OFF AS S#,Snnn*
**************************************
```

where, Snnn is the SNUMB of the CONVER activity. (These SNUMBS's are assigned in consecutive order beginning with ,S001.)

BMC CONTROL CARDS

The control cards associated with the $ CONVER card are as follows.

```
1       8       16
$       LIMITS  Time,Storage-1,Storage-2,Print Lines,I/O Time
```

GCOS job limits card - optional; used when an amount of memory other than GCOS standard memory allocation for BMC is required. The standard limits are 0.08 hours of processor time, 7K of core storage, and 1000 lines of output.

```
1       8       16
$       (file)  IN
```

Various standard GCOS file control cards (i.e., $ READ, $ FILE, etc.) for the input device. (Use only one $(file) IN per activity.)

The input device is rewound at the beginning of a BMC activity. At the end of an activity, the input file is locked and a MME GERELS is issued. Refer to the General Comprehensive Operating Supervisor manual for a description of the effect of MME GERELS on the input file according to the various disposition codes.

```
1       8       16
$       INPUT   Parameters
```

$ INPUT control card is optional; used only if the input file requires other than standard system parameters for the device.

```
1       8       16
$       (file)  OT
```

Standard GCOS file control card for the output device (i.e., $ PUNCH, $ TAPE, etc.). The output device is rewound at the beginning but not at the end of an activity. (Use only one $ (file) OT card per activity.)

```
1       8       16
$       OUTPUT  Parameters
```

$ OUTPUT control card is optional; used only if the output file requires other than standard system parameters for the device.

1	8	16	
$	MULTI	File Sequence Numbers and Report Codes	

$ MULTI control card is optional, used for media conversion involving multiple input and/or output files; also for multiple report codes.

1	7	
FILES	Variables	

FILES card is a BMC parameter card; causes sequential processing of a specified number of files.

1	8	16	
$	FORM	Form Identification	

$ FORM control card is optional; used to inform the operator of special printer or card form required for this BMC activity.

The $ INPUT and $ OUTPUT control cards are necessary only if either of the media files varies from the BMC standard file parameters.

STANDARD SYSTEM PARAMETERS

If $ INPUT and $ OUTPUT cards are not included in the control card deck, BMC assumes standard parameters as a function of the input and output media. The standard system parameters are:

1. Block size (device-dependent):

   Card reader/punch -- 27 words
   Printer -- 440 words
   All other devices -- 320 words

2. Number of buffers:

   Printer -- 1 buffer
   All other -- 2 buffers

3. Record form:

   Unit record devices -- fixed
   All other devices -- variable-length

4. Record size: determined on basis of device type

5. Labels (magnetic tape only): included without file name

6. Block serial numbers: included where applicable

7. Density (magnetic tape only): high

8. Mode:

   Printer -- BCD
   Others -- binary

9. Retention period: 0 (magnetic tape only)

The standard system setup is capable of performing bulk media conversion between the following peripherals without need for input or output parameters:

Magnetic tape Disk Card reader	to	Card punch Magnetic tape Disk Printer

OPTIONAL SYSTEM PARAMETERS

The standard file specifications can be altered by use of either $ INPUT control card or $ OUTPUT control card. These cards can appear in any order after the $ CONVER card. If a $ DATA card is used, all BMC control cards must precede the $ DATA card.

```
1       8          16
$       INPUT      Parameters
  (or)
$       OUTPUT     Parameters
```

The parameters (described below) can be arranged in any order, but parameters contained on one card must be separated by commas; note that in some cases there is a choice in spelling of a parameter. Any blank beyond column 16, other than those contained in a file name, terminates card scanning. The $ ETC card cannot be used to specify additional parameters. However, multiple $ INPUT or $ OUTPUT cards can be used for this purpose. Permitted parameters are:

Block Size--Bxxxx

xxxx = block size, left-justified

The standard system allows for a maximum block size of 320 words for magnetic tape and disk files (input or output) and 27 words for card files. If either maximum is exceeded, the Bxxxx block size parameter is required. The maximum value for block size is 4095 words.

NOTE: A $ LIMITS control card may have to be used to accommodate any block size greater than the standard block size.

Low Density--LDENS or LODENS

This parameter is used when it is desired to read from or write to a magnetic tape in low density.

9-Track Tape Mode--ASA9

The ASA9 parameter is used to set the recording mode to the ASA 9-track tape format. This parameter is applicable only to magnetic tape files. The command used for reading is RT9 and that used for writing is WT9.

The ASA9 option will cause the stripping of the leading bit of each 9-bit byte before writing the tape, and will add a leading bit to each 8-bit byte when read. This mode is not required for normal 9-Track tape usage.

BCD Mode--MBCD or MODBCD

This parameter is applicable only to magnetic tape and should be used for reading or writing tapes in the BCD mode.

Binary Mode-- MBIN

Applicable to card reader only. BMC reads cards mixed unless the MBIN option is specified (in which case, read card binary is used). MBIN must be used for reading binary cards that do not contain 7-9 punches in column 1.

No Label--NLABEL or NSTDLB

This parameter is used when it is desired to read or write an unlabeled magnetic tape file.

No Block Serial Numbers--NSER or NOSRLS

If block serial numbers are not present on input files, or if they are not desired on output files, this parameter is used. The parameter is applicable only to magnetic tape files.

Retention Period--Rxxx or RETPER/xxx

xxx = Retention period in days, left-justified. This parameter is applicable only to labeled magnetic tape output files.

Fixed Record Length--Fxxx or FIXLNG/xxx

Applicable only to the punch, printer, and magnetic tape files.

xxx = Number of words/record, left-justified.

This parameter is used primarily when input is from records of fixed form or when the output is to be fixed form records with each record being the same length. The use of this parameter on a $ INPUT card causes the input record form to be regarded as fixed and each record to be the length specified by xxx regardless of the presence or absence of record size control words in the input file. The use of this parameter on the $ OUTPUT card causes the output record form to be fixed and all output records to be the length specified by xxx.

Mixed Record Length--MIXL

The MIXL parameter is applicable to magnetic tape files only.

1. When MIXL is used on a $ INPUT card, mixed-length records can be read; however there must be only one logical record per physical record. Note that the record size control word is not used for mixed-length records; therefore media and report codes are not applicable.

   For output to card punch, the recording mode is determined as follows:

   a. If input record size is 14 words, output mode is BCD.

   b. If input record size is 27 words, output mode is binary.

   c. If input record size is neither 14 nor 27 words, the recording mode is not changed from that found in the output file control block.

   For output to printer, the print lines are edited and single spaced or spaced according to the SLEWx parameter.

2. When MIXL is used on a $ OUTPUT card, the output record size is made equal to the input record size. MIXL also inhibits the addition of a record size control word to the output record.

Character Transliteration -- IBMF (FORTRAN), IBMC (COBOL), IBMEL (EXTENDED LANGUAGE) or GE225 (G-225)

The parameter (IBMF, IBMC, IBMEL, or GE225) is used when it is desired to undergo character transliteration from the IBM FORTRAN, IBM COBOL, IBM EXTENDED LANGUAGE, or G-225 character set, respectively, to the Standard Character Set (e.g., IBMF on a $ INPUT control card). The parameter is also used when character transliteration from the Standard Character Set to IBM FORTRAN, IBM COBOL, IBM EXTENDED LANGUAGE, or G-225 character set (e.g., IBMF on a $ OUTPUT control card) is desired.

NOTE: IBMF, IBMC, IBMEL or GE225 transliteration can be specified on the $ INPUT card for only the card reader or magnetic tape. Output can be to any output device. IBMF, IBMC, IBMEL or GE225 transliteration can be specified on the $ OUTPUT card for only magnetic tape or card punch. Input can be from any input device. If transliteration is specified on the $ INPUT card, it can not be specified on the $ OUTPUT card. If transliteration is specified on the $ OUTPUT card, it can not be specified on the $ INPUT card.

Character Transliteration -- ASCII to BCD or BCD to ASCII

The BMC $ OUTPUT may have one of following options:

"ASCII" to transliterate BCD to ASCII
"GBCD" to transliterate ASCII to BCD

ASCII/BCD transliteration in BMC can be requested by the use of the control card option or will be automatic if the expected output peripheral type (ASCII or BCD) is not online.

The following tables indicate which transliteration segment is to be used.

Table 2-1. Automatic Transliteration

Input Format	Output Format	Online Device Used	Transliteration Routine Used
ASCII	ASCII	ASCII PUNCH	none
BCD	BCD	ASCII PUNCH	none
ASCII	ASCII	BCD PUNCH	ASCII→ASCII BINARY IMAGE
BCD	BCD	BCD PUNCH	none
ASCII	ASCII	ASCII PRINTER	none
BCD	BCD	ASCII PRINTER	EBCD→EASC
ASCII	ASCII	BCD PRINTER	EASC→EBCD[a]
BCD	BCD	BCD PRINTER	none

[a] Slew by line count in ASCII allows up to 127 lines to be slewed while BCD allows a maximum of 15 lines to be slewed. The following conventions are followed:

If slew count ≤ 15, slew as indicated
If 15 < slew count ≤ 64, slew 15 lines
If slew count > 64, slew top of page

Table 2-2. Specified Transliteration

Input Format	Output Format	Online Device Used	Transliteration Routine Used
ASCII	BCD	ASCII PUNCH	ASC→BCD
BCD	ASCII	ASCII PUNCH	BCD→ASCII BINARY IMAGE
ASCII	BCD	BCD PUNCH	ASC BCD
BCD	ASCII	BCD PUNCH	BCD→ASCII BINARY IMAGE
ASCII	BCD	ASCII PRINTER	request ignored (denied)
BCD	ASCII	ASCII PRINTER	EBCD→EASC
ASCII	BCD	BCD PRINTER	EASC→EBCD[a]
BCD	ASCII	BCD PRINTER	request ignored (denied)
ASCII	BCD	HIGH SPEED	ASC→BCD OR EASC→EBCD
BCD	ASCII	HIGH SPEED	BCD→ASC OR EBCD→EASC

[a] Slew by line count in ASCII allows up to 127 lines to be slewed while BCD allows a maximum of 15 lines to be slewed. The following conventions are followed:

If slew count ≤ 15, slew as indicated
If 15 < slew count ≤ 64, slew 15 lines
If slew count > 64, slew top of page

Character Transliteration - HBCD to GBCD or GBCD to HBCD

The parameter S2000 is used with the $ INPUT card to read HBCD (H2000) cards and transliterate to GBCD, or with the $ OUTPUT card to transliterate GBCD characters to HBCD before punching cards. A B1 abort occurs, if a card reader is not assigned to the input file when using $ INPUT S2000 or, if a card punch is not assigned to the output file when using $ OUTPUT S2000.

Single Buffer--SBUFF

The SBUFF parameter is used when only one buffer is desired for the device specified.

Checksum--CKSUM

The CKSUM parameter applies to card reader files and is valid only on a $ INPUT control card. It is used to provide for a checksum test of all binary cards read during the activity.

When a checksum error is detected the operator is given the choice of:

1. Backspace and reread the error card.
2. Accept the error card and discontinue the checksum test of all the remaining binary cards read in the activity.

No $ ASCII or $ ENX Check - NSTRIP

When card input includes ASCII data, the ASCII data must be preceded by a $ ASCII card and followed by a $ ENX card. Since these cards are needed only for card input, BMC does not copy them to the output file.

The parameter NSTRIP is used with the $ INPUT card to bypass the check for $ ASCII and $ ENX cards and permit these cards to be copied to the output file. A B1 abort occurs, if a card reader is not assigned to the input file when using $ INPUT NSTRIP.

Character Substitution--TAKEc

The TAKEc parameter applies to 6-bit character set card reader files and is valid only on a $ INPUT control card. It is used to provide for the substitution of the character found in the "c" position of TAKEc, (where "c" may be any valid 6-bit card punch character except the delimiters comma (,) and blank (Ø)), for invalid card punch characters encountered in reading the input card file. When a card is read on an MPC card reader, the TAKEc option does not apply to illegal card punches (i.e., multiple punches in row 1-7).

Printer Slew--SLEWx

The SLEWx parameter on a $ OUTPUT card is used to specify the number of lines to slew when BMC must edit for printing, i.e., input records are fixed length or the NMEDIA parameter is present on a $ INPUT card. x = 1, 2, or 3, number of lines to slew; if x = other than 1, 2, or 3, a B1 abort occurs. If this parameter is not specified, a slew of 1 line is assumed.

Ignore Media Code -- NMEDIA,NMEDIA/NEPRT, or NMEDIA/n

For output to printer:

In order to print variable-length records that have not been edited for printing (no media code 3 or 7 and/or no slew codes in the print image), the NMEDIA parameter must be used on a $ INPUT card. NMEDIA causes BMC to ignore media codes and to print in the edit mode (see CALL EPRINT in the File and Record Control manual) when variable length records are to be printed.

The NMEDIA parameter is not needed if the input records are fixed length or mixed length.

A one line slew is executed unless specified otherwise by a SLEWx parameter on a $ OUTPUT card.

For output to card punch:

For variable length records, BMC examines each record for a media code 1 or 2. If a 1 or 2 is found, the output mode is set accordingly (binary for 1, BCD for 2) and the card image is sent to output. In this case the NMEDIA option is not needed and, if present, is ignored by BMC.

If the variable length records have not been edited for punching (no media codes 1 or 2), it is necessary to specify NMEDIA on a $ INPUT control card; otherwise no data is sent to output for punching. The NMEDIA option causes BMC to examine the input record size (bits 0-17 of the input record control word) and set the output mode as follows:

1. For 14-word record size - set output mode BCD.
2. For 27-word record size - set output mode binary.
3. If neither 14- or 27-word record size - leave the output mode unchanged.

In the case where records are already edited for printing and only the ignore media code function is desired, the NMEDIA/NEPRT parameter should be given with the $ INPUT control card. This parameter should not be used for card input/printer output.

If the user wishes to specify that a character-by-character scan need not begin until a particular word in the record is reached, the NMEDIA/n parameter should be used with the $ INPUT control card. For example:

```
$ INPUT NMEDIA/5
```

specifies that there are no printer control characters in the first five words of each record; therefore, time-consuming character-by-character scan does not begin until the sixth word of each record. The number of words to be skipped (n) should not be greater than the record length.

The number of lines per page is determined by the site default value.

Edit for Printing--EDITP and EDITP/nn

EDITP provides the edit for printing capability for records going to high speed devices (tape, disk, SYSOUT and remote). This capability is invoked by use of EDITP on a $ OUTPUT card. EDITP/nn provides the same function as EDITP plus the capability of allowing the user to determine the number of lines per page (nn).

When the EDITP option is specified, BMC examines the media code (variable length records) or record length (fixed length records) to determine if the record is BCD or ASCII. BMC inserts BCD or ASCII slews at the end of the data and media code 3 (BCD) or 7 (ASCII) into the RCW. An initial top-of-page slew plus page numbers are added so that the output is completely edited for printing. The output must be variable length. If fixed length (Fxxxxx) is specified a B1 abort will occur.

If /nn (number of lines per page) is not used with the EDITP parameter, the site default is used.

Specify Output Media Code--MEDIA/nn

If the user wishes to specify output media codes for variable length records when output is to a device other than printer or punch, the MEDIA/nn parameter should be used with the $ OUTPUT control card. The media code can range from 00 to 15.

Use Physical Record in Error-- Uxxxxx

xxxxx = Maximum number of error records, left justified, to be accepted on the input device without occurrence of activity termination. U is an identifier applicable to $ INPUT card only. (See "Error Recovery" in this section.)

Skip Physical Record in Error--Sxxxxx

xxxx = Maximum number of error records, left justified, to be skipped on the input device without occurrence of activity termination. S is an identifier applicable to $ INPUT card only. (See "Error Recovery" in this section.)

Restart Run-- Xnnnnnn

nnnnnn = Number of input records (logical, left justified) to be skipped before normal output is resumed. X is an identifier applicable to $ INPUT card only. (See "Error Recovery" in this section.) The P and the Q PAGE RANGE RESTARTS should not both be used at the same time.

Block Serial Number Error Alert-- SERALT

If a block serial error is detected during the reading of a disk or magnetic tape file, the presence of the SERALT parameter on a $ INPUT card gives the operator the option of continuing or aborting the job. (See "Error Recovery" in this section.)

File Name--*nnn...n

The *nnn...n parameter can be used for magnetic tape files when it is desired that the file name be checked on input or recorded on output labels. Unless used as the last field, 12 characters must follow the asterisk. BMC picks up the entire 12-character field; therefore, blanks and commas within the 12-character field are assumed to be part of the file name. It is recommended that the file name variable be the last entry on $ INPUT or $ OUTPUT control cards. Used as the last field, the file name can contain less than 12 characters, and BMC inserts blanks to fill out the 12 characters.

Page Range Restart--Pn...n or Pn..n/m..m, Qn..n or Qn..n/m..m

The page range restart option allows for re-printing various sections of a report based on a beginning and ending page number (Qn..n/m..m) or a beginning and ending top of page slew (Pn..n/m..m).

Where:

n = Beginning m = Ending

The "P" parameter is for top-of-page slew count restart and the "Q" parameter is for actual page number restart.

The "P" and "Q" parameters are applicable only to the $ INPUT card.

The following rules apply:

1. P and Q restarts are valid only for printer directed output (i.e., $ PRINT OT).

2. The NOID option on the $ OUTPUT card should be used.

3. The x restart option should not be used.

4. The P and Q restarts can only be used in a given activity for a single file. However, positioning to the correct file of multi-files can be done first with a $ MULTI card or FILES card in the same BMC activity.

5. Up to five parameters can be specified for each re-print job. If more are used, a B1 abort occurs. A report can be restarted at a given page number or top of page slew and printed to the end. The format for this is Pn..n or Qn..n.

6. The parameters must be in ascending sequence. If there is an out-of-sequence, only the pages that were in sequence are printed and normal termination occurs.

7. If a page number or top-of-page slew number is used greater than that available in the given file, a normal termination occurs, with all pages being printed that were available.

8. If the "P" (top-of-page slew) option is used and more than 100 records are read without a top-of-page slew appearing, a B8 abort occurs.

9. When using the "Q" (page number) option, BMC depends upon the word "PAGE" and the page "NUMBER" being in specific locations. The location for "PAGE" is the 2nd through 5th position of the 18th word and the page "NUMBER" is expected right-justified in the 19th word. These are the positions used for these fields by File and Record Control's CALL PRINT and CALL EPRINT routines.

Card Label--*nnn...n

The *nnn...n parameter can be used when it is desired that the card label be checked on the card data deck. Unless used as the last field, 12 characters must follow the asterisk. BMC picks up the entire 12-character field; therefore, blanks and commas within the 12-character field are assumed to be part of the card label. It is recommended that the card label parameter be the last entry on $ INPUT control cards. Used as the last field, the card label can contain less than 12 characters, and BMC inserts blanks to fill out the 12 characters.

No Identification--NOID

The NOID parameter on a $ OUTPUT card is used when it is desired to bypass printing/punching of the BMC printer-banners/identification cards. If the NOID parameter is not specified, the banners/cards are output.

COMDK Decompression -- COMDK

This parameter is used on the $ INPUT control card when it is desired to decompress a COMDK. The COMDK can be on any device and the source output can be on any device. If the COMDK is on either tape or disk and does not have media codes, the NMEDIA option must be used for output to the printer or punch. Any BCD cards encountered are output normally.

A B8 abort occurs under the following conditions:

1. If a binary card read is not a COMDK card.
2. If a COMDK card contains an error.

FILE CONTROL CARDS

The bulk media conversion program requires the use of standard GCOS file control cards. However, BMC specifies that the two-character file code designation be IN for input files and OT for output files. Following are the file control cards used by BMC. For a more detailed discussion, refer to the Control Cards Reference Manual.

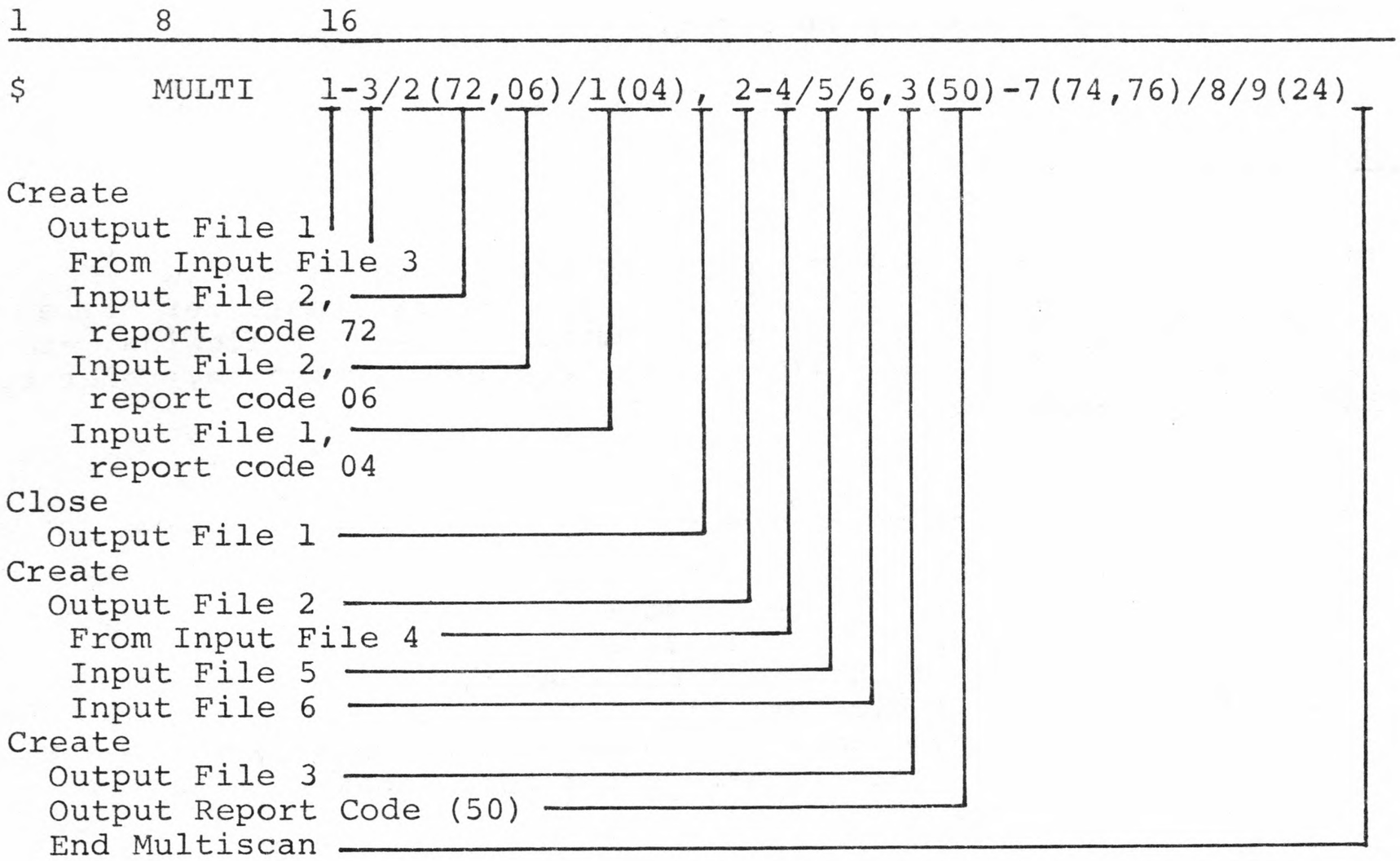
1	8	16
$	READ	IN, Logical Unit Designator
$	PUNCH	OT, Logical Unit Designator
$	PRINT	OT, Logical Unit Designator
$	TAPE TAPE7 TAPE9	IN or OT, Logical Unit Designator, Multireel Indicator, File Serial No., Reel Sequence No., File Name, Class, Density
$	FILE	IN or OT, Logical Unit Designator, Access
$	SYSOUT	OT
$	DATA	IN, Options
$	PRMFL	IN or OT, Permit, Mode, File String
$	REMOTE	OT, Destination
$	167PK 170PK 180PK 181PK 190PK 191PK 310PK 400PK	IN or OT, Logical Unit Designator, Access, Pack Number, Pack Name, Ownership

$ MULTI CONTROL CARD

The $ MULTI control card is used to build an output file, or files with a single (per file) user specified report code, from various input files according to the file sequence and report code(s) specified by the user. The format of the $ MULTI control card is as follows.

1	3	16
$	MULTI	File Sequence Numbers and Report Codes

Some possible variable field entries, beginning in column 16, are described in the following example:



$ MULTI Variables

Output and input file numbers are expressed in decimal. The parameter is limited to 3 digits; therefore, 999 is the greatest number of files that can be processed.

A hyphen or minus (octal 52) separates the output file number or output report code on the left from the input file number(s) on the right.

A slash (octal 61) separates the input file numbers of the files to be sent to the same output file in the order given, that is, left to right. A slash does not close the output file.

A left parenthesis (octal 35) indicates that report codes follow.

A right parenthesis (octal 55) indicates the end of the set of report codes.

A comma within a parenthesis (octal 73) separates report code numbers. The number of commas allowed within a pair of parentheses is one less than the number of report codes. All records within the file with a request report code are sent to the output file before the search for the next report code is begun.

A comma outside a parenthesis (octal 73) indicates the end of a set of output file parameters. The output file is closed.

Report codes are expressed as two-digit "octal" numbers; that is, the digits 8 and 9 are not allowed. The leading zero is required for codes 00 through 07.

A blank (octal 20) indicates the end of the parameters on a $ MULTI control card. There must be a blank prior to or in column 72 of each $ MULTI control card.

Use Of The $ MULTI Control Card

The order of the $ MULTI cards is significant. The table of output file numbers, output report codes, input file numbers, and input report codes is constructed according to the order of the parameters found on each $ MULTI control card, and according to the order of all $ MULTI control cards in the BMC deck.

The following conventions are used to continue information from one $ MULTI card to the next.

REPORT CODES. The output report code for a given output file number cannot be split to the next card. For each left parenthesis there must be an associated right parenthesis on the $ MULTI control card; that is, pairs of parentheses cannot be split between $ MULTI cards. If there is not enough room on the card for all the report codes needed for a given output file, begin the succeeding $ MULTI card with the same input file number at column 16 (to avoid closing the output file) and follow the input file number with a set of parentheses containing the remaining report codes.

Example:

First Card

```
1       8       16
$       MULTI   1-1/2/3/4(01,02,22,23,24)
```

Second Card

```
1       8       16
$       MULTI   4(25,26,30,15,16,17)
```

Output file 1 is created from input files 1, 2, 3, and those records of input file 4 with report codes 01, 02, 22, 23, 24, 25, 26, 30, 15, 16, and 17. All of report 01 is sent to output before report 02 is considered. All of report 02 is sent to output before report 22 is considered, etc.

A specified output report code is inserted into all records with report codes matching the specified input report codes. No report code change is made if an input report code(s) is not specified. Hence, it is possible to change any number of input report codes to a single output report code.

INPUT FILE NUMBERS. If there is not enough room on a $ MULTI card for all the input file numbers associated with a given output file number, continuation of input file numbers from one $ MULTI card to the next (without closing the output file) is obtained by leaving a blank behind the nth file number and placing the N + 1 input file number on the next $ MULTI card, beginning in column 16. An output file number, an output report code, a slash, or a hyphen must not be followed by a blank or improper file sequence results.

Example:

First Card

1	8	16
$	MULTI	1-1/2/3/4

Second Card

1	8	16
$	MULTI	5/6/7,2-1

Third Card

1	8	16
$	MULTI	2/3/4/5

Output file 1 is created from input file numbers 1 through 7. Output file 2 is created from input files 1 through 5.

Only one pair of parentheses can follow an input file number. It is permissible to use the same input file number several times on a single $ MULTI control card.

There is no limit on the number of $ MULTI card file numbers and report codes that can be used, other than that imposed by memory required for the MULTI table built by BMC. As the table (containing the file numbers and report codes) increases in size, the space remaining for the input/output buffers is reduced. The following rules can be used as a rough guide for calculating the size of the MULTI table:

1. Each output file number requires two memory words (one word for the output file number and its associated output report code (if specified), and the other word for a count of the number of input files to follow).

2. Each input file number requires two memory words (one word for the input file number and one word for the count of the following report codes).

3. Each input report code requires one memory word.

During the first pass through the specified input file, BMC determines and stores in a table the logical record number where each report (code) starts and ends within the file. On each subsequent pass through the input file, BMC continually checks for the final record of the current report. When this record is encountered, BMC terminates its search for this report instead of continuing to end-of-file.

$ MULTI Entry Totals

When input report codes are specified on the $ MULTI control card, the following message appears on the execution report for each report code, in sequence:

```
FILE #xxxxxx RPT CODE xx xxxxxx IGN xxxxxx
```

For each file that is specified without a report code, the following message appears:

```
FILE #xxxxxx TOT xxxxxx INPUT
```

FILES CONTROL CARD

1-5	7-12	13-18
FILES	ffffff	ssssss

Where:

ffffff = Number of last file to process.
ssssss = Starting file number.
If not present, it is assumed to be 1.

The FILES control card causes sequential media conversion of the specified files, from ssssss to ffffff and cannot be used if a $ MULTI control card is present, character transliteration is specified, or input is from card reader. If more than one FILES control card is included in the deck, only the last one is effective.

Example:

If it is desired to obtain the last five files from 10 files in input storage, the FILES control card is punched as follows:

1 - 5	7 - 12	13 - 18
FILES	000010	000006

Files 1-5 are skipped; output begins with file 6 and continues through the end of file 10.

An option of placing 999999 in the "number of last file to process" field, positions 7 through 12, allows processing through the last input file regardless of the number of files present, and without being aborted.

$ FORM CONTROL CARD

The format of the $ FORM card is:

1	8	16
$	FORM	nnnnn...n

Where:

nnnnn...n is the form identification.
(This field is restricted to 51 characters.)

If a specific form is required for printer or punch output, the $ FORM control card must be used to define the form. The form identification from the $ FORM card is typed on the console typewriter. The printer or punch must be online.

Example:

1	8	16
$	FORM	THREE PART 11x14 PAPER

This would result in the following typeout:

sssss-aa MNT {PRT / PCH} i cc THREE PART 11x14 PAPER

Where:

i = IOM number
cc = Channel address
sssss-aa = SNUMB and activity number

Form identification information, "THREE PART 11x14 PAPER," is taken from the $ FORM card. The BMC program supplies the remaining parts of the message.

When a $ FORM option is used with printer or punched card output, the message to change form is typed and BMC waits until a special interrupt is received from the printer or punch indicating that the new form was placed in the output device.

Only one $ FORM card can be used per activity.

ERROR RECOVERY

Input Error

When an error occurs on an input device, BMC either accepts the record in error, deletes the record in error, or terminates the job depending on which one of the following options the user specifies on the $ INPUT control card. See Table 2-3, "Error Recoveries and Aborts".

1. Use physical record in error -- Uxxxxx

   where

   xxxxx = Maximum number of error records, left justified, to be accepted on the input device without occurrence of termination.

   U = Parameter applicable only to $ INPUT card.

   The input record in error is used as read. A message is written on SYSOUT for each error record used. When the maximum number of errors is exceeded, a code B7 abort results, and a termination message is written on SYSOUT.

2. Skip physical record in error -- Sxxxxx

   where

   xxxxx = Maximum number of error records, left justified, to be skipped on the input device without occurrence of termination.

   S = Parameter applicable only to $ INPUT card.

   The input record in error is skipped. A message is written on SYSOUT for each error record skipped. When the maximum number of errors is exceeded, code B7 abort results and a termination message is written on SYSOUT.

3. Specification of the U or S parameter on the $ INPUT card causes the operator to be bypassed in the case of a physical record in error. If the user does not specify either the U or S parameter on the $ INPUT card, an input error results in a code B6 (no user action) abort if the operator returns status to BMC by typing in a U.

Operations must always be directed to return status to BMC in response to input device error messages to ensure that the input error option selected by the user is carried out.

4. Block Serial Number Error Alert - SERALT (applicable only to the $ INPUT card).

When a block serial number error occurs, the operator has the option of typing in a C or an A.

C = Ignore the error and continue the activity.

A = Abort the job.

If the SERALT parameter is not present on the $ INPUT card, the run is aborted immediately if a block serial number error occurs.

Table 2-3. Error Recoveries and Aborts

INPUT DEVICE	MESSAGE	TYPE-WRITER	SYSOUT	OPERATOR TYPE-IN	ACTION[1]
Card Reader	GFRC DETECTED ERROR CODE, cc STATUS ms ss where cc is the error code (01-08), ms is major status, and ss is substatus		X		B8 Abort
	NO USER INPUT ERROR OPTION		X		B6 Abort
	INPUT ERROR, USE CARD nnnnnn		X		
	INPUT ERROR, SKIP CARD nnnnnn		X		
	MAXIMUM NUMBER INPUT ERRORS		X		B7 Abort
	If run is aborted:				
	INPUT CARD COUNT nnnnnn		X		Terminate
	CKSUM ERROR CARD READER i cc SNUMB sssss	X	X		
	TO REREAD--BACKSPACE { 1 CARD / 2 CARDS } AND TYPE B	X	X	B	Reread
	TO CONTINUE WITH NO FURTHER CKSUMMING-- TYPE C	X	X	C	Continue
	where i is the IOM number, cc is the channel address, and sssss is the SNUMB number. The "1 CARD" option is typed for single buffered input and the "2 CARDS" option is typed for double buffered input.				
Disk	GFRC DETECTED ERROR CODE, cc STATUS mm ss where cc is the error code (01-08), ms is major status, and ss is substatus		X		B8 Abort
	NO USER INPUT ERROR OPTION		X		B6 Abort
	INPUT ERROR, USE BN nnnnnn		X		
	INPUT ERROR, SKIP BN nnnnnn		X		
	MAXIMUM NUMBER INPUT ERRORS		X		B7 Abort
	If run is aborted:				
	INPUT BLOCK COUNT nnnnnn		X		Terminate
Disk or Magnetic Tape	sssss aa { MT / DS / DR } i cc dd BLOCK SERIAL ERROR	X	X		
	TYPE C TO CONTINUE OR A TO ABORT	X	X	C	Continue
	where sssss=SNUMB aa=Activity number i=IOM cc=Channel dd=Device address			A	Abort
	UNRECOVERABLE D/D INPUT ERROR		X		B8 Abort
Magnetic Tape	ILLEGAL 77 FILE MARK		X		B8 Abort
	GFRC DETECTED ERROR CODE, cc STATUS ms ss where cc is the error code (01-08), ms is major status, and ss is substatus		X		B8 Abort
	NO USER INPUT ERROR OPTION		X		B6 Abort
	INPUT ERROR, USE BN nnnnnn REEL nnn		X		
	INPUT ERROR, SKIP BN nnnnnn REEL nn		X		
	MAXIMUM NUMBER INPUT ERRORS		X		B7 Abort
	If run is aborted:				
	INPUT BLOCK COUNT nnnnnn		X		Terminate

[1]See Section V for abort codes.

Output Error

Standard recovery action for each type of output device is summarized in the following table.

Output Device	Recovery Action
Disk	File and Record Control abort.
Magnetic Tape	File and Record Control abort.
Printer	Uses the printer button interface and follows the operator action specified.
Card Punch	Types the message sssss-aa REMOVE LAST 2 CDS PN icc, and repunches the cards removed by the operator.

Restart Facilities

BMC has restart facilities for high-speed device to printer, to card punch, and to another high-speed device.

The following parameter must be specified on the $ INPUT control card whenever a restart is desired:

Xnnnnnn

Where:

nnnnnn = Number of input print/punch records, left justified, that, instead of being sent to output, are to be skipped.

X = Parameter applicable only to $ INPUT card.

All output is suppressed during the restart run until the logical input record count reaches nnnnnn+1. If output is to the punch, normal punching is resumed. If the input contains its own slew codes and output is to the printer, a top-of-page slew code is issued before normal printing is resumed. Otherwise, normal printing is resumed immediately.

For printer output, BMC has additional restart parameters Pn..n/m../ and Qn..n/m..m .

Where:

Pn..n/m..m = Parameter for top-of-page slew count

All output is suppressed during the restart run until the top-of-page slew count reaches n.

Qn..n/m..m = Parameter for actual page number starting at n and ending at m.

All output is suppressed during the restart run until the actual page number reaches n.

If restart is required at any file other than the first on a multifile reel, the input tape must be positioned on the right file by a $ MULTI or FILES control card in the restart activity.

If multiple report codes were being processed, a $ MULTI control card must restart the activity at the proper report code also.

If an abort occurs during a restartable BMC activity, the message

*TERM sssss-aa, REEL rrrr, FILE ffff, COUNT nnnnnn

Where:

sssss = SNUMB
aa = Activity number
rrrr = Reel sequence number
ffff = File number (count)
nnnnnn = Number of logical records that have been printed/punched successfully up to this point. This count is reset to zero at the beginning of each file on a multifile reel and at the beginning of each reel of a multireel file.

is typed out and written on SYSOUT to supply restart information. This message can appear also in nonrestartable situations (e.g., card to tape) merely for informational purposes.

Printer Button Interface

Any action taken by the operator in using the printer buttons is reflected in the execution report by messages. These messages are as follows:

FORWARD SPACE TO TOP OF PAGE
INVALID LINE
OPERATOR RESTARTED THIS REPORT
OPERATOR KILLED THIS REPORT
BACKSPACE TO TOP OF PAGE
BACKSPACE

SUBSTATUS AND PROGRAM ACTION WITH BMC

NORMAL (00). Normal printing.

PRINT ONE LINE (01). Prints next line of report.

FORWARD SPACE (02). Prints and types OPERATOR KILLED THIS REPORT, and forward spaces the input device to the beginning of the next report.

FORWARD T.O.P. (03). Prints FORWARD SPACE TO TOP OF PAGE, forward spaces input device, skips remainder of current page and executes a paper slew to top of page.

INVALID LINE (04). Prints INVALID LINE.

REVERSE REWIND (05). Prints and types OPERATOR RESTARTED THIS REPORT, rewinds input device to beginning of report, and executes paper slew to top of page.

BACKSPACE (06). Prints BACKSPACE, and backs up input device one print line.

BACKSPACE T.O.P. (07). Prints BACKSPACE TO TOP OF PAGE, and backspaces input device to previous top of page position of current report. If no top of page slew is encountered within 100 records, a B8 abort occurs.

EXAMPLES OF USE WITH BMC

1. Print next line of report.

```
PRINT ONE LINE
OPERATE/RESET
NORMAL
OPERATE/RESET
```

2. Terminate current report.

```
FORWARD SPACE
OPERATE/RESET
NORMAL
OPERATE/RESET
```

3. Skip to next top of page.

```
FORWARD T.O.P.
OPERATE/RESET
NORMAL
OPERATE/RESET
```

4. Print invalid line.

```
INVALID LINE
OPERATE/RESET
BACKSPACE T.O.P.  }      if reprinting of current
OPERATE/RESET     }      pages is desired
NORMAL
OPERATE/RESET
```

5. Reprint from beginning of current report.

```
REVERSE REWIND
OPERATE/RESET
NORMAL
OPERATE/RESET
```

6. Reprint last line of report.

```
BACKSPACE
OPERATE/RESET
NORMAL
OPERATE/RESET
```

7. Reprint from previous top of page.

```
BACKSPACE T.O.P.
OPERATE/RESET
NORMAL
OPERATE/RESET
```

NOTE: Multiple use of printer buttons - Three printer buttons can be used more than one time prior to pushing the NORMAL and OPERATE/RESET buttons.

1. FORWARD T.O.P. causes forward space to the next top-of-page slew each time the FORWARD T.O.P. and OPERATE/RESET buttons are used.

2. BKSPACE T.O.P. causes backspace to the previous top-of-page slew each time the BKSPACE T.O.P. and OPERATE/RESET buttons are used.

3. BACKSPACE causes backup of one print line each time BACKSPACE and OPERATE/RESET buttons are used.

No Output Data

If BMC is not able to send any data to output during the reading of a file, the following message is written on SYSOUT:

NO DATA SENT TO OUTPUT FILE NO. ffff, CHECK MEDIA CODE

If an examination of the input data shows that the media code is missing, or is not compatible with the output device, the NMEDIA option is available.

RECORD COUNT ON EXECUTION REPORT

The execution report lists record count totals for a BMC activity in the following form:

```
INPUT COUNT      xxxxxx        OUTPUT COUNT xxxxxx
BLOCKS SKIPPED   xxxxxx        IGNORE COUNT xxxxxx
```

Where:

INPUT COUNT is the count of all logical records read, including multiple readings of the same record caused by using a $ MULTI control card. The count is not reset by multiple files or reels. This count does not include (1) file marks and label records or (2) logical records contained in a skipped file or block.

OUTPUT COUNT is the count of all logical records sent to output except (1) printer and card punch header and trailer banner records, (2) standard file marks and label records, and (3) error records.

BLOCKS SKIPPED is the count of physical records skipped by using the $ INPUT Sxxxxx (skip physical record in error) option.

IGNORE COUNT is the count of all logical records read but not sent to output, including multiple readings of the same record caused by using a $ MULTI control card. The count is not reset by multiple files or reels. This count does not include (1) file marks and label records or (2) logical records contained in a skipped file or block.

Input records included in the ignore count are, for example:

1. Those preceding nnnnnn+1 when restarting via the $ INPUT Xnnnnnn option.

2. Those whose report code does not match the report code in the $ MULTI control card.

3. Those whose media code does not agree with the media code required for output.

LABEL CHECKING FOR CARD READER INPUT

Normally a label check is not made for card reader input, but if label checking is desired, the file name option *nnnnnnnnnnnn must appear on a $ INPUT control card. A label card with an * in column 1 and the label, in columns 2-13, corresponding to the file name appearing on the $ INPUT control card, is placed in front of the input card deck.

The label card is read and the contents compared with the file name. If there is no * in column 1, or the contents of columns 2-13 do not agree with the file name, the following message is typed:

```
*sssss-aa LABEL ERR *nnn...n   (Expected label as found on $ INPUT control
                               card, where sssss = job number and aa =
                               activity number.)

          ccc...c NO           (Actual label from card where the c's are the
                               first 13 characters on the label card.)

  LOAD CORRECT DECK, TYPE RD   (Operator should reply with RD after loading
                               into the card reader the deck with a label
                               card containing the expected label.)
```

After the operator has reloaded the card reader, and typed RD, the label check is repeated.

PRINTER AND CARD PUNCH OUTPUT IDENTIFICATION

If the output is to the card punch, a header card and a trailer card are punched with the following formats:

```
                1---56789----80
Header     sssss-aa...
Trailer    sssss-aa99 ...9
```

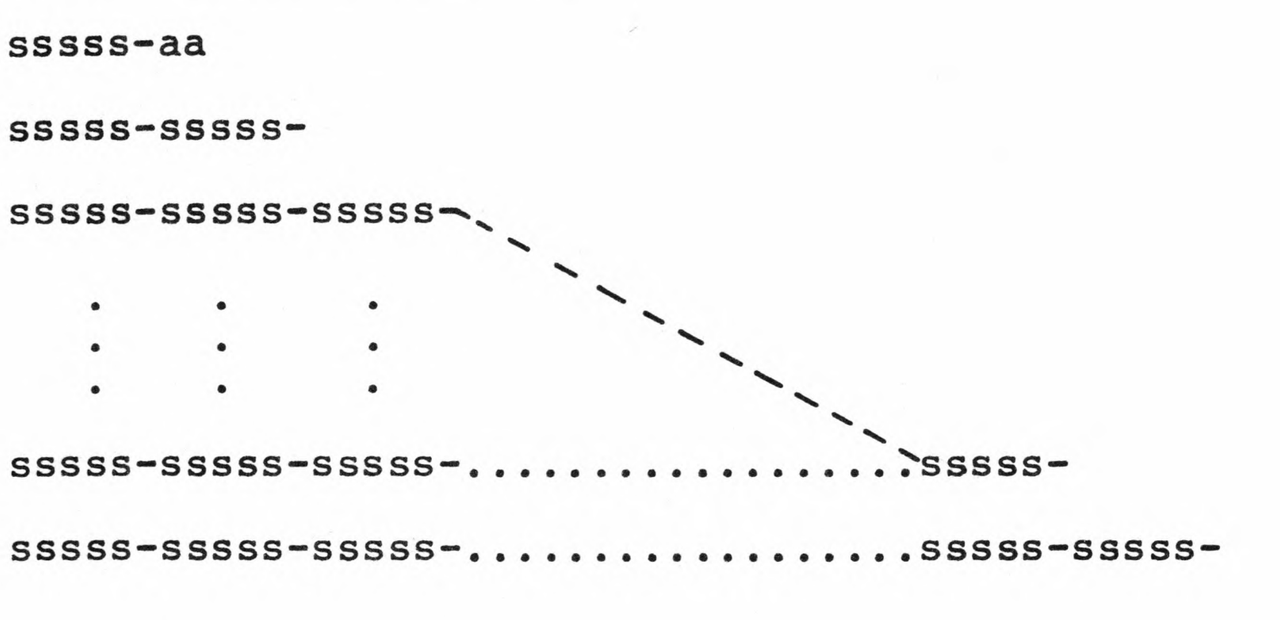
where

sssss = SNUMB

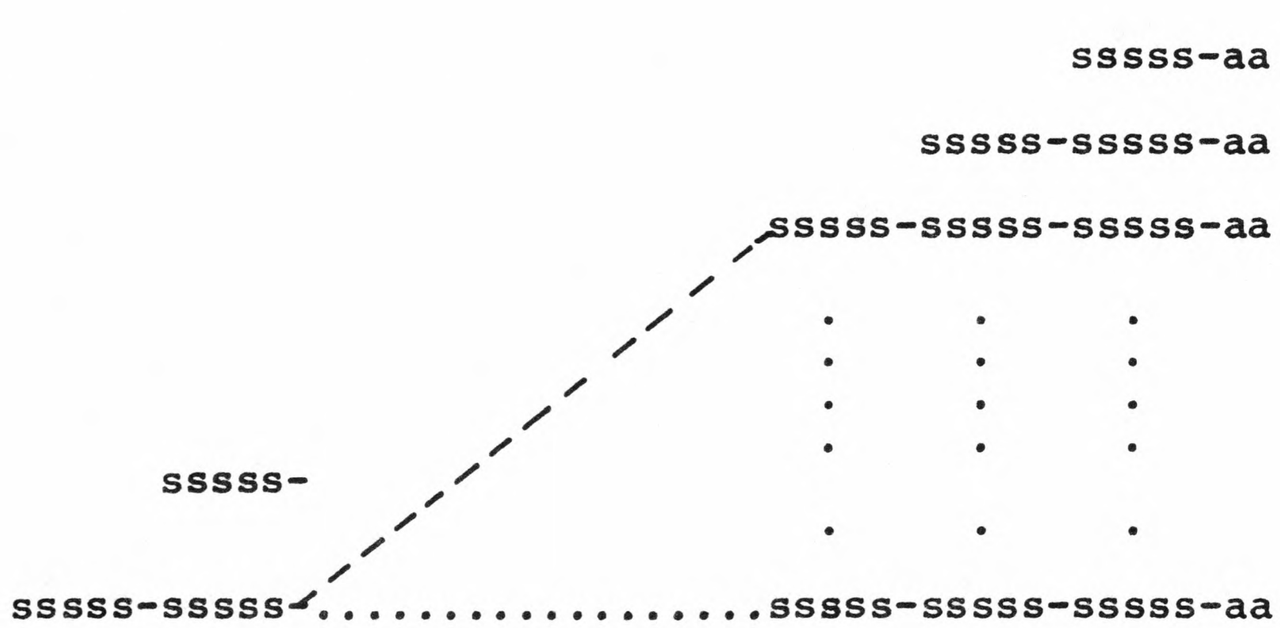
aa = Activity number

If the output is to the printer, a header and trailer banner are printed.

The header banner appears as



and the trailer banner appears as



The printer banners or identification cards can be suppressed by specifying the NOID parameter on a $ OUTPUT control card.

SECTION III

PROGRAM USAGE

An important step in using the BMC program is the definition of the input and output files. The user must decide if input and output files are in the standard BMC format. If the files are not in standard format, optional control cards must be used for specifying their nonstandard features.

It is also important to note that if the combined input and output block sizes exceed 640 words, a $ LIMIT control card must be used. See Appendix A for a complete list of control cards for BMC. Appendix B contains a complete list of both the standard and optional parameters for each peripheral used by BMC.

The input device is rewound at the beginning of a BMC activity. At the end of an activity, the input file is locked and a MME GERELS is issued. Refer to the General Comprehensive Operating Supervisor manual for a description of the effect of MME GERELS on the input file according to the various disposition codes.

The output device is rewound at the beginning but not at the end of an activity.

When printing from an input file of fixed length records, BMC edits the line images before printing and provides a 1-line slew. Variable length input records must contain media code 3 to be printed and the media code 1 or 2 to be punched unless the NMEDIA option is used. (See "Interface with GCOS and File and Record Control" in Section IV.)

The remainder of the section contains examples of deck setups for various types of bulk media conversion.

CARD TO REMOTE PUNCH

This example of BMC input deck (Figure 3-1) shows a method of sending a mixed (binary and BCD) card deck to a remote site. The media codes are placed in the data file by System Input.

```
$  SNUMB
$  IDENT
$  CONVER
$  REMOTE OT
$  DATA IN
      .    } file of mixed
      .    } data cards
$  ENDJOB
```

Figure 3-1. Card-to-Remote Punch Deck

NOTE: A $ DATA file must follow any BMC control cards used. Otherwise, any BMC control cards ($ INPUT, $ OUTPUT, $ FORM, $ MULTI, FILES) following the $ DATA file are not seen by BMC.

CARD TO PRINTER

This example of BMC input deck (Figure 3-2) assumes that the job is a card-to-printer conversion, and the input cards are in BCD format. Therefore, an input optional control card need not be used since the input mode is assumed to be BCD and the record length is fixed at 14 words during card-to-printer conversions. The complete control card deck for this job is shown below. The $ READ and $ PRINT control cards are standard GCOS file control cards designating the input device as a card reader and the output device as a printer.

```
$  SNUMB
$  IDENT
$  CONVER
$  READ     IN
$  PRINT    OT
$  ENDJOB
```

Figure 3-2. Card-to-Printer Deck

CARD TO TAPE

This example of a BMC input deck (Figure 3-3) assumes that the input is standard format binary cards. The output will be a standard format tape file, labeled FLIPFILE, to be retained 30 days. Since the input and output files are standard format, the combined block sizes do not exceed 640 words; therefore, a $ LIMITS control card card is not needed.

```
$  SNUMB
$  IDENT
$  CONVER
$  READ      IN
$  TAPE      OT,A1D,,,,FLIPFILE
$  OUTPUT    R30,*FLIPFILE
$  ENDJOB
```

Figure 3-3. Card-to-Tape Deck

TAPE TO PRINTER

This example of a BMC input deck (Figure 3-4) assumes that the input is a magnetic tape file labeled CKFILE. The tape contains two files of fixed-length, 14-word non-edited records in binary mode to be printed. The block length is 320 words and the blocks carry block serial numbers. The output is to be a single printer file obtained from the two input files. The operator is requested to use three-part paper in the printer. Since the input is made up of fixed length records, the line image editing and a 1-line slew are provided by BMC.

```
$  SNUMB
$  IDENT
$  CONVER
$  TAPE      IN,A1D,,85
$  INPUT     F14,*CKFILE
$  PRINT     OT
$  FORM      USE 3 PART 11x14 PAPER
$  MULTI     1-1/2
$  ENDJOB
```

Figure 3-4. Tape-to-Printer Deck

TAPE TO PUNCH

This example of a BMC input deck (Figure 3-5) assumes that the input file is a magnetic tape (containing BCD information) in binary mode with fixed length, 14-word records. The block size is 210 words and the blocks have serial numbers. The tape is labeled CARDFILE. Since the input record size is 14 words, BMC sets the punch mode to BCD. The output record size (to be F14) does not have to be specified. In the absence of an output record size, BMC considers the output record size the same as the input record size.

```
$  SNUMB
$  IDENT
$  CONVER
$  TAPE      IN,A1D,,93
$  INPUT     F14,B210,*CARDFILE
$  PUNCH     OT,A1
$  ENDJOB
```

Figure 3-5. Tape-to-Punch Deck

FILE TO PUNCH

In the previous examples, the media conversion is a one-activity job. In this example (Figure 3-6), the BMC program is run as the second activity of a job. This example assumes the first activity creates a file with BCD data from card and magnetic tape input. The BMC activity converts the file onto cards.

Standard GCOS file control cards are used in both activities to designate the input and output devices.

```
$  SNUMB
$  IDENT
$  OBJECT
     .
     .      }    object deck
     .
$  DKEND
$  EXECUTE
$  LIMITS
$  FILE      AA,A1S,4L
$  TAPE      CE,A1D,,123
$  DATA
     .
     .      }    AB deck
     .
$  ENDCOPY
$  CONVER
$  FILE      IN,A1R,4L
$  PUNCH     OT
$  ENDJOB
```

Figure 3-6. File-to-Punch Deck

CARD TO IMCV TAPE

This example shows a BMC input deck that creates a standard system format IMCV tape.

```
$  SNUMB
$  IDENT
$  CONVER
$  READ      IN
$  TAPE      OT,A1D,,,,JOB-INPUT
$  ENDJOB
```

Figure 3-7. Card-to-IMCV-Tape Deck

Card input to the BMC run looks like any other job input deck. For the format of IMCV tapes, see the System Startup and Operation manual.

SECTION IV

PROGRAM STRUCTURE

In order to conserve memory space, bulk media conversion is written as a series of subprograms. One subprogram, the main or executive routine of BMC, remains in memory throughout execution of the BMC activity. Other BMC subprograms are called as needed by the main routine and overlay one another using the System Loader. The functions of the main routine of BMC and each overlay are described below, in the order of processing.

MAIN ROUTINE (OVERLAY A)

With the exception of the MC file and its associated buffer and OPEN routine, the main routine remains in memory throughout the execution of the BMC activity. This routine contains the three file control blocks used by BMC: (1) the IN (input) file, (2) the OT (output) file, and (3) the MC file (BMC control information file created by GCOS from BMC control cards). The main routine also contains the necessary control and switch words for communication between overlays.

OVERLAY B

Overlay B performs file control block initialization for the user input file IN, and the user output file OT, based on the $ INPUT or $ OUTPUT control card parameters, found in the MC file, and the device type. Overlay B also does the processing of the $ FORM and FILES control cards and builds a table of $ MULTI control card parameters at the top of the allocated memory area.

During initialization, buffer locations are calculated, based either on standard system parameters for the specified device or on block size as supplied by the user through $ INPUT and/or $ OUTPUT parameters. Buffer areas occupy the top of the allocated memory area and extend downward as necessary; they follow the $ MULTI table, if it is present.

Overlay B of the BMC program assigns standard block sizes on the basis of device type as follows:

Magnetic disk Magnetic tape	320 words
Card reader Card punch	27 words

During initialization, the control cards in the MC file are recorded on SYSOUT.

OVERLAY C

Overlay C performs the CLOSE functions for the MC file.

OVERLAY D

Overlay D performs the character set transliteration functions in conjunction with Overlays K through Q.

OVERLAY E

Overlay E performs the MULTI function (multifile and report code processing) in conjunction with Overlays K through Q, as required.

OVERLAY F

Overlay F performs the OPEN functions for the IN and OT files.

OVERLAY G

Overlay G performs CLOSE functions for closing the IN and OT files and terminates the activity.

OVERLAY H

Overlay H performs the GET and COPY functions for logical record processing of the IN and OT files.

OVERLAY I

Overlay I performs the GET and COPY functions for logical record processing in which card punch output is required.

OVERLAY J

Overlay J performs the GET and MME GEINOS functions for logical record to printer output.

OVERLAYS K THROUGH Q

In any given activity, the $ file control cards determine which of the following overlays are to be used in the BMC run:

Overlay K - High-speed device to high-speed device

Overlay L - High-speed device to card punch

Overlay M - High-speed device to printer

Overlay N - Card reader to high-speed device

Overlay P - Card reader to card punch

Overlay Q - Card reader to printer

The Printer Button Interface subroutine is combined with Overlay J for use with Overlays M and Q.

OVERLAY R

Overlay R performs the control functions for the FILES option.

INTERFACE WITH GCOS AND FILE AND RECORD CONTROL

Bulk media conversion, called by a $ CONVER control card, operates as a system program in slave mode under GCOS. GCOS, the operating system, places input/output optional parameter cards associated with the BMC activity in a file with the code MC. GCOS calls the BMC main subprogram into allocated memory from the system library file. The main BMC subprogram sets up a 13-word file control block for the MC file, and two 15-word file control blocks--one for the IN (input) file and one for the OT (output) file. Overlay A performs the standard OPEN function on the MC file. Overlay B performs the file control block initialization for files IN and OT, based on the control card information on the MC file and standard parameters for BMC. During initialization by Overlay B, the block sizes and buffer locations are also determined by the information contained on the MC file or BMC standard device type parameters.

Because the Bulk Media Conversion program uses standard File and Record Control routines to perform its input/output functions, with the exception of printer output, it is necessary for the user to ensure that input or output files conform generally to standard system format. (Exceptions are allowed as noted under "Optional System Parameters" in Section II.)

The details of the standard system format are as follows:

1. Block size--Data blocks are variable in length up to a maximum block size of 320 words.

2. Block serial number--A block serial number exists as the first word of each data block and contains two binary values as follows:

Bits 0-17 Block serial number--The sequential number of this physical record within the current reel of this file.

Bits 18-35 Block size--The size of the block in words, not including this control word.

Block serial numbers are limited to those files recorded in the binary mode.

3. Record Mode--File is recorded in the binary mode and high density when magnetic tape is used.

4. Record Format--Records contained within each block are variable in length and contain a record size control word as the first word of each variable length record. The contents of this control word are as follows:

Bits 0-17 Binary equivalent of record size in words, not including this control word. When the file is assigned to the disk or drum, this value may be zero and the word is interpreted as a file mark analogous to a tape end-of-file marker.

Bits 18-19 "Next available character position" following transliteration to media code 6 and deleted following transliteration from media code 6.

Bits 20-23 Not used unless bits 0-17 are zero, in which case this character contains the specific file-mark character.

Bits 24-29 Logical record type code--Used by media conversion to determine the specific action required for each record. The following 6-bit codes are assigned:

0--Not a media conversion record
1--Binary card image
2--Hollerith card image
(When output is to the punch and the media code is not 1 or 2, the record is ignored.)
3--Print line image (When output is to the printer and media code is not 3, the record is ignored.)

Bits 30-35 Report code identifying this record as one that belongs to a specific report or punch deck.

5. Labels--Standard system format files contain standard header and trailer labels when magnetic tape is used.

Variable length records produced by File and Record Control always include a record size control word as the first word of the record. Variable length records created by File and Record Control are limited to those files recorded in the binary mode.

All standard magnetic tape files must contain the following 14-word labels:

a. Header Label

Word Number	Format	Description
1-2	GEØØ600ØBTLØ	Label identifier
3	XXXXXX	Installation identification
4	ØXXXXX	Tape reel serial number
5	ØXXXXX	File serial number
6	ØØXXXX	Reel sequence number
7	ØYYDDD	Creation data YY = Year DDD = Day of year (001-365)
8	ØØØXXX	Retention days
9-10	XXXXXX	File name
11-13	(arbitrary)	Not used-available to user program
14	ØØØØØØ or PRVERR	 Reel serial number in preceding EOR label is erroneous

b. Trailer Label

Word Number	Format	Description
1	ØEORØØ or ØEOFØØ	End-of-reel label or End-of-file label
2	XXXXXX	Block count
3-13	(arbitrary)	Not used
14	ØØØØØØ or #XXXXX	If EOF label Reel serial number of next reel (left-justified) if EOR label

A preheader option tests for a partial label on opening an input tape file. For unlabeled tape files, each record read is tested for a partial label.

A partial label is a label written as an end of data banner on all magnetic tapes.

A partial label is detected by testing for the following conditions:

a. Word 1 contains GEØØ60

b. Word 2 contains 0ØBTLØ

c. Words 5-10 contain 000000

The message PARTIAL HEADER (END-OF-INFORMATION) LABEL is written on SYSOUT and an abort with code B5 results when one is encountered.

SECTION V

OPERATOR INFORMATION

GENERAL INFORMATION

The operator receives special messages on the typewriter concerning the card reader, card punch, and printer when a BMC activity that uses these peripherals is allocated.

For the card reader, the system message contains the SNUMB, activity number, channel, and unit of the allocated card reader. After this message is typed, the BMC message

sssss-aa LOAD CARD READER i cc

instructs the operator that BMC is ready for card reader input. When the card reader label check option has been selected and the label on the deck is in error, the label error message is typed. If the operator is not able to locate the deck with the correct label, it is necessary to either terminate the activity or kill the job.

A system message is typed out when the card punch is allocated to a BMC job. This allows the operator to identify the output deck with the proper job in the multiple punch situation. The operator may receive additional information about the card punch from $ FORM control cards.

The operator is also notified by a typewriter message when the printer is allocated to a BMC job. The operator may receive additional information about the printer from $ FORM control cards.

A console message

sssss-aa PR i cc NEEDS ATTENTION

occurs anytime the BMC online printer requires attention. The same message, followed by

LINE TOO LONG

indicates a line of data longer than the printer can print has been sent to the printer; this portion of the message is also printed on the execution report.

BMC continues the printing activity if MANUAL HALT and OPERATE/RESET buttons are pushed.

If the NMEDIA option is in use, BMC truncates the line that is too long to 160 characters and prints the line. No console message is issued in this case.

When the printer has halted for a form change caused by the $ FORM control card, the operator can align the form as follows:

1. Press the HALT button

2. Press the PRINT E's button

A line of E's are printed on the paper. After the form is aligned, the operator signals that the printer is ready by pressing the OPERATE/RESET switch on the printer.

If the operator notices that the paper is not aligned after the BMC print routine has started, he can halt printing by pressing the HALT button on the printer. Overlay J of the BMC program contains the printer button interface routine. This is a recovery routine that allows the operator to reposition the input medium through the use of the printer buttons. A detailed discussion of this operator procedure is contained in Section II under "Printer Button Interface."

Operator instructions concerning magnetic tape or disk and all conditions of peripherals while bulk media conversion is running, are standard system messages. These messages and operator actions are discussed fully in the Operator's Reference Manual.

When punching or printing has been completed, a message is typed directing the operator to remove the output.

If the $ FORM card is present, the operator must run out the cards before removing the output deck.

If the $ FORM card is not present, BMC punches two blank cards to run out the cards.

ABORT CODES

The following is an explanation of the abort reason codes given by a BMC execution of the master mode entry MME GEBORT (refer to Table 2-3 for table of error recoveries and aborts):

Code	Explanation
B0	Partition record error.
B1	Improper use of variables on a $ OUTPUT or $ INPUT card. Check for spelling, use of MIXED (or MODMIX) for other than card input, use of MIXL on input, etc.
B2	The $ MULTI variables are incorrectly used.
B3	Improper calling for transliteration. Either the media combination is in error or codes are improperly interpreted.

B4 The input or output device code is not acceptable to BMC. The device type for the "IN" or "OUT" file is not acceptable as "INPUT" or "OUTPUT", or no "IN" or "OUT" file was given to BMC. The output device must be an online printer or punch if the $ FORM control card is used.

B5 A partial header label has been encountered on magnetic tape input.

B6 User has not provided an Sxxxxx or Uxxxxx option (input only) and an error has occurred.

B7 The number (xxxxx) of acceptable input errors as specified in Uxxxxx or Sxxxxx has been exceeded.

B8 Input error prevents BMC from continuing.

B9 An erroneous entry is made to an overlay. Probably hardware failure.

APPENDIX A

CONTROL CARDS

All control cards used with BMC are shown below.

1	8	16	
$	SNUMB	(Variable)	GCOS job identification card--required.
$	IDENT	(Variable)	GCOS accounting information card--required.
$	CONVER		BMC CALL card--required.
$	LIMITS	(Variable)	GCOS job limits card--optional.
$	(Variable)	IN	GCOS file card (input device)--required.
$	INPUT	(Variables)	BMC parameter card--optional.
$	(Variable)	OT	GCOS file card (output device)--required.
$	OUTPUT	(Variables)	BMC parameter card--optional.
$	MULTI	(Variables)	BMC parameter card--optional.

1	7		
FILES	(Variables)		BMC parameter card--optional.

1	8	16	
$	FORM	(Variable)	BMC form control card--optional.
$	ENDJOB		GCOS termination card--required for last activity of a job.

For a detailed discussion of the GCOS control cards, see the Control Cards Reference Manual.

APPENDIX B

STANDARD AND OPTIONAL PARAMETERS

All the standard and optional parameters for every peripheral device used by BMC are shown in the following lists.

CARD READER

Standard Parameters:

Block size:	27 words
Number of buffers:	2
Record form:	Fixed
Record size:	27 words (binary cards), 14 words (BCD cards)
Mode:	Mixed

For card-to-printer conversion, the record size is 14 words and the reader mode is mixed.

Card reader must be in BCD mode for input transliteration.

Optional Parameters:

Mode:	Binary
Block size:	≤ 27
Number of buffers:	1

CARD PUNCH

Standard Parameters:

Block size:	27 words
Number of buffers:	2
Record form:	Fixed length
Record size:	27 words maximum (set from input record size)
Mode:	Set from input record size. BCD if 14 words in length, binary if 27 words in length. If neither length, set mode as specified in output file control block.

Optional Parameters:

Record size:	≤ 27 (any input record 14 words or less is punched BCD)
Number of buffers:	1

When the input file contains variable length records, only those records with the media code 1 or 2 are punched. All others are ignored unless the NMEDIA option is specified on a $ INPUT card.

PRINTER

Standard Parameters:

Block size:	440 words
Number of buffers:	1
Record form:	Fixed
Record size:	22 words of printable characters maximum (set from input record size)
Mode:	BCD

Optional Parameters:

Record size:	< 22

When the input is from the card reader, all print lines are edited and single spaced or spaced according to the SLEWx parameter. BCD,ASCII, and/or binary cards are printed (14 words maximum).

When magnetic tape for disk input is made up of variable length records, only those records with media code 3 are printed. All others are ignored unless the NMEDIA option is specified on a $ INPUT card.

MAGNETIC TAPE

Standard Parameters:

Block size:	320 words
Number of buffers:	2
Record form:	Variable
Record size:	Variable length
Mode:	Binary
Labels:	Standard labels
Block serial numbers:	Included
Retention period:	0
Density:	High

Optional Parameters:

Block size:	<4095 words
Record form:	Fixed, mixed length (MIXL)
Record size:	Fixed length
No block serial numbers.	
Mode:	BCD
No labels.	
Retention period:	Variable
File name:	Used if checking of the input name is desired, or if a file name is to be included on the output file.
Density:	Low
Number of buffers:	1

DISK

Standard Parameters:

Block size:	320 words
Number of buffers:	2
Record form:	Variable
Record size:	Variable length
Block serial numbers:	Included

Optional Parameters:

Block size:	≤320 words
Number of buffers:	1

APPENDIX C

MEMORY REQUIREMENTS

The standard memory size limit assigned to BMC is 7K words. Less memory can be used depending on the combination of input and output devices and the control card options selected. Table C-1 is a guide for selection of memory size.

The table is based on system standard buffer sizes; i.e., 320 words for magnetic tape and disk and 27 words for card reader and card punch. A 440-word buffer is also used for the printer. An additional 66-word buffer is used for editing unedited data for printing.

Table C-1. Memory Size Guide

INPUT DEVICE	OUTPUT DEVICE	I/O BUFFERS	BASIC NO OPTIONS	OPTION 1 TRANS-LITERATE	OPTION 2 MULTI	OPTION 3 TRANSLIT. MULTI	OPTION 4 FILES
Magnetic tape	Magnetic Tape or Disk	Single	4000	4000	4000	4000	4000
Disk		Double	4000	4000	5000	5000	4000
	SYSOUT	Single	3000	4000	4000	4000	4000
	Card Punch	Double	4000	4000	4000	4000	4000
	Printer	Single	6000	6000	6000	6000	6000
	Magnetic Tape or Disk	Single	3000	3000	4000	4000	N/A
		Double	4000	4000	4000	4000	N/A
	SYSOUT	Single	3000	3000	3000	4000	N/A
Card Reader	Card Punch	Double	3000	3000	3000	4000	N/A
	Printer	Single	5000	6000	6000	6000	N/A

Explanation of OPTIONS:

OPTION	
1	TRANSLITERATION: this option is selected by the use of any of the transliteration options on $ INPUT or $ OUTPUT control card.
2	MULTI[1]: this option is selected by the use of a $ MULTI card.
3	TRANSLITERATION and MULTI: this option is selected by the use of any of the transliteration options on a $ INPUT or $ OUTPUT control card in addition to the use of a $ MULTI card.
4	FILES: this option is selected by the use of a FILES card. Note that the FILES option precludes the use of both the TRANSLITERATION and MULTI options.

---

[1] The storage size shown for options 2 and 3 assumes a MULTI table of 100 words or less. If the MULTI table exceeds 100 words, the storage size must also be increased. Refer to "Use of the $ MULTI Control Card" in Section II for the rules to follow for calculating the size of the MULTI table.

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