This document outlines the extensions and facilities implemented in Z390\CICS. Please refer to the IBM Manuals on BMS usage.

The documentation for EXEC CICS SEND MAP, RECEIVE MAP and SEND CONTROL are in the Z390\CICS Application Programming Guide.

The following BMS facilities are not yet implemented:
- Support for devices outside the 3270 family
- Printers
- Extended Attributes and alternate screen size
- Dynamic Map Positioning
- Partitioning
- Paging

BMS Macros

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1) DFHMSD -- Mapset definition and termination

Although DFHMSD is optional it is recommended that one is coded. A default set of values will be internally generated from the DFHMDI macro if missing.

mapset DFHMSD TYPE=MAP/DSECT/FINAL
      MODE=IN/OUT/INOUT
      LANG=ASM
      CTRL=
      CURSLOC=YES/NO
      STORAGE=AUTO
      TIOAPFX=NO

Notes:
   LANG=ASM is the only option supported.
   TIOAPFX=YES is not supported.

Errors:
   A MAXIMUM OF 3 OPERANDS ALLOWED IN CTRL
   CANNOT HAVE MORE THAN ONE DFHMSD MACRO
   INVALID CURSLOC -- cursloc
   INVALID LANG -- lang
   INVALID MODE -- mode
   INVALID STORAGE -- storage
2) DFHMDI -- Map definition

```
mapname DFHMDI  TYPE=MAP/DSECT
    MODE=IN/OUT/INOUT
    LANG=ASM
    CTRL=
        CURSLOC=YES/NO
        SIZE=(24,80)
        LINE=1
        COLUMN=1
        STORAGE=AUTO
        TIOAPFX=NO
```

Notes:
- TYPE, STORAGE and TIOAPFX are required here only if the DFHMSD macro is omitted.
- LANG=ASM is the only option supported.
- TIOAPFX=YES is not supported.

Parameters TYPE, MODE, LANG, CTRL, CURSLOC, STORAGE, and TIOAPFX can all be omitted if the settings specified in DFHMSD are correct for this map.

MODE may be specified as an override to DFHMSD. This facility is an extension.

Any option(s) specified in CTRL will override all the options specified in DFHMSD.

For LINE and COLUMN, only numeric parameters are supported.

Errors:
- A MAXIMUM OF 3 OPERANDS ALLOWED IN CTRL
- INVALID CTRL OPTION - ctrl
- INVALID CURSLOC -- cursloc
- INVALID MODE -- mode
- INVALID SIZE -- size
- INVALID TIOAPFX -- tioapfx
- MAPNAME IS MISSING
MSD AND MDI TYPE MISMATCH
POSITIONAL OPERAND xxxxx INVALID

2) DFHMDF -- Field definition
fldname DFHMDF  POS=n/(n,n)
  LENGTH=
  ATTRB=
  JUSTIFY=
  INITIAL=
  XINIT=
  PICIN=
  PICOUT=
  OCCURS=
  GRPNAME=

Notes:
  If ATTRB is missing then ATTRB=(ASKIP,NORM) is assumed.
  If protection or intensity parameters are missing then a sensible
default is assumed.

  A field specified as ATTRB=(UNPROT,NUM) will only accept digits
0-9. Some 3270 models also allowed dots and commas.

  Extensive cross-checking is made, such that any 'unusual' map
structure is flagged as an error. A peruse of the errors below give
a good indication of these types of map structure.

Extensions:
  ATTRB=(ALPHA) has been added as the opposite of NUM

  XINIT=FF..
  The dots are replaced by a hex code of a fill character.
  This will generate an RA order to fill this field for its whole
  length.

  eg.
  Instead of coding INITIAL='________'
  Code XINIT=FF6D

  PICIN and PICOUT
  Previously only available for COBOL and PL/I, it is now
available
  for assembler.

  The parameter is (almost) a standard edit word with some
Currently only numeric data can be subjected to PICIN/PICOUT.

PICOUT...
   Operates for a SEND MAP, but not if MAPONLY is specified.
   Data is taken from the map structure and subjected to the
   edit word before being sent to the screen.

PICIN...
   Operates for a RECEIVE MAP.
   The data received is subjected to the edit word and then
   passed to the application in the map structure.

   Note that the resulting data may no longer be numeric.

   The edit word has some strict rules at present. Suggested
   extensions are most welcome.

   The first hex pair must be 40, 5C, 5B or 4D (blank, asterisk,
   dollar, open bracket).
   Blank and asterisk are fill characters, dollar and open bracket
   are float characters.

   The remaining hex pairs can be 20 (digit select), 21
   (significance
   starter), 4B (dot) or 6B (comma).

   The number of 20 and 21's must be odd.

Examples...
   PICOUT=4020216B202020
   Data is 12345, displayed as 12,345

   PICOUT=5B20216B202020
   Data is 1234 , displayed as $1,234

   PICOUT=5C20216B202020
   Data is 89, displayed as *****89

PICIN is no different, just that it edits incoming data.

If the data to be processed is not numeric after being PACKed,
a MAPFAIL/8 condition is raised.
For each TYPE=MAP generation, a mapname.IMG file is generated. This gives a symbolic picture of the resulting screen and can be used for planning map changes.

See the file GUI6.IMG for a good example.

Errors:

- A MAXIMUM OF 2 OPERANDS ALLOWED IN JUSTIFY
- ADJACENT ATTRIBUTE AT POS nnn
- ATTRIBUTE CONFLICT - ALPHA AND NUM
- ATTRIBUTE CONFLICT - ASKIP AND ALPHA
- ATTRIBUTE CONFLICT - ASKIP AND NUM
- ATTRIBUTE CONFLICT - ASKIP AND PROT
- ATTRIBUTE CONFLICT - ASKIP AND UNPROT
- ATTRIBUTE CONFLICT - BRT AND DRK
- ATTRIBUTE CONFLICT - BRT AND NORM
- ATTRIBUTE CONFLICT - NORM AND DRK
- ATTRIBUTE CONFLICT - PROT AND UNPROT
- BAD LENGTH - length
- BOTH INITIAL AND XINIT ARE SPECIFIED
- CONFLICTING JUSTIFY PARMS
- GRPNAME AND OCCURS ARE SPECIFIED
- GRPNAME SPECIFIED WITHOUT FLDNAME
- IC ATTRIBUTE HAS OCCURRED IN ANOTHER MDF MACRO
- INITIAL/XINIT IS GREATER THAN LENGTH
- INITIAL/XINIT IS INVALID WITH LENGTH=0
- INVALID ATTRB OPTION - attrb
- INVALID JUSTIFY OPTION - justify
- INVALID OCCURS - occurs
- INVALID POS - pos
- JUSTIFY CONFLICT - BLANK AND ZERO
- JUSTIFY CONFLICT - LEFT AND RIGHT
- LENGTH=0 IS INVALID FOR NAMED FIELD
- PICIN/PICOUT CAN ONLY BE SPECIFIED FOR A NAMED FIELD
- PICIN/PICOUT HAS ODD NUMBER OF HEX DIGITS
- PICIN/PICOUT HEX LENGTH NOT EQUAL TO LENGTH
- PICIN/PICOUT IS INVALID
- PICIN/PICOUT: 1ST PAIR NOT 40, 5C, 5B, 4D
- PICIN/PICOUT: NUMBER OF 20/21 IS NOT ODD
- POS nnn OVERLAPS WITH ANOTHER FIELD
- POS COLUMN+LENGTH EXCEEDS DEFINED MAP SIZE
- POS EXCEEDS DEFINED MAP SIZE
- POS HAS TOO MANY PARAMETERS
- POSITIONAL OPERAND xxxx INVALID
SINGLE POS EXCEEDS DEFINED MAP SIZE
SPECIAL FORMAT XINIT CANNOT BE SPECIFIED IF LENGTH IS LESS THAN 8
UNNAMED FIELD HAS UNPROT OR FSET, INPUT DATA CANNOT BE MAPPED
XINIT HAS ODD NUMBER OF HEX DIGITS

The following errors occur owing to internal limits. Please report them.

AN INTERNAL ERROR HAS OCCURRED
ERROR IN ATTRIBUTE TABLE nnnn

AN INTERNAL ERROR HAS OCCURRED
MAPSIZE TOO LARGE - nnnn

AN INTERNAL ERROR HAS OCCURRED
PICIN/PICOUT LENGTH GREATER THAN 50 BYTES

Map generation
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See the sample MAP01.BAT. This generates the TYPE=DSECT (MAP01.CPY) and the TYPE=MAP (MAP01.390).

As the program name is the same, the TYPE=DSECT assembler output is renamed mapset.PR1.

Change Summary
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Author: Melvyn Maltz
Shipping Date: June 27, 2008
Z390 version: V1.4.02
Z390/CICS version: V5