```
MMM          MMM  TTTTTTTTTTTTTTT   HHH          HHH  RRRRRRRRRRR     TTTTTTTTTTTTTTT   LLL
MMM          MMM  TTTTTTTTTTTTTTT   HHH          HHH  RRRRRRRRRRRR    TTTTTTTTTTTTTTT   LLL
MMM          MMM  TTTTTTTTTTTTTTT   HHH          HHH  RRRRRRRRRRRR    TTTTTTTTTTTTTTT   LLL
MMMMMM    MMMMMM        TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMMMMM    MMMMMM        TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMMMMM    MMMMMM        TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMM   MMM   MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMM   MMM   MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMM   MMM   MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLL
MMM         MMM         TTT         HHHHHHHHHHHHHHHH  RRRRRRRRRRR           TTT         LLL
MMM         MMM         TTT         HHHHHHHHHHHHHHHH  RRRRRRRRRRRR          TTT         LLL
MMM         MMM         TTT         HHHHHHHHHHHHHHHH  RRRRRRRRRRRR          TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR   RRR             TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR   RRR             TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR   RRR             TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR      RRR          TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR      RRR          TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR      RRR          TTT         LLL
MMM         MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLLLLLLLLLLLLLLL
MMM         MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLLLLLLLLLLLLLLL
MMM         MMM         TTT         HHH          HHH  RRR         RRR       TTT         LLLLLLLLLLLLLLLL
```

FILEID**MTHCDABS

```
MM      MM  TTTTTTTTTT  HH      HH    CCCCCCCC  DDDDDDDD      AAAAAA    BBBBBBBB      SSSSSSSS
MM      MM  TTTTTTTTTT  HH      HH    CCCCCCCC  DDDDDDDD      AAAAAA    BBBBBBBB      SSSSSSSS
MMMM  MMMM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB  SS
MMMM  MMMM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB  SS
MM  MM  MM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB  SS
MM  MM  MM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB  SS
MM      MM      TT      HHHHHHHHHH  CC          DD      DD  AA      AA  BBBBBBBB      SSSSSS
MM      MM      TT      HHHHHHHHHH  CC          DD      DD  AA      AA  BBBBBBBB      SSSSSS
MM      MM      TT      HH      HH  CC          DD      DD  AAAAAAAAAA  BB      BB          SS
MM      MM      TT      HH      HH  CC          DD      DD  AAAAAAAAAA  BB      BB          SS
MM      MM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB          SS      ....
MM      MM      TT      HH      HH  CC          DD      DD  AA      AA  BB      BB          SS      ....
MM      MM      TT      HH      HH    CCCCCCCC  DDDDDDDD    AA      AA  BBBBBBBB    SSSSSSSS      ....
MM      MM      TT      HH      HH    CCCCCCCC  DDDDDDDD    AA      AA  BBBBBBBB    SSSSSSSS      ....

LL              IIIIII      SSSSSSSS
LL              IIIIII      SSSSSSSS
LL                II      SS
LL                II      SS
LL                II      SS
LL                II      SS
LL                II        SSSSSS
LL                II        SSSSSS
LL                II              SS
LL                II              SS
LL                II              SS
LL                II              SS
LLLLLLLLLL      IIIIII    SSSSSSSS
LLLLLLLLLL      IIIIII    SSSSSSSS
```

Table of contents

```
0000     1          .TITLE  MTH$CDABS       D COMPLEX*16 Absolute value
0000     2          .IDENT  /1-002/         ; File: MTHCDABS.MAR Edit: RNH1002
0000     3
0000     4 ;
0000     5 ;
0000     6 ;****************************************************************************
0000     7 ;*                                                                          *
0000     8 ;*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                                 *
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0000    25 ;*                                                                          *
0000    26 ;*                                                                          *
0000    27 ;****************************************************************************
0000    28 ;
0000    29 ;
0000    30 ;
0000    31 ; FACILITY: MATH LIBRARY
0000    32 ;++
0000    33 ; ABSTRACT:
0000    34 ;       Return the absolute value of the D COMPLEX*16 value.
0000    35 ;
0000    36 ;
0000    37 ;--
0000    38 ;
0000    39 ; VERSION: 1
0000    40 ;
0000    41 ; HISTORY:
0000    42 ;
0000    43 ; AUTHOR:
0000    44 ;       Steven B. Lionel, 20-July-1979
0000    45 ;
0000    46 ; MODIFIED BY:
0000    47 ;
0000    48 ;
0000    49 ;
```

D COMPLEX*16 Absolute value
HISTORY ; Detailed Current Edit History

```
0000     51          .SBTTL  HISTORY         ; Detailed Current Edit History
0000     52
0000     53
0000     54 ; Edit History
0000     55 ;
0000     56 ; 1-001 - Adapted from MTH$CABS version 1-002.  SBL 20-July-1979
0000     57 ; 1-002 - Changed shared external references to G^ RNH 25- Sep-81
```

```
                     59          .SBTTL  DECLARATIONS
                     60
                     61 ;
                     62 ; INCLUDE FILES:
                     63 ;
                     64
                     65 ;
                     66 ; EXTERNAL SYMBOLS:
                     67 ;
                     68          .DSABL  GBL
                     69          .EXTRN  MTH$DSQRT_R5
                     70
                     71 ;
                     72 ; MACROS:
                     73 ;
                     74
                     75 ;
                     76 ; PSECT DECLARATIONS:
00000000             77          .PSECT  _MTH$CODE       PIC, SHR, LONG, EXE, NOWRT
                     78
                     79 ;
                     80 ; EQUATED SYMBOLS:
                     81 ;
                     82
                     83 ;
                     84 ; OWN STORAGE:
                     85 ;        NONE
                     86
                     87          .SBTTL  MTH$CDABS - D COMPLEX*16 Absolute Value
                     88
                     89 ;++
                     90 ; FUNCTIONAL DESCRIPTION:
                     91 ;
                     92 ;        MTH$CDABS computes the absolute value of a COMPLEX number (r, i)
                     93 ;        as follows:
                     94 ;
                     95 ;        result = ABS(MAX*SQRT((MIN/MAX)**2 + 1))
                     96 ;
                     97 ; CALLING SEQUENCE:
                     98 ;        result.wdc.v = MTH$CDABS (arg.rdc.r)
                     99 ;
                    100 ;
                    101 ; INPUT PARAMETERS:
                    102 ;
00000004            103          arg = 4                    ; The address of the D COMPLEX*16 argument.
                    104 ;
                    105 ; IMPLICIT INPUTS:
                    106 ;        NONE
                    107 ;
                    108 ; OUTPUT PARAMETERS:
                    109 ;
                    110 ;
                    111 ; IMPLICIT OUTPUTS:
                    112 ;        NONE
                    113 ;
                    114 ; COMPLETION CODES:
                    115 ;        NONE
```

```
                                0000   116 ;
                                0000   117 ; FUNCTION VALUE:
                                0000   118 ;
                                0000   119 ;       D Floating absolute value is returned in R0-R1.
                                0000   120 ;
                                0000   121 ; SIDE EFFECTS:
                                0000   122 ;       Signals:        Invalid Operand if r or i are undefined (-0.0).
                                0000   123 ;                       Floating overflow if r and i are both large.
                                0000   124 ;--
                                0000   125
                                0000   126
                           003C 0000   127         .ENTRY  MTH$CDABS,      ^M<R2,R3,R4,R5>
                                0002   128         MTH$FLAG_JACKET                 ; resignal
                                0002
      6D  00000000'GF     9E    0002               MOVAB   G^MTH$$JACKET_HND, (FP)
                                0009                                               ; set handler address to jacket
                                0009                                               ; handler
                                0009
            54    04 AC     D0  0009   129         MOVL    arg(AP), R4             ; Get address of argument
               50     84     7D  000D   130         MOVQ    (R4)+, R0               ; Get real part
               52     64     7D  0010   131         MOVQ    (R4), R2                ; Get imaginary part
      55    50     08     07    EF  0013   132         EXTZV   #7, #8, R0, R5          ; Get exponent of real part
      55    52     08     07    ED  0018   133         CMPZV   #7, #8, R2, R5          ; Is imaginary part bigger?
                  09     18    001D   134         BGEQ    REALLO                  ; Yes, that is correct
               54     50     7D  001F   135         MOVQ    R0, R4                  ; Swap values
               50     52     7D  0022   136         MOVQ    R2, R0
               52     54     7D  0025   137         MOVQ    R4, R2
                                0028   138
                                0028   139 REALLO:
                                0028   140
                                0028   141 ; at this point R0-R1 contains MIN (the smaller of |r| and |i|), and
                                0028   142 ; R2-R3 contains MAX (the larger of |r| and |i|).
                                0028   143 ;
            52     73           0028   144         TSTD    R2                      ; divisor zero?
            1B     13           002A   145         BEQL    ZERO                    ; yes, answer is zero
      50    52     66           002C   146         DIVD2   R2, R0                  ; R0-R1 = MIN/MAX
      50    50     64           002F   147         MULD2   R0, R0                  ; R0-R1 = (MIN/MAX)**2
      50    08     60           0032   148         ADDD2   #1, R0                  ; R0-R1 = (MIN/MAX)**2 + 1
      7E    52     7D           0035   149         MOVQ    R2, -(SP)               ; Save maximum
00000000'GF     16              0038   150         JSB     G^MTH$DSQRT_R5          ; R0-R1 = SQRT((MIN/MAX)**2+1)
      50    6E     64           003E   151         MULD2   (SP), R0                ; R0-R1 = MAX*SQRT((MIN/MAX)**2+1)
                                0041   152                                         ; Floating overflow could happen
50    8000 8F     AA            0041   153         BICW    #^X8000, R0             ; R0-R1 = ABS(....)
                  04            0046   154         RET                             ; with result in R0-R1
                                0047   155
                                0047   156 ZERO:
            50     7C           0047   157         CLRQ    R0                      ; answer is zero
                  04            0049   158         RET
                                004A   159
                                004A   160
                                004A   161
                                004A   162         .END
```

```
ARG             = 00000004
MTH$$JACKET_HND  ********   X   01
MTH$CDABS        00000000 RG    01
MTH$DSQRT_R5     ********   X   00
REALLO           00000028 R     01
ZERO             00000047 R     01
```

Psect synopsis

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
_MTH$CODE	0000004A (74.)	01 (1.)	PIC USR CON REL LCL SHR EXE RD NOWRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	33	00:00:00.07	00:00:00.93
Command processing	130	00:00:00.65	00:00:04.97
Pass 1	87	00:00:00.66	00:00:05.19
Symbol table sort	0	00:00:00.00	00:00:00.00
Pass 2	42	00:00:00.47	00:00:02.02
Symbol table output	2	00:00:00.02	00:00:00.12
Psect synopsis output	3	00:00:00.01	00:00:00.07
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	299	00:00:01.88	00:00:13.30

```
The working set limit was 900 pages.
2685 bytes (6 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 6 non-local and 0 local symbols.
222 source lines were read in Pass 1, producing 11 object records in Pass 2.
1 page of virtual memory was used to define 1 macro.
```

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYSLIB]STARLET.MLB;2	0

```
0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/ENABLE=SUPPRESSION/DISABLE=(GLOBAL,TRACEBACK)/LIS=LIS$:MTHCDABS/OBJ=OBJ$:MTHCDABS MSRC$:MTHJACKET/UPDATE=(ENH$:MTHJACKET)+MSRC
```

MTH4OVPI
LIS

MTHABS
LIS

MTHAINT
LIS

MTHAMOD
LIS

MTHERR
SDL

MTHASIN
LIS

MTHCDABS
LIS

MTHATAN
LIS

MTHATANH
LIS

MTHCDLOG
LIS

MTHJACKET
MAR

MTHBITOPS
LIS

MTHALOG
LIS

MTHDEF
FOR

MTHANINT
LIS

MTHCABS
LIS

MTHACOS
LIS

MTHCDEXP
LIS