


```

MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  AAAAAA  BBBB BBBB  SSSSSSSS
MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  AAAAAA  BBBB BBBB  SSSSSSSS
MMM     MMM     TT          HH      HH      CC          AA      AA  BB      BB  SS
MMM     MMM     TT          HH      HH      CC          AA      AA  BB      BB  SS
MM      MM      TT          HH      HH      CC          AA      AA  BB      BB  SS
MM      MM      TT          HH      HH      CC          AA      AA  BB      BB  SS
MM      MM      TT          HHHHHHHHHH  CC          AA      AA  BBBB BBBB  SSSSSS
MM      MM      TT          HHHHHHHHHH  CC          AA      AA  BBBB BBBB  SSSSSS
MM      MM      TT          HH      HH      CC          AAAAAAAAAA  BB      BB  SS
MM      MM      TT          HH      HH      CC          AAAAAAAAAA  BB      BB  SS
MM      MM      TT          HH      HH      CC          AA      AA  BB      BB  SS
MM      MM      TT          HH      HH      CC          AA      AA  BB      BB  SS
MM      MM      TT          HH      HH      CCCCCCCC  AA      AA  BBBB BBBB  SSSSSSSS
MM      MM      TT          HH      HH      CCCCCCCC  AA      AA  BBBB BBBB  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
LLLLLLLL  IIIIII  SSSSSSSS
LLLLLLLL  IIIIII  SSSSSSSS

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(2)	49	HISTORY	; Detailed Current Edit History
(3)	59	DECLARATIONS	
(3)	85	MTHSCABS - COMPLEX	absolute value

```

0000 1 .TITLE MTHSCABS COMPLEX ABSOLUTE VALUE
0000 2 .IDENT /1-003/ ; File: MTHCABS.MAR
0000 3
0000 4
0000 5 :*****
0000 6 :*
0000 7 :* COPYRIGHT (c) 1978, 1980, 1982, 1984 BY *
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0000 22 :* DIGITAL ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS *
0000 23 :* SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL. *
0000 24 :*
0000 25 :*
0000 26 :*****
0000 27
0000 28
0000 29 : FACILITY: MATH LIBRARY
0000 30 :++
0000 31 : ABSTRACT:
0000 32 : Return the absolute value of the COMPLEX number.
0000 33
0000 34
0000 35 :--
0000 36
0000 37 : VERSION: 0
0000 38
0000 39 : HISTORY:
0000 40
0000 41 : AUTHOR:
0000 42 : Jonathan M. Taylor, 19-JUL-77: Version 0
0000 43
0000 44 : MODIFIED BY:
0000 45
0000 46
0000 47 :

```

MTH\$CABS
1-003

C 15
COMPLEX ABSOLUTE VALUE 16-SEP-1984 01:05:49 VAX/VMS Macro V04-00
HISTORY ; Detailed Current Edit History 6-SEP-1984 11:20:45 [MTHRTL.SRC]MTHCABS.MAR;1

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(2)

```
0000 49      .SBTTL HISTORY      ; Detailed Current Edit History
0000 50
0000 51
0000 52 : Edit History for Version 0 of MTH$CABS
0000 53 :
0000 54 : 0-4 - Add comment about floating overflow. TNH 13-June-78
0000 55 : 1-001 - Update version number and copyright notice. JBS 16-NOV-78
0000 56 : 1-002 - Add "" to the PSECT directive. JBS 21-DEC-78
0000 57 : 1-003 - Use MTH$SQRT_R3. SBL 27-Sept=1979
```

```
0000 59 .SBTTL DECLARATIONS
0000 60
0000 61 :
0000 62 : INCLUDE FILES:
0000 63 : OERR.MAR
0000 64 :
0000 65 :
0000 66 : EXTERNAL SYMBOLS:
0000 67 : .GLOBL MTH$SQRT_R3
0000 68 :
0000 69 :
0000 70 : MACROS:
0000 71 : NONE
0000 72 :
0000 73 :
0000 74 : PSECT DECLARATIONS:
0000 75 : .PSECT _MTH$CODE PIC, SHR, LONG, EXE, NOWRT
0000 76 :
0000 77 :
0000 78 : EQUATED SYMBOLS:
0000 79 : argadr = 4 ; offset from AP of arg addr
0000 80 :
0000 81 :
0000 82 : OWN STORAGE:
0000 83 : NONE
0000 84 :
0000 85 .SBTTL MTH$CABS - COMPLEX absolute value
0000 86
0000 87 :++
0000 88 : FUNCTIONAL DESCRIPTION:
0000 89 :
0000 90 : MTH$CABS computes the absolute value of a COMPLEX number (r, i)
0000 91 : as follows:
0000 92 :
0000 93 : result = ABS(MAX*SQRT((MIN/MAX)**2 + 1))
0000 94 :
0000 95 : CALLING SEQUENCE:
0000 96 : Absolute_value.wf.v = MTH$CABS (arg.rfc.r)
0000 97 :
0000 98 :
0000 99 : INPUT PARAMETERS:
0000 100 : The one input parameter is the address of a COMPLEX number (r, i),
0000 101 : where r and i are both single-precision floating values.
0000 102 :
0000 103 : IMPLICIT INPUTS:
0000 104 : NONE
0000 105 :
0000 106 : OUTPUT PARAMETERS:
0000 107 : NONE
0000 108 :
0000 109 : IMPLICIT OUTPUTS:
0000 110 : NONE
0000 111 :
0000 112 : COMPLETION CODES:
0000 113 : NONE
0000 114 :
0000 115 : SIDE EFFECTS:
```

```

0000 116 : SSS_ROPRAND - Reserved operand
0000 117 : SSS_FLTOVF(_F) - Floating overflow trap (fault)
0000 118 :--
0000 119
0000 120
001C 0000 121 .ENTRY MTH$CABS, ^M<R2,R3,R4>
0002 122 MTH$FLAG_JACKET ; resignal
6D 00000000'GF 9E 0002 MOVAB G^MTH$$JACKET_HND, (FP)
0009 ; set handler address to jacket
0009 ; handler
0009
52 50 04 BC 7D 0009 123 MOVQ @argadr(AP), R0 ; R0/R1 = (r, i)
53 50 8000 8F AB 000D 124 BICW3 #^X8000, R0, R2 ; R2 = ABS(r)
53 51 8000 8F AB 0013 125 BICW3 #^X8000, R1, R3 ; R3 = ABS(i)
53 53 52 B1 0019 126 CMPW R2, R3 ; compare the magnitudes of r and i
0D 19 001C 127 BLSS REALLO ; and branch if r is smaller
52 53 001E 128 TSTF R2 ; quit if r = 0
24 13 0020 129 BEQL ZERO
52 51 D0 0022 130 MOVL R1, R2 ; else swap so R0 is smaller
51 50 D0 0025 131 MOVL R0, R1 ; R1 = larger part (r)
50 52 D0 0028 132 MOVL R2, R0 ; R0 = smaller part (i)
002B 133
002B 134 REALLO:
002B 135
002B 136 ; at this point R0 contains MIN (the smaller of |r| and |i|), and
002B 137 ; R1 contains MAX (the larger of |r| and |i|).
002B 138 :
50 51 46 002B 139 DIVF R1, R0 ; R0 = MIN/MAX
50 50 44 002E 140 MULF R0, R0 ; R0 = (MIN/MAX)**2
50 08 40 0031 141 ADDF #1.0, R0 ; R0 = (MIN/MAX)**2 + 1
54 51 D0 0034 142 MOVL R1, R4 ; R4 = MAX
00000000'EF 16 0037 143 JSB MTH$$SQRT_R3 ; R0 = SQRT((MIN/MAX)**2 + 1)
50 54 44 003D 144 MULF R4, R0 ; R0 = MAX*SQRT((MIN/MAX)**2 + 1)
0040 145 ; Floating overflow could happen
50 8000 8F AA 0040 146 BICW #^X8000, R0 ; R0 = ABS(....)
04 0045 147 RET
0046 148
0046 149 ZERO:
50 D4 0046 150 CLRL R0 ; answer is 0
04 0048 151 RET
0049 152
0049 153
0049 154
0049 155 .END

```

MTH\$CABS
Symbol table

COMPLEX ABSOLUTE VALUE

F 15

16-SEP-1984 01:05:49 VAX/VMS Macro V04-00
6-SEP-1984 11:20:45 [MTHRTL.SRC]MTHCABS.MAR;1

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ARGADR	=	00000004		
MTH\$\$JACKET_HND	*****		X	01
MTH\$CABS	00000000	RG		01
MTH\$SQRT_R3	*****	G		00
REALLO	0000002B	R		01
ZERO	00000046	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	00000049 (73.)	01 (1.)	PIC	USR	CON	REL	LCL	SHR	EXE	RD	NOWRT	NOVEC	LONG

+-----+
! Performance indicators !
+-----+

Phase	Page faults	CPU Time	Elapsed Time
Initialization	32	00:00:00.06	00:00:01.21
Command processing	127	00:00:00.60	00:00:06.24
Pass 1	86	00:00:00.58	00:00:04.18
Symbol table sort	0	00:00:00.01	00:00:00.03
Pass 2	45	00:00:00.49	00:00:04.74
Symbol table output	2	00:00:00.01	00:00:00.13
Psect synopsis output	2	00:00:00.02	00:00:00.02
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	296	00:00:01.79	00:00:16.57

The working set limit was 750 pages.
 2575 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.
 215 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
_\$255\$DUA28:[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\$:MTHCABS/OBJ=OBJ\$:MTHCABS MSRC\$:MTHJACKET/UPDATE=(ENH\$:MTHJACKET)+MSRC\$:

