


```

MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  GGGGGGGG  EEEEEEEEEEE  XX      XX  PPPPPPPP
MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  GGGGGGGG  EEEEEEEEEEE  XX      XX  PPPPPPPP
MMMM    MMMM    TT          HH      HH      CC          GG          EE          XX      XX  PP          PP
MMMM    MMMM    TT          HH      HH      CC          GG          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          GG          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          GG          EE          XX      XX  PP          PP
MM      MM      TT          HHHHHHHHHH  CC          GG          EEEEEEEEE  XX      XX  PPPPPPPP
MM      MM      TT          HHHHHHHHHH  CC          GG          EEEEEEEEE  XX      XX  PPPPPPPP
MM      MM      TT          HH      HH      CC          GG      GGGGGG  EE          XX      XX  PP
MM      MM      TT          HH      HH      CC          GG      GGGGGG  EE          XX      XX  PP
MM      MM      TT          HH      HH      CC          GG          GG          EE          XX      XX  PP
MM      MM      TT          HH      HH      CC          GG          GG          EE          XX      XX  PP
MM      MM      TT          HH      HH      CC          GG          GG          EE          XX      XX  PP
MM      MM      TT          HH      HH      CC          GG          GG          EE          XX      XX  PP
MM      MM      TT          HH      HH      CCCCCCCC  GGGGGG  EEEEEEEEEEE  XX      XX  PP
MM      MM      TT          HH      HH      CCCCCCCC  GGGGGG  EEEEEEEEEEE  XX      XX  PP

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LL      IIIIII  SSSSSSSS
LL      IIIIII  SSSSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
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LL      II      SSSSSS
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LL      II      SS
LL      II      SS
LL      II      SS
LLLLLLLLLLLL IIIIII  SSSSSSSS
LLLLLLLLLLLL IIIIII  SSSSSSSS

```

(2)	49	HISTORY	: Detailed Current Edit History
(3)	57	DECLARATIONS	
(4)	86	MTH\$CGEXP	- perform G COMPLEX*16 exponentiation

```

0000 1 .TITLE MTHSCGEXP G COMPLEX*16 Exponential
0000 2 .IDENT /1-002/ ; File: MTHCGEXP.MAR Edit: SBL1002
0000 3
0000 4
0000 5 :*****
0000 6 :*
0000 7 :* COPYRIGHT (c) 1978, 1980, 1982, 1984 BY *
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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 : Perform G COMPLEX*16 exponentiation: e**(r,i)
0000 33 :
0000 34 :
0000 35 :--
0000 36 :
0000 37 : VERSION: 1
0000 38 :
0000 39 : HISTORY:
0000 40 :
0000 41 : AUTHOR:
0000 42 : Steven B. Lionel, 20-July-1979
0000 43 :
0000 44 : MODIFIED BY:
0000 45 :
0000 46 :
0000 47 :

```

MTH
Sym
ARG
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MAC

MTHSCGEXP
1-002

N 3
G COMPLEX*16 Exponential 16-SEP 1984 01:08:57 VAX/VMS Macro V04-00 Page 2
HISTORY ; DetaileG Current Edit History 6-SEP-1984 11:21:03 [MTHRTL.SRC]MTHCGEXP.MAR;1 (2)

0000 49 .SBTTL HISTORY ; DetaileG Current Edit History
0000 50
0000 51
0000 52 ; Edit History
0000 53
0000 54 ; 1-001 - Adapted from MTHSCEXP version 1-002. SBL 20-July-1979
0000 55 ; 1-002 - Use MTHSGEXP_R6. SBL 14-Dec-1979

**F

```
0000 57          .SBTTL  DECLARATIONS
0000 58
0000 59 :
0000 60 : INCLUDE FILES:
0000 61 :
0000 62 :
0000 63 :
0000 64 : EXTERNAL SYMBOLS:
0000 65          .DSABL  GBL
0000 66          .EXTRN  MTH$GSIN_R7
0000 67          .EXTRN  MTH$GCOS_R7
0000 68          .EXTRN  MTH$GEXP_R6
0000 69
0000 70 :
0000 71 : MACROS:
0000 72 :      NONE
0000 73 :
0000 74 :
0000 75 : PSECT DECLARATIONS:
00000000 76          .PSECT  _MTH$CODE          PIC, SHR, LONG, EXE, NOWRT
0000 77
0000 78 :
0000 79 : EQUATED SYMBOLS:
0000 80 :
0000 81 :
0000 82 :
0000 83 : OWN STORAGE:
0000 84 :      NONE
```

```

0000 86      .SBTTL MTHSCGEXP - perform G COMPLEX*16 exponentiation
0000 87
0000 88 :++
0000 89 : FUNCTIONAL DESCRIPTION:
0000 90 :
0000 91 :   The result of the operation e ** (r, i) is computed
0000 92 :   by:
0000 93 :
0000 94 :   result = (EXP(r) * COS(i), EXP(r) * SIN(i))
0000 95 :
0000 96 : CALLING SEQUENCE:
0000 97 :   CALL MTHSCGEXP (result.wgc.r, arg.rgc.r)
0000 98 :
0000 99 :
0000 100 : INPUT PARAMETERS:
0000 101 :   arg      = 8                ; G COMPLEX*16 argument by reference
0000 102 :
0000 103 : IMPLICIT INPUTS:
0000 104 :   NONE
0000 105 :
0000 106 : OUTPUT PARAMETERS:
0000 107 :   result   = 4                ; G COMPLEX*16 result by reference
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 :   Signals:      MTH$_SINSIGLOS if !i! > 2*PI*2**31.
0000 117 :                 Floating Overflow if r > 88.028
0000 118 :
0000 119 :--
0000 120
0000 121
00FC 0000 122      .ENTRY MTHSCGEXP,      ^M<R2,R3,R4,R5,R6,R7>
0002 0002 123      MTH$FLAG_JACKET      ; resignal
0002 0002
6D 00000000'GF 9E 0002      MOVAB  G^MTH$$JACKET_HND, (FP)
0009 0009 ; set handler address to jacket
0009 0009 ; handler
0009 0009
0009 124
50 08 BC 7D 0009 125      MOVQ  @arg(AP), R0      ; R0-R1 = real part
00000000'EF 16 000D 126      JSB  MTH$GEXP R6      ; R0-R1 = EXP(r)
7E 50 7D 0013 127      MOVQ  R0, -(SPT)      ; Save it on the stack
0016 128
50 08 AC D0 0016 129      MOVL  arg(AP), R0      ; R0 is address of arg
001A 130
50 08 A0 7D 001A 131      MOVQ  8(R0), R0      ; R0-R1 = imaginary part
7E 50 7D 001E 132      MOVQ  R0, -(SP)      ; Save imaginary part
00000000'EF 16 0021 133      JSB  MTH$GCOS R7      ; R0-R1 = COS(i)
04 BC 08 AC 50 45FD 0027 134      MULG3 R0, 8(SPT), @result(AP) ; Store real part
50 8E 7D 002E 135      MOVQ  (SP)+, R0      ; Get imaginary part again
00000000'EF 16 0031 136      JSB  MTH$GSIN R7      ; R0-R1 = SIN(i)
52 04 AC D0 0037 137      MOVL  result(AP), R2 ; Address of result

```

```
08 A2 8E 50 45FD 003B 138      MULG3  R0, (SP)+, 8(R2)      ; Store imaginary part
          04 0041 139      RET
          0042 140
          0042 141
          0042 142      .END
```


MTH\$CGEXP
Symbol table

G COMPLEX*16 Exponential

E 4

16-SEP-1984 01:08:57
6-SEP-1984 11:21:03

VAX/VMS Macro V04-00
[MTHRTL.SRC]MTHCGEXP.MAR;1

Page 6
(4)

MTH
1-00

```

ARG = 00000008
MTH$$JACKET_HND ***** X 01
MTH$CGEXP 00000000 RG 01
MTH$GCOS_R7 ***** X 00
MTH$GEXP_R6 ***** X 00
MTH$GSIN_R7 ***** X 00
RESULT = 00000004

```

```

+-----+
! 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	00000042 (66.)	01 (1.)	PIC USR CON REL LCL SHR EXE RD NOWRT NOVEC LONG

```

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

```

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.07	00:00:01.02
Command processing	135	00:00:00.68	00:00:05.80
Pass 1	77	00:00:00.69	00:00:04.38
Symbol table sort	0	00:00:00.00	00:00:00.00
Pass 2	40	00:00:00.48	00:00:01.93
Symbol table output	2	00:00:00.01	00:00:00.01
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	287	00:00:01.97	00:00:13.18

The working set limit was 900 pages.
2344 bytes (5 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 7 non-local and 0 local symbols.
202 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\$:MTHCGEXP/OBJ=OBJ\$:MTHCGEXP MSRC\$:MTHJACKET/UPDATE=(ENH\$:MTHJACKET)+MSRC

