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000000  TTTTTTTTTT  SSSSSSSS  PPPPPPPP  000000  WW  WW  CCCCCCCC  CCCCCCCC
000000  TTTTTTTTTT  SSSSSSSS  PPPPPPPP  000000  WW  WW  CCCCCCCC  CCCCCCCC
00  00  TT  SS  PP  PP  00  00  WW  WW  CC  CCCCCCCC  CC  CCCCCCCC
00  00  TT  SS  PP  PP  00  00  WW  WW  CC  CCCCCCCC  CC  CCCCCCCC
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00  00  TT  SS  PP  PP  00  00  WWW WW  CC  CCCCCCCC  CC  CCCCCCCC
00  00  TT  SS  PP  PP  00  00  WWW WW  CC  CCCCCCCC  CC  CCCCCCCC
000000  000000  WW  WW  CCCCCCCC  CCCCCCCC
000000  000000  WW  WW  CCCCCCCC  CCCCCCCC

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LL  IIIIII  SSSSSSSS
LL  IIIIII  SSSSSSSS
LL  II  SS
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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

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DECLARATIONS
OTSSPOWCC - COMPLEX*8 ** COMPLEX*8 power routine

```
0000 1 .TITLE OTSSPOWCC - COMPLEX*8 ** COMPLEX*8 power routine
0000 2 .IDENT /1-004/ ; File: OTSPOWCC.MAR
0000 3
0000 4
0000 5 :*****
0000 6 :*
0000 7 :* COPYRIGHT (c) 1978, 1980, 1982, 1984 BY *
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0000 24 :*
0000 25 :*
0000 26 :*****
0000 27 :
0000 28
0000 29 :++
0000 30 : FACILITY: Language support library - user callable
0000 31 :
0000 32 : ABSTRACT:
0000 33 :
0000 34 : COMPLEX*8 base to COMPLEX*8 power giving COMPLEX*8 result.
0000 35 :
0000 36 : ENVIRONMENT: User Mode, AST Reentrant
0000 37 :
0000 38 : --
0000 39 : AUTHOR: Steven B. Lionel, CREATION DATE: 24-Oct-1978: Version 0
0000 40 :
0000 41 : MODIFIED BY:
0000 42 :
0000 43 : SBL 24-Oct-1978, VERSION 00
0000 44 : 1-001 - Original
0000 45 : 1-002 - Standardized version number format, with three digits in
0000 46 : the edit number. JBS 16-NOV-78
0000 47 : 1-003 - Add "" to the PSECT directive. JBS 22-DEC-78
0000 48 : 1-004 - Change shared external references to G^ RNH 25-Sep-81
```

```
0000 50      .SBTTL  DECLARATIONS
0000 51      :
0000 52      : INCLUDE FILES:
0000 53      :
0000 54      :
0000 55      :
0000 56      : EXTERNAL DECLARATIONS:
0000 57      :
0000 58      .GLOBL  MTH$CEXP      ; Complex exponentiation
0000 59      .GLOBL  MTH$CLOG     ; Complex logarithm
0000 60      :
0000 61      : MACROS:
0000 62      :
0000 63      :
0000 64      :
0000 65      : EQUATED SYMBOLS:
0000 66      :
00000004 0000 67      base = 4      ; base input - by value
0000000C 0000 68      exp = 12     ; exponent input - by value
0000 69      :
0000 70      : OWN STORAGE:
0000 71      :
0000 72      :
0000 73      :
0000 74      : PSECT DECLARATIONS:
0000 75      :
00000000 0000 76      .PSECT _OTSSCODE PIC,USR,CON,REL,LCL,SHR,-
0000 77      EXE, RD, NOWRT, LONG
0000 78
```

```

0000 80      .SBTTL OTSSPOWCC - COMPLEX*8 ** COMPLEX*8 power routine
0000 81      :++
0000 82      : FUNCTIONAL DESCRIPTION:
0000 83      :
0000 84      : OTSSPOWCC evaluates the result of taking a complex base
0000 85      : to a complex power. The ANS FORTRAN X3.9-1978 standard defines
0000 86      : complex exponentiation as:
0000 87      :
0000 88      :  $x ** y = \text{EXP}(y * \text{CLOG}(x))$ 
0000 89      :
0000 90      : where x and y are type COMPLEX.
0000 91      :
0000 92      : The arguments of OTSSPOWCC are CALL BY VALUE.
0000 93      :
0000 94      : CALLING SEQUENCE:
0000 95      :
0000 96      : power.wfc.v = OTSSPOWCC (base.rfc.v, exponent.rfc.v)
0000 97      :
0000 98      : INPUT PARAMETERS:
0000 99      :
0000 100     : Both base and exponent are COMPLEX*8 numbers, each consisting
0000 101     : of a REAL*4 real part and a REAL*4 imaginary part. Both are
0000 102     : CALL BY VALUE.
0000 103     :
0000 104     : IMPLICIT INPUTS:
0000 105     :
0000 106     : NONE
0000 107     :
0000 108     : OUTPUT PARAMETERS:
0000 109     :
0000 110     : NONE
0000 111     :
0000 112     : IMPLICIT OUTPUTS:
0000 113     :
0000 114     : NONE
0000 115     :
0000 116     : FUNCTION VALUE:
0000 117     :
0000 118     : The COMPLEX*8 (REAL*4, REAL*4) result of taking the
0000 119     : COMPLEX base to the COMPLEX exponent power.
0000 120     :
0000 121     : SIDE EFFECTS:
0000 122     :
0000 123     : Possible error signals are:
0000 124     :
0000 125     : MTH$_INVARGMAT if base is (0.,0.).
0000 126     : MTH$_FLOOVEMAT if floating overflow occurs.
0000 127     : MTH$_SINCOSSIG if absolute value of the imaginary part of
0000 128     : (exponent * CLOG(base)) > PI*2**30.
0000 129     :
0000 129     : SSS$_ROPRAND if reserved floating operand is fetched.
0000 130     :--
  
```

```

003C 0000 132 .ENTRY OTSSPOWCC, ^M<R2,R3,R4,R5> ; disable integer ovflo
      0002 133
      0002 134 MTH$FLAG_JACKET ; establish math error handler
6D 00000000'GF 9E 0002 MOVAB G^MTH$$JACKET_HND, (FP) ; set handler address to jacket
      0009 ; handler
      0009
      0009 135
      52 0C AC 7D 0009 MOVQ exp(AP), R2 ; put exponent in R2, R3
      000D 136 ; later operations will check
      000D 137 ; for reserved operands
      000D 138
      000D 139
      000D 140 :+
      000D 141 :+
      000D 142 :-
      000D 143 Get complex logarithm of base
00000000'GF 04 AC DF 000D 143 PUSHAL base(AP) ; address of base
      01 FB 0010 144 CALLS #1, G^MTH$CLOG ; R0,R1 get LOG(base)
      0017 145 ; call by reference
      0017 146
      0017 147 :+
      0017 148 CLOG(base) is in R0, R1. Multiply by exponent.
      0017 149 R0,R1 = CLOG(base) = a+bi
      0017 150 R2,R3 = exp = c+di
      0017 151
      0017 152 Complex multiplication defined as:
      0017 153
      0017 154 real part = ac-bd
      0017 155 imaginary part = ad+bc
      0017 156 :-
      0017 157
      54 53 50 45 0017 158 MULF3 R0, R3, R4 ; R4 = ad
      50 52 44 001B 159 MULF2 R2, R0 ; R0 = ac
      55 53 51 45 001E 160 MULF3 R1, R3, R5 ; R5 = bd
      50 55 42 0022 161 SUBF2 R5, R0 ; R0 = ac-bd
      51 52 44 0025 162 MULF2 R2, R1 ; R1 = bc
      51 54 40 0028 163 ADDF2 R4, R1 ; R1 = ad+bc
      002B 164
      002B 165 :+
      002B 166 :-
      002B 167
      002B 168
      7E 50 7D 002B 169 MOVQ R0, -(SP) ; put product (R0,R1) on stack
      5E DD 002E 170 PUSHL SP ; address of arguments
00000000'GF 01 FB 0030 171 CALLS #1, G^MTH$CEXP ; R0, R1 get EXP(product)
      0037 172 ; call by reference
      0037 173
      04 0037 174 RET
      0038 175 .END ; all done, exit
    
```

OTSSPOWCC
Symbol table

- COMPLEX*8 ** COMPLEX*8 power routine L 8

16-SEP-1984 01:55:02
6-SEP-1984 11:27:45

VAX/VMS Macro V04-00
[MTHRTL.SRC]OTSP0WCC.MAR;1

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```

BASE      = 00000004
EXP      = 0000000C
MTH$$JACKET_HND ***** X 01
MTH$CEXP ***** G 00
MTH$CLOG ***** G 00
OTSSPOWCC 00000000 RG 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 |
| _OTSSCODE | 00000038 (56.) | 01 (1.) | PIC USR CON REL LCL SHR EXE RD NOWRT NOVEC LONG |

```

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

```

| Phase | Page faults | CPU Time | Elapsed Time |
|------------------------|-------------|-------------|--------------|
| Initialization | 32 | 00:00:00.08 | 00:00:01.80 |
| Command processing | 138 | 00:00:00.59 | 00:00:05.14 |
| Pass 1 | 87 | 00:00:00.65 | 00:00:03.71 |
| Symbol table sort | 0 | 00:00:00.00 | 00:00:00.00 |
| Pass 2 | 45 | 00:00:00.48 | 00:00:04.60 |
| Symbol table output | 2 | 00:00:00.01 | 00:00:00.05 |
| Psect synopsis output | 2 | 00:00:00.02 | 00:00:00.03 |
| Cross-reference output | 0 | 00:00:00.00 | 00:00:00.00 |
| Assembler run totals | 308 | 00:00:01.85 | 00:00:15.34 |

The working set limit was 900 pages.
 2597 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.
 235 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\$:OTSP0WCC/OBJ=OBJ\$:OTSP0WCC MSRC\$:MTHJACKET/UPDATE=(ENH\$:MTHJACKET)+MSRC

0264 AH-BT13A-SE
VAX/VMS V4.0

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The image shows a large array of computer terminal screens, likely from a VAX/VMS system. Each screen displays a different view of data or code. The screens are arranged in a grid, and many of them have labels that identify the data being displayed. The labels include:

- OTSMULCD LIS
- OTSPOWGC LIS
- OTSDIUC LIS
- OTSPOWDD LIS
- OTSPOWCC LIS
- OTSPOWCJ LIS
- MHTAN LIS
- MTHVECTOR LIS
- OTSDIUCG LIS
- OTSPOWCJ LIS
- OTSPOWDLJ LIS
- MHTANH LIS
- OTSMULCG LIS
- OTSPOWCG LIS
- OTSPOWDJ LIS
- OTSDIUCD LIS
- OTSPOWDC LIS