


```

000000  TTTTTTTTTT  SSSSSSSS  PPPPPPPP  000000  WW      WW  LL      UU      UU  LL
000000  TTTTTTTTTT  SSSSSSSS  PPPPPPPP  000000  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WW      WW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WWWW   WWWW  LL      UU      UU  LL
00      00    TT      SS      PP      PP  00      00  WWWW   WWWW  LL      UU      UU  LL
000000  TT      SSSSSSSS  PPPPPPPP  000000  WW      WW  LLLLLLLLLL  UUUUUUUUUU  LLLLLLLLLL  ....
000000  TT      SSSSSSSS  PPPPPPPP  000000  WW      WW  LLLLLLLLLL  UUUUUUUUUU  LLLLLLLLLL  ....

```

```

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
LLLLLLLLLLLL  IIIIII  SSSSSSSS
LLLLLLLLLLLL  IIIIII  SSSSSSSS

```

OTSSPOWLULU
Table of contents

- LU ** LU Exponentiation Routine^J 6

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DECLARATIONS
OTSSPOWLULU - LU ** LU Exponentiation Routine

OT
1-

```
0000 1 .TITLE OTSSPOWLULU - LU ** LU Exponentiation Routine
0000 2 .IDENT /1-001/ ; File: OTSSPOWLUL.MAR, Edit: SBL1001
0000 3
0000 4 :*****
0000 5 :*
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0000 22 :* SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.
0000 23 :*
0000 24 :*
0000 25 :*****
0000 26
0000 27 :++
0000 28 : FACILITY: Mathematics Library
0000 29
0000 30 : ABSTRACT:
0000 31
0000 32 : This module contains OTSSPOWLULU which takes an unsigned longword base
0000 33 : to an unsigned longword power resulting in an unsigned longword.
0000 34
0000 35 : ENVIRONMENT: Runs at any access mode, AST Reentrant
0000 36
0000 37
0000 38 : AUTHOR: Steven B. Lionel, CREATION DATE: 2-September-1980
0000 39
0000 40 : MODIFIED BY:
0000 41
0000 42 : 1-001 - Original. SBL 2-September-1980
0000 43 :--
```

```
0000 45 .SBTTL DECLARATIONS
0000 46 :
0000 47 : LIBRARY MACRO CALLS:
0000 48 :
0000 49 : NONE
0000 50 :
0000 51 : EXTERNAL DECLARATIONS:
0000 52 :
0000 53 : .DSABL GBL ; Force all external symbols to be declared
0000 54 : .EXTRN MTH$$SIGNAL ; Signal a math error
0000 55 : .EXTRN MTH$K_UNDEXP ; Undefined exponentiation error code
0000 56 :
0000 57 : MACROS:
0000 58 :
0000 59 : NONE
0000 60 :
0000 61 : EQUATED SYMBOLS:
0000 62 :
0000 63 : NONE
0000 64 :
0000 65 : OWN STORAGE:
0000 66 :
0000 67 : NONE
0000 68 :
0000 69 : PSECT DECLARATIONS:
0000 70 :
00000000 71 : .PSECT _MTH$CODE PIC, USR, CON, REL, LCL, SHR, -
0000 72 : EXE, RD, NOWRT, LONG
0000 73 :
```

OT
Sy
BA
CH
CH
CH
CH
CO
DO
DO
DO
EX
EX
EX
EX
MT
MT
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PA
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```

0000 75      .SBTTL  OTSS$POWLULU - LU ** LU Exponentiation Routine
0000 76      : **
0000 77      : FUNCTIONAL DESCRIPTION:
0000 78      :
0000 79      : This routine takes an unsigned longword integer base to an unsigned
0000 80      : longword integer power yielding an unsigned longword integer result.
0000 81      :
0000 82      : Overflow can not happen in this routine.  If the result or intermediate
0000 83      : result is greater than 32 bits, the low 32 bits are used.
0000 84      :
0000 85      : CALLING SEQUENCE:
0000 86      :
0000 87      : result.wlu.v = OTSS$POWLULU (base.rlu.v, exponent.rlu.v)
0000 88      :
0000 89      : FORMAL PARAMETERS:
0000 90      :
00000004 0000 91      : base = 4 ; Unsigned longword integer base by value
00000008 0000 92      : exponent = 8 ; Unsigned longword integer exponent by value
0000 93      :
0000 94      : IMPLICIT INPUTS:
0000 95      :
0000 96      : NONE
0000 97      :
0000 98      : IMPLICIT OUTPUTS:
0000 99      :
0000 100     : NONE
0000 101     :
0000 102     : FUNCTION VALUE:
0000 103     :
0000 104     : The unsigned longword integer result is returned in R0.
0000 105     :
0000 106     : SIDE EFFECTS:
0000 107     :
0000 108     : MTHS_UNDEXP if both the base and exponent are zero
0000 109     :
0000 110     :--
0000 111     :
0004 0000 112     .ENTRY  OTSS$POWLULU, ^M<R2> ; IV must be disabled
0002 113
50 01 D0 0002 114     MOVL  #1, R0 ; Intialize result
52 04 AC D0 0005 115     MOVL  base(AP), R2 ; Get base
51 08 AC D0 0009 116     MOVL  exponent(AP), R1 ; Get exponent
18 13 000D 117     BEQL  ZERO_EXP ; If exponent is zero, result is 1
000F 118     ; unless base is zero.
000F 119
000F 120     :+
000F 121     : Scan exponent bits from right to left, squaring base each time through loop.
000F 122     : If an exponent bit is set, multiply the current result by the current base.
000F 123     :-
000F 124
000F 125     LOOP:
13 51 E8 000F 126     BLBS  R1, PARTIAL ; If exponent bit set, get partial result
0012 127     LOOP1:
51 51 FF 8F 78 0012 128     ASHL  #-1, R1, R1 ; Drop rightmost exponent bit
51 80000000 8F CA 0017 129     BICL2 #^X80000000, R1 ; Clear leftmost bit
19 13 001E 130     BEQL  EXIT ; If zero, we're done
52 52 C4 0020 131     MULL2 R2, R2 ; Square current base

```

OT
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MA

```

EA 11 0023 132 ; If overflow, use low 32 bits
      0023 133 ; Continue searching
      0025 134
      0025 135 PARTIAL:
50 52 C4 0025 136 MULL2 R2, R0 ; Get new partial result
      0028 137 ; If we overflow, use low 32 bits
E8 11 0028 138 BRB LOOP1 ; Continue searching
      002A 139
      002A 140 ZERO_EXP:
52 D5 002A 141 TSTL R2 ; Exponent is zero, is base?
      0B 12 002C 142 BNEQ EXIT ; If not, result is 1
7E 00 8F 9A 002E 143 MOVZBL #MTH$K UNDEXP, -(SP) ; If so, it's an error
00000000'GF 01 FB 0032 144 CALLS #1, G^MTH$$SIGNAL ; Signal the error
      0039 145
      04 0039 146 EXIT: RET ; Return with result in R0
      003A 147
      003A 148 .END ; End of module OTSSPOWLULU
  
```

```

BASE          = 00000004
EXIT          = 00000039 R    01
EXPONENT     = 00000008
LOOP         = 0000000F R    01
LOOP1        = 00000012 R    01
MTHSSIGNAL   ***** X    00
MTHSK UNEXP  ***** X    00
OTSSPOWLULU  00000000 RG   01
PARTIAL      00000025 R    01
ZERO_EXP     0000002A 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
_MTHSCODE	0000003A (58.)	01 (1.)	PIC USR CON REL LCL SHR EXE RD NOWRT NOVEC LONG

! Performance indicators !

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.08	00:00:00.82
Command processing	119	00:00:00.50	00:00:02.65
Pass 1	69	00:00:00.42	00:00:03.50
Symbol table sort	0	00:00:00.00	00:00:00.00
Pass 2	40	00:00:00.28	00:00:01.87
Symbol table output	2	00:00:00.03	00:00:00.22
Psect synopsis output	3	00:00:00.03	00:00:00.04
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	264	00:00:01.34	00:00:09.11

The working set limit was 900 pages.
1694 bytes (4 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 10 non-local and 0 local symbols.
148 source lines were read in Pass 1, producing 11 object records in Pass 2.
0 pages of virtual memory were used to define 0 macros.

! 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\$:OTSSPOWLUL/OBJ=OBJ\$:OTSSPOWLUL MSRC\$:OTSSPOWLUL/UPDATE=(ENH\$:OTSSPOWLUL)

0265 AH-BT13A-SE
VAX/VMS V4.0

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This image displays a grid of 100 terminal window screenshots, arranged in 10 rows and 10 columns. Each window shows a different view of system data, including logs, performance metrics, and configuration files. The windows are titled with various identifiers such as 'OTSPOWHH LIS', 'OTSPOWII LIS', 'OTSPOWRJ LIS', 'UUXPOWGG LIS', 'OTSPOWGLU LIS', 'OTSPOWHLU LIS', 'OTSPOWHJ LIS', 'UUXPOWCU LIS', 'UUXPOWR LIS', 'OTSPOWLUL LIS', 'OTSPOWRR LIS', 'OTSPOWUJ LIS', 'UUXEXP LIS', 'UUXGSTNCO LIS', and 'OTSPOWRLU LIS'. The content within the windows is dense and technical, typical of a VAX/VMS environment. The overall appearance is that of a multi-terminal session on a mainframe or minicomputer system.