



# DECUS

## PROGRAM LIBRARY

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| DECUS NO.       | 8-157   |
| TITLE           | SQUARE ROOT PATCH   |
| AUTHOR          | A. K. Head  |
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| DATE            | April 30, 1968  |
| SOURCE LANGUAGE | PAL   |

# SQUARE ROOT PATCH

DECUS Program Library Write-up

DECUS No. 8-157

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/ SQUARE ROOT PATCH FOR DEC 8-5-S
/ THIS IS SHORTER, ABOUT THREE TIMES FASTER AND
/ GIVES EXACT ROOTS OF EXACT SQUARES
/ METHOD: TOP 11 BITS EXACTLY BY DOUBLE SHIFT
/ AND SUBTRACT, THEN ROUNDED 12TH BIT AND
/ ONE NEWTONIAN ITERATION IN FLOATING POINT
/ AVERAGE TIME = 4MS FOR PDP8
    
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*6656
6656 0000 SQRT,0
6657 3743 DCA I REM
6660 3061 DCA 61
6661 1045 TAD 45
6662 7450 SNA
6663 5656 JMP I SORT
6664 7510 SPA
6665 2061 ISZ 61 /ERROR FLAG
6666 7510 SPA
6667 4653 JMS I 6653 /NEGATE
6670 4407 JMS I 7
6671 6052 FPUT 52
6672 0000 0
6673 1052 TAD 52 /HALVE
6674 7101 CLL IAC
6675 7550 SPA SNA
6676 7020 CML
6677 7010 RAR
6700 3345 DCA EPROX /EXPONENT
6701 7430 SZL
6702 4744 JMS I X2 /DOUBLE MANTISSA
6703 7124 NXTBIT,CLL CML RAL
6704 3346 DCA APROX
6705 4744 JMS I X2 /LEFT SHIFT INTO IREM
6706 4744 JMS I X2 /AGAIN, LINK=OVERFLOW
6707 1346 TAD APROX
6710 7041 CIA
6711 1743 TAD I REM /TRIAL SUBTRACT
6712 7430 SZL
6713 3743 DCA I REM
6714 7240 CLA CMA
6715 7430 SZL
6716 7041 CIA
6717 1346 TAD APROX
6720 7500 SMA
6721 5303 JMP NXTBIT
6722 7110 CLL RAR
6723 3346 DCA APROX / 11 BITS
6724 1346 TAD APROX
6725 7110 CLL RAR
6726 7141 CLL CIA
6727 1743 TAD I REM
6730 7210 CLA RAR
    
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|      |      |             |            |
|------|------|-------------|------------|
| 6731 | 3347 | DCA APROX+1 | / 12TH BIT |
| 6732 | 4407 | JMS I 7     |            |
| 6733 | 5052 | FGET 52     | / NEWTON   |
| 6734 | 4345 | FDIV EPROX  |            |
| 6735 | 1345 | FADD EPROX  |            |
| 6736 | 0000 | 0           |            |
| 6737 | 7240 | CLA CMA     |            |
| 6740 | 1044 | TAD 44      |            |
| 6741 | 3044 | DCA 44      |            |
| 6742 | 5656 | JMP I SORT  |            |
| 6743 | 7064 | REM,7064    |            |
| 6744 | 7067 | X2,7067     |            |
| 6745 | 0000 | EPROX,0     |            |
| 6746 | 0000 | APROX,0     |            |
| 6747 | 0000 | 0           |            |