INTEROFFICE MEMORANDUM

M-1093

PRELIMINARY

DATE November 22, 1960

SUBJECT ARCSINE AND ARCCOSINE SUBROUTINES[1] FOR PDP-1

TO PDP Distribution List FROM Chas. W. Adams Associates

I. The binary point of the argument is considered to be immediately to the right of the sign position, and the argument can range from -.377777 (almost -1.0) to +.377777 (almost +1.0). The answer is given in radians and scaled by a factor of 2^{-3}, i.e., the binary point is considered to be to the right of three binary positions to the right of the sign position. (Even though the absolute value of the result is never greater than 2^2, the 2^{-3} scaling permits compatibility with the sine and cosine subroutines). The result of the arccosine routine varies from 0 to pi radians; the result of the arcsine routine varies from +pi/2 to -pi/2. These subroutines use the "modified multiply", square root, and divide subroutines.

II. Calling sequence:

```
LIO    (the address of the sine or cosine)
JSP    (the address of the first instruction of the arcsine
        or arccosine subroutines)
```

III. Subroutines:

```
          ORG     (fill in)
          OPD     SQROOT        (fill in)
          OPD     MULTIP        001662
ARCSIN    DAP     ASX
          JSP     ARCCOS
          CMA
          ADD     PO2
ASX       JMP
ARCCOS    DAP     ACX
          DIO     T
          LAC     T
          SMA
          CMA
          DAC     X
```

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1. Acknowledgment
The ARCSINE and ARCCOSINE Subroutines were supplied to DEC by Chas. W. Adams Associates, Inc., Bedford, Mass.

```
        ADD     ONE
        SPA
        CMA
        RCR     S9
        RCR     S9
        JSP     SQROOT
        DAC     RT
        LIO     A3
        JSP     MULTIP
        LOC     X
        ADD     A2
        RCR     S9
        RCR     S9
        JSP     MULTIP
        LOC     X
        ADD     A1
        RCR     S9
        RCR     S9
        JSP     MULTIP
        LOC     X
        ADD     ROU
        SAR     S5
        ADD     A0
        RCR     S9
        RCR     S9
        JSP     MULTIP
        LOC     RT
        LIO     T
        SPI
        CMA
        SPI
        ADD     PI
ACX     JMP
        A3      023134
        A2      114026
        A1      331151
        A0      062207
        One     377777
        PO2     062210
        PI      144420
        ROU     000020
        X
        T
        RT
        END
```