INTEROFFICE MEMORANDUM

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
```