

GEOMAS

DECUS Program Library Write-up

DECUS NO. 8-638

ABSTRACT

The program GEOMAS developed for the SEAMAP program of the University of Puerto Rico, calculates

- (i) Great circle distance between two oceanographic stations
- (ii) The mean latitude between the stations
- (iii) The coriolis parameter for the mean latitude
- (iv) Geostrophic velocities relative to a depth chosen by the operator or to the greatest depth common to both stations
- (v) Geostrophic volume transports between given depths (by trapezoidal interpolation) and the total transport between the surface and the reference depth.

A description of the format and manner in which the input depths and dynamic heights are entered, is contained on comment cards in the program.

Dear Sir,

Reference is made to your letter of the 15th inst.

concerning

the matter of the proposed extension of the term of office of the members of the Board of Directors of the Corporation.

The Board of Directors has considered the matter and has decided to extend the term of office of the members of the Board of Directors for a period of one year.

The Board of Directors has also decided to extend the term of office of the members of the Board of Directors for a period of one year.

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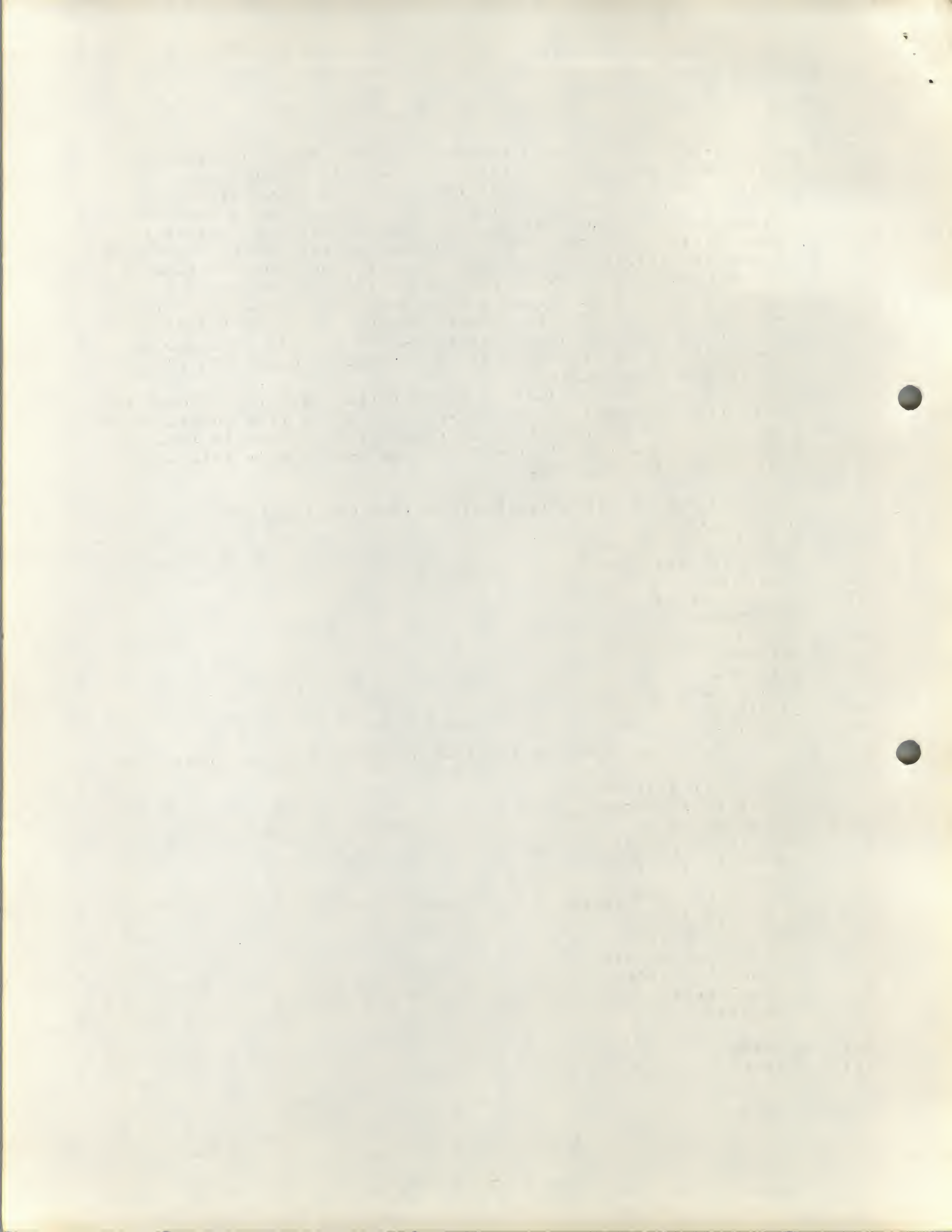
C
C THIS PROGRAM CALCULATES GEOSTROPHIC VELOCITIES AND VOLUME
C TRANSPORTS BETWEEN TWO STATIONS. INPUT IS FIRSTLY THE
C DEPTHS FOR WHICH THE VELOCITIES ARE TO BE CALCULATED, AND
C BETWEEN WHICH THE VOLUME TRANSPORTS WILL BE FOUND TRAPEZ-
C IDALLY. TO SIGNAL THAT ALL THE DEPTHS HAVE BEEN READ IN,
C TYPE '-133'. THE NEXT DATA REQUIRED ARE THE STATION NUMBER OF
C THE FIRST STATION AS A4, WITH THE LATITUDE AND LONGITUDE
C IN DECIMAL FORM AS 2F4.2. THEN FEED IN UP TO 30 DYNAMIC
C HEIGHTS IN DYNAMIC METERS, CORRESPONDING TO CHOSEN DEPTHS.
C SIGNAL THAT ALL DYNAMIC HEIGHTS ARE IN BY TYPING '0000'.
C SAME THING FOR THE SECOND STATION. THE PROGRAM WILL CHOOSE
C THE GREATEST COMMON DEPTH AS THE REFERENCE LEVEL FOR THE
C GEOSTROPHIC CALCULATION.
C AFTER DOING THE CALCULATION AND PRINTING OUT, THE PROGRAM WILL
C WAIT FOR MORE DATA AT THE ENTRY POINT OF STATION NAME, LATITUDE
C AND LONGITUDE OF THE FIRST OF THE STATION PAIRS. IF THERE IS
C NO MORE DATA, TYPE 'EXIT-1' AND THE RETURN KEY. THIS WILL
C TERMINATE THE PROGRAM.

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DIMENSION Z(30), DIF(30), D1(30), D2(30), V(30), VEL(30)
DO 613 K=2,30
READ (1,223) Z(K)
IF(Z(K)) 99,100,613
613 CONTINUE
99 DO 612 K=1,30
DIF(K)=0.
VEL(K)=0.
D1(K)=0.
D2(K)=0.
V(K) = 0.
612 CONTINUE
223 FORMAT(F4.3)
C DEPTHS NOW READ IN. STARTING TO READ FIRST STATION.
C
READ (1,1) STA1, XA, YA
IF(XA) 100, 224, 224
224 DO 26 N=2,30
READ (1,20) D1(N)
IF(D1(N)) 27, 27, 26
26 CONTINUE
27 READ (1,1) STA2, XB, YB
DO 28 N=2,30
READ (1,20) D2(N)
IF(D2(N)) 345, 345, 26
1 FORMAT(A4, 2F4.2)
20 FORMAT(F4.3)
24 CONTINUE
C
345 Z(1)=0.
333 KK=N-1

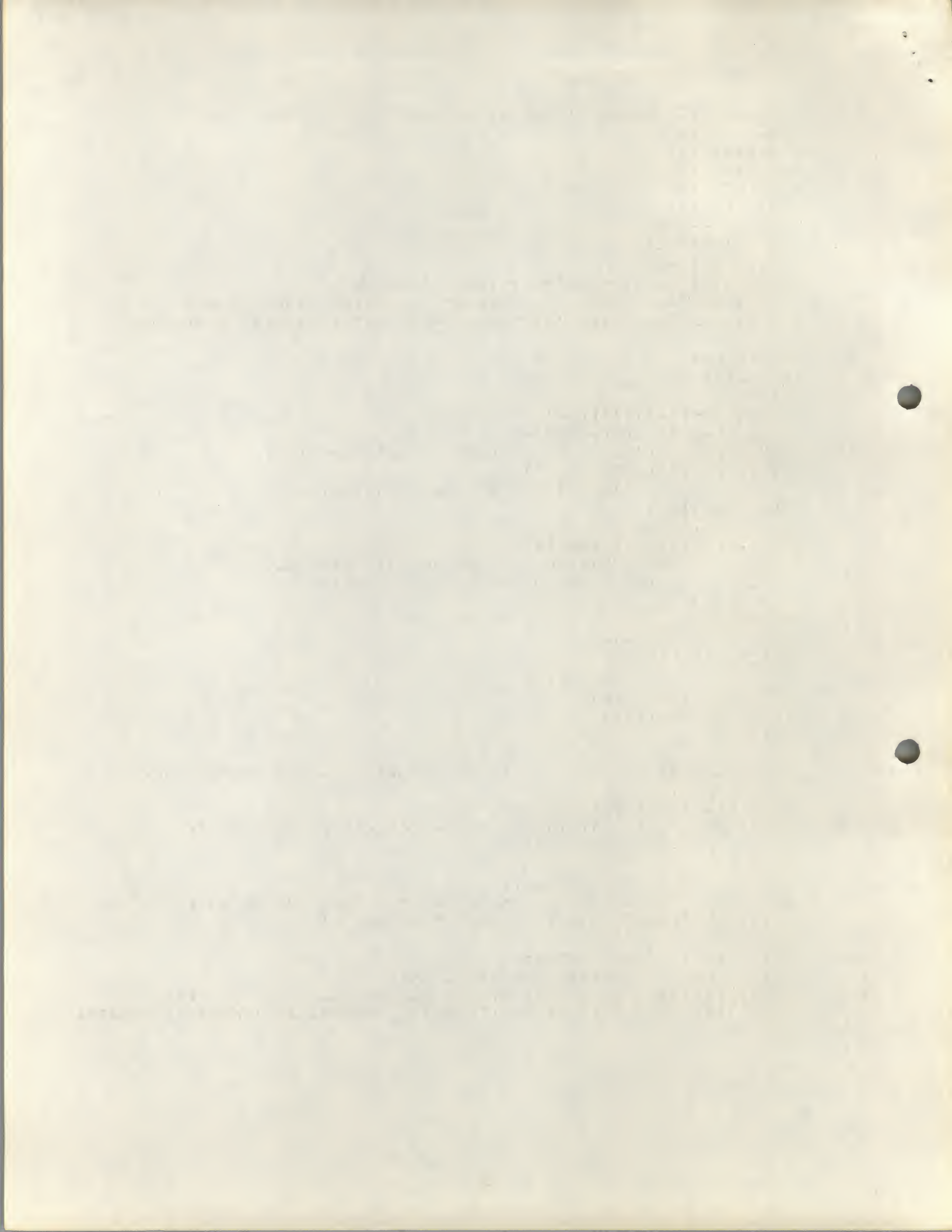
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C
C      CALCULATING GREAT CIRCLE DISTANCE
AK=.0174533
FLAT1=KA*AK
FLAT2=KB*AK
FLON1=YA*AK
FLON2=YB*AK
DL=FLON1-FLON2
AB=1.5708-FLAT2
BA=1.5708-FLAT1
C=COS(AB)*COS(BA)+SIN(AB)*SIN(BA)*COS(DL)
C      THIS COMPILER DOES NOT HAVE THE FUNCTION 'ARCCOSINE'.
C      I AM THEREFOR USIN 'SIN SQ = 1-COS SQ' , AND TAN = SIN/COS
C
S=1.-(C*C)
S=SQRT(S)
T=S/C
F=ATAN(T)*57.2958*110.5
WRITE (1,103) STA1,STA2,F
103  FORMAT(///1X,'DISTANCE BETWEEN ',A4,' AND ',A4,
15X,F7.2,2X,'KILOMETERS'//)
C      CALCULATING CORIOLIS PARAMETER
PHI=(KA+KB)/2.
PHL=PHI*0.0174533
PAR=1./(14.534+SIN(PHL))
C      CALCULATING DYNAMIC HEIGHT DIFFERENCES
C      AND DETERMINING THE DEEPEST COMMON DEPTH
DO 3 N=2,30
IMP=K-N-1
IF(IMP) 346,343,348
343  DIF(N)=D1(N)-D2(N)
C      SWITCHING
IF(D2(N)) 100,77,102
102  IF(D1(N)) 100,75,3
3   CONTINUE
C
C      PRINTING OUT THE MEAN LATITUDE AND THE DEEPEST COMMON DEPTH
C
WRITE (1,22) PHI,Z(N)
22  FORMAT(25X,'MEAN LATITUDE = ',F6.2//1X,' BOTH STATIONS',
1' CO TO ',F5.0,' METERS')
CO TO 30
77  WRITE (1,4) PHI,STA2,Z(N-1)
4   FORMAT(25X,'MEAN LATITUDE = ',F6.2//1X,' MAXIMUM DEPTH IS AT '
1' STATION ',A4,' AND IS ',F5.0,' METERS'//)
CO TO 7)
75  WRITE (1,4) PHI,STA1,Z(N-1)
79  WRITE (1,5) STA1,STA2,DIF(N-1),Z(N-1)
5   FORMAT(1X,' DYNAMIC HEIGHT DIFFERENCE BETWEEN STATION ',A4, /
1' AND STA. ',A4,' IS ',F7.3,' DYNAMIC METERS AT ',F5.0,' METERS'//)

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CALCULATING THE GEOSTROPHICS

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C
C
6  I=N-1
   Z(1)=0.
   V(1)=0.
   DO 7 M=2,I
     QDIF=(DIF(I)-(DIF(M)+DIF(M-1)))/2.
     V(M)=V(M-1)+PAR*(Z(M)-Z(M-1))*QDIF
7  CONTINUE
   DO 1001 K=1,I
     VEL(K)=(DIF(I)-DIF(K))*PAR*1.E5/F
1001 CONTINUE
   WRITE (1,8)
8   FORMAT(1X,'  DEPTH      VOLUME TRANSPORT      ',
1  'VELOCITY      VOLUME TRANSPORT'/6X,'Z',11X,'ABOVE Z',
2  14X,'AT Z',11X,'Z2-Z1')
C
C
   WRITE (1,9) Z(1),V(1),VEL(1)
9   FORMAT(1X,F8.3,3X,F11.2,13X,F6.1)
   DO 10 N=2,I
     A=V(N)-V(N-1)
     WRITE (1,50) A
     WRITE (1,9) Z(N),V(N),VEL(N)
10  CONTINUE
    WRITE(1,401)
401  FORMAT(//3X,'METERS',6X,'MEGATONS/SEC',10X,'CM/SEC',
1  19X,'MEGATONS/SEC')
    COPO99)
C
34  WRITE(1,5) STAI,STAR,DIF(N),Z(N)
35  FORMAT(55X,F6.2)
16  I=N
   Z(1)=0.
   V(1)=0.
   DO 17 M=2,I
     QDEF=(DIF(I)-(DIF(M)+DIF(M-1)))/2.
     V(M)=V(M-1)+PAR*(Z(M)-Z(M-1))*QDEF
17  CONTINUE
   DO 1002 K=1,I
     VEL(K)=(DIF(I)-DIF(K))*PAR*1.E5/F
1002 CONTINUE
   WRITE (1,3)
   WRITE (1,9) Z(1),V(1),VEL(1)
   DO 101 K=2,I
     A=V(K)-V(K-1)
     WRITE (1,50) A
     WRITE (1,9) Z(K),V(K),VEL(K)
101  CONTINUE
    CO TO 99
346  WRITE(1,347)
347  FORMAT(/////////'YOU MADE A MISTAKE OF SOME SORT',////)
100  STOP
    END

```

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by proper documentation and that the books should be kept up to date at all times.

In the second section, the author details the various methods used to collect and analyze data. This includes the use of standardized forms, regular audits, and the application of statistical techniques to identify trends and anomalies.

The third part of the report focuses on the implementation of internal controls to prevent errors and fraud. It describes the segregation of duties, the use of checks and balances, and the establishment of a clear chain of command.

Finally, the document concludes with a summary of the findings and recommendations. It suggests that the current system is generally sound but requires some minor adjustments to improve efficiency and accuracy. The author also provides a list of specific actions to be taken in the near future.

OUTPUT

R FORT

*,, <MAS.FT/G

0050
0100
0150
0200
0250
0300
0350
0400
0450
0500
-123

Reading in depth data

Signal that all depths are in

READING IN FIRST STATION

(A) 262117676698 Reading in station number, latitude and longitude

0288
0499
0652
0767
0861
0945
1023
1096
1164
1228

Reading in dynamic heights

0000 Signal that all dynamic heights are in

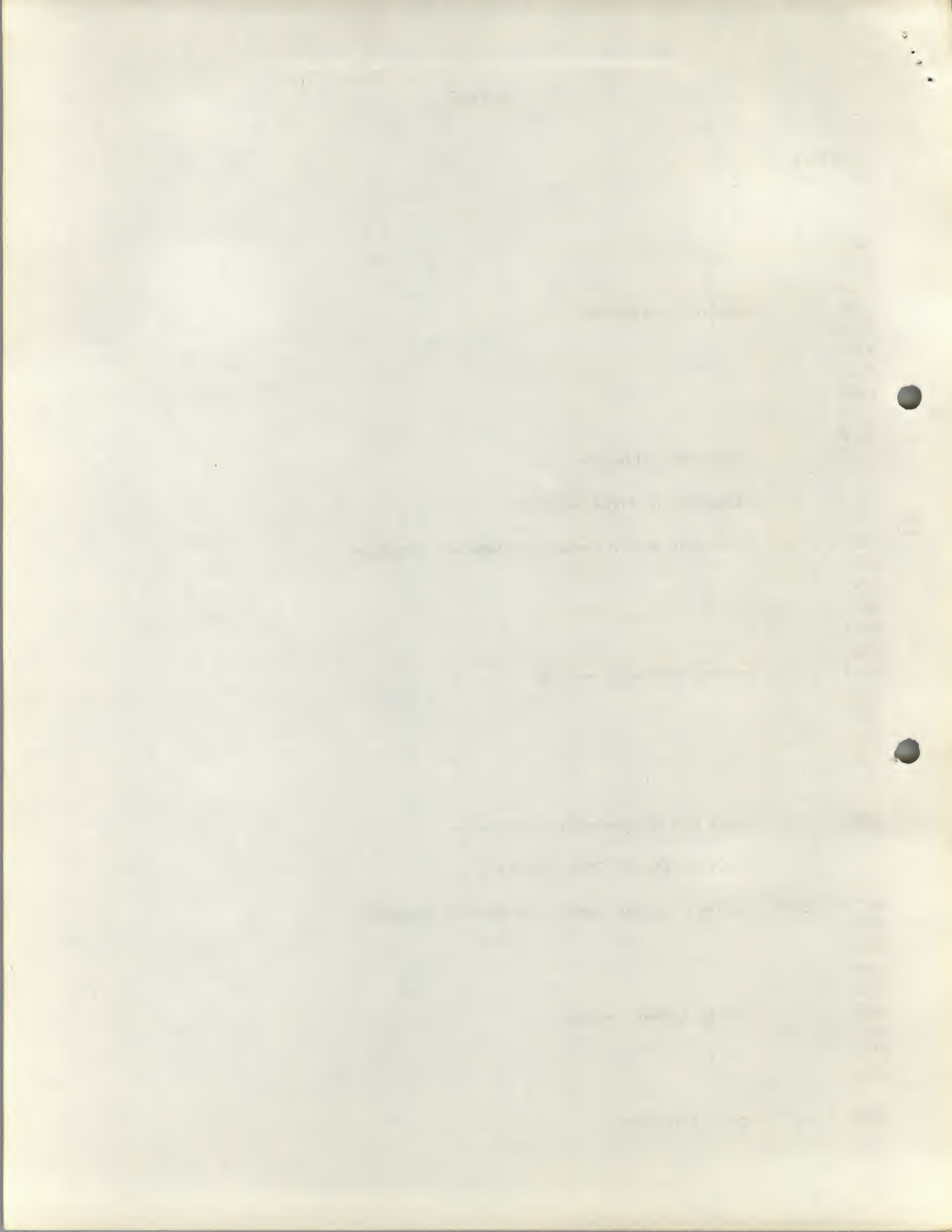
READING IN SECOND STATION

262911336700 Reading in station number, latitude and longitude

0224
0369
0466
0543
0603
0657
0712
0764

Reading dynamic heights

0000 Signal to start work



OUTPUT

DISTANCE BETWEEN 2621 AND 2629 700.57 KILOMETERS

MEAN LATITUDE = 14.50

MAXIMUM DEPTH IS AT STATION 2629 AND IS 400. METERS

DYNAMIC HEIGHT DIFFERENCE BETWEEN STATION 2621
AND STA. 2629 IS 0.332 DYNAMIC METERS AT 400. METERS

DEPTH Z	VOLUME TRANSPORT ABOVE Z	VELOCITY AT Z	VOLUME TRANSPORT Z2-Z1
0.	0.00	13.0	
50.	4.11	10.5	4.11
100.	7.33	7.9	3.22
150.	9.71	5.7	2.38
200.	11.45	4.2	1.74
250.	12.69	2.9	1.25
300.	13.50	1.7	0.81
350.	13.95	0.8	0.45
400.	14.09	0.0	0.14
METERS	MEGATONS/SEC	CM/SEC	MAGATONS/SEC

Now either return to (A) to process more work, or type

EXIT-1

to terminate.

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DECUS NO.	8-638
TITLE	GEOMAS
AUTHOR	Dr. Peter Duncan
COMPANY	University of Puerto Rico Dept. of Marine Services Mayaguez, Puerto, Rico
DATE	June 7, 1973
SOURCE LANGUAGE	FORTRAN II

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