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1984/21. A FORTRAN program to calculate bearings

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*Abstract*

The program BEARIN calculates the short distance great circle bearing, the distance and time difference between two points on the Earth's surface.

## INTRODUCTION

The program was written to provide calculation of the bearing, distance and time difference of VLF transmitting stations relative to the area of the VLF-EM survey. It is equally useful for any other purpose requiring this particular information. The program language is FORTRAN and the program runs on the Department of Mines Perkin-Elmer 8/32 mini-computer.

## PROGRAM BEARIN (APPENDIX 1)

For ease of use, BEARIN allows input in terms of the accepted latitude and longitude co-ordinates. The program will prompt for the required information and will provide an example of the input required. To run, simply type BEARIN, and a .CSS of the same name will take control.

[5 April 1984]

## APPENDIX 1

## Program BEARIN

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C * * * * *
C PROGRAM BEARIN CALCULATES THE SHORT DISTANCE BEARING OF ONE PLACE
C ON THE EARTH FROM ANOTHER. THE NEED FOR THIS PROGRAM AROSE WHEN
C CARRYING OUT VLF EM SURVEYS.
  IMPLICIT REAL*8(A-H, O-Z)
  INTEGER LATDEG, LATMIN, LONDEG, LONMIN
  REAL*8 LATR, LONR, LATT, LONT, LONDIF
  CHARACTER*1 LATDRR, LATDRT, LONDIR
  LOGICAL CROSS
  PI=3.141592654
  CROSS=.FALSE.
  WRITE(5,100)
100 FORMAT(1X, 'ENTER LAT AND LONG OF RECEIVER POSITION IN THE',
1' FOLLOWING FORMAT',/, ' LATDEG, LATMIN, ',10H'N' OR 'S',/, 'LONGDEG',
2', LONGMIN, ',10H'E' OR 'W',/, ' FOR EXAMPLE: 42.10, ',3H'S',
3',146.43, ',3H'E')
  READ(5,*)LATDEG, LATMIN, LATDRR, LONDEG, LONMIN, LONDIR
  LATR=LATDEG+LATMIN/60.0
  IF(LATDRR.EQ.'S') LATR = -LATR
  LONR=LONDEG+LONMIN/60.0
  IF(LONDIR.EQ.'W') LONR = -LONR
  WRITE(5,110)
110 FORMAT(1X, 'ENTER LAT AND LONG OF TRANSMITTER POSITION IN THE',
1' FOLLOWING FORMAT',/, ' LATDEG, LATMIN, ',10H'N' OR 'S',/, 'LONGDEG',
2', LONGMIN, ',10H'E' OR 'W',/, ' FOR EXAMPLE: 19.30, ',3H'N',
3',155.30, ',3H'W')
  READ(5,*)LATDEG, LATMIN, LATDRT, LONDEG, LONMIN, LONDIR
  LATT=LATDEG+LATMIN/60.0
  IF(LATDRT.EQ.'S') LATT = -LATT
  IF(LATDRR.NE.LATDRT) CROSS=.TRUE.
  LONT=LONDEG+LONMIN/60.0
  IF(LONDIR.EQ.'W') LONT = -LONT
  LONDIF=LONT-LONR
  WRITE(5,125) LONDIF, LONT, LONR
125 FORMAT(1X, 'LONDIF, LONT, LONR ARE',3F10.2)
  IF(LONDIF.GT.180.0) LONDIF=LONDIF-360
  IF(LONDIF.LT.-180.0) LONDIF=360+LONDIF
  WRITE(5,125) LONDIF, LONT, LONR
  B1=ABS(LONDIF*PI/180.0)
  C1=ABS(LATR*PI/180.0)
  C2=ABS(LATT*PI/180.0)
  A1=DACOS(DCOS(C1)*DCOS(B1))
  BB1=DASIN(DSIN(B1)/DSIN(A1))
  IF(B1.GT.PI/2.0) BB1=PI-BB1
  CC1=DASIN(DSIN(C1)/DSIN(A1))
  IF(CROSS) THEN
  WRITE(5,140)
140 FORMAT(1X, 'CROSS')
  AA2=PI/2.0+CC1
  ELSE
  AA2=PI/2.0-CC1
  ENDIF
  A2=DACOS(DCOS(A1)*DCOS(C2)+DSIN(C2)*DSIN(A1)*DCOS(AA2))
  CC2=DASIN(DSIN(C2)*DSIN(AA2)/DSIN(A2))
  WRITE(5,150) A1*180.0/PI, B1*180.0/PI, C1*180.0/PI, BB1*180.0/PI,
1CC1*180.0/PI, A2*180.0/PI, C2*180.0/PI, AA2*180.0/PI, CC2*180.0/PI
150 FORMAT(1X, ' A1 B1 C1 BB1 CC1 A2 ',
1' C2 AA2 CC2',/,1X,9F8.1)
  IF(CROSS) THEN
  BEAR=(BB1-CC2)*180.0/PI
  ELSE
  BEAR=(BB1+CC2)*180.0/PI

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ENDIF
WRITE(5, 200) BEAR, LATR, LONDIF
200 FORMAT(1X, 'BEAR, LATR, LONDIF ', F8.1)
IF(LATR.GT.0.0) BEAR=180.0-BEAR
IF(LONDIF.LT.0.0) BEAR=360.0-BEAR
DIST=6370*#2
HRS=ABS(LONDIF/15.0)
IHRS=INT(HRS)
IMIN=NINT((HRS-IHRS)*60.0)
WRITE(5, 300) BEAR, DIST
300 FORMAT(1X, 'BEARING IS ', F5.1, ' DEG          DISTANCE', F7.0, ' KM. ')
IF(LONDIF.GT.0.0) THEN
WRITE(5, 310) IHRS, IMIN
310 FORMAT(1X, 'TIME DIFFERENCE IS ', I2, ' HRS', I3, ' MINS AHEAD')
ELSE
WRITE(5, 312) IHRS, IMIN
312 FORMAT(1X, 'TIME DIFFERENCE IS ', I2, ' HRS', I3, ' MINS BEHIND')
ENDIF
END

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THE MI POSITION ENTER LAT AND LONG OF TRANSMITTER POSITION IN THE  
 FOLLOWING FORMAT: LATITUDE, LONGITUDE, BEARING, DISTANCE  
 (LATITUDE, LONGITUDE, BEARING, DISTANCE)

READ(5,\*)LATR,LATR,LONDIF,LONDIF,LONDIF,LONDIF  
 IF(LATR.GT.0.0) THEN  
 IF(LONDIF.LT.0.0) THEN  
 DIST=6370\*#2  
 HRS=ABS(LONDIF/15.0)  
 IHRS=INT(HRS)  
 IMIN=NINT((HRS-IHRS)\*60.0)  
 WRITE(5,\*)BEAR,DIST  
 IF(LONDIF.GT.0.0) THEN  
 WRITE(5,\*)IHRS,IMIN  
 ELSE  
 WRITE(5,\*)IHRS,IMIN  
 ENDIF  
 END