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COMPUTER PROGRAM THAT PROCESSES ENVIRONMENTAL DATA TO FACILITAT--ETC(U)
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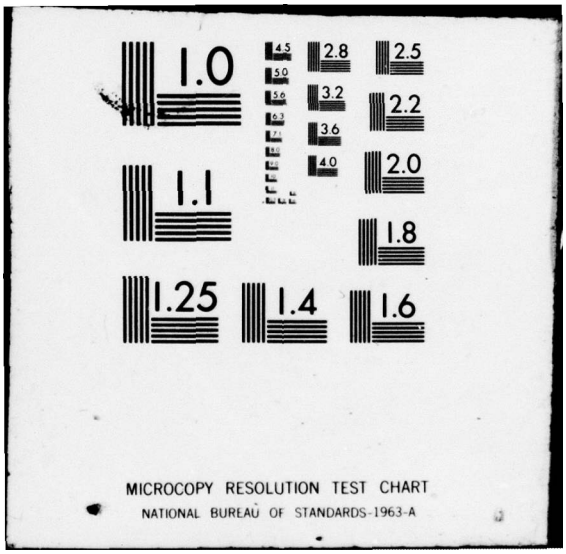
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NRL Report 8305

Computer Program That Processes Environmental Data to Facilitate Contouring

MARILYN L. BLODGETT

Applied Ocean Acoustics Branch
Acoustics Division

LEVEL II

June 21, 1979

NAVAL RESEARCH LABORATORY
Washington, D.C.

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REPORT DOCUMENTATION PAGE

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Bathymetry
Magnetics
Contour charts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A program has been written to read GEODATA formatted tapes containing bathymetric and/or magnetics data. The program identifies the high and low values and finds or interpolates values of a certain interval (every 500 meters, every 50 gammas). The program was written to aid the scientist in producing contour charts. The program was written in Fortran IV for use on the CDC 3800; however, it can be changed rather easily to run on other systems.

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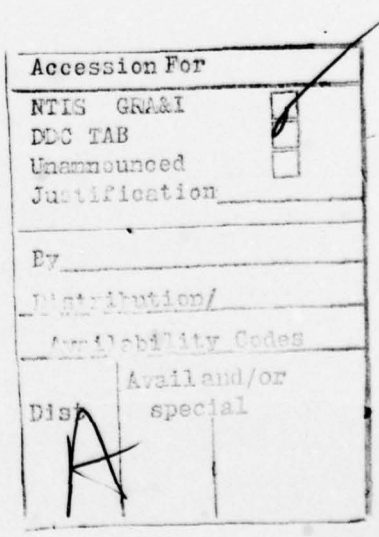
CONTENTS



COMPUTER PROGRAM THAT PROCESSES ENVIRONMENTAL DATA TO FACILITATE CONTOURING

1.0 IDENTIFICATION

1.1 Title

A program to find the high and low values and/or find or interpolate all values which are multiples of a specified value.

1.2 Identification Name

HIGHLOW.

1.3 Classification Code

None.

1.4 RCC Identification Number

None.

1.5 Entry Points

HIGHLOW.

1.6 Programming Language

Language: CDC 3600/3800 Fortran.
Routine type: program.
Operating System: Drum Scope 2.1.

1.7 Computer and Configuration

CDC-3800.

1.8 Contributor or Programmer

Marilyn L. Blodgett, Code 8122MB, Applied Ocean Acoustics Branch, Acoustics Division, written for the Environmental Sciences Group, Acoustics Division.

1.9 Contributing Organization

NRL — Naval Research Laboratory, Washington, DC 20375.

Manuscript submitted December 27, 1978.

1.10 Program Availability

If supplied with a magnetic tape, the Environmental Sciences Group, Acoustics Division, will make a copy of this program available.

1.11 Verification

This program has been used and tested by the Environmental Sciences Group, Acoustics Division.

1.12 Date

June 1978.

2.0 PURPOSE

2.1 Description of the Routine

This program reads the bathymetric or magnetics data collected by an oceanographic or geophysical experiment from a magnetic tape or tapes and finds the high and low values and/or all readings which are multiples of a specified value (such as every 100 meters or every 100 gammas). It also checks to see if there are multiples of the specified value between any two readings. If so, the program will interpolate the required fixes. The input tape(s) containing the bathymetric and/or magnetics data is written in the format recommended by the National Academy of Sciences. There is one logical record (of 80 characters) for each data point. The input tape(s) may also contain navigational data, but each data type is separated by an end-of-file mark with a double end-of-file mark at the end of all the data.

The program has one input card. The Parameter card specifies the value for which all multiples are to be found or interpolated, the number of input tape(s), the number of files to be skipped on the input tape(s), the type of data to be read (uncorrected fathoms or meters or corrected fathoms or meters for bathymetry or total or residual magnetic intensity for magnetics), the specific portion of data to be read, and the type of output desired.

With all the required parameters defined, the program starts to read the input tape one record at a time. If only certain portions of the data are to be used, the program will check to see that the fix falls on the defined grid or that it was taken on or between the two specified dates.

The program will continue reading the first input tape until it reads an end-of-file mark or a fix taken after the last specified date. If there are any additional tapes, the program will read them in a similar manner. The number of files to be skipped over on the new input tape and the beginning and end dates are contained on an Extra card. A maximum of four input tapes can be used.

All the values, read or interpolated, will either be written on a new tape, be printed out on logical unit 61, or both.

2.2 Problem Background

This program was written to aid the oceanographer/geophysicist in producing contour charts of bathymetric and/or magnetics data. HIGHLOW identifies the high and low values and finds or interpolates values of a certain interval (every 500 meters, every 50 gammas). The program presupposes edited data.

3.0 USAGE

3.1 Calling Sequence or Operation Procedure

Not applicable.

3.2 Arguments, Parameters, and/or Initial Conditions

Not applicable.

3.3 Space Required (Decimal and Octal)

3.3.1 Unique Storage:
4035 octal (2077 decimal) locations exclusive of system library functions.

3.3.2 Common Blocks:
None.

3.3.3 Temporary Storage:
None.

3.7 Input

There is one Parameter card which specifies the number and content of the input data tapes, the requirements for selecting data points, and the type of output. An Extra card must be provided for each additional input tape. The actual bathymetric and/or magnetics data is read in via magnetic tape on logical units 10-13. Appendix A presents a sample of the input data formats. Appendix B is a complete description of the input deck setup.

3.8 Output

The program will write all the required fixes and values on the standard printer (logical unit 61) and/or on a magnetic tape (logical unit 40). The format of the output tape will be the same as that of the input tape (Appendix A). Appendix C presents sample output listings.

3.9 Formats

Appendix B describes the Program deck structure.

3.10 External Routines and Symbols

SKIPFILE, XABSF, ABS, MOD, REWIND, ENDFILE.

3.11 Timing

The time required depends on the number of data read and the number of fixes interpolated.

3.12 Accuracy

Not applicable.

3.13 Cautions to Users

None.

3.14 Program Deck Structure

Appendix B describes the program deck structure.

3.15 Reference

M.L. Blodgett and J.V. Massingill, "A Program for Storing Oceanographic Data on Magnetic Tape," NRL Report 7861, March 1975.

4.0 METHOD OR ALGORITHM

Not applicable

5.0 FLOW CHART AND/OR SOURCE LANGUAGE LISTING

The flow chart and listing are given in Appendixes D and E.

6.0 COMPARISON

No other known programs are available for comparison.

7.0 TEST METHOD AND RESULTS

Sample bathymetric and magnetics output listings are given in Appendix C.

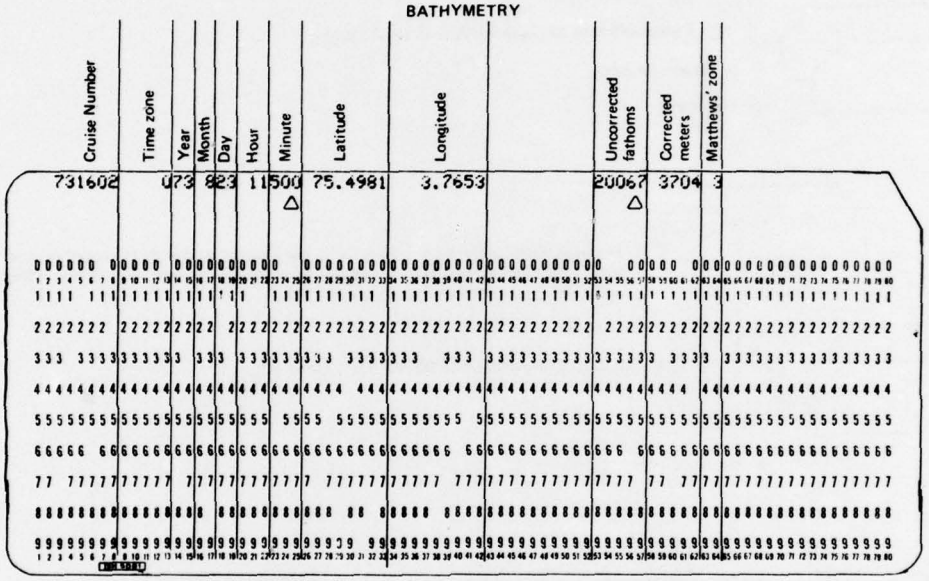
8.0 REMARKS

None.

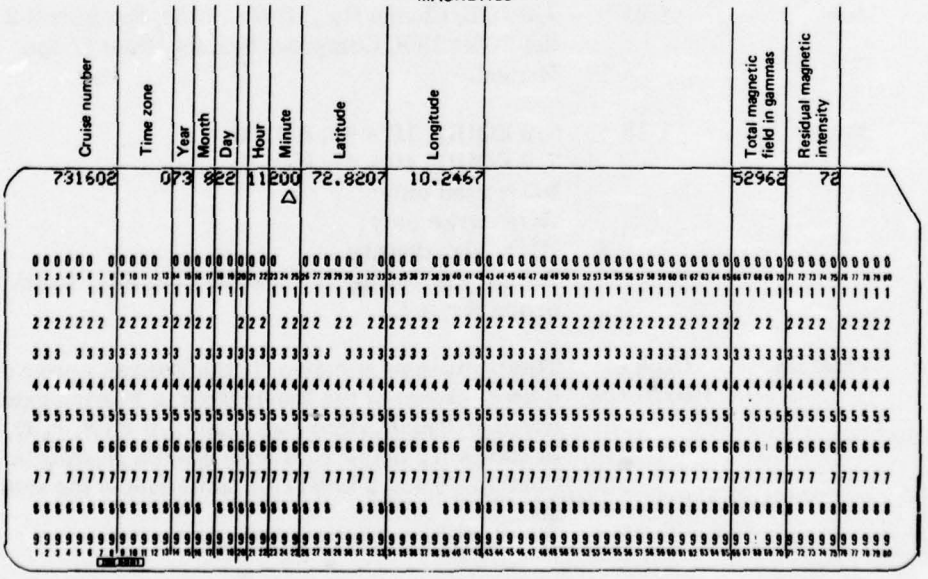
Appendix A

SAMPLE INPUT DATA FORMATS

BATHYMETRY



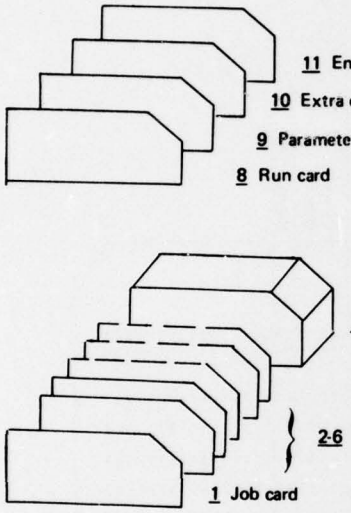
MAGNETICS



△ The symbol implies a decimal point.

Appendix B

DECK ASSEMBLY



Number	Card Title	Column Number	Description
1	Job	1-21	7/9 JOB, Charge No., ID No., time. See page 2-2 of the 3600/3800 Computer System Drum Scope Manual.
2-6	Equip	1-18	7/9 EQUIP, 10 = **, RO, HI 7/9 EQUIP, 40 = **, WO, HI RO = read only; WO = write only; HI = high density. See page 2-3 of the 3600/3800 Computer Drum Scope Manual.
7	Program	Deck of HIGHLOW	This is the main program. If the Fortran source deck is used instead of the binary deck, a Fortran card is required. The Fortran card reads 7/9 FTN, L, R, X. In addition a Scope card with SCOPE starting in Column 10 and a Load card must follow the source deck.

Number	Card Title	Column Number	Description
8	Run	1-13	7/9 RUN, T, P, R, M, D T = time limits in minutes; P = maximum number of print or write operations; R, M, and D may be left blank. See page 2-15 of the 3600/3800 Computer System Drum Scope Manual.
9	Parameter	1-10	1000 (IDEPTH) Specified interval. Needed only if column 18 = 1.
		11	1, 2, 3, or 4 (NOTP) Number of input tapes. There can be a maximum of four tapes.
		12	1, 2, 3, 4, 5, or 6 (KIND) 1 = value in uncorrected fathoms; 2 = value in corrected fathoms; 3 = value in uncorrected meters; 4 = value in corrected meters; 5 = value is total magnetic intensity; 6 = value is residual magnetic intensity.
		14	1 or 2 (LOHI) 1 = find all high and low values; 2 = do not find all high and low values.
		16	1, 2, or 3 (INEED) 1 = write information on tape; 2 = print out information; 3 = write on tape and print out information.
		18	1 or 2 (IMOD) 1 = find the fixes for all values which are multiples of a specified value (columns 1-10); 2 = do not find fixes for all values which are multiples of a specified value.
		20	2 (ISKIP) Number of files to be skipped on the first input tape.
		22	1 or 2 (IFILE) 1 = bathymetry file to be read; 2 = magnetics file to be read.

Number	Card Title	Column Number	Description
		24	0, 1 or 2 (ICOPY) 0 = only the data within a certain area are to be copied. The latitude and longitude values defining the area are in columns 41-80. 1 = Only the data taken during a certain time interval are to be copied. The beginning and end times for input tape 1 are defined in columns 25-40. 2 = All the data are to be copied. Columns 25-40 are used if column 24 = 1.

		25-32	07172130
			This is the time the program starts copying the data.
			Columns 25-26 = month;
			columns 27-28 = day;
			columns 29-30 = hour;
			columns 31-32 = minutes.

		33-40	08152215
			This is the time the program stops copying the data.
			Columns 33-34 = month;
			columns 35-36 = day;
			columns 37-38 = hour;
			columns 39-40 = minutes.
			
			In this example for columns 25-40, the data between July 17 and 21 hours and 30 minutes and August 15 at 22 hours and 15 minutes will be copied from input tape 1.
			
			Columns 41-80 are used if column 24 = 0.

		41-50	40.50 The southernmost latitude of the area to be copied.
		51-60	50.00 The northernmost latitude.
		61-70	-28.00 The westernmost longitude.
		71-80	-14.00 The easternmost longitude.

Number	Card Title	Column Number	Description
			In this example for columns 41-80, the positions are in degrees and hundredths of a degree (not degrees and minutes). Southern latitudes and western longitudes are preceded by a negative sign (−).
10	Extra	1-4	0, 1, or 2 (ISKIP) Number of files to be skipped on the second input tape.
		5-12	02250330 Date and time of the first data point to be read and plotted from the second input tape.
		13-20	02280830 Date and time of the last data point to be read and plotted from the second input tape.
			There must be an Extra card for each additional input tape. Since there is a maximum of four input tapes, the maximum number of Extra cards is three. The dates for the first input tape are on the parameter card.
11	End-of-file		Terminates the run.

Appendix C

SAMPLE OUTPUT LISTINGS

HIGH AND LOW VALUES MO	DAY	HR	MIN	LATITUDE	LONGITUDE	DEPTH IN CORRECTED METERS	
8	19	10	400	59.4105	-7,5401	1130	H
8	19	11	350	59.6197	-7,4533	954	L
8	19	12	0	59.7143	-7,4124	967	H
8	19	12	400	59.8654	-7,3445	902	L
8	19	12	440	59.8805	-7,3377	967	H
8	19	12	510	59.9079	-7,3268	789	L
8	19	12	550	59.9266	-7,3237	819	H
8	19	13	250	60.0375	-7,2754	473	L
8	19	14	300	60.2754	-7,1559	1159	H
8	19	17	95	60.8442	-6,7773	156	L
8	19	17	150	60.8633	-6,7612	183	H
8	19	17	200	60.8807	-6,7467	156	L
8	19	17	250	60.8981	-6,7321	186	H
8	19	18	250	61.1157	-6,5579	130	L
8	19	19	200	61.3178	-6,4289	234	H
8	19	19	250	61.3347	-6,4194	221	L
8	19	19	350	61.3686	-6,4006	336	H
8	19	19	450	61.4025	-6,3817	311	L
8	19	19	500	61.4194	-6,3722	326	H
8	19	20	100	61.4514	-6,3328	262	L
8	19	20	150	61.5104	-6,3225	302	H
8	19	20	200	61.5294	-6,3122	272	L
8	19	20	250	61.5485	-6,3019	297	H
8	19	21	575	61.8878	-6,1208	106	L
8	19	22	350	62.0224	-6,0458	141	H
8	19	22	550	62.0938	-6,0078	97	L
8	19	23	0	62.1117	-5,9983	130	H
8	19	23	100	62.1503	-5,9788	104	L
8	19	23	250	62.1724	-5,9675	126	H
8	19	23	550	62.1688	-5,9693	101	L
8	20	3	50	63.0251	-5,7248	1889	H
8	20	3	100	63.0434	-5,7195	1385	L
8	20	3	250	63.0986	-5,7037	2027	H
8	20	3	350	63.1358	-5,6910	2016	L
8	20	3	550	63.2112	-5,6609	2132	H
8	20	4	45	63.2474	-5,6497	2108	L
8	20	4	100	63.2687	-5,6452	2189	H
8	20	4	130	63.2803	-5,6428	2167	L
8	20	4	200	63.3074	-5,6371	2269	H
8	20	4	255	63.3286	-5,6326	1979	L
8	20	4	300	63.3460	-5,6289	2001	H
8	20	4	450	63.4011	-5,6148	1970	L
8	20	6	550	63.8861	-5,4757	3451	H
8	20	7	50	63.9222	-5,4713	3137	L
8	20	7	360	64.0385	-5,4351	3400	H
8	20	7	380	64.0454	-5,4335	3360	L
8	20	8	0	64.1217	-5,4150	3585	H
8	20	8	500	64.3268	-5,3677	2590	L
8	20	9	0	64.3650	-5,3367	3046	H
8	20	9	150	64.4134	-5,3385	2487	L
8	20	9	350	64.4764	-5,3405	3208	H
8	20	9	400	64.4921	-5,3410	3101	L
8	20	9	550	64.5394	-5,3424	3259	H
8	20	10	0	64.5551	-5,3429	3188	L
8	20	10	50	64.5709	-5,3434	3335	H
8	20	10	200	64.6181	-5,3449	2493	L
8	20	10	230	64.6275	-5,3452	2741	H
8	20	10	300	64.6496	-5,3459	2544	L
8	20	10	340	64.6622	-5,3463	3005	H

ALL VALUES WHICH ARE MULTIPLES OF 10

MO	DAY	HR	MIN	LATITUDE	LONGITUDE	DEPTH IN CORRECTED METERS
8	19	10	0	59.2678	-7,5888	1050
8	19	10	50	59.2815	-7,5825	1060
8	19	10	50	59.2921	-7,5782	1070
8	19	10	100	59.3051	-7,5736	1080
8	19	10	150	59.3217	-7,5684	1090
8	19	10	150	59.3428	-7,5616	1100
8	19	10	250	59.3648	-7,5546	1110
8	19	10	250	59.3877	-7,5473	1120
8	19	10	400	59.4105	-7,5401	1130
8	19	10	400	59.4232	-7,5360	1120
8	19	10	400	59.4359	-7,5320	1110
8	19	10	500	59.4486	-7,5279	1100
8	19	10	500	59.4581	-7,5249	1090
8	19	10	550	59.4676	-7,5219	1080
8	19	10	550	59.4729	-7,5202	1070
8	19	10	550	59.4782	-7,5185	1060
8	19	10	550	59.4835	-7,5168	1050
8	19	11	0	59.4916	-7,5128	1040
8	19	11	0	59.5039	-7,5054	1030
8	19	11	0	59.5162	-7,4979	1020
8	19	11	100	59.5275	-7,4916	1010
8	19	11	100	59.5366	-7,4878	1000
8	19	11	150	59.5463	-7,4838	990
8	19	11	150	59.5585	-7,4786	980
8	19	11	200	59.5738	-7,4724	970
8	19	11	250	59.5990	-7,4619	960
8	19	11	350	59.6634	-7,4344	960
8	19	12	0	59.7705	-7,3870	960
8	19	12	300	59.8308	-7,3601	950
8	19	12	300	59.8413	-7,3554	940
8	19	12	350	59.8494	-7,3517	930
8	19	12	350	59.8551	-7,3491	920
8	19	12	350	59.8608	-7,3466	910
8	19	12	400	59.8673	-7,3437	910
8	19	12	400	59.8696	-7,3426	920
8	19	12	400	59.8719	-7,3416	930
8	19	12	400	59.8742	-7,3405	940
8	19	12	400	59.8766	-7,3395	950
8	19	12	400	59.8789	-7,3384	960
8	19	12	440	59.8816	-7,3373	960
8	19	12	440	59.8831	-7,3367	950
8	19	12	440	59.8847	-7,3360	940
8	19	12	440	59.8862	-7,3354	930
8	19	12	440	59.8877	-7,3348	920
8	19	12	440	59.8893	-7,3342	910
8	19	12	440	59.8908	-7,3336	900
8	19	12	440	59.8924	-7,3330	890
8	19	12	440	59.8939	-7,3324	880
8	19	12	440	59.8954	-7,3318	870
8	19	12	440	59.8970	-7,3311	860
8	19	12	440	59.8985	-7,3305	850
8	19	12	440	59.9000	-7,3299	840
8	19	12	440	59.9016	-7,3293	830
8	19	12	440	59.9031	-7,3287	820
8	19	12	440	59.9047	-7,3281	810
8	19	12	440	59.9062	-7,3275	800
8	19	12	440	59.9077	-7,3269	790
8	19	12	510	59.9085	-7,3267	790
8	19	12	510	59.9148	-7,3257	800

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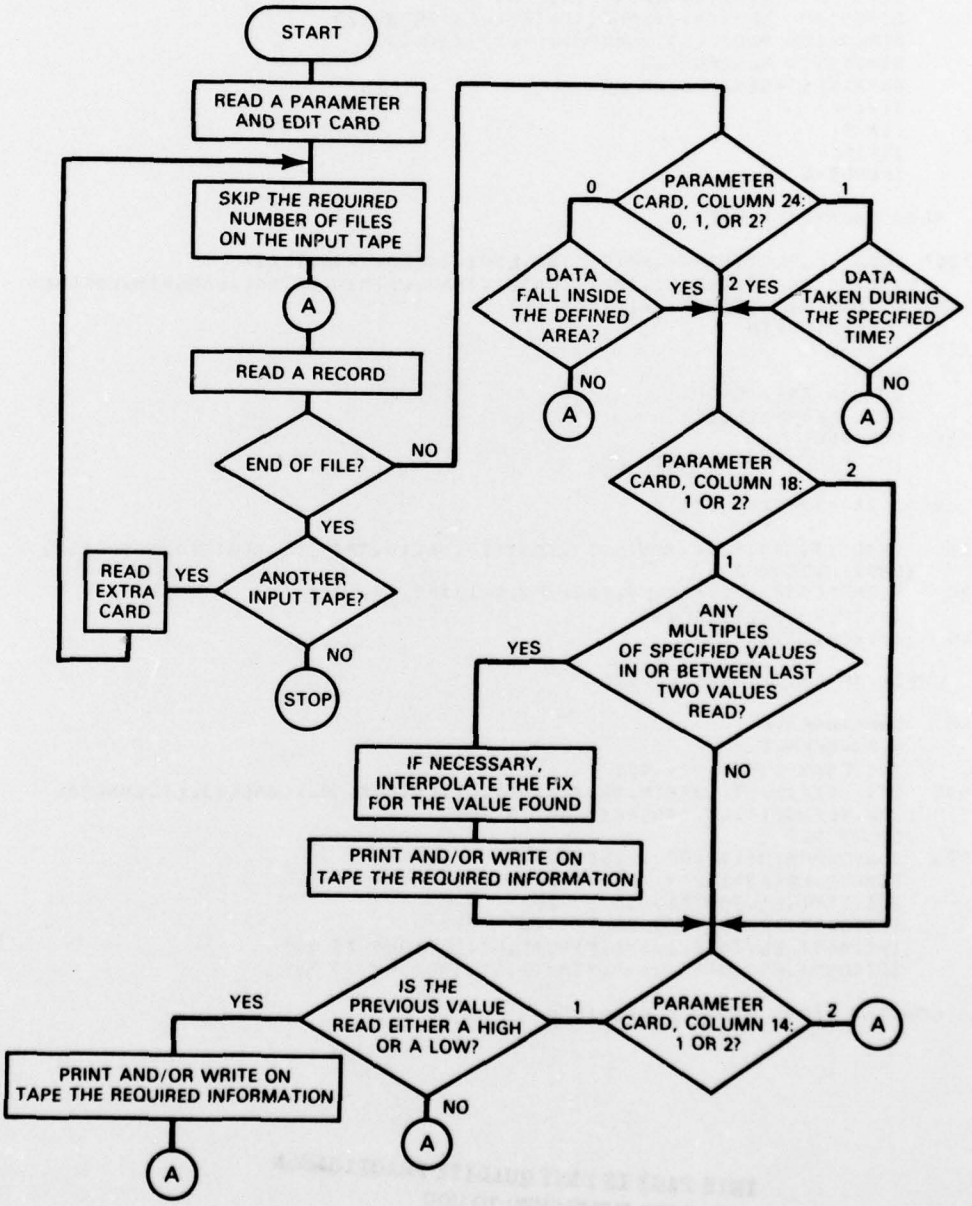
HIGH AND LOW VALUES AND ALL VALUES WHICH ARE MULTIPLES OF 10

MO	DAY	HR	MIN	LATITUDE	LONGITUDE	DEPTH IN CORRECTED METERS	
8	19	10	0	59.2678	-7,5888	1050	
8	19	10	50	59.2815	-7,5825	1060	
8	19	10	50	59.2921	-7,5782	1070	
8	19	10	100	59.3051	-7,5736	1080	
8	19	10	150	59.3217	-7,5684	1090	
8	19	10	150	59.3428	-7,5616	1100	
8	19	10	250	59.3648	-7,5546	1110	
8	19	10	250	59.3877	-7,5473	1120	
8	19	10	400	59.4105	-7,5401	1130	H
8	19	10	400	59.4232	-7,5360	1120	
8	19	10	400	59.4359	-7,5320	1110	
8	19	10	500	59.4486	-7,5279	1100	
8	19	10	500	59.4581	-7,5249	1090	
8	19	10	550	59.4676	-7,5219	1080	
8	19	10	550	59.4729	-7,5202	1070	
8	19	10	550	59.4782	-7,5185	1060	
8	19	10	550	59.4835	-7,5168	1050	
8	19	11	0	59.4916	-7,5128	1040	
8	19	11	0	59.5039	-7,5054	1030	
8	19	11	0	59.5162	-7,4979	1020	
8	19	11	100	59.5275	-7,4916	1010	
8	19	11	100	59.5366	-7,4878	1000	
8	19	11	150	59.5463	-7,4838	990	
8	19	11	150	59.5589	-7,4786	980	
8	19	11	200	59.5738	-7,4724	970	
8	19	11	250	59.5990	-7,4619	960	
8	19	11	350	59.6197	-7,4533	954	L
8	19	11	350	59.6634	-7,4344	960	
8	19	12	0	59.7143	-7,4124	967	H
8	19	12	0	59.7709	-7,3870	960	
8	19	12	300	59.8308	-7,3601	950	
8	19	12	300	59.8413	-7,3554	940	
8	19	12	350	59.8494	-7,3517	930	
8	19	12	350	59.8551	-7,3491	920	
8	19	12	350	59.8608	-7,3466	910	
8	19	12	400	59.8654	-7,3445	902	L
8	19	12	400	59.8673	-7,3437	910	
8	19	12	400	59.8696	-7,3426	920	
8	19	12	400	59.8719	-7,3416	930	
8	19	12	400	59.8742	-7,3405	940	
8	19	12	400	59.8766	-7,3395	950	
8	19	12	400	59.8789	-7,3384	960	
8	19	12	440	59.8805	-7,3377	967	H
8	19	12	440	59.8816	-7,3373	960	
8	19	12	440	59.8831	-7,3367	950	
8	19	12	440	59.8847	-7,3360	940	
8	19	12	440	59.8862	-7,3354	930	
8	19	12	440	59.8877	-7,3348	920	
8	19	12	440	59.8893	-7,3342	910	
8	19	12	440	59.8908	-7,3336	900	
8	19	12	440	59.8924	-7,3330	890	
8	19	12	440	59.8939	-7,3324	880	
8	19	12	440	59.8954	-7,3318	870	
8	19	12	440	59.8970	-7,3311	860	
8	19	12	440	59.8985	-7,3305	850	
8	19	12	440	59.9000	-7,3299	840	
8	19	12	440	59.9016	-7,3293	830	
8	19	12	440	59.9031	-7,3287	820	
8	19	12	440	59.9047	-7,3281	810	

Appendix D

FLOW CHART



Appendix E

SOURCE LANGUAGE LISTING

```
      PROGRAM HIGHLOW
      REAL LATMIN,LATMAX,LONGMIN,LONGMAX
      DIMENSION XLAT(3),XLONG(3),IREAD(3),READ(2)
      DIMENSION MONTH(3),IDAY(3),HR(3),XMIN(3)
      DIMENSION MESSAGE(2)
      DATA(MESSAGE=2H L,2H H)
      ILBL=0
      IEX=0
      IT=10
      IFUDGE=0

C  READ PARAMETER CARD

 1000 READ(60,250)IDEPTH,NOTP,KIND,LOHI,INEED,IMOD,ISKIP
     1,IFILE,ICOPY,IDATE1,IHR1,IDATE2,IHR2,LATMIN,LATMAX,LONGMIN,LONGMAX
  250 FORMAT(I10,2I1,6I2,4I4,4F10.5)
      DEPTH=IDEPTH
  507 IREC=1
      NUM=1
      DO 334 I=1,ISKIP
      CALL SKIPFILE(IT)
  334 CONTINUE
      IF(IFILE.EQ.2) GO TO 600

C  READ BATHYMETRY DATA

  200 READ(IT,38)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1UNFATH,ICRMET
   38 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,1QXF5,I5,13X)
      IF(ICCHECK,IT)200,45
   45 IF(EOF,IT)500,50

C  CHECK IF DATA TO BE COPIED

   50 UNFS=UNFATH
      ICRS=ICRMET
      IF(ICOPY-1)925,926,927
  925 IF(XLAT(1).LT.LATMIN.OR.XLAT(1).GT.LATMAX.OR.XLONG(1).LT.LONGMIN
     1.OR.XLONG(1).GT.LONGMAX) GO TO 200
      GO TO 927
  926 IDAY1=MONTH(1)*100 + IDAY(1)
      MINUTE=HR(1)*100 + XMIN(1)/10
      IF(IDAY1.LT.IDATE1) GO TO 200
      IF(IDAY1.GT.IDATE2) GO TO 500
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 200
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500

C  CONVERT DEPTH DATA IF REQUIRED
```

```
 927  IF(KIND.EQ.4) GO TO 55
      IF(KIND-2)101,102,103
 101  IREAD(1)=UNFATH/10.0
      GO TO 104
 102   READ(1)=ICRMET/1.8288
      IF( READ(1).LT.0)GO TO 551
      IREAD(1)= READ(1)+.5
      GO TO 104
 551  IREAD(1)= READ(1)-.5
      GO TO 104
 103   READ(1)=(UNFATH/10.0)*1.8288
      IF( READ(1).LT.0)GO TO  552
      IREAD(1)= READ(1)+.5
      GO TO 104
 552  IREAD(1)= READ(1)-.5
      GO TO 104

C  READ MAGNETICS

 600  READ(IT,604)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1ITMI,IRMI
 604  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23X2I5,5X)
      IF(IQCHECK,IT)600,601
 601  IF(EOF,IT)500,602

C  CHECK IF DATA TO BE COPIED

 602  ITMIS=ITMI
      IRMIS=IRMI
      IF(ICOPY-1)928,929,930
 928  IF(XLAT(1).LT.LATMIN.OR.XLAT(1).GT.LATMAX.OR.XLONG(1).LT.LONGMIN
     1.OR.XLONG(1).GT.LONGMAX) GO TO  600
      GO TO 930
 929  IDAY1=MONTH(1)*100 + IDAY(1)
      MINUTE=HR(1)*100 + XMIN(1) / 10
      IF(IDAY1.LT.IDATE1) GO TO 600
      IF(IDAY1.GT.IDATE2) GO TO 500
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 600
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500
 930  IF(KIND.EQ.5)GO TO 603
      IREAD(1)=IRMI
      GO TO 104
 603  IREAD(1)=ITMI
      GO TO 104
 55   IREAD(1)=ICRMET

C  CHECK IF MULTIPLES OF SPECIFIED DEPTH REQUIRED
 104  IF(IMOD-1)402,305,402
C  WRITE LABELS AT TOP OF PAGE
```

```
888   IF(LOHI.EQ.1.AND.IMOD.EQ.1) GO TO 909
      IF(LOHI.EQ.1.AND.IMOD.EQ.2) GO TO 910
      WRITE(61,913) IDEPTH
913   FORMAT(1H1,33HALL VALUES WHICH ARE MULTIPLES OF,I10)
      GO TO 914
909   WRITE(61,911) IDEPTH
911   FORMAT(1H1,57HHIGH AND LOW VALUES AND ALL VALUES WHICH ARE MULTIPL
     1ES OF,I10)
      GO TO 914
910   WRITE(61,912)
912   FORMAT(1H1,19HHIGH AND LOW VALUES)
      GO TO 914
914   GO TO(901,902,903,904,915,916),KIND
901   WRITE(61,905)
905   FORMAT(1H ,88H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         DEPTH IN UNCORRECTED FATHOMS/)
      GO TO 164
902   WRITE(61,906)
906   FORMAT(1H ,86H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         DEPTH IN CORRECTED FATHOMS/)
      GO TO 164
903   WRITE(61,907)
907   FORMAT(1H ,87H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         DEPTH IN UNCORRECTED METERS/)
      GO TO 164
915   WRITE(61,917)
917   FORMAT(1H ,84H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         TOTAL MAGNETIC INTENSITY/)
      GO TO 164
916   WRITE(61,918)
918   FORMAT(1H ,87H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         RESIDUAL MAGNETIC INTENSITY/)
      GO TO 164
904   WRITE(61,908)
908   FORMAT(1H ,85H     MO DAY    HR    MIN      LATITUDE      LONGITUDE
     1         DEPTH IN CORRECTED METERS/)
164   NUM=1
      IF(ITRIP.EQ.4) GO TO 472
      IF(ITRIP-2) 162,172,1602
162   WRITE(61,40)MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),IREAD
     1(1)
40    FORMAT(1H ,5XI2,I4,4XF2,3XF3,5XF8.4,5XF9.4,10XI5,1XA2)
      NUM=NUM + 1
      GO TO 305
305   IF(IFILE.EQ.2) GO TO 605

C  READ BATHYMETRY DATA

315   READ(IT,38)IYEAR,MONTH(2),IDAY(2),HR(2),XMIN(2),XLAT(2),XLONG(2),
```

```
     1UNFATH,ICRMET
      IF(IOCHECK,IT) 315,700
 700  IF(EOF,IT)500,701
 701  IF(ICOPY-1)931,932,3333

C  CHECK IF DATA TO BE COPIED

 931  IF(XLAT(2).LT.LATMIN.OR.XLAT(2).GT.LATMAX.OR.XLONG(2).LT.LONGMIN
     1.OR.XLONG(2).GT.LONGMAX) GO TO 315
      GO TO 3333
 932  IDAY1=MONTH(2)*100 + IDAY(2)
      MINUTE=HR(2)*100 + XMIN(2)/10
      IF(IDAY1.LT.IDATE1) GO TO 315
      IF(IDAY1.GT.IDATE2) GO TO 500
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 315
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500
      GO TO 3333

C  CONVERT DEPTH DATA IF REQUIRED

 3333 IF(KIND.EQ.4) GO TO 705
      IF(KIND-2)702,703,704
 702  IREAD(2)=UNFATH/10.0
      GO TO 756
 703   READ(2)=ICRMET/1.8288
      IF( READ(2).LT.0)GO TO 553
      IREAD(2)= READ(2)+.5
      GO TO 756
 553  IREAD(2)= READ(2)-.5
      GO TO 756
 704   READ(2)=(UNFATH/10.0)*1.8288
      IF( READ(2).LT.0)GO TO 554
      IREAD(2)= READ(2)+.5
      GO TO 756
 554  IREAD(2)= READ(2)-.5
 756  IUBT=XABSF(IREAD(1)-IREAD(2))
      GO TO 706

C  READ MAGNETICS

 605  READ(IT,604)IYEAR,MONTH(2),IDAY(2),HR(2),XMIN(2),XLAT(2),XLONG(2),
     1ITMI,IRMI
      IF(IOCHECK,IT)605,606
 606  IF(EOF,IT)500,607

C  CHECK IF DATA TO BE COPIED

 607  IF(ICOPY-1)934,935,936
 934  IF(XLAT(2).LT.LATMIN.OR.XLAT(2).GT.LATMAX.OR.XLONG(2).LT.LONGMIN
     1.OR.XLONG(2).GT.LONGMAX) GO TO 605
```

```
      GO TO 936
  935 IDAY1=MONTH(2)*100 + IDAY(2)
      MINUTE=HR(2)*100 + XMIN(2)/10
      IF(IDAY1.LT.IDATE1) GO TO 605
      IF(IDAY1.GT.IDATE2) GO TO 500
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 605
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500
  936 IF(KIND.EQ.5) GO TO 608
      IREAD(2)=IRMI
      GO TO 746
  608 IREAD(2)=ITMI
      GO TO 746
  705 IREAD(2)=ICRMET
      GO TO 756
  746 IUBT=XABSF(IREAD(1)-IREAD(2))

C  CHECK IF ANY MULTIPLES OF SPECIFIED DEPTH BETWEEN TWO FIXES

  706 SLOT1=IREAD(1)/ DEPTH
      ISLOT1=SLOT1
      SLOT2=IREAD(2)/ DEPTH
      ISLOT2=SLOT2
      IF(MOD(IREAD(1),IDEPTH).EQ.0)GO TO 970
      ILBL=0
      IF(ISLOT2-ISLOT1)900,833,300
  444 XLAT(1)=XLAT(2)
      XLONG(1)=XLONG(2)
      IREAD(1)=IREAD(2)
      MONTH(1)=MONTH(2)
      IDAY(1)=IDAY(2)
      HR(1)=HR(2)
      XMIN(1)=XMIN(2)
      GO TO 305
  900 IF(IREAD(1).LT.0.AND.IREAD(2).LT.0) GO TO 905
      ZNUM=ISLOT1-SLOT1
      ISLOT1=ISLOT1 - 1
      GO TO 301
  300 IF(IREAD(1).GE.0.AND.IREAD(2).GE.0) GO TO 309
      ZNUM=ISLOT1-SLOT1
      ISLOT1=ISLOT1 + 1
      GO TO 301
  905 ISLOT1=ISLOT1-1
      ZNUM=ISLOT1-SLOT1
      GO TO 301
  309 ISLOT1=ISLOT1 + 1
      ZNUM=ISLOT1-SLOT1

C  INTERPOLATE FIXES

  301 DENOM=SLOT2-SLOT1
```

```
      CALAT=XLAT(1)+(ZNUM/DENOM)*(XLAT(2)-XLAT(1))
      CALONG=XLONG(1)+(ZNUM/DENOM)*(XLONG(2)-XLONG(1))
      TEST=ZNUM/DENOM
      XYZ=TEST*(IREAD(2)-IREAD(1))
      XX=IREAD(1)+XYZ
      IF(XX.LT.0) GO TO 559
      XX=XX + .5
      GO TO 563
  559 XX=XX - .5
  563 ICALMET=XX
      IF(ICALMET.EQ.IREAD(1))GO TO 307
      IF(ICALMET.EQ.IREAD(2))GO TO 307
C  PRINT AND/OR WRITE ON TAPE THE REQUIRED INFORMATION

  323 IF(INEED-2)70,72,71
   70 GO TO(170,170,270,270,3370,470),KIND
  170 WRITE(40,171)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICA
     1LMET
  171 FORMAT(13X,3I2,1XF2,F3,F8.4,F9.4,10XI5,23X)
      GO TO 307
  270 WRITE(40,271)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICALMET
     1LMET
  271 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,15XI5,18X)
      GO TO 307
 3370 WRITE(40,3371)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,
     1ICALMET
 3371 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
      GO TO 307
  470 WRITE(40,471)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICA
     1LMET
  471 FORMAT(13X3I2,1XF2, F3,F8.4,F9.4,28XI5,5X)
      GO TO 307
   71 GO TO(570,570,670,670,770,870),KIND
  770 WRITE(40,771)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICAL
     1LMET
  771 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
      GO TO 72
  570 WRITE(40,571)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICALMET
     1LMET
  571 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,10XI5,23X)
      GO TO 72
  670 WRITE(40,671)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICA
     1LMET
  671 FORMAT(13X3I2,1XF2,1XF2,F3,F8.4,F9.4,15XI5,18X)
      GO TO 72
  870 WRITE(40,871)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICAL
     1LMET
  871 FORMAT(13X,3I2,1XF2,F3,F8.4,F9.4,28XI5,5X)
      GO TO 72
   72 IF( MOD(NUM,60).NE.1) GO TO 172
```

```
      ITRIP=2
      GO TO 888
172   WRITE(61,40)MONTH(1),IDAY(1),HR(1),XMIN(1),CALAT,CALONG,ICALMET
      NUM=NUM + 1
      GO TO 307
307   IF(IFUDGE.EQ.1) GO TO 4444
      IF(ISLOT2-ISLOT1) 900,833,300
407   IREC=2
      GO TO 401

833   IF(MOD(IREAD(2),IDEPTH).EQ.0) GO TO 333
      IF(IREAD(1).LT.0.AND.IREAD(2).GT.0) GO TO 150
      IF(IREAD(1).GT.0.AND.IREAD(2).LT.0) GO TO 160
      GO TO 333
150   IFUDGE=1
      GO TO 300
160   IFUDGE=1
      GO TO 900
4444  IFUDGE=0
      GO TO 333
 970  IF(ILBL.EQ.1) GO TO 1
      IF(INEED-2)370,372,371
1     ILBL=0
      GO TO 307
370   GO TO(1370,1370,1371,1371,1372,1373),KIND
1370   WRITE(40,1374)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG
     1 (1),IREAD(1)
1374  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,10X15,23X)
      GO TO 307
1371  WRITE(40,1375)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1)
     1),IREAD(1)
1375  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,15XI5,18X)
      GO TO 307
1372  WRITE(40,1376)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1),IREAD(1)
1376  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
      GO TO 307
1373   WRITE(40,1377)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1)
     11),IREAD(1)
1377  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,28XI5,5X)
      GO TO 307
371   GO TO(2371,2371,2372,2372,2373,      2374),KIND
2371  WRITE(40,2375)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),IREA
     1),IREAD(1)
2375  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,10XI5,23X)
      GO TO 372
2372  WRITE(40,2376)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),
     1XLONG(1),IREAD(1)
2376  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,15XI5,18X)
      GO TO 372
```

```
 2373 WRITE(40,2377)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1)
     1),IREAD(1)
 2377  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
       GO TO 372
 2374 WRITE(40,2378)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1),IREAD(1)
 2378  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,28XI5,5X)
       GO TO 372
 372   IF(MOD(NUM,60).NE.1) GO TO 472
       ITRIP=4
       GO TO 888
 472   WRITE(61,40)MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),IREAD(1)
     11)
       NUM=NUM + 1
       GO TO 307
C  CHECK IF HIGH/LOW VALUES WANTED
 333   IF(LOHI.NE.1)GO TO 444
 401   XLONG(3)=XLONG(1)
       XLAT(3)=XLAT(1)
       IREAD(3)=IREAD(1)
       MONTH(3)=MONTH(1)
       IDAY(3)=IDAY(1)
       HR(3)=HR(1)
       XMIN(3)=XMIN(1)
       XLAT(1)=XLAT(2)
       XLONG(1)=XLONG(2)
       IREAD(1)=IREAD(2)
       MONTH(1)=MONTH(2)
       IDAY(1)=IDAY(2)
       HR(1)=HR(2)
       XMIN(1)=XMIN(2)
 402   IF(IFILE.EQ.2) GO TO 610

C  READ BATHYMETRY DATA

 412   READ(IT,38)IYEAR,MONTH(2),IDAY(2),HR(2),XMIN(2),XLAT(2),XLONG(2),
     1UNFATH,ICRMET
       IF(IOCHECK,IT)412,403
 403   IF(EOF,IT)500,404

C  CHECK IF DATA TO BE COPIED

 404   IF(ICOPY-1)937,938,939
 937   IF(XLAT(2).LT.LATMIN.OR.XLAT(2).GT.LATMAX.OR.XLONG(2).LT.LONGMIN
     1.OR.XLONG(2).GT.LONGMAX) GO TO  412
       GO TO 939
 938   IDAY1=MONTH(2)*100 + IDAY(2)
       MINUTE=HR(2)*100 + XMIN(2)/10
       IF(IDAY1.LT.IDATE1) GO TO 412
       IF(IDAY1.GT.IDATE2) GO TO 500
```

```
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 412
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500
      GO TO 939

C  CONVERT DEPTH DATA IF REQUIRED

 939  IF(KIND.EQ.4) GO TO 805
      IF(KIND-2) 802,803,804
 802  IREAD(2)=UNFATH/10.0
      GO TO 826
 803   READ(2)=ICRMET/1.8288
      IF( READ(2).LT.0)GO TO 555
      IREAD(2)= READ(2)+.5
      GO TO 826
 555  IREAD(2)= READ(2)-.5
      GO TO 826
 804   READ(2)=(UNFATH/10.0)*1.8288
      IF( READ(2).LT.0)GO TO 556
      IREAD(2)= READ(2)+.5
      GO TO 826
 556  IREAD(2)= READ(2)-.5
 826  IUBT=XABSF(IREAD(1)-IREAD(2))
      GO TO 806

C  READ MAGNETICS

 610  READ(IT,604)IYEAR,MONTH(2),IDAY(2),HR(2),XMIN(2),XLAT(2),XLONG(2),ITMI,IRM
     1ITMI,IRMI
      IF(ICCHECK,IT)610,611
 611  IF(EOF,IT) 500,612

C  CHECK IF DATA TO BE COPIED

 612  IF(ICOPY-1)940,941,942
 940  IF(XLAT(2).LT.LATMIN.OR.XLAT(2).GT.LATMAX.OR.XLONG(2).LT.LONGMIN
     1.OR.XLONG(2).GT.LONGMAX) GO TO 610
      GO TO 942
 941  IDAY1=MONTH(2) *100 + IDAY(2)
      MINUTE=HR(2)*100 + XMIN(2)/10
      IF(IDAY1.LT.IDATE1) GO  TO 610
      IF(IDAY1.GT.IDATE2) GO TO 500
      IF(IDAY1.EQ.IDATE1.AND.MINUTE.LT.IHR1)GO TO 610
      IF(IDAY1.EQ.IDATE2.AND.MINUTE.GT.IHR2)GO TO 500
      GO TO 942
 942  IF(KIND.EQ.5) GO TO 613
      IREAD(2)=IRMI
      GO TO 836
 613  IREAD(2)=ITMI
      GO TO 836
 805  IREAD(2)=ICRMET
```

```
      GO TO 826
 836  IUBT=XABSF(IREAD(1)-IREAD(2))

C  CHECK FOR LOW AND HIGH VALUES

 806  IF(IREAD(1).GT.IREAD(3).AND.IREAD(1).GT.IREAD(2))GO TO 820
 405  IF(IREAD(1).LT.IREAD(3).AND.IREAD(1).LT.IREAD(2)) GO TO 830
 812  IF(IMOD-1)401,706,401

C  PRINT AND/OR WRITE ON TAPE THE REQUIRED INFORMATION

 810  IF(INEED-2)668,662,661
 668  GO TO(1660,1660,1661,1661,1662,1663),KIND
 1660  WRITE(40,1664)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(
     11),IREAD(1)
 1664  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,10XI5,23X)
       GO TO 812
 1661  WRITE(40,1665)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(
     11),IREAD(1)
 1665  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,15XI5,18X)
       GO TO 812
 1662  WRITE(40,1666)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(
     11),IREAD(1)
 1666  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
       GO TO 812
 1663 WRITE(40,1667)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN( 1),XLAT(1),XLONG
     1(1),IREAD(1)
 1667  FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,28XI5,5X)
       GO TO 812
 661  GO TO(2660,2660,1661,2661,2662,2663),KIND
 2660 WRITE(40,2664)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),I
     1),IREAD(1)
 2664 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,10XI5,23X)
       GO TO 662
 2661 WRITE(40,2665)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1),IREAD(1)
 2665 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,15XI5,18X)
       GO TO 662
 2662 WRITE(40,2666)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),
     1),IREAD(1)
 2666 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,23XI5,10X)
       GO TO 662
 2663 WRITE(40,2667)IYEAR,MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1)
     1),IREAD(1)
 2667 FORMAT(13X3I2,1XF2,F3,F8.4,F9.4,28XI5,5X)
       GO TO 662
 662  IF(MOD(NUM,60).NE.1) GO TO 1602
       ITRIP=3
       GO TO 888
 1602 WRITE(61,40)MONTH(1),IDAY(1),HR(1),XMIN(1),XLAT(1),XLONG(1),IREAD(1),
```

```
     11),MESSAGE(LLL)
      NUM=NUM + 1
      GO TO 812
820   LLL=2
      ILGL=1
      GO TO 810
830   LLL=1
      ILEL=1
      GO TO 910
500   IEX=IEX + 1
      REWIND IT
      IF(NOTP.EQ.IEX) GO TO 505
      IT=IT + 1
      READ(60,506)ISKIP,IDATE1,IHR1,IDATE2,IHR2
506   FORMAT(5I4)
      GO TO 507
505   IF(ICOPY-1) 420,421,422
422   WRITE(61,423)
423   FORMAT(1H1,46HTHE PROGRAM SHOULD HAVE COPIED THE ENTIRE TAPE)
      GO TO 430
420   WRITE(61,424)
424   FORMAT(1H1,70HTHE PROGRAM SHOULD HAVE COPIED  ALL THE DATE POINTS
     1WHICH FALL BETWEEN)
      WRITE(61,425) LATMIN,LATMAX
425   FORMAT(1H0,7X,16HSOUTH LATITUDE  ,F10.5,5X16HNORTH LATITUDE  ,F10.
     15)
      WRITE(61,426)LONGMIN,LONGMAX
426   FORMAT(1H0,7X16HWEST LONGITUDE  ,F10.5,5X16HEAST LONGITUDE  ,F10.5
     1)
      GO TO 430
421   WRITE(61,427)
427   FORMAT(1H1,95HTHE PROGRAM SHOULD HAVE COPIED ALL THE DATA POINTS W
     1HICH WERE TAKEN BETWEEN THE SPECIFIED DATES)
430   IF(INEED-2)501,502,501
501   ENDFILE 40
      REWIND 40
502   STOP
      END
```