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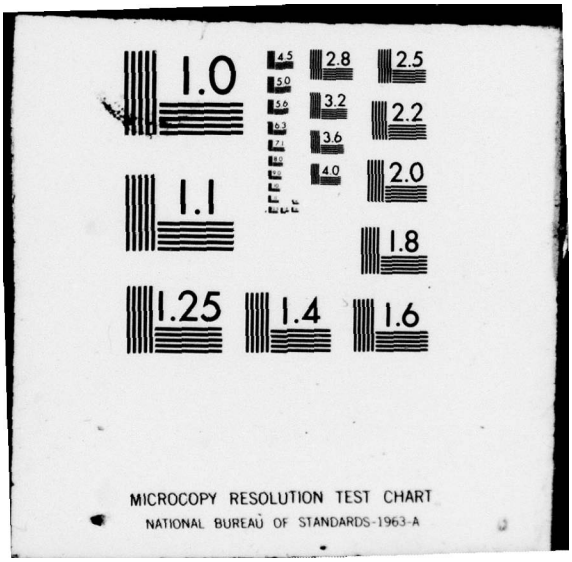
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NRL Report 8306

Program to Convert Navigation and Bathymetric Data on Tape into Geodata Format

MARILYN L. BLODGETT

Applied Ocean Acoustics Branch
Acoustics Division

LEVEL II

June 21, 1979

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

A program has been written to convert tapes containing navigation and bathymetric data into GEODATA formatted tapes. This enables the scientist to easily exchange data with other facilities and to use several programs using the GEODATA tapes for input. The program was written in Fortran IV for use on the CDC 3800; however the program can be converted to run on other systems with little difficulty.

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PROGRAM TO CONVERT NAVIGATION AND BATHYMETRIC DATA ON TAPE INTO GEODATA FORMAT

1.0 INTRODUCTION

1.1 Title

Program to convert navigation and bathymetric data on tape into GEODATA format.

1.2 Identification Name

CONBATH.

1.3 Classification Code

None.

1.4 NRL Research Computation Center Identification Number

None.

1.5 Entry Points

CONBATH.

1.6 Programming Language

Language: 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

April 1978.

2.0 PURPOSE

2.1 Description of the Routine

The program reads a data tape from an oceanographic or geophysical cruise and converts it into the GEODATA format. This is the format recommended by the National Research Council of the National Academy of Sciences with one slight modification for the navigational data. There is one logical record (of 80 characters) for each data point.

For navigation the program converts the Julian day to month and day and converts the latitude and longitude degree-and-minute values into their decimal equivalents.

For bathymetry the Julian day is converted into month and day, the minutes and seconds are combined into their decimal equivalents, depth in uncorrected meters is converted to uncorrected fathoms, and corrected depth in meters is calculated using the Matthews' table coefficients.

The converted data for both types of data is written on to a new tape and/or printed out on the standard printer (logical unit 61).

2.2 Problem Background

A program was needed to convert the navigation and bathymetric data into GEODATA formatted tapes, so that the data collected could be easily exchanged with other facilities and so that the scientist could use several other programs using GEODATA tapes for input.

3.0 USAGE

3.1 Calling Sequence or Operational 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:
2740 octal (1504 decimal) locations exclusive of system library functions.

3.3.2 Common Blocks:
None.

3.3.3 Temporary Storage:
None.

3.4 Messages and Instructions to the Operator

None.

3.5 Error Returns, Messages, and Codes

None.

3.6 Informative Messages to the User

None.

3.7 Input

The program has a Navigation Parameter card which supplies the information needed for the GEODATA format, the number of files of navigational data and the type of output desired. The Bathymetry Parameter card serves the same purpose for the bathymetric data. This is followed by a Matthews' Zone Values card (or cards).

The navigation and bathymetric data is read in via magnetic tape. The formats for both types of data are given in Appendix A. Appendix B is a complete description of the input setup.

3.8 Output

The program will write a new tape in GEODATA format. Appendix C shows the GEODATA format for both navigation and bathymetry. There is also an option for listing the records on the standard printer (logical unit 61). Appendix D presents sample output listings.

3.9 Formats

Appendix B, which shows the program deck structure, describes the formats.

3.10 External Routines and Symbols

ABSF, ENDFILE, MOD.

3.11 Timing

The time required depends on the length of the input tape.

3.12 Accuracy

Not applicable.

3.13 Caution to User

None.

3.14 Program Deck Structure

Appendix B describes the program deck structure.

3.15 References — Literature

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

M.L. Blodgett and J.V. Massingill, "Program to Plot an Annotated Track or a Track and Bathymetry or Magnetic Profile on a Mercator Projection," NRL Report 7930, Feb. 1976.

L. LaLumiere, "Program OCEANO" (not published).

4.0 METHOD OR ALGORITHM

Not applicable.

5.0 FLOW CHART AND/OR SOURCE LANGUAGE LISTING

The flow chart is given in Appendix E, and the listing is given in Appendix F.

6.0 COMPARISON

There are no other known programs available for comparison.

7.0 TEST METHODS AND RESULTS

Samples of the GEODATA format for both navigation and bathymetry are given in Appendix C. Sample output listings are given in Appendix D.

8.0 REMARKS

Program CONBATH, in order to convert the bathymetric data into the GEODATA format, requires the different Matthews' zones the ship passed through. One method to obtain this information is as follows:

- Run Program CONVNAV to convert the navigational data into GEODATA format.
- Using the GEODATA formatted tape, plot the navigational data with every fifth fix annotated on a Mercator projection.
  - Use Program OCEANO (see references) with a scale of 0.3966.
  - Use Program MERCATOR (NRL Report 7930, see references) if the required heights can be measured from an already existing chart.

Appendix A

SAMPLE INPUT DATA FORMATS

BATHYMETRY

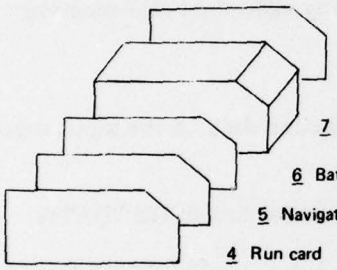
Julian day	Hour	Minutes	Seconds	Latitude; N = +, S = -	Longitude; W = -, E = +	Depth in uncorrected meters
240	19	4	34	64.3961	-23.0032	101.

NAVIGATION

Julian day	Hour	Minutes	Latitude in degrees	Latitude in minutes; n = +, S = -	Longitude in degrees	Longitude in minutes; W = -, E = +	Fix description	Fix number
245	21	12.3	55	13.00	-105	40.0050		204

Appendix B

DECK ASSEMBLY



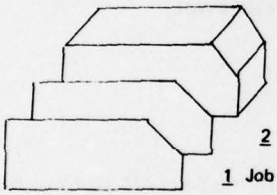
8 End-of-file card

7 Matthews' Zone Values card(s)

6 Bathymetry parameter card

5 Navigation parameter card

4 Run card



3 Program CONBATH (binary deck). (If the Fortran source deck is used instead of the binary deck, a Fortran card is required after the Equip cards. In addition, a Scope card and a Load card must follow the source deck.)

2 Equip cards (logical units 15 and 40)

1 Job card

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	Equip	1-18	7/9 EQUIP, 15 = **, RO, HI 7/9 EQUIP, 40 = **, WO, HI 15, 40 = logical unit number; RO = read only; WO = write only; HI = high density.
3	Program	Deck of CONBATH	This is the main program and associated subroutines in binary form.
4	Run	1-13	7/9 RUN, T, P, R, M, D T = time limit 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.

Number	Card Title	Column Number	Description
5	Navigation Parameter	1+2	75 (IYEAR) Last two digits of the year.
		3-10	A64-17-8 (CRUISE) Cruise identification. Any eight-digit alphanumeric number can be used.
		11-15	1 (NOFILE) Number of files of navigation data on the input tape.
		16-20	0 or 1 (IOUT) 0 = just write the navigation data in GEODATA format on the tape; 1 = write the navigation data in GEODATA format on the tape and also print it out.
6	Bathymetry Parameter	1+2	75 (IYR) Last two digits of the year.
		3-10	A64-17-8 (CRUISE) Cruise identification. Any eight-digit alphanumeric number can be used.
		11-15	1 (NOFILE) Number of files of bathymetric data on the input tape.
		16-20	8 (NOMZ) Number of Matthews' zone changes during the ship cruise.
		21-25	0 or 1 (IOUT) 0 = just write the bathymetric data in GEODATA format on the tape; 1 = write the bathymetric data in GEODATA format on the tape and also print it out.
7	Matthews' Zone Values	2-5	0705 (ITIME (1)) Time before or when the first data point was taken. The first two digits (CC 2+3) specify the hour and the last two digits (CC 4+5) specify the minutes.
		8-10	262 (JUL (1)) Julian day when the first data point was taken.

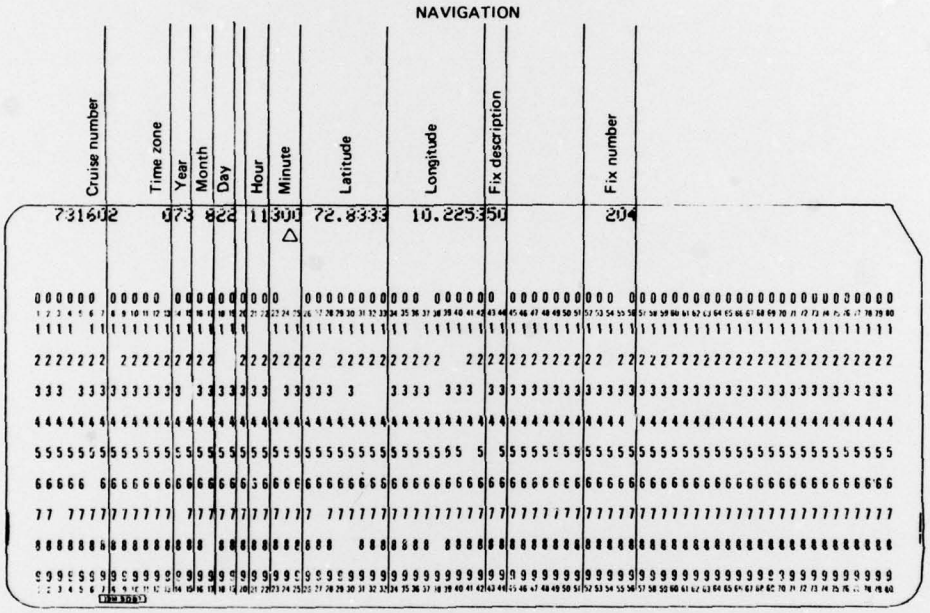
Number	Card Title	Column Number	Description
		14+15	2 (MZ(1)) Matthews' zone the ship was in when the first data point was taken.
		17-20	1215 (ITIME (2)) Time when the ship passed into a different Matthews' zone.
		23-25	262 (JUL (2)) Julian day when the ship passed into a different Matthews' zone.
		29+30	3 (MZ (2)) New Matthews' zone.
		32-35	1956 (ITIME (3)) Time when the ship passed into a different Matthews' zone.
		38-40	263 (JUL (3)) Julian day when the ship passed into this Matthews' zone.
		44+45	4 (MZ (3)) New Matthews' zone.
		47-50	1000 Time when the ship passed into a different Matthews' zone.
		53-55	264 Julian day when the ship passed into this Matthews' zone.
		59+60	3 New Matthews' zone.
		62-65	1300 Time when the ship passed into a different Matthews' zone.
		68-70	264 Julian day when the ship passed into this Matthews' zone.

Number	Card Title	Column Number	Description
		74+75	2 New Matthews' zone. As many Matthews' Zone Value cards as required may be used. The number of change sets must equal columns 16-20 of the Bathymetry Parameter card. The last time, the Julian day and Matthews' zone stated must be on or after the time when the last datum was taken.
8	End-of-file		Terminates the run.

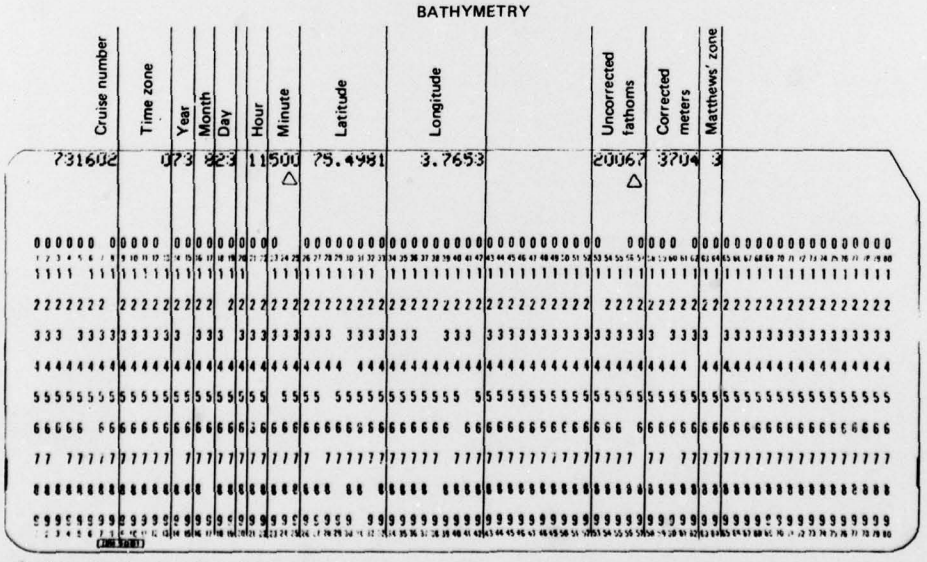
Appendix C

SAMPLE GEODATA RECORDS

NAVIGATION



BATHYMETRY



△ The symbol implies a decimal point.

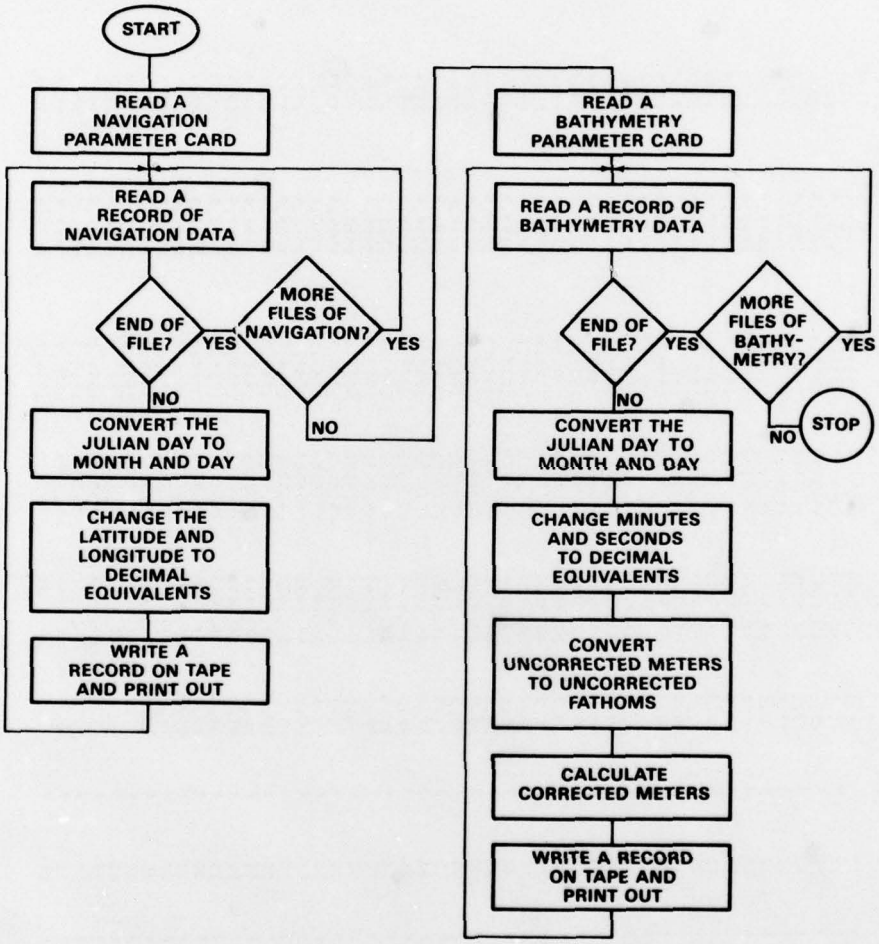
Appendix D

SAMPLE OUTPUT LISTING

SHIP AND CRUISE IDENTIFICATION	TIME ZONE	YEAR	MONTH	DAY	HOUR	MINUTE	LATITUDE	LONGITUDE	FIX DESCRIPTION	FIX NUMBER
72-16-06	0	72	8	18	17	50.0	55.6000	-6.5867	10	1
72-16-06	0	72	8	18	18	0.0	55.6267	-6.6167	9	2
72-16-06	0	72	8	18	19	0.0	55.8333	-6.8367	9	3
72-16-06	0	72	8	18	20	0.0	56.0400	-7.0650	9	4
72-16-06	0	72	8	18	21	0.0	56.2500	-7.2950	9	5
72-16-06	0	72	8	18	22	0.0	56.4533	-7.5167	9	6
72-16-06	0	72	8	18	23	0.0	56.6667	-7.7500	10	7
72-16-06	0	72	8	19	0	0.0	56.9067	-7.7817	9	8
72-16-06	0	72	8	19	1	0.0	57.1500	-7.8167	9	9
72-16-06	0	72	8	19	2	0.0	57.3917	-7.8567	9	10
72-16-06	0	72	8	19	3	0.0	57.6317	-7.8967	9	11
72-16-06	0	72	8	19	4	0.0	57.8717	-7.9317	9	12
72-16-06	0	72	8	19	5	0.0	58.1150	-7.9617	9	13
72-16-06	0	72	8	19	5	30.0	58.2500	-7.9833	10	14
72-16-06	0	72	8	19	6	6.0	58.3818	-7.9193	50	15
72-16-06	0	72	8	19	6	34.0	58.4943	-7.8800	50	16
72-16-06	0	72	8	19	7	0.0	58.5950	-7.8450	40	17
72-16-06	0	72	8	19	7	54.0	58.8087	-7.7697	50	18
72-16-06	0	72	8	19	8	0.0	58.8300	-7.7633	40	19
72-16-06	0	72	8	19	8	17.0	58.8683	-7.7317	40	20
72-16-06	0	72	8	19	9	0.0	59.0167	-7.6683	40	23
72-16-06	0	72	8	19	9	40.0	59.1813	-7.6258	50	24
72-16-06	0	72	8	19	10	0.0	59.2583	-7.5933	40	25
72-16-06	0	72	8	19	10	8.0	59.2887	-7.5788	50	26
72-16-06	0	72	8	19	11	0.0	59.4867	-7.5158	40	27
72-16-06	0	72	8	19	11	4.0	59.5020	-7.5022	50	28
72-16-06	0	72	8	19	11	48.0	59.6690	-7.4328	50	29
72-16-06	0	72	8	19	12	50.0	59.9032	-7.3275	50	31
72-16-06	0	72	8	19	13	0.0	59.9500	-7.3200	40	32
72-16-06	0	72	8	19	13	36.0	60.0760	-7.2558	50	33
72-16-06	0	72	8	19	14	0.0	60.1800	-7.2147	40	34
72-16-06	0	72	8	19	14	21.0	60.2450	-7.1950	40	35
72-16-06	0	72	8	19	14	36.0	60.2957	-7.1298	50	36
72-16-06	0	72	8	19	15	0.0	60.3833	-7.0850	40	37
72-16-06	0	72	8	19	16	0.0	60.5933	-6.9533	40	38
72-16-06	0	72	8	19	16	22.0	60.6797	-6.9015	50	39
72-16-06	0	72	8	19	17	0.0	60.8133	-6.8083	40	40
72-16-06	0	72	8	19	17	4.0	60.8250	-6.7933	50	41
72-16-06	0	72	8	19	18	0.0	61.0200	-6.6300	40	42
72-16-06	0	72	8	19	18	46.0	61.1960	-6.4973	50	44
72-16-06	0	72	8	19	19	0.0	61.2500	-6.4667	40	45
72-16-06	0	72	8	19	20	0.0	61.4533	-6.3533	40	46
72-16-06	0	72	8	19	21	0.0	61.6817	-6.2300	40	48
72-16-06	0	72	8	19	21	34.0	61.8008	-6.1573	50	49
72-16-06	0	72	8	19	21	58.0	61.8897	-6.1200	50	50
72-16-06	0	72	8	19	22	22.0	61.9760	-6.0705	50	52
72-16-06	0	72	8	19	23	0.0	62.1117	-5.9983	40	53
72-16-06	0	72	8	19	23	16.0	62.1735	-5.9670	50	54
72-16-06	0	72	8	20	0	2.0	62.3425	-5.8840	50	57
72-16-06	0	72	8	20	1	0.0	62.5592	-5.8342	50	58
72-16-06	0	72	8	20	1	40.0	62.7035	-5.7995	50	59
72-16-06	0	72	8	20	2	0.0	62.7828	-5.8015	50	60
72-16-06	0	72	8	20	2	46.0	62.9530	-5.7452	50	61
72-16-06	0	72	8	20	3	0.0	63.0067	-5.7300	40	62
72-16-06	0	72	8	20	3	30.0	63.1170	-5.6985	50	63
72-16-06	0	72	8	20	4	0.0	63.2300	-5.6533	40	64
72-16-06	0	72	8	20	4	34.0	63.3615	-5.6257	50	65
72-16-06	0	72	8	20	5	0.0	63.4550	-5.6000	40	66
72-16-06	0	72	8	20	5	16.0	63.5150	-5.5843	50	67
72-16-06	0	72	8	20	5	42.0	63.6093	-5.5583	50	68

SHIP AND CRUISE IDENTIFICATION	TIME ZONE	YEAR	MONTH	DAY	HOUR	MINUTE	LATITUDE	LONGITUDE	UNCORRECTED FATHOMS	UNCORRECTED METERS	CORRECTED METERS	MATTHEWS ZONE
72-16-06	0	72	8	20	5	35.0	63.5839	-5.5659	1207.3	2207.9	2211	2
72-16-06	0	72	8	20	5	40.0	63.6021	-5.5605	1235.7	2259.8	2264	2
72-16-06	0	72	8	20	5	45.0	63.6197	-5.5556	1257.6	2299.9	2304	2
72-16-06	0	72	8	20	5	50.0	63.6370	-5.5509	1286.6	2352.9	2358	2
72-16-06	0	72	8	20	5	55.0	63.6544	-5.5463	1318.7	2408.0	2414	2
72-16-06	0	72	8	20	6	0.0	63.6717	-5.5417	1356.0	2479.9	2487	2
72-16-06	0	72	8	20	6	5.0	63.6900	-5.5371	1400.9	2562.0	2570	2
72-16-06	0	72	8	20	6	10.0	63.7083	-5.5326	1449.0	2649.9	2659	2
72-16-06	0	72	8	20	6	15.0	63.7266	-5.5281	1496.6	2737.0	2748	2
72-16-06	0	72	8	20	6	20.0	63.7449	-5.5236	1544.7	2824.9	2837	2
72-16-06	0	72	8	20	6	25.0	63.7632	-5.5191	1585.7	2899.9	2914	2
72-16-06	0	72	8	20	6	30.0	63.7833	-5.5123	1593.9	2914.9	2929	2
72-16-06	0	72	8	20	6	35.0	63.8038	-5.5050	1608.7	2942.0	2956	2
72-16-06	0	72	8	20	6	40.0	63.8244	-5.4976	1624.0	2970.0	2985	2
72-16-06	0	72	8	20	6	45.0	63.8450	-5.4903	1625.6	2972.9	2988	2
72-16-06	0	72	8	20	6	50.0	63.8655	-5.4830	1667.7	3049.9	3066	2
72-16-06	0	72	8	20	6	55.0	63.8861	-5.4757	1875.5	3429.9	3451	2
72-16-06	0	72	8	20	7	0.0	63.9067	-5.4683	1740.4	3182.8	3201	2
72-16-06	0	72	8	20	7	5.0	63.9222	-5.4713	1706.0	3119.9	3137	2
72-16-06	0	72	8	20	7	10.0	63.9413	-5.4650	1781.4	3257.8	3277	2
72-16-06	0	72	8	20	7	15.0	63.9604	-5.4588	1793.5	3280.0	3299	2
72-16-06	0	72	8	20	7	20.0	63.9795	-5.4526	1809.9	3309.9	3330	2
72-16-06	0	72	8	20	7	25.0	63.9986	-5.4464	1808.2	3306.8	3326	2
72-16-06	0	72	8	20	7	30.0	64.0177	-5.4402	1830.7	3348.0	3368	2
72-16-06	0	72	8	20	7	36.0	64.0385	-5.4351	1848.2	3380.0	3400	2
72-16-06	0	72	8	20	7	38.0	64.0454	-5.4335	1826.3	3339.9	3360	2
72-16-06	0	72	8	20	7	45.0	64.0697	-5.4276	1908.3	3489.9	3511	2
72-16-06	0	72	8	20	7	50.0	64.0870	-5.4234	1923.6	3517.9	3539	2
72-16-06	0	72	8	20	7	55.0	64.1043	-5.4192	1919.2	3509.8	3531	2
72-16-06	0	72	8	20	8	0.0	64.1217	-5.4150	1948.2	3562.9	3585	2
72-16-06	0	72	8	20	8	5.0	64.1422	-5.4103	1944.9	3556.8	3579	2
72-16-06	0	72	8	20	8	10.0	64.1627	-5.4055	1941.1	3549.9	3572	2
72-16-06	0	72	8	20	8	15.0	64.1832	-5.4008	1934.7	3541.8	3564	2
72-16-06	0	72	8	20	8	20.0	64.2037	-5.3961	1926.3	3522.8	3544	2
72-16-06	0	72	8	20	8	25.0	64.2242	-5.3913	1889.2	3455.0	3476	2
72-16-06	0	72	8	20	8	30.0	64.2448	-5.3866	1801.1	3293.9	3313	2
72-16-06	0	72	8	20	8	35.0	64.2653	-5.3819	1755.2	3209.9	3228	2
72-16-06	0	72	8	20	8	40.0	64.2858	-5.3771	1708.7	3124.9	3142	2
72-16-06	0	72	8	20	8	45.0	64.3063	-5.3724	1666.6	3047.9	3064	2
72-16-06	0	72	8	20	8	50.0	64.3268	-5.3677	1411.8	2581.9	2599	2
72-16-06	0	72	8	20	8	55.0	64.3459	-5.3522	1410.7	2579.9	2598	2
72-16-06	0	72	8	20	9	0.0	64.3650	-5.3367	1656.8	3030.0	3044	2
72-16-06	0	72	8	20	9	5.0	64.3815	-5.3374	1651.3	3019.9	3035	2
72-16-06	0	72	8	20	9	10.0	64.3976	-5.3380	1397.0	2554.8	2567	2
72-16-06	0	72	8	20	9	15.0	64.4134	-5.3385	1356.0	2479.9	2487	2
72-16-06	0	72	8	20	9	20.0	64.4291	-5.3390	1404.3	2571.8	2580	2
72-16-06	0	72	8	20	9	25.0	64.4449	-5.3395	1650.2	3017.9	3033	2
72-16-06	0	72	8	20	9	30.0	64.4606	-5.3400	1684.1	3079.9	3096	2

Appendix E


START
READ A NAVIGATION PARAMETER CARD
READ A RECORD OF NAVIGATION DATA
END OF FILE?
YES
MORE FILES OF NAVIGATION?
YES
NO
NO
CONVERT THE JULIAN DAY TO MONTH AND DAY
CHANGE THE LATITUDE AND LONGITUDE TO DECIMAL EQUIVALENTS
WRITE A RECORD ON TAPE AND PRINT OUT
READ A BATHYMETRY PARAMETER CARD
READ A RECORD OF BATHYMETRY DATA
END OF FILE?
YES
MORE FILES OF BATHY-METRY?
YES
NO
NO
STOP
CONVERT THE JULIAN DAY TO MONTH AND DAY
CHANGE MINUTES AND SECONDS TO DECIMAL EQUIVALENTS
CONVERT UNCORRECTED METERS TO UNCORRECTED FATHOMS
CALCULATE CORRECTED METERS
WRITE A RECORD ON TAPE AND PRINT OUT

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Appendix F

SOURCE LANGUAGE LISTING

```
      PROGRAM CONVERTH
      COMMON/IOERR/IOEF
C     IN THE EVENT OF AN I/O CONVERSION ERROR AT STATEMENT 209 DUE TO
C     AN INVALID CHARACTER, FUDGE WILL SET IOEF TO 1
      CALL FUDGE
      IOEF=0
      IFIX=0
      ITMZNE=0
      NUM=1
      ICNT=0
      READ(60,200)IYR,CRUISE,NOFILE,ICLT
  200 FORMAT(I2,A8,2I5)
  300 READ(15,100)JDAY,HR,XMIN,XLAT,XLAM,XLOD,XLOM,ITYPE,IFIX
  100 FORMAT(  I3,F2,F4.1,F3,F5.2,F4,F5.2,I2,I4)
      IF(IOCHECK,15) 300,301
  301 IF(EOF,15) 302,303
C  CONVERT JULIAN DAY TO MONTH AND DAY
  303 IF(IOEF,EQ,1) GO TO 444
      CALL JULIAN(IYR,JDAY,ID,IM,LPYR)
      IF(IFIX,LE,IFIX2) GO TO 300
      IFIX2=IFIX
      XMIN=XMIN*10
C CHANGE LATITUDE AND LONGITUDE TO DECIMAL
      MINUS=40000000000000000
      XLAM=ABSF(XLAM)
      XLOM=ABSF(XLOM)
      KEY=XLAD.AND.MINUS
      IF(KEY.EQ.MINUS)27,28
   27 COMLAT=XLAD-XLAM/60.0
      GO TO 29
   28 COMLAT=XLAD + XLAM/60.0
   29 KEY=XLOD.AND.MINUS
      IF(KEY.EQ.MINUS)30,31
   30 COMLON=XLOD-XLOM/60.0
      GO TO 400
   31 COMLON=XLOD + XLOM/60.0
  400 WRITE(40,401)CRUISE,ITMZNE,IYR,IM,ID,HR,XMIN,COMLAT,COMLON,ITYPE,
     1IFIX
  401 FORMAT(A8,I5,3I2,1XF2,F3,F2.4,F9.4,I2,7X15,24X)
      IF(ICUT.NE.1) GO TO 300
      ZMIN=XMIN/10.0
      IF(MOD(NUM,60),NE,1) GO TO 600
  501 WRITE(61,501)
  501 FORMAT(1H1,123HSHIP AND CRUISE      TIME      YEAR      MONTH      DAY
     1      HOUR      MINUTE      LATITUDE      LONGITUDE          FIX
     2   FIX)
      WRITE(61,502)
  502 FORMAT(1H ,24HIDENTIFICATION       ZONE,79X,22HDESCRIPTION      NUMB
     1ER)
      NUM=1
  600 WRITE(61,116)CRUISE,ITMZNE,IYR,IM,ID,HR,ZMIN,COMLAT,COMLON,ITYPE,
     1IFIX
```

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```
  116  FORMAT(1H ,2XA8,7X15,7X12,7X12,7X12,7XF2,7XF4,1,6XF8.4,5XF9.4,9X12
      1,10X15)
       NUM=NUM + 1
       GO TO 300
  444  IOEF = 0
       GO TO 300
  302  ICNT=ICNT + 1
       IF(ICNT,EQ,NOFILE) GO TO 700
       GO TO 300
  700  ENDFILE 40
       CALL BATHY(ITMZNE)
       STOP
       END
```

```
                                    ITEXT     CONVBATH
PROGRAM LENGTH              00447
ENTRY POINTS     CONVBATH   00135
BLOCK NAMES
                 IOERR      00001
EXTERNAL SYMBOLS
                 O8CENTRY
                 THEND.
                 O8CSTOPS
                 O8CDICT.
                 FUDGE
                 JULIAN
                 BATHY
                 XMOLF
                 O8CIFEOF
                 O8CIFIOC
                 EFT.
                 TSH.
                 STH.
                 ONSINGL.
  00125 SYMBOLS
       SUBROUTINE JULIAN (IY,JUDY,IC,IM,LPYR)                              F    1
C      CONVERTS JULIAN DATE INTO DAY, MONTH, YEAR FOR ANNOTATION IN OCEANO  F    2
C      IY = YEAR, JUDY = JULIAN DAY, IC = CALENDER DAY, IM = CALENDER MON   F    3
C      COMPLIMENTS OF BOB FECHA - CODE 8174 - 17 NOV 1971                   F    4
C      MODIFIED BY LEON LA LUMIERE - CODE 8178 - 17 NOV 1971                F    5
C                                                                           F    6
       DIMENSION JJ(13), AA(12)                                            F    7
       TYPE INTEGER AA                                                     F    8
       DATA ((JJ(I), I = 1, 13) = 0, 31, 59, 90, 120, 151, 181, 212, 243,  F    9
      1273, 304, 334, 365)                                                 F   10
       DATA ((AA(I), I = 1, 12) = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12)   F   11
       LL=IY                                                               F   12
       MM=JUDY                                                             F   13
       IF (LL.LT.0) GO TO 10                                               F   14
       IF (LL.EQ.0) GO TO 1                                                F   15
       IF (MOD(LL,4),EQ.0) GO TO 4                                         F   16
     1 IF (MM.LE.0.OR.MM.GT.365) GO TO 4                                   F   17
     2 DO 3 K=2,13                                                         F   18
       IF (MM.LE.JJ(K)) GO TO 6                                            F   19
     3 CONTINUE                                                            F   20
```

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```
    4 LPYR=2
      IF (MM.LE.0.OR.MM.GT.366) GO TO 10
      IF (MM.LE.59) GO TO 2
      IF (MM.EQ.60) GO TO 5
      MM=MM-1
      GO TO 2
    5 II=29
      K=3
      GO TO 7
    6 II=MM-JJ(K-1)
      IF (LL.EQ.0) GO TO 8
      IF (MOD(LL,4).NE.0) GO TO 8
      IF (MOD(LL,4).EQ.0.AND.MM.LE.59) GO TO 8
      MM=MM+1
    7 IF (LL.GE.10) GO TO 8
    8 ID=II
      IM=AA(K-1)
    9 RETURN
   10 PRINT 11, LL,MM
      GO TO 9
C
   11 FORMAT (1X,*YEAR = *,I2,1X,*JULIAN DAY = *,I3,1X,*ARE BAD DATES*)
      END
```

5.4DS JULIAN

```
                                        IDENT     JULIAN
      PROGRAM LENGTH                 00301
      ENTRY POINTS     JULIAN        00053
      EXTERNAL SYMBOLS
                       THEND.
                       Q8QDICT.
                       XMODF
                       STH.
                       QNSINGL.
         00116 SYMBOLS


                                    IDENT     FUDGE
PROGRAM LENGTH                 00023
ENTRY POINTS     FUDGE         00000
BLOCK NAMES
                 IOERR         00001
EXTERNAL SYMBOLS
                 ELD.
                 Q8QERSET
                                    EXT       ELD.,Q8QERSET
                                    ENTRY     FUDGE
  00000                  IOERR      BLOCK
  00000                             COMMON    IOEF
  00000   00  0  00000   FUDGE      OCT       0
          00  0  00000
  00001   77  2  00000              DSTA      X+1
          20  0 P00015
  00002   56  1 P00011              SIL       RESTOR,1
          50  0  00000
```

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```
00003   77  1  04000          ENA       (*)FUDGE,1
        10  0 P00017
00004   50  1  00000          ENI       0,1
        50  0  00000
00005   63  0  10017          SFYT,A0,E15  X,,1
        50  5 P00014
00006   50  1  00017          ENI       15,1
        12  0 P00002          LDA       FUDGE+2
00007   63  0  14003          SFYT,A32,E3  X,,1
        50  5 P00014
00010   12  0 P00014          LDA       X
        20  0 X77777          STA       GAOFRSET-2
00011   50  1  77777  RESTOF  ENI       **,1
        50  0  00000
00012   77  2  00000          DLDA      X+1
        12  0 P00015
00013   75  0 P00000          SLC       FUDGE
        50  0  00000
00014   63  0  00000        X  LBJP      **
        00  0  77777
00015   00  0  00000          OCT       0
        00  0  00000
00016   00  0  00000          OCT       0
        00  0  00000
00017   77  2  00000  FUDGE,1 DSTA      X+1
        20  0 P00015
00020   10  0  00001          ENA       1
        20  0 C00000          STA       IOEF
00021   77  2  00000          DLDA      X+1
        12  0 P00015
00022   63  0  00000          LBJP      (*)FLD,+10
        01  0 X77777
                               END
 00007 SYMBOLS
```

```
      SUBROUTINE BATHY(ITMZNE)
      DIMENSION ITIME(40),JUL(40),MZ(40)
      NUM=1
      ICNT=0
      ITMZNE=0
      READ(60,100)IYR,CRUISE,NEFILE,NOMZ,IOUT
  100 FORMAT(I2,A8,3I5)
      READ(60,400)(ITIME(I),JUL(I),MZ(I),I=1,NOMZ)
  400 FORMAT(15I5,5X)
      MAT=MZ(1)
      I=2
  300 READ(15,200)JUDY,HR,XMIN,SEC,XLAT,XLON,UNCOR
  200 FORMAT(  I3,3F2,2F9.4,F7.0)
      IF(IOCHECK,15)300,301
  301 IF(EOF,15)302,303
C  CONVERT JULIAN DAY TO MONTH AND DAY
  303 IF(IOEF,EQ,1) GO TO 444
      CALL JULIAN(IYR,JUDY,ID,IM,LPYR)
C  CHANGE MINUTES AND SECONDS TO DECIMAL EQUIVALENT
      MINUS=40000000000000000
      SEC=ABSF(SEC)
      KEY=XMIN.AND.MINUS
      IF(KEY.EQ.MINUS)27,28
```

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```
 27   COMLAT=XMIN-SEC/60.0
      GO TO 29
 28   COMLAT=XMIN + SEC/60.0
C  CALCLLATE CORRECTED METERS
 29    DEPTH=UNCOR/1.8288
      ICLOCK=HR*100 + XMIN
      IDEPTH=DEPTH
      IF(JUDY.EQ.JLL(I).AND.ICLOCK.GE.ITIME(I)) GO TO 600
      GO TO 602
 600  MAT=MZ(I)
      I=I + 1
 602  CALL MTCOR( DEPTH,MAT,KORFAT,KORMET,METUNC,MTDC)
      COMLAT=COMLAT*10
      MDEPTH=DEPTH * 10
      WRITE(40,605)CRUISE,ITMZNE,IYR,IM,ID,HR,COMLAT,XLAT,XLON,MDEPTH,
     1KORMET,MAT
 605  FORMAT(A8,I5,3I2,1XF2,F3,F8.4,F9.4,10X2I5,I2,16X)
      IF(IOUT.NE.1) GO TO 300
      ZMIN=COMLAT/10.0
      IF(MOD(NUM,60).NE.1) GO TO 700
      NLM=1
      WRITE(61,504)
      WRITE(61,505)
 504  FORMAT(1H1,133HSHIP AND CRUISE   TIME   YEAR   MONTH   DAY   HOUR
     1  MINUTE   LATITUDE   LONGITUDE   UNCORRECTED   UNCORRECTED   CORR
     2ECTED   MATTHEWS)
 505  FORMAT(1H ,22HIDENTIFICATION    ZONE,65X,44HFATHOMS        METERS
     1      METERS       ZONE)
 700  WRITE(61,701)CRUISE,ITMZNE,IYR,IM,ID,HR,ZMIN,XLAT,XLON, DEPTH,
     1UNCOR,KORMET,MAT
 701  FORMAT(1H ,2XA8,5X15,5X12,5X12,5X12,5XF2,5XF4.1,4XF8.4,3XF9.4,
     1 5XF6.1,8XF6.1,7X15,9X12)
      NLM=NUM + 1
      GO TO 300
 302  ICNT=ICNT + 1
      IF(ICNT.EQ.NOFILE) GO TO 800
      GO TO 300
 444  IOEF=0
      GO TO 300
 800  ENDFILE 40
      REWIND 40
      REWIND 15
      RETURN
      END
```

```
                                    IDENT    BATHY
PROGRAM LENGTH              00753
ENTRY POINTS    BATHY       00334
EXTERNAL SYMBOLS
                THEND.
                Q1C10100
                Q8CEICT.
                JULIAN
                MTCOR
                XMELF
                Q8CIFE0F
                Q8CIFI0C
                EET.
                REW.
                TSF.
                STF.
                QNSINGL.
  00150 SYMBOLS
```

```
      SUBROUTINE MTCOR (IDEP,MT,KCDF,KCDM,METUNC,MTDC)                  J    1
C                                                                       J    2
C     JAN 10, 1972                                                      J    3
C                                                                       J    4
C     MODIFIED FOR CDC 3600 BY LEON LA LUMIERE - CODE 8174 - 20 MAR 1972 J   5
C                                                                       J    6
C     SUBROUTINE MTCOR(ARG), MATTHEWS TABLE CORRECTION                  J    7
C          VERSION WHERE COEFFICIENTS ENTERED AT RUN TIME               J    8
C     CALCULATES CORRECTED DEPTH IN METERS WHEN GIVEN                   J    9
C          MATTHEWS TABLE COEFFICIENTS AND UNCORRECTED                  J   10
C          DEPTH IN FATHOMS,                                            J   11
C     COPIED FROM WHOI PROGRAM FOR IBM 1130                             J   12
C                                                                       J   13
C     INPUT,                                                            J   14
C          IDEP = UNCORRECTED DEPTH IN FATHOMS                          J   15
C          MT = MATTHEWS TABLE COEFFICIENT(1 - 52)                      J   16
C                                                                       J   17
C     OUTPUT,                                                           J   18
C          KCDF = CORRECTED DEPTH IN FATHOMS                            J   19
C          KCDM = CORRECTED DEPTH IN METERS                             J   20
C          MTDC = MATHEWS TABLE DEPTH CORRECTION (METERS)               J   21
C                                                                       J   22
C     INTERNAL                                                          J   23
C          NUDF  WATER DEPTH UNCORRECTED FATHOMS                        J   24
C          WUDF  WATER DEPTH UNCORRECTED FATHOMS                        J   25
C          WUDM  WATER DEPTH UNCORRECTED METERS                         J   26
C          WCOR  CORRECTION IN METERS                                   J   27
C                                                                       J   28
C     SETTING MATTHEWS TABLE COEFFICIENTS SUPPLIED BY C. GANTAR         J   29
      DIMENSION MTN(52),AMT(52),BMT(52),CMT(52),DMT(52),EMT(52),FMT(52) J   30
C                                                                       J   31
      REAL IDEP
      DATA (MTN=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22 J   32
     1,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44 J   33
     2,45,46,47,48,49,50,51,52)                                         J   34
      DATA (AMT=-,05,,21,,19,,25,,35,,43,,12,-,21,,76,-,19,-,07,1,29,,34 J   35
     1,-,04,,12,,39,1,18,1,25,-,11,,64,-,31,,43,-,29,-,06,-,110,-,08,-,2 J   36
     23,,06,1,14,-,38,,2,-,56,,34,,58,1,15,,58,,01,,59,2,49,,97,3,93,1,9 J   37
     36,-,15,,09,,06,,42,-,05,,03,-,41,-,19,-,01,,07)                  J   38
      DATA (BMT=-,01683,-,00247,,006885,,000632,,015719,,004269,,013881, J   39
     1,025565,,030789,,023035,,031673,,036491,,031972,,049788,,032253,,0 J   40
     240042,,037533,,043541,,046531,,034097,,019659,,025093,,012063,,005 J   41
     3833,-,000139,-,006374,-,00994,-,012026,-,019317,-,011231,,034103,, J   42
     4037121,,037874,,03524,,031429,,037872,,043038,,0395,,025775,,03583 J   43
     58,,021001,,0186,,021906,,013118,,001109,,044699,,02651,,028006,,03 J   44
     65524,,03841,,049807,,000832)                                      J   45
      DATA (CMT=,130695,-,028055,-,033416,,030785,-,169795,,049419,-,059 J   46
     1931,-,156579,-,141286,,00879,-,101806,-,121871,-,040565,-,233986,, J   47
     2011268,-,363995,-,227838,-,239633,-,383832,-,24561,-,044804,-,2165 J   48
     309,-,014753,-,009209,,021746,,082109,,101101,,11845,,193882,,06327 J   49
     48,-,255508,-,174712,-,196492,-,149662,-,141422,-,17812,-,210477,-, J   50
     5103453,-,092957,-,142454,-,04741,-,02271,-,117873,-,039335,,023648 J   51
     6,-,271705,-,041812,,048156,-,059269,-,097981,,001276,,161859)     J   52
      DATA (DMT=-,040587,,017161,-,00471,,012525,,115271,-,015992,,04609 J   53
     14,,083656,,05727,-,01941,,036137,,039775,,004688,,083487,-,030352, J   54
     2,207727,,102774,,095135,,187189,,123539,,02245,,119429,,008118,,02 J   55
```

```
     34232,,01811,-,013313,-,020412,-,030545,-,061797,-,001826,,121471,.
     4064336,,081801,,056314,,055151,,067,,083684,.020131,,037683,.09235
     59,.018848,,00924,.06013,.023795,,007413,.103092,.167905,.004016,.0
     670316,.097868,-,000464,-,162078)
      DATA (EMT=,092394,.048995,.127138,-,02266,-,249166,.06975,-,087349
     1,-.154994,-,075775,,081004,-,035675,-,040077,.023167,-,115908,.107
     256,-,470139,-,166568,-,137278,-,366057,-,235691,-,029841,-,232583,
     3,015918,-,046104,-,045777,.024588,,037058,,062662,,110085,,001486,
     4-,214992,-,08885,-,138137,-,079156,-,07518,-,09377,-,136212,.01265
     52,-,041351,-,186534,-,014159,,001108,-,09774,-,025662,-,004717,-,1
     642748,-,983392,,000155,-,170839,-,2527,,24145,,983392)
      DATA (FMT=-,072171,-,158148,-,23102,,012058,.190978,-,076755,.0646
     179,,109779,,038823,-,075341,,011294,,015287,-,027333,,062495,-,096
     2216,,403122,,10073,,074903,,267798,,169277,,021495,,16502,-,028903
     3,,035913,,040884,-,014177,-,022102,-,045831,-,06729,,001066,.14100
     47,.04968,,094743,,048085,,039534,.050998,,089176,-,032552,,017001,
     5,140729,,003867,-,004373,,058355,,010515,,000162,,067775,2,003205,
     6-,00155,.149654,.235294,-,623288,-2,003205)
C
      NZERO=0
C
      NUDF=IDEP
      IF (NUDF) 3,5,1
    1 IF (52-MT) 4,2,2
C
 2    WUDF=IDEP
      WUDM=WUDF*1,8288
      WCOR=AMT(MT)+EMT(MT)*WUDM+CMT(MT)*1,E-04*(WUDM**2)+DMT(MT)*1.E-07*
     1(WUDM**3)+EMT(MT)*1,E-11*(WUDM**4)+FMT(MT)*1.E-15*(WUDM**5)
      WCDM=WUDM+WCOR
      KCDM=WCDM+0,5
      MTDC=WCOR+0,5
      KCDF=(WCDM*0,54681)+0,5
      METUNC=WUDM
      RETURN
C
    3 PRINT 6
      GO TO 5
C
    4 PRINT 7
C     ERROR EXIT
    5 KCDM=NZERO
      MTDC=NZERO
      KCDF=NZERO
      RETURN
C
    6 FORMAT (1X,*DEPTH READ IS NEGATIVE*)
    7 FORMAT (1X,*MATTHEWS ZONE NUMBER IS GREATER THAN 52*)
      END
```

```
                                        IDENT      MTCOR
      PROGRAM LENGTH                 01015
      ENTRY POINTS     MTCOR         00577
      EXTERNAL SYMBOLS
                       Q1Q10100
                       THEND,
                       Q8QDICT,
                       STH,
         00074 SYMBOLS
LOAD
```