THE MARINE GEOPHYSICAL DATA EXCHANGE FORMAT - "MGD77"
(Bathymetry, Magnetics, and Gravity)

NATIONAL GEOPHYSICAL DATA CENTER
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 10 (REVISED)

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Table Of Contents

INTRODUCTION.....I

GENERAL DESCRIPTION.....II

THE HEADER RECORD.....III

THE DATA RECORD.....IV

10-DEGREE IDENTIFIER CODE.....APPENDIX A

NGDC CONTACTS.....APPENDIX B

I. INTRODUCTION

In January of 1977, a group of 24 geophysical data managers from academia, government, industry and foreign countries participated in a workshop at the National Geophysical Data Center (NGDC) in Boulder, Colorado. The "Workshop for Marine Geophysical Data Formats" established the basic outline of a new format for the exchange of digital underway geophysics data. A six member task force was formed to work with NGDC in implementing the decisions of the workshop into the new format. By the end of 1977 the "MGD77" format was being disseminated by NGDC as its standard exchange format.

The "MGD77" format has experienced much success over the past 15 years. It has been sanctioned by the Intergovernmental Oceanographic Commission (IOC) as an accepted standard for international data exchange, and it has been translated into French, Japanese, and Russian. Most contributors of data to NGDC now send transfer data over the internet in the "MGD77" format.

This newest revision makes the MGD77 format "Year 2000 Compliant", ensuring it's success into 21st Century.

II. GENERAL DESCRIPTION

The digital format presented, and referred to as "MGD77", is an exchange format for marine geophysical data (bathymetry, magnetics, and gravity) It is intended to be used for the transmission of data to and from a data center and may be useful for the exchange of data to and from a data center and may be useful for the exchange of data between marine institutions. Data is to be exchanged in files, one file per survey operation. Generally each survey operation is a port-to-port operation of a survey vessel, but in some cases several port-to-port operations of the same vessel are combined in single survey operation, especially if this is the manner of organizing the data at the contributing institution. Data may be exchanged on via the Internet or on various mass storage devices such as 8mm or 9 track tapes, removable disks. The National Geophysical Data Center uses CD-ROM disks as its chief method of distribution of these data.

Data Exchange

1. For exchange of MGD77 data via mass storage files on magnetic or optical media participants shall establish type and format of the media to be exchanged.

2. Each survey operation shall be contained in one file with Header and Data Records, or in 2 files, one Header file and one Data Record file. If the media is too small to contain one survey the data may be continued on a second media.

3. Each survey operation shall have one MGD77 Header consisting of 24 80-character logical records.

4. The MGD77 data records are sequentially and chronologically organized until the end of the file. The data records are 120 logical characters.

5. A survey is defined as all observations that conveniently constitute a survey operation (e.g., a port-to-port survey or in some cases several surveys). A survey file(s) ideally should not span two media.

6. For sequential files, the MGD77 Header shall consist of 24 sequential records of 80 logical characters each separated by an end-of-record character(s) and, if the data records are in the same file, the Header shall be at the beginning of the file. The MGD77 Data Records shall be 120 logical characters each.

7. 9 Track tapes should be recorded as ASCI 1600 or 6250 BPI. The tape structure consists of physical records of 1920 characters each, a header followed by data records, separated by inter-record gaps (IRG) and organized into files. The files are separated by end-of-file (EOF) marks (sometimes called tape marks).

III. THE HEADER RECORD

The purpose of the Header Record is to document both the content and structure of the geophysical data contained within subsequent data records. In general, documentation that is constant throughout the survey will be in the Header Record, while documentation that is variable will be in the Data Records.

For sequential files, the MGD77 Header consists of 24 80-character sequential records. For 9 track magnetic tapes the MGD77 Header is a physical record (block) consisting of 1,920 characters. In both cases the data records follow immediately with no intervening end-of-file marks.

The Header Record contains fields which are both fixed and freely formatted. All field lengths within the Header that have not been coded with information should be blank-filled, and all plain language statements should be left-justified. The Header consists of a "sequence" of twenty-four 80-character images. The field lengths within the Header Records are designed to allow one to read the information (from magnetic tapes) as a series of 120-character logical records -- the same logical record length as the data records.

To help the marine geophysical community prepare this documentation, a coding pad is available free of charge from the National Geophysical Data Center.

Format Conventions for the Header Record:

1. All decimal points are implied.
2. Leading zeros and blanks are equivalent.
3. Unknown or unused fields are to be blank filled.
4. All "corrections", such as time zone, diurnal magnetics, and Eotvos, are understood to be added (e.g., time-zone correction is the number of hours which must be added to the recorded time to determine GMT).

*** CHANGES SINCE LAST REVISION ***

Several changes in the MGD77 Header were required in order to make the format "Year 2000 Compliant" (Y2K Compliant):

SEQUENCE	DESCRIPTOR	CHANGE
01	RECORD TYPE	Change from "1" to "4"
01	FILE CREATION DATE	Change to include century From 6 digits (col 32-37) to 8 digits (col 32-39)
01	SOURCE INSTITUTION	Change from 41 chars (col 38-78) to 39 chars (col 40-78)
04	SURVEY DEPARTURE DATE	Change to include century From 6 digits (col 1-6) to 8 digits (col 1-8)
04	PORT OF DEPARTURE	Change from 34 chars (col 7-40) to 32 chars (col 9-40)
04	SURVEY ARRIVAL DATE	Change to include century From 6 digits (col 41-46) to 8 digits (col 41-48)
04	PORT OF ARRIVAL	Change from 32 chars (col 47-78) to 30 chars (col 49-78)

The following is a detailed description of the Header Record. Fields can be of type integer, real or character. Fields that represent whole numbers are integers Fields that contain a decimal component are real, and fields that are alphanumeric are character.

Character Nos.	Field Length	Type	Description
Sequence No. 1			
1	1	int	RECORD TYPE - Set to "4" (Header)
***nncc*IDENT2**			
2-9	8	char	SURVEY IDENTIFIER
***nncc*CRUISE**			Identifier supplied by the contributing organization, else given by NGDC in a manner which represents the data. Identical to that in data record.
10-14	5	char	FORMAT ACRONYM - Set to"MGD77"
***nncc*ACRNYM**			
15-22	8	int	DATA CENTER FILE NUMBER
***nncc*DCFNUM**			Survey identifier bestowed by the data
***nncc*HDNUM1**			center. First 2 chars indicate the
***nncc*HDNUM2**			source, first 4 indicate platform.
***nncc*DANUM**			
27-31	5	int	PARAMETERS SURVEYED CODE Status of geophysical parameters for this survey. COLUMN PARAMETER SURVEYED
***nncc*BATHCD/*nncc*BATHX**			27 bathymetry (e.g., 12 kHz or 3.5 kHz used for bathymetry)
***nncc*MAGCD/*nncc*MAGX**			28 magnetics
***nncc*GRAVCD/*nncc*GRAVX**			29 gravity
***nncc*HRSSCD/*nncc*HRSSX**			30 high-resolution seismics (e.g., 3.5 kHz)
***nncc*DPSSCD/*nncc*DPSSX**			31 deep penetration seismics (e.g., large airgun)
			CODE - (for columns 27-31) 0 or blank - unspecified 1 - Parameter NOT surveyed 3 - Parameter surveyed, not contained in file 5 - Parameter surveyed, contained in file
32-39	8	int	FILE CREATION DATE (YYYYMMDD)
***nncc*DATE2**			Date data records were last altered (including century).
40-78	39	char	SOURCE INSTITUTION
***nncc*INST**			Organization which collected the data. Include contributor if different from collector.

79-80	2	int	SEQUENCE NUMBER - Set to "01"
nnccSEQ1			

Sequence No. 2

1-18	18	char	COUNTRY
nnccCNTRY			
19-39	21	char	PLATFORM NAME
nnccPLTFRM			
40	1	int	PLATFORM TYPE CODE
nnccPLTCD			0 - Unspecified
nnccPLTX			1 - Surface ship
			2 - Submersible ship
			3 - Aircraft
			4 - Buoy
			5 - Mobile land
			6 - Fixed land
			7 - Deep tow
			8 - Anchored seafloor instrument
			9 - Other, specify
41-46	6	char	PLATFORM TYPE
nnccPLTTP			(e.g., "SHIP","PLANE", "SUB", etc.)
47-78	32	char	CHIEF SCIENTIST(S)
nnccSCI			
79-80	2	int	SEQUENCE NUMBER - Set to "02"
nnccSEQ2			

Sequence No. 3

1-58	58	char	PROJECT
nnccPROJ			(e.g., "SURVOPS 6-69",
			"INDOPAC, Leg3")
59-78	20	char	FUNDING
nnccFUND			(i.e. agency or institution)
79-80	2	int	SEQUENCE NUMBER - Set to "03"
nnccSEQ3			

Sequence No. 4

1-8	8	int	SURVEY DEPARTURE DATE (YYYYMMDD)
nnccDPDT			
9-40	32	char	PORT OF DEPARTURE
nnccDPPRT			(i.e. city, country)
41-48	8	int	SURVEY ARRIVAL DATE (YYYYMMDD)
nnccARDT			
49-78	30	char	PORT OF ARRIVAL
nnccARPRT			(i.e. city, country)
79-80	2	int	SEQUENCE NUMBER - Set to "04"
nnccSEQ4			

Sequence No. 5

1-40 ***nncc*NAVIN**	40	char	NAVIGATION INSTRUMENTATION (e.g. "SAT/LORAN A/SEXTANT")
41-78 ***nncc*NAVMTH**	38	char	GEODETIC DATUM/POSITION DETERMINATION METHOD (e.g. "WGS84/PRIM - SATELLITE, SEC-LORAN A")
79-80 ***nncc*SEQ5**	2	int	SEQUENCE NUMBER - Set to "05"

Sequence No. 6

1-40 ***nncc*BATHIN**	40	char	BATHYMETRY INSTRUMENTATION Include information such as frequency, beam width, and sweep speed of recorder.
41-78 ***nncc*BATHDA**	38	char	ADDITIONAL FORMS OF BATHYMETRIC DATA (e.g., "MICROFILM", "ANALOG RECORDS")
79-80 ***nncc*SEQ6**	2	int	SEQUENCE NUMBER - Set to "06"

Sequence No. 7

1-40 ***nncc*MAGIN**	40	char	MAGNETICS INSTRUMENTATION (e.g., "PROTON PRECESSION MAG-GEOMETRICS G-801")
41-78 ***nncc*MAGDA**	38	char	ADDITIONAL FORMS OF MAGNETICS DATA (e.g., "PUNCH TAPE", "ANALOG RECORDS")
79-80 ***nncc*SEQ7**	2	int	SEQUENCE NUMBER - Set to "07"

Sequence No. 8

1-40 ***nncc*GRAVIN**	40	char	GRAVITY INSTRUMENTATION (e.g., "L and R S-26")
41-78 ***nncc*GRAVDA**	38	char	ADDITIONAL FORMS OF GRAVITY DATA (e.g., "MICROFILM", "ANALOG RECORDS")
79-80 ***nncc*SEQ8**	2	int	SEQUENCE NUMBER - Set to "08"

Sequence No. 9

1-40 ***nncc*SEISIN**	40	char	SEISMIC INSTRUMENTATION Include the size of the sound source, the recording frequency

			filters, and the number of channels (e.g., "1700 cu. in., AIRGUN, 8-62 Hz, 36 CHANNELS")
41-78 ***nnccSEISDA***	38	char	FORMATS OF SEISMIC DATA (e.g., "DIGITAL", "MICROFILM", "NEGATIVES", etc.)
79-80 ***nnccSEQ9***	2	int	SEQUENCE NUMBER - Set to "09"
Sequence No. 10			
1 ***nnccFORMAT***	1	char	FORMAT TYPE Set to "A", which means format contains integers, floating points, and alphanumerics
2-75 ***nnccFRTRN1*** ***nnccFILL1***	74	char	FORMAT DESCRIPTION This is one method of reading (not writing) the data in FORTRAN. Set to the following: "(I1,A8,F5.2,4I2,F5.3,F8.5,F9.5,I1,F6.4, F6.1,I2,I1,3F6.1,I1,F5.1,F6.0,F7.1," (NOTE: continued in sequence no. 11)
79-80 ***nnccSEQ10***	2	int	SEQUENCE NUMBER - Set to "10"
Sequence No. 11			
1-17 ***nnccFRTRN2*** ***nnccFILL2***	17	char	FORMAT DESCRIPTION Continued, set to following: "F6.1,F5.1,A5,A6,I1)"
41-43 ***nnccLATTOP***	3	int	TOPMOST LATITUDE OF SURVEY ** (to next whole degree)
44-46 ***nnccLATBOT***	3	int	BOTTOMMOST LATITUDE
47-50 ***nnccLONGLT***	4	int	LEFTMOST LONGITUDE
51-54 ***nnccLONGRT*** ***nnccFILL3***	4	int	RIGHTMOST LONGITUDE
79-80 ***nnccSEQ11***	2	int	SEQUENCE NUMBER - Set to "11"
Sequence No. 12			
1-3 ***nnccDIGRT1***	3	real	GENERAL DIGITIZING RATE OF BATHYMETRY In tenths of minutes. The rate which is present within the data records (e.g., if values were coded every 5 minutes, set to "050")

4-15 ***nnccSMPRT1***	12	char	GENERAL SAMPLING RATE OF BATHYMETRY This rate is instrumentation dependent (e.g., "1/SECOND")
16-20 ***nnccSNDVEL***	5	real	ASSUMED SOUND VELOCITY In tenths of meters per second. Historically, in the U.S., this speed has been 800 fathoms/sec, which equals 1463.0 meters/sec.; however, some recorders have a calibration of 1500 meters/sec (e.g., "14630")
21-22 ***nnccBATHDM*** ***nnccBATHDMX***	2	int	BATHYMETRIC DATUM CODE - 00 - No correction applied (sea level) 01 - Lowest normal low water 02 - Mean lower low water 03 - Lowest low water 04 - Mean lower low water spring 05 - Indian spring low water 06 - Mean low water spring 07 - Mean sea level 08 - Mean low water 09 - Equatorial spring low water 10 - Tropic lower low water 11 - Lowest astronomical tide 88 - Other, specify in additional documentation
23-78 ***nnccINTRPL***	56	char	INTERPOLATION SCHEME This field allows for a description of the interpolation scheme used, should some of the data records contain interpolated values (e.g., "5-MINUTE INTERVALS AND PEAKS AND TROUGHS").
79-80 ***nnccSEQ12***	2	int	SEQUENCE NUMBER - Set to "12"

Sequence No. 13

1-3 ***nnccDIGRT2***	3	real	GENERAL DIGITIZING RATE OF MAGNETICS In tenths of minutes. The rate which is present within the data records.
4-5 ***nnccSMPRT2***	2	int	GENERAL SAMPLING RATE OF MAGNETICS In seconds. This rate isinstrumentation dependent (e.g., if the pulse rate is every 3 sec, set to "03")
6-9	4	int	MAGNETIC SENSOR TOW DISTANCE

***nncc*SENDST**			In meters. The distance from the navigation reference to the leading sensor.
10-14 ***nncc*SENDTH**	5	real	SENSOR DEPTH In tenths of meters. This is the estimated depth of the lead magnetic sensor.
15-17 ***nncc*SENSEP**	3	int	HORIZONTAL SENSOR SEPARATION In meters. If two sensors are used.
18-19 ***nncc*REFCD**	2	int	REFERENCE FIELD CODE - This is the reference field used to determine the residual magnetics: 00 - Unused 01 - AWC 70 02 - AWC 75 03 - IGRF-65 04 - IGRF-75 05 - GSFC-1266 06 - GSFC (POGO) 0674 07 - UK 75 08 - POGO 0368 09 - POGO 1068 10 - POGO 0869 11 - IGRF-80 12 - IGRF-85 13 - IGRF-90 88 - Other, specify
20-31 ***nncc*REFFLD**	12	char	REFERENCE FIELD (e.g., "IGRF-85")
32-78 ***nncc*RESFLD**	47	char	METHOD OF APPLYING RESIDUAL FIELD The procedure used in applying this reduction to the data (e.g., "LINEAR INTERP. in 60-mile SQUARE")

79-80 ***nncc*SEQ13**	2	int	SEQUENCE NUMBER - Set to "13"

Sequence No. 14

1-3 ***nncc*DIGRT3**	3	real	GENERAL DIGITIZING RATE OF GRAVITY In tenths of minutes. The rate present within the data records
4-5 ***nncc*SMPRT3**	2	int	GENERAL SAMPLING RATE OF GRAVITY In seconds. This rate is instrumentation dependent. If recordingis continuous, set to "00"
6 ***nncc*TGFMCD**	1	int	THEORETICAL GRAVITY FORMULA CODE 1 - Heiskanen 1924 2 - International 1930 3 - IAG System 1967 4 - IAG System 1980 8 - Other, specify
7-23 ***nncc*TGFM**	17	char	THEORETICAL GRAVITY FORMULA (e.g., "INTERNATIONAL '30", "IAG SYSTEM (1967)", etc.)
24 ***nncc*RFSYCD**	1	int	REFERENCE SYSTEM CODE Identifies the reference field: 1 - Local system, specify 2 - Potsdam system 3 - System IGSN 71 9 - Other, specify
25-40 ***nncc*RFSY**	16	char	REFERENCE SYSTEM (e.g., "POTSDAM SYSTEM", "SYSTEM IGSN 71", etc.)
41-78 ***nncc*CORRCT**	38	char	CORRECTIONS APPLIED Drift, tare and bias corrections applied. (e.g., "+0.075 MGAL PER DAY")
79-80 ***nncc*SEQ14**	2	int	SEQUENCE NUMBER - Set to "14"

Sequence No. 15

1-7 ***nncc*DGRVBS**	7	real	DEPARTURE BASE STATION GRAVITY In tenths of milligals. At sea level (Network value preferred.)
8-40 ***nncc*DGRVDS**	33	char	DEPARTURE BASE STATION DESCRIPTION Indicates name and number of station
41-47 ***nncc*AGRVBS**	7	real	ARRIVAL BASE STATION GRAVITY In tenths of milligals. At sea level (Network value preferred.)

48-78 ***nncc*AGRVDS**	31	char	ARRIVAL BASE STATION DESCRIPTION Indicates name and number of station
79-80 ***nncc*SEQ15**	2	int	SEQUENCE NUMBER - Set to "15"

Sequence No. 16

1-2 ***nncc*AREAID** ***nncc*FILL4**	2	int	NUMBER OF 10-DEGREE IDENTIFIERS ** This is the number of 4-digit 10-degree identifiers, excluding the "9999" flag, which will follow this field. (see APPENDIX B)
4-78 ***nncc*AEREAF1**	75	int	10-DEGREE IDENTIFIERS - This is a series of 4-digit codes,separated by commas, which identify the 10-degree squares through which the survey collected data (see APPENDIX B). Code "9999" after last identifier.
79-80 ***nncc*SEQ16**	2	int	SEQUENCE NUMBER - Set to "16"

Sequence No. 17

1-75 ***nncc*AREAF2**	75	int	10-DEGREE IDENTIFIERS Continued
79-80 ***nncc*SEQ17**	2	int	SEQUENCE NUMBER - Set to "17"

Sequence Nos. 18-24

1-78 ***nncc*ADD18… *Nncc*ADD24**	78	char	ADDITIONAL DOCUMENTATION information concerning this survey not contained in header fields.
79-80 ***nncc*SEQ18… *nncc*SEQ24**	2	int	SEQUENCE NUMBER ("18" thru "24")

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** Fields 41-54 in sequence Number 11 and Fields 1-78 in sequence numbers 16 and 17 may be blank filled by the contributing institution. The data center can determine these numbers by a computer search of the latitudes and longitudes within the MGD77 file.

IV. THE DATA RECORD

The data record presents underway marine geophysical data in a correlative manner. Geophysical data (bathymetry, magnetics, and gravity) and seismic identification (shot-point identification) are presented with a corresponding time and position. Documentation that is variable throughout the survey also is included within each data record. If primary navigation exists at a juncture where no geophysical data are present, this record should be included with the data parameter fields left unused (9s filled).

The logical record length is 120 characters and the blocking factor is 16 logical records per physical record (i.e., 1,920 characters).

*** CHANGES SINCE LAST REVISION ***

Several changes in the MGD77 Record were required in order to make the format "Year 2000 Compliant" (Y2K Compliant):

DESCRIPTOR	CHANGE
DATA-RECORD TYPE	Change from "3" to "5" (col 1)
TIME ZONE CORRECTION	Change from hundredths of hours to hours From 5 digits (col 10-14) to 3 digits (col 10-12)
YEAR	Change to include century From 2 digits (col 15-16) to 4 digits (col 13-16)

Format Conventions:

1. All decimal points are implied.

2. Leading zeros and blanks are equivalent.

3. Unknown or unused fields are to be filled with 9s (DO NOT BLANK FILL).

4. All "corrections", such as time zone, diurnal magnetics, and Eotvos, are understood to be added (e.g., time-zone correction is the number of hours which must be added to the recorded time to determine GMT).

Character Nos.	Length of Field	Fortran code	Description
1 ***nncc*IDENT**	1	int	DATA RECORD TYPE Set to "5" for data record.
2-9 ***nncc*CRUISE**	8	char	SURVEY IDENTIFIER Identifier supplied by the contributing organization, else given by NGDC in a manner which represents the data. Identical to that in header record.
10-12 ***nncc*TZ**	3	int	TIME-ZONE CORRECTION Corrects time (in characters 13-27) to GMT when added: equals zero when time is GMT. Timezone normally falls between -13 and +12 inclusively.
13-16 ***nncc*DATE**	4	int	YEAR including century (e.g. 1972)
17-18	2	int	MONTH (e.g. May is represented as 05)
19-20	2	int	DAY Day of month
21-22 ***nncc*TIME**	2	int	HOUR Hour of day
23-27	5	real	MINUTES X 1000
28-35	8	real	LATITUDE X 100000 + = North; - = South Between -9000000 and 9000000
36-44	9	real	LONGITUDE X 100000 + = East; - = West Between -18000000 and 18000000
45 ***nncc*PSTN** ***nncc*PSTNX**	1	int	POSITION TYPE CODE Indicates how lat/lon was obtained: 1 = Observed fix 3 = Interpolated 9 = Unspecified
46-51 ***nncc*BTRVL**	6	real	BATHYMETRY, 2- WAY TRAVELTIME In ten-thousandths of seconds. Corrected for transducer depth and other such corrections, especially in shallow water
52-57 ***nncc*BDPTH**	6	real	BATHYMETRY, CORRECTED DEPTH In tenths of meters.

58-59 ***nncc*BCORCD** ***nncc*BCORX**	2	int	BATHYMETRIC CORRECTION CODE This code details the procedure used for determining the sound velocity correction to depth: 01-55 Matthews' Zones with zone 59 Matthews' Zones, no zone 60 S. Kuwahara Formula 61 Wilson Formula 62 Del Grosso Formula 63 Carter's Tables 88 Other (see Add. Doc.) 99 Unspecified
60 ***nncc*TYPCD** ***nncc*BTYPX**	1	int	BATHYMETRIC TYPE CODE Indicates how the data record's bathymetric value was obtained: 1 = Observed 3 = Interpolated (Header Seq. 12) 9 = Unspecified
61-66 ***nncc*MTOT1**	6	real	MAGNETICS TOTAL FIELD, 1ST SENSOR In tenths of nanoteslas (gammas). For leading sensor. Use this field for single sensor.
67-72 ***nncc*MTOT2**	6	real	MAGNETICS TOTAL FIELD, 2ND SENSOR In tenths of nanoteslas (gammas). For trailing sensor.
73-78 ***nncc*MRES**	6	real	MAGNETICS RESIDUAL FIELD In tenths of nanoteslas (gammas). The reference field used is in Header Seq. 13.
79 ***nncc*MRESS** ***nncc*MRESX**	1	int	SENSOR FOR RESIDUAL FIELD 1 = 1st or leading sensor 2 = 2nd or trailing sensor 9 = Unspecified
80-84 ***nncc*MDI**	5	real	MAGNETICS DIURNAL CORRECTION - In tenths of nanoteslas (gammas). (In nanoteslas) if 9-filled (i.e., set to "+9999"), total and residual fields are assumed to be uncorrected; if used, total and residuals are assumed to have been already corrected.
85-90 ***nncc*MDPTH**	6	F6.0	DEPTH OR ALTITUDE OF MAGNETICS SENSOR In meters. + = Below sealevel - = Above sealevel
91-97 ***nncc*GOBS**	7	real	OBSERVED GRAVITY In tenths of milligals. Corrected for Eotvos, drift, and

			tares
98-103 ***nncc*GEOTV**	6	real	EOTVOS CORRECTION In tenths of milligals. E = 7.5 V cos phi sin alpha + 0.0042 V*V
104-108 ***nncc*GFAIR**	5	real	FREE-AIR ANOMALY In tenths of milligals. Free-air Anomaly = G(observed) - G(theoretical)
109-113 ***nncc*SLINE**	5	char	SEISMIC LINE NUMBER Used for cross referencing with seismic data.
114-119 ***nncc*SSHOT**	6	char	SEISMIC SHOT-POINT NUMBER
120 ***nncc*QC** ***nncc*QCX**	1	int	QUALITY CODE FOR NAVIGATION - 5 - Suspected, by the originating institution 6 - Suspected, by the data center 9 - No identifiable problem found (NOTE - Institution will most frequently 9-fill this field; however, should they wish to code a "5", the data center will not contradict. The data center's quality control program, which performs (among other checks) a vectorial analysis of the navigation, is available in a printout form upon request.)

APPENDIX B 10-DEGREE-SQUARE IDENTIFIER CODE

A 10-degree-square area can be easily identified by constructing a four-digit number. The components of this number, in order of their construction are described as follows:

Quadrant - A one-digit number identifies the quadrant of the world with the following significance to each digit:

1st digit = Quadrant number

Qc Code	Latitude	Longitude
1	North	East
3	South	East
5	South	West
7	North	West

10-Degree Square - The next three digits identify a unique 10-degree square; thus, the significant digits consist of:

2nd digit = Tens digit of degrees latitude
3rd digit = Hundreds digit of degrees longitude
4th digit = Tens digit of degrees longitude

		10-DEGREE SQ IDENT. CODE			
EXAMPLES:		Qc	Lat	Long	Long
(i)	37 degrees 48'S, 4 degrees 13'E	3	3	0	0
(ii)	21.6 degrees S, 14.3 degrees W	5	2	0	1
(iii)	34 degrees 28'N, 143 degrees 27'W	7	3	1	4
(iv)	75 degrees N, 43 degrees E	1	7	0	4

APPENDIX B NGDC CONTACTS

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