NATIONAL OCEANOGRAPHIC DATA CENTER

MANUAL SERIES

MANUAL FOR CODING AND KEYPUNCHING BIOLOGICAL DATA

PUBLICATION M—4
(PROVISIONAL)

NATIONAL OCEANOGRAPHIC DATA CENTER

MANUAL SERIES

MANUAL FOR CODING AND KEYPUNCHING BIOLOGICAL DATA

PHYTOPLANKTON DECK
PRIMARY PRODUCTIVITY DECK
PHYTOPLANKTON PIGMENT DECK
ZOOPLANKTON DECK
BENTHOS DECK

PUBLICATION M-4
(PROVISIONAL)

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FOREWORD

The objective of this manual is to provide the necessary instructions and conversion tables for reducing biological and related data collected at biological oceanographic stations to the standard format developed by the National Oceanographic Data Center (NODC).

It is intended for use by institutions, agencies, and other contributors interested in furnishing data to NODC for processing; copies of these forms are also available in volume to those who wish to maintain a system compatible with that of the national archive.

The card formats and codes described in this manual are based mainly on comments and suggestions from numerous scientific specialists of the oceanographic community. NODC is especially indebted to the *ad hoc* Biological Advisory Committee, chaired by Dr. B. Ketchum, for its valued guidance and review of all material. In general, the recommendations of the National Academy of Sciences/National Research Council Committee on Oceanography's Panel on Biological Methods were followed.

The NODC would particularly like to express its appreciation and gratitude to the following scientists who gave so freely of their time and advice toward establishing the data processing system described in this publication: Bostwick H. Ketchum, Elbert H. Ahlstrom, Thomas S. Austin, Beatrice Burch, Robert W. Holmes, Kenneth W. Kaye, Joseph E. King, Robert J. Menzies, Milner B. Schaefer, Oscar E. Sette, John M. Sieburth, Donald F. Squires, and I. Eugene Wallen.

W. C. Jacobs

W. C. JACOBS
Director
National Oceanographic Data Center

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INTRODUCTION

Biological data which are accumulated and cataloged by the NODC fall into two categories:

1. Data which are amenable to recording and processing by electronic data processing methods. Data can be effectively handled by these techniques only if the methods of measurement are sufficiently standardized. There appear to be only a few types of biological data gathered by different investigators by sufficiently comparable techniques to meet this specification.

2. Data which, because of the diversity of methods of measurement or for reasons of their descriptive nature, cannot be handled in standard formats. Data of this sort are filed as original data reports.

It is hoped that in time many data types presently being filed in category 2. above can become sufficiently standardized so as to be suitable for filing in category 1. We recommend and urge that biologists agree on standard techniques and units of measurements wherever possible. This will be especially important in connection with the results of ocean-wide surveys which, to be of greatest utility, should be made by methods which are comparable among different parts of the ocean and among different investigators.

The purpose of this manual is to provide instructions for processing the kinds of data described in category 1. above. An effort was made to avoid the use of codes; however, due to the variety of techniques employed in the collection of data and measurement of biological variables, it was found to be a necessary "final resort" in many cases.

Brief descriptions of the biological data decks appear below.

1. The <u>Phytoplankton Deck</u> provides data on the nature, abundance, and distribution of phytoplankton.

2. The <u>Primary Productivity Deck</u> provides measurements of primary organic production and ancillary information necessary for the evaluation of the productivity of a given area.

3. The <u>Phytoplankton Pigment Deck</u> provides quantitative measurements of phytoplankton pigments, such as chlorophyll a, b, and c, and the astacin and non-astacin carotenoids.

4. The <u>Zooplankton Deck</u> provides data on the nature, abundance, and distribution of zooplankton populations.

5. The <u>Benthos Deck</u> provides data on the nature, abundance, and distribution of benthic populations.

GENERAL

The biological data decks described in this manual have provisional status and are always subject to improvement when the need arises. The NODC welcomes suggestions for their improvement from the scientific community.

The related physical, chemical, and geological environmental data may be contained in the appropriate NODC data archives and can be requested along with the biological data. The NODC is developing standard formats for non-nutrient ocean chemistry data, current data, inshore oceanographic data, marine sediment analysis data, and sediment chemical analysis data. When available, these will provide the marine biologist additional correlative data in an organized form in the shortest possible time.

Values are not to be suffixed by zeros when not given by the originator. However, zeros must be prefixed to fill a field.

In a few instances, decimal positions are not fixed within a field. Always fill the fields from right to left so that the last column within the field is filled, and enter a red dash over the digit which immediately follows the decimal point (tenths position). Leave columns blank when data are not available.

When the code "Other" is entered as an alternate to a specific code list of taxa, gear types, methods, etc., specify what is meant in the <u>Remarks Section</u> of the coding form and identify the column numbers.

Use the following rounding procedures whenever rounding is necessary:

Example: > 5 - add one (1) to the preceding column.
< 5 - drop.
5 - round to the nearest even number.

Whenever time is entered on the coding forms, be sure to enter the time according to the 24-hour system. For example, 4:30 P.M. should be entered as 1630 hours.

PHYTOPLANKTON DECK

Coding the Phytoplankton Data Form

CARD TYPE 1

Columns 1-5 IDENTITY NUMBER

These columns provide a cumulative identification reference which is assigned by the NODC prior to processing. This number must be obtained from the NODC for cards punched outside the NODC.

Columns 6-8 CONSECUTIVE STATION NUMBER

Station numbers will be assigned and coded by the NODC unless the card is punched outside the NODC. Stations will be numbered consecutively and will start at 001 for each new cruise regardless of originator's numbering.

Columns 9-11 MARSDEN TEN-DEGREE SQUARE

Enter the number of the Marsden ten-degree square. A Marsden Square Chart is provided in Appendix I to help locate the station's position according to the Marsden Square System.

Column 12 MARSDEN FIVE-DEGREE SQUARE

Enter the number of the Marsden five-degree (quadrant) square. See Appendix I.

Columns 13-14 MARSDEN ONE-DEGREE SQUARE

Enter the number of the Marsden one-degree square. This is obtained by uniting the unit numbers of the degrees latitude and degrees longitude, respectively. For example, the one-degree square for the position 3<u>5</u>°20'N., 14<u>8</u>°10'W. is 58.

Columns 15-16

ENVIRONMENT

Enter whichever is applicable according to code. Column 15 must be filled in; estimate the environmental type if necessary.

Column 15

TYPE

0 - Inland waters
1 - Littoral zone
2 - Harbor
3 - Estuary
4 - Shelf
5 - Slope
6 - Canyon
7 - Rise or ridge
8 - Plain
9 - Deep, including trench and trough

Column 16

DEPTH RANGE

0 - 0-50 m
1 - 51-100 m
2 - 101-200 m
3 - 201-500 m
4 - 501-1000 m
5 - 1001-2000 m
6 - 2001-3000 m
7 - 3001-4000 m
8 - 4001-6000 m
9 - > 6000 m

Column 17

PERIOD OF DAY OF SAMPLING

Enter whichever is applicable according to code.

1 - 0000-0600 hours
2 - 0600-1200 hours
3 - 1200-1800 hours
4 - 1800-2400 hours

When the above code is not applicable, enter as follows.

5 - A.M.
6 - P.M.
7 - Period covers both A.M. and P.M.

Columns 18-19

MONTH

Enter the month as determined by GMT using Arabic numerals 01 through 12.

Columns 20-21

DAY

Enter day of month as determined by GMT. Use Arabic numerals 01 through 31.

Columns 22-23 YEAR

Enter last two digits of year as determined by GMT.

Columns 24-26 LOCAL TIME OF SAMPLING

Enter the hour and tenths of an hour when the sample was collected. Table 1 converts minutes to tenths of an hour.

Columns 27-29 GREENWICH MEAN TIME (GMT) OF SAMPLING

Enter the hour and tenths of an hour when the sample was collected. Table 1 converts minutes to tenths of an hour. Table 2 converts local time to GMT.

Columns 30-34 LATITUDE

Enter the latitude in degrees and minutes. Enter N or S in Column 34.

Columns 35-40 LONGITUDE

Enter the longitude in degrees and minutes. Enter E or W in Column 40.

Columns 41-42 COUNTRY

Enter the NODC Country Code as shown in Table 3.

Columns 43-44 INSTITUTION

Enter the institution responsible for the data analysis as shown in the Institution Code in Table 4.

Columns 45-48 ORIGINATOR'S CRUISE NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the cruise by the originator. Leave blank if unknown.

Columns 49-53 ORIGINATOR'S STATION NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the station by the originator.

Columns 54-55 NAVIGATIONAL SYSTEM

Enter the Navigational System Code as shown in Table 5.

Columns 56-60 DEPTH TO BOTTOM

Enter uncorrected sounding depth in meters. If depth is corrected, enter a red dash over the numeral in Column 56. When a red dash appears over Column 56, x overpunch Column 56. Table 6 converts fathoms to meters. Table 7 converts feet to meters.

Columns 61-63 UPPER DEPTH OF SAMPLING

Enter depth in meters. Table 6 converts fathoms to meters. Table 7 converts feet to meters. Enter a zero in Column 63 if the sample was collected at the surface.

Columns 64-66 LOWER DEPTH OF SAMPLING

Enter depth in meters. Repeat above entry when a horizontal haul was made. When the sample was collected at a single depth, the entry is made in Columns 61-63, and Columns 64-66 are left blank.

Column 67 TYPE OF SAMPLING DEVICE

Enter whichever is applicable according to code.

1 - Water sampler
2 - Net
9 - Other

Columns 68-69 CAPACITY OF WATER SAMPLER

Enter capacity of water sampler in liters. Use Column 69 for tenths. Should the capacity of the water sampler exceed 9.9 liters, enter the following code in Column 68: A = 10, B = 11, C = 12, etc.

Columns 70-72 MOUTH DIAMETER OF NET

Enter the diameter of the mouth opening in centimeters.

Columns 73-75 LENGTH OF THE NET

Enter the length of the net in centimeters.

Column 76 CARD TYPE

The numeral 1 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 01 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 22 appears in Columns 79-80.

PHYTOPLANKTON DECK

Coding the Phytoplankton Data Form

CARD TYPE 2

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-21 MESH APERTURE OF NETTING

Enter the first two significant figures giving the mesh aperture to the nearest hundredth of a millimeter.

Columns 22-23 DURATION OF SAMPLING

Enter duration of sampling in minutes.

Column 24 SHIP SAMPLING SPEED

Enter the ship's speed at time of sampling in knots. Use zero if the ship is anchored or drifting. Use letters to designate ship's speed above 9 knots; A = 10 knots, B = 11 knots, etc. The letter O is to be omitted.

Columns 25-28 VOLUME OF WATER FILTERED

Enter the volume of water filtered in cubic meters.

Column 29 PRESERVATIVE

Enter whichever is applicable according to code.

1 - Formalin
2 - Alcohol
3 - Lugol
9 - Other

Column 30 — TAXONOMIC STATUS

Enter whichever is applicable according to code.

1 - Sample taxonomically unanalyzed
2 - Sample enumerated to family level
3 - Sample enumerated to generic level or below

Column 31 — COUNTING TECHNIQUE

Enter whichever is applicable according to code.

1 - Inverted microscope
2 - Hemocytometer
3 - Sedgewick-Rafter cell
4 - Millipore® filter
5 - Particle counter
9 - Other

Columns 32-33 — CELL VOLUME

Enter the total cell volume in cubic millimeters.

Columns 34-38 — NUMBER OF CELLS

Enter number of cells in thousands per liter; use Column 38 for decimals.

Columns 39-41 — TOTAL NUMBER OF SPECIES

Enter total number of species as given or after computation.

Columns 42-44 — NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE

Enter number of species as given or after computation.

Columns 45-51 — LIST OF TAXA

Enter according to code:

1 - Present in aliquot
2 - Present in sample, but not found in aliquot
3 - Searched for, but not found in sample

Column 45	Chlorophyceae
Column 46	Dinophyceae
Column 47	Bacillariophyceae
Column 48	Cyanophyceae
Column 49	Silicoflagellates
Column 50	Mμ Flagellates
Column 51	Other

Columns 52-71

Do not code. These columns are reserved for future use.

Columns 72-75 SMITHSONIAN OCEANOGRAPHIC SORTING CENTER (SOSC) ACCESSION NUMBER

Enter the SOSC accession number.

Column 76 CARD TYPE

The numeral 2 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 02 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 22 appears in Columns 79-80.

NATIONAL OCEANOGRAPHIC DATA CENTER

PHYTOPLANKTON DATA FORM

NODC-3167/33 (4-65)

CARD TYPE—1

NODC REFERENCE NUMBER		MARSDEN SQUARE			ENV.			GMT DATE			TIME				LATITUDE			LONGITUDE									DEPTH OF SAMPLING				NET				
											LOCAL TIME		GMT																						
IDENTITY NUMBER	CONSECUTIVE STATION NUMBER	10° SQUARE	5° SQUARE	1° SQUARE	TYPE	DEPTH RANGE	TIME OF DAY	MONTH	DAY	YEAR	HOUR	1/10	HOUR	1/10	DEGREES	MINUTES	N/S	DEGREES	MINUTES	E/W	COUNTRY	INSTITUTION	ORIGINATOR'S CRUISE NUMBER	ORIGINATOR'S STATION NUMBER	NAVIGATIONAL SYSTEM	DEPTH TO BOTTOM	UPPER DEPTH	LOWER DEPTH	SAMPLING DEVICE	CAPACITY OF WATER SAMPLER	MOUTH DIAMETER	LENGTH	CARD TYPE	CARD NUMBER	DECK NUMBER
1 2 3 4 5	6 7 8	9 10 11	12	13 14	15	16	17	18 19	20 21	22 23	24 25	26	27 28	29	30 31	32 33	34	35 36 37	38 39	40	41 42	43 44	45 46 47 48	49 50 51 52 53	54 55	56 57 58 59 60	61 62 63	64 65 66	67	68 69	70 71 72	73 74 75	76	77 78	79 80
																																	1	0 1	2 2

CARD TYPE—2

REMARKS

VESSEL
CRUISE NO.
STATION NO.
GENERAL OCEAN AREA
SENIOR SCIENTIST
CODED BY

NET																						
MESH APERTURE	DURATION OF SAMPLING	SHIP SAMPLING SPEED	VOLUME OF WATER FILTERED	PRESERVATIVE	TAXONOMIC STATUS	COUNTING TECHNIQUE	CELL VOLUME	NUMBER OF CELLS (1000/l)	TOTAL NUMBER OF SPECIES	NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE	CHLOROPHYCEAE	DINOPHYCEAE	BACILLARIOPHYCEAE	CYANOPHYCEAE	SILICOFLAGELLATES	MU FLAGELLATES	OTHER		SOSC ACCESSION NUMBER	CARD TYPE	CARD NUMBER	DECK NUMBER
20 21	22 23	24	25 26 27 28	29	30	31	32 33	34 35 36 37 38	39 40 41	42 43 44	45	46	47	48	49	50	51	52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71	72 73 74 75	76	77 78	79 80
																				2	0 2	2 2

PRIMARY PRODUCTIVITY DECK

Coding the Primary Productivity Data Form

CARD TYPE 1

Columns 1-5 IDENTITY NUMBER

These columns provide a cumulative identification reference which is assigned by the NODC prior to processing. This number must be obtained from the NODC for cards punched outside the NODC.

Columns 6-8 CONSECUTIVE STATION NUMBER

Station numbers will be assigned and coded by the NODC unless the card is punched outside the NODC. Stations will be numbered consecutively and will start at 001 for each new cruise regardless of the originator's numbering.

Columns 9-11 MARSDEN TEN-DEGREE SQUARE

Enter the number of the Marsden ten-degree square. A Marsden Square Chart is provided in Appendix I to help locate the station's position according to the Marsden square system.

Column 12 MARSDEN FIVE-DEGREE SQUARE

Enter the number of the Marsden five-degree (or quadrant) square. See Appendix I.

Columns 13-14 MARSDEN ONE-DEGREE SQUARE

Enter the number of the Marsden one-degree square. This is obtained by uniting the unit numbers of the degrees latitude and degrees longitude, respectively. For example, the one-degree square for the position 35°20'N., 148°10'W. is 58.

Columns 15-16 ENVIRONMENT

Enter whichever is applicable according to code. Column 15 must be filled in; estimate the environment type if necessary.

Column 15	Column 16
TYPE	DEPTH RANGE
0 - Inland waters	0 - 0-50 m
1 - Littoral zone	1 - 51-100 m
2 - Harbor	2 - 101-200 m
3 - Estuary	3 - 201-500 m
4 - Shelf	4 - 501-1000 m
5 - Slope	5 - 1001-2000 m
6 - Canyon	6 - 2001-3000 m
7 - Rise or ridge	7 - 3001-4000 m
8 - Plain	8 - 4001-6000 m
9 - Deep, including trench or trough	9 - > 6000 m

Columns 17-18 MONTH

Enter the month as determined by GMT using Arabic numerals 01 through 12.

Columns 19-20 DAY

Enter day of month as determined by GMT using Arabic numerals 01 through 31.

Columns 21-22 YEAR

Enter last two digits of year as determined by GMT.

Columns 23-27 LATITUDE

Enter latitude in degrees and minutes. Enter N or S in Column 27.

Columns 28-33 LONGITUDE

Enter the longitude in degrees and minutes. Enter E or W in Column 33.

Columns 34-35 COUNTRY

Enter the NODC Country Code as shown in Table 3.

Columns 36-37 INSTITUTION

Enter the Institution Code as shown in Table 4.

Columns 38-41 ORIGINATOR'S CRUISE NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the cruise by the originator. Leave blank if unknown.

Columns 42-46 ORIGINATOR'S STATION NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the station by the originator.

Column 47 METHOD OF MEASUREMENT

The method by which the rate of photosynthesis is given is the Carbon-14 uptake method first described by Steemann Nielsen (1952 J. Cons. Internation Explor. Mer. 43:117-140) and modifications thereof.

The letter C (for Carbon-14 uptake) appears in Column 47.

Columns 48-50 TOTAL CARBON DIOXIDE CONCENTRATION OF WATER SAMPLE

Enter total carbon dioxide concentration in milliliters per liter. Column 50 is for tenths.

Columns 51-53 ACTIVITY OF CARBON-14 AMPULE

Enter the activity of the Carbon-14 ampule in microcuries. Use Column 53 for tenths.

Columns 54-57 COLLECTION TIME OF WATER SAMPLE

Enter the local time (24-hour system) the water sample used for the productivity measurements was collected.

Columns 58-61 INITIAL INCUBATION TIME

Enter the local time (24-hour system) incubation was initiated.

Columns 62-64 DURATION OF INCUBATION

Enter duration of incubation of water samples in hours and tenths of hours. Enter hours in Columns 62-63; enter tenths of an hour in Column 64. Table 1 converts minutes to tenths of hours.

Column 65 TYPE OF ILLUMINATION DURING INCUBATION

Enter whichever is applicable according to code:

Ambient natural light

1 - Without light filters
2 - With spectrally neutral filters
3 - With spectrally selective filters

Fluorescent light

4 - Without light filters
5 - With spectrally neutral filters
6 - With spectrally selective filters

Incandescent light

7 - Without light filters
8 - With spectrally neutral filters
9 - With spectrally selective filters

Column 66 FILTER TYPE

Enter according to code:

Spectrally neutral filters

1 - Nylon netting
2 - Monel screening
3 - Nickel screening
4 - Plexiglass
5 - Other

Spectrally selective filters

6 - Wratten 45 filter
7 - Wratten 45A filter
8 - Wratten 61 filter
9 - Other

Columns 67-69

DOMINANT WAVE LENGTH OF FILTER
OR
PERCENT TRANSMITTANCE OF LIGHT
BY SPECTRALLY NEUTRAL FILTER

Enter the dominant wave length of the spectrally selective filter in millimicrons in Columns 67-69; or enter the percent transmittance of light by the spectrally neutral filter in Columns 67-68, and enter the letter P in Column 69.

Columns 70-74

MEAN DAILY LIGHT INTENSITY

Enter the mean daily light intensity in gram calories per square centimeter per minute (langleys/min) in Columns 70-73. Enter tenths, hundredths, and thousandths in Columns 71-73.

Enter the time period of measurement in Column 74 according to code:

1 - Daylight period between sunrise and sunset
2 - 24-hour period

Column 75

FLUX COLLECTOR

Enter according to code.

1 - Flat plate (total irradiance falling upon a horizontal plane)
2 - Sphere
3 - Estimate obtained through use of a deck photometer

Column 76

CARD TYPE

The numeral 1 appears in Column 76.

Columns 77-78

CARD NUMBER

The number 01 appears in Columns 77-78.

Columns 79-80

DECK NUMBER

The number 23 appears in Columns 79-80.

PRIMARY PRODUCTIVITY DECK

Coding the Primary Productivity Data Form

CARD TYPE 2

Columns 1-18

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 19-22

TOTAL DAILY RADIATION

Enter the total daily radiation in whole langleys in Columns 19-21. Enter the time period of measurement in Column 22 according to code.

1 - Daylight period between sunrise and sunset
2 - 24-hour period

Columns 23-27

MEAN LIGHT INTENSITY DURING INCUBATION

Enter the mean light intensity during incubation of the water samples in foot candles.

COLUMNS 28-41 ARE FOR RECORDING DATA ON LIGHT TRANSMISSION.

Columns 28-30

WAVE LENGTH MEASURED

Enter the wave length in millimicrons.

Columns 31-33

PEAK SPECTRAL SENSITIVITY OF THE IRRADIANCE METER AT HALF BAND WIDTH

Enter the peak spectral sensitivity at half band width in millimicrons.

Columns 34-37

HALF BAND WIDTH

Enter the half band width of the irradiance meter in millimicrons. Enter the lowest value of the range in Columns 34-35 and the highest value of the range in Columns 36-37. Record only the tens and units digits. The hundreds digit will be understood. For example, the half band width for a peak spectral sensitivity of 480 mμ may range from 450 to 510 mμ. Record 50 in Columns 34-35, and 10 in Columns 36-37.

Column 38 TYPE OF IRRADIANCE

Enter the type of irradiance measured according to code.

1 - Upwelling light
2 - Downwelling light

Columns 39-41 ATTENUATION COEFFICIENT

Enter the attenuation coefficient.

COLUMNS 42-53 ARE FOR RECORDING PHOTOMETRIC DEPTHS IN METERS.

Column 42 100% TRANSMISSION

Enter the depth corresponding to 100 percent transmission. Enter a zero for the surface.

Columns 43-44 75% TRANSMISSION

Enter the depth corresponding to 75 percent transmission. If less than 10 meters, prefix the depth with a zero in Column 43.

Columns 45-46 50% TRANSMISSION

Enter the depth corresponding to 50 percent transmission. If less than 10 meters, prefix the depth with a zero in Column 45.

Columns 47-48 25% TRANSMISSION

Enter the depth corresponding to 25 percent transmission.

Columns 49-50 10% TRANSMISSION

Enter the depth corresponding to 10 percent transmission.

Columns 51-53 1% TRANSMISSION

Enter the depth corresponding to one (1) percent transmission. If less than 100 meters, prefix the depth with a zero in Column 51.

Columns 54-67 SAMPLING DEPTHS

Enter, in order of increasing depth, the depths from which the water samples were collected. Depths are entered in meters. Table 6 converts fathoms to meters. Table 7 converts feet to meters. If necessary, prefix the depth with zeros in order to fill the field.

Columns 54-55	FIRST DEPTH

(Enter a zero in Column 55 if the sample was collected at the surface.)

Columns 56-57	SECOND DEPTH
Columns 58-59	THIRD DEPTH
Columns 60-61	FOURTH DEPTH
Columns 62-64	FIFTH DEPTH
Columns 65-67	SIXTH DEPTH

Columns 68-75

Do not code. These columns are reserved for future use.

Column 76 CARD TYPE

The numeral 2 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 02 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 23 appears in Columns 79-80.

PRIMARY PRODUCTIVITY

Coding the Primary Productivity Data Form

CARD TYPE 3

There will be as many of Card Type 3 produced as there are depths at which primary productivity has been measured. The Card Number (Columns 77-78) increases by one for each depth, beginning with 03.

Columns 1-18

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 19-21 PRODUCTIVITY DEPTH

Enter the depth(s) (in order of increasing depth) for which productivity has been measured. Enter a zero in Column 21 when the sample was collected at the surface and prefix with zeros in Columns 19-20.

COLUMNS 22-38 ARE FOR RECORDING DATA ON RATE OF CARBON-14 ASSIMILATION.

Columns 22-26 MILLIGRAMS OF CARBON PER CUBIC METER PER HOUR

Enter rate of C-14 assimilation in mg $C/m^3/hr$. Use Columns 24-26 for tenths, hundredths, and thousandths, respectively.

Columns 27-32 MILLIGRAMS OF CARBON PER CUBIC METER PER DAY

Enter rate of C-14 assimilation in mg $C/m^3/day$. Use Columns 30-32 for tenths, hundredths, and thousandths, respectively.

Columns 33-38 GRAMS OF CARBON PER SQUARE METER PER DAY (INTEGRATED)

Enter rate of C-14 assimilation in g $C/m^2/day$. Use Columns 36-38 for tenths, hundredths, and thousandths, respectively.

Column 39 INCUBATION TECHNIQUE

Enter according to code.

1 - Photosynthesis was measured in individual water samples incubated at the depths from which they came.

2 - Photosynthesis was measured in subsamples of a surface water sample incubated at the different depths.

3 - Equal volumes of water from several depths were mixed to give a composite sample. Photosynthesis was measured on composite sample held in a deck incubator under natural light.

4 - Same as Code 3, but sample held in a deck incubator under constant light.

5 - Photosynthesis was measured in individual samples from the surface and/or various depths. Each sample was held in a deck incubator under natural light.

6 - Photosynthesis was measured in individual samples from the surface and/or various depths. Each sample was held in a deck incubator under constant light.

7 - Photosynthesis was measured in individual samples from the surface and/or various depths. Each sample was exposed to natural light in a deck incubator under a spectrally neutral filter corresponding to the light level from which the sample was taken.

9 - Other

Columns 40-43 MEAN WATER TEMPERATURE DURING INCUBATION

Enter the mean temperature of the water during incubation in degrees Celsius. Use Columns 42 and 43 for tenths and hundredths, respectively.

Columns 44-51 LIGHT BOTTLE ACTIVITY

Enter the total count for the light bottle in Columns 44-49. Enter the duration of counting in minutes for the light bottle in Columns 50-51.

Columns 52-59 DARK BOTTLE ACTIVITY

Enter the total count for the dark bottle in Columns 52-57. Enter the duration of counting in minutes for the dark bottle in Columns 58-59.

Columns 60-63 BACKGROUND ACTIVITY

Enter the background activity in counts per minute.

Columns 64-75

Do not code. These columns are reserved for future use.

Column 76 CARD TYPE

The numeral 3 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 03 appears in Columns 77-78. The numbers 04-10 also appear on the coding form, providing card numbers corresponding to data associated with samples from the surface and seven depths.

Should data for samples taken from eight or more different depths be recorded, enter additional card numbers as needed, beginning with 11.

Columns 79-80 DECK NUMBER

The number 23 appears in Columns 79-80.

NATIONAL OCEANOGRAPHIC DATA CENTER

PRIMARY PRODUCTIVITY DATA FORM

NODC-3167/35 (4-65)

CARD TYPE—1

NODC REFERENCE NUMBER		MARSDEN SQUARE			ENV.		GMT DATE			LATITUDE			LONGITUDE												DURATION OF INCUBATION					MEAN DAILY LIGHT INTENSITY					
IDENTITY NUMBER	CONSECUTIVE STATION NUMBER	10° SQUARE	5° SQUARE	1° SQUARE	TYPE	DEPTH RANGE	MONTH	DAY	YEAR	DEGREES	MINUTES	N/S	DEGREES	MINUTES	E/W	COUNTRY	INSTITUTION	ORIGINATOR'S CRUISE NUMBER	ORIGINATOR'S STATION NUMBER	METHOD	TOTAL CO_2 CONCENTRATION OF WATER SAMPLE	ACTIVITY OF CARBON—14 AMPULE (μC)	COLLECTION TIME OF WATER SAMPLE	INITIAL INCUBATION TIME	HOURS	1/10	TYPE ILLUMINATION	FILTER TYPE	DOMINANT WAVE LENGTH OR % TRANSMISSION OF FILTER	ly/min	TIME PERIOD	FLUX COLLECTOR	CARD TYPE	CARD NUMBER	DECK NUMBER
1 2 3 4 5	6 7 8	9 10 11	12	13 14	15	16	17 18	19 20	21 22	23 24	25 26	27	28 29 30	31 32	33	34 35	36 37	38 39 40 41	42 43 44 45 46	47	48 49 50	51 52 53	54 55 56 57	58 59 60 61	62 63	64	65	66	67 68 69	70 71 72 73	74	75	76	77 78	79 80
																				C													1	0 1	2 3

CARD TYPE—2

REMARKS

VESSEL

CRUISE NO.

STATION NO.

GENERAL OCEAN AREA

SENIOR SCIENTIST

CODED BY

TOTAL RADIATION		MEAN LIGHT INTENSITY DURING INCUBATION	LIGHT TRANSMISSION DATA						PHOTOMETRIC DEPTH						SAMPLING DEPTHS									
				IRRADIANCE METER					TRANSMISSION m															
					HALF BAND WIDTH																			
LANGLEYS	TIME PERIOD		WAVE LENGTH MEASURED	PEAK SPECTRAL SENSITIVITY AT HALF BAND WIDTH	FROM	TO	TYPE IRRADIANCE	ATTENUATION COEFFICIENT	100 %	75 %	50 %	25 %	10 %	1 %	DEPTH—1	DEPTH—2	DEPTH—3	DEPTH—4	DEPTH—5	DEPTH—6		CARD TYPE	CARD NUMBER	DECK NUMBER
19 20 21	22	23 24 25 26 27	28 29 30	31 32 33	34 35	36 37	38	39 40 41	42	43 44	45 46	47 48	49 50	51 52 53	54 55	56 57	58 59	60 61	62 63 64	65 66 67	68 69 70 71 72 73 74 75	76	77 78	79 80
																						2	0 2	2 3

CARD TYPE—3

PRODUCTIVITY DEPTH	CARBON—14 ASSIMILATION			INCUBATION TECHNIQUE	MEAN WATER TEMPERATURE DURING INCUBATION	RAW DATA						CARD TYPE	CARD NUMBER	DECK NUMBER
						LIGHT BOTTLE ACTIVITY		DARK BOTTLE ACTIVITY						
	mg C/m³/hr.	mg C/m³/day	g C/m²/day (INTEGRATED)			TOTAL COUNT	MINUTES COUNTED	TOTAL COUNT	MINUTES COUNTED	BACKGROUND ACTIVITY (COUNTS/MIN)				
19 20 21	22 23 24 25 26	27 28 29 30 31 32	33 34 35 36 37 38	39	40 41 42 43	44 45 46 47 48 49	50 51	52 53 54 55 56 57	58 59	60 61 62 63	64 65 66 67 68 69 70 71 72 73 74 75	76	77 78	79 80
												3	0 3	2 3
												3	0 4	2 3
												3	0 5	2 3
												3	0 6	2 3
												3	0 7	2 3
												3	0 8	2 3
												3	0 9	2 3
												3	1 0	2 3
												3		2 3
												3		2 3
												3		2 3
												3		2 3

PHYTOPLANKTON PIGMENT DECK

Coding the Phytoplankton Pigment Data Form

CARD TYPE 1

Columns 1-5 IDENTITY NUMBER

These columns provide a cumulative identification reference which is assigned by the NODC prior to processing. This number must be obtained from the NODC for cards punched outside the NODC.

Columns 6-8 CONSECUTIVE STATION NUMBER

Station numbers will be assigned and coded by the NODC unless the card is punched outside the NODC. Stations will be numbered consecutively and will start at 001 for each new cruise regardless of originator's numbering.

Columns 9-11 MARSDEN TEN-DEGREE SQUARE

Enter the number of the Marsden ten-degree square. A Marsden Square Chart is provided in Appendix I to help locate the station's position according to the Marsden Square System.

Column 12 MARSDEN FIVE-DEGREE SQUARE

Enter the number of the Marsden five-degree (quadrant) square. See Appendix I.

Columns 13-14 MARSDEN ONE-DEGREE SQUARE

Enter the number of the Marsden one-degree square. This is obtained by uniting the unit numbers of the degrees latitude and degrees longitude, respectively. For example, the one-degree square for the position 35°20'N., 148°10'W. is 58.

Columns 15-16

ENVIRONMENT

Enter whichever is applicable according to code. Column 15 must be filled in; estimate the environmental type if necessary.

Column 15

TYPE

0 - Inland waters
1 - Littoral zone
2 - Harbor
3 - Estuary
4 - Shelf
5 - Slope
6 - Canyon
7 - Rise or ridge
8 - Plain
9 - Deep, including trench and trough

Column 16

DEPTH RANGE

0 - 0-50 m
1 - 51-100 m
2 - 101-200 m
3 - 201-500 m
4 - 501-1000 m
5 - 1001-2000 m
6 - 2001-3000 m
7 - 3001-4000 m
8 - 4001-6000 m
9 - > 6000 m

Column 17

PERIOD OF DAY OF SAMPLING

Enter whichever is applicable according to code.

1 - 0000-0600 hours
2 - 0600-1200 hours
3 - 1200-1800 hours
4 - 1800-2400 hours

When the above code is not applicable, enter as follows.

5 - A.M.
6 - P.M.
7 - Period covers both A.M. and P.M.

Columns 18-19

MONTH

Enter the month as determined by GMT using Arabic numerals 01 through 12.

Columns 20-21

DAY

Enter day of month as determined by GMT. Use Arabic numerals 01 through 31.

Columns 22-23 YEAR

Enter last two digits of year as determined by GMT.

Columns 24-26 LOCAL TIME OF SAMPLING

Enter the hour and tenths of an hour when the water sample was collected. Table 1 converts minutes to tenths of an hour.

Columns 27-29 GREENWICH MEAN TIME (GMT) OF SAMPLING

Enter the hour and tenths of an hour when the water sample was collected. Table 1 converts minutes to tenths of an hour. Table 2 converts local time to GMT.

Columns 30-34 LATITUDE

Enter the latitude in degrees and minutes. Enter N or S in Column 34.

Columns 35-40 LONGITUDE

Enter the longitude in degrees and minutes. Enter E or W in Column 40.

Columns 41-42 COUNTRY

Enter the NODC Country Code as shown in Table 3.

Columns 43-44 INSTITUTION

Enter the Institution Code as shown in Table 4.

Columns 45-48 ORIGINATOR'S CRUISE NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the cruise by the originator. Leave blank if unknown.

Columns 49-53 ORIGINATOR'S STATION NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the station by the originator.

Columns 54-57 VOLUME OF WATER FILTERED

Enter the volume of water filtered in milliliters. When the volume exceeds 9,999 ml, apply the following code: A = 10,000, B = 11,000, etc. Enter the appropriate letter in Column 54 followed by the hundredths, tenths, and units in Columns 55, 56, and 57, respectively. For example: 12,576 ml would be entered as C576.

Column 58 FILTER TYPE

Enter according to code.

Cellulose-type membrane filters

1 - Millipore® Type PH
2 - Millipore® Type HA
3 - Millipore® Type DA
4 - Millipore® Type AA
5 - Other

Fine-glass fiber filters

6 - Whatman GF/C
7 - Gelman glass filter
9 - Other

Columns 59-60 PORE SIZE OF FILTER

Enter pore size in microns.

Column 61 SOLVENT TYPE

Enter whichever is applicable according to code.

1 - Acetone
2 - Methanol
3 - Diethyl ether
9 - Other

Columns 62-63 SOLVENT CONCENTRATION

Enter solvent concentration in percent; prefix zeros to fill the field, if necessary.

Column 64 — REFERENCE STANDARD

Enter whichever is applicable according to code:

1 - Air
2 - Solvent
3 - Solvent plus filter

Columns 65-66 — PRESSURE REDUCTION

Enter pressure reduction in cm Hg.

Column 67 — PIGMENT ASSAY METHOD

Enter whichever is applicable according to code.

1 - Richards with Thompson (1952 J. Mar. Res. 11(2):156-172)
2 - Strickland and Parsons (1960 Bull. Res. Bd. Canada, 125:107-112) (Modifications of [1])
3 - SCOR Procedure (Working Group 17, 1964)
9 - Other

Column 68 — SPECTROPHOTOMETER, MAKE AND MODEL

Enter according to code:

Open list, see Appendix II

Columns 69-72 — DATE OF LAST WAVE LENGTH CALIBRATION

Enter the month (01-12) in Columns 69-70; enter the last two digits of the year in Columns 71-72. (Example: July 1964 = 0764)

Column 73 — CALIBRATION REFERENCE

Enter whichever is applicable according to code:

1 - Didymium glass
2 - Interference filter
9 - Other

Columns 74-75

Do not code. These columns are reserved for future use.

Column 76 CARD TYPE

The numeral 1 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 01 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 24 appears in Columns 79-80.

PHYTOPLANKTON PIGMENT DECK

Coding the Phytoplankton Pigment Data Form

CARD TYPE 2

There will be as many of Card Type 2 produced as there are depths from which samples have been collected and data reported. The card number (Columns 77-78) increases by one for each depth, beginning with 02.

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-22 DEPTH OF WATER SAMPLE

Enter the depth from which the water sample was collected in meters. If the sample was collected at the surface, enter a zero in Column 22, and prefix with zeros in Columns 20-21.

Columns 23-64 OPTICAL DENSITIES OF PIGMENT EXTRACTS DETERMINED AT VARIOUS WAVE LENGTHS (INCLUDING HALF BAND WIDTHS)

The optical densities recorded must be corrected for the blank.

Columns 23-25

Enter the optical density (O.D.) measured at 480 mμ.

Columns 26-29

Enter the half band width (in mμ) at 480 mμ. Enter the lowest value of the range in Columns 26-27, and highest value in Columns 28-29. Record only the tens and units digits. The hundreds digit will be understood. For example, the half band widths for a peak spectral sensitivity of 480mμ may range from 450 to 510 mμ. Record 50 in Columns 26-27 and 10 in Columns 28-29. Follow these instructions for all half band widths recorded.

Columns 30-32

Enter the O.D. measured at 510 mμ.

Columns 33-36

Enter the half band width (in mμ) at 510 mμ. Enter the lowest value of the range in Columns 33-34 and highest value in Columns 35-36.

Columns 37-39

Enter the O.D. measured at 630 mμ.

Columns 40-43

Enter the half band width (in mμ) at 630 mμ. Enter the lowest value of the range in Columns 40-41 and highest value in Columns 42-43.

Columns 44-46

Enter the O.D. measured at 645 mμ.

Columns 47-50

Enter the half band width (in mμ) at 645 mμ. Enter the lowest value of the range in Columns 47-48 and highest value in Columns 49-50.

Columns 51-53

Enter the O.D. measured at 663 mμ. When the O.D. was measured at 665 mμ, place a red dash over Column 51. When a red dash appears over Column 51, x overpunch Column 51.

Columns 54-57

Enter the half band width (in mμ) at 663 (or 665) mμ. Enter the lowest value of the range in Columns 54-55 and highest value in Columns 56-57.

Columns 58-60

Enter the O.D. measured at 750 mμ.

Columns 61-64

Enter the half band width (in mμ) at 750 mμ. Enter the lowest value of the range in Columns 61-62 and highest value in Columns 63-64.

Columns 65-66 LENGTH OF LIGHT PATH

Enter the length of the light path in centimeters.

Columns 67-68 FINAL VOLUME OF SOLVENT

Enter the final volume of the solvent in milliliters.

Columns 69-75

Do not code. These columns are reserved for future use.

Column 76 CARD TYPE

The numeral 2 appears in Column 76.

Columns 77-78 CARD NUMBER

The card number increases by one for each successive depth for which data are recorded. Begin coding with the number 02 in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 24 appears in Columns 79-80.

PHYTOPLANKTON PIGMENT DECK

Coding the Phytoplankton Pigment Data Form

CARD TYPE 3

There will be as many of Card Type 3 produced as there are depths from which samples have been collected and data reported. The card number (Columns 77-78) increases by one for each depth.

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-22 SAMPLE DEPTH

Enter the depth from which the sample was collected in meters. If the sample was taken from the surface, enter a zero in Column 22 and prefix with zeros in Columns 20-21.

Columns 23-26 MILLIGRAMS OF CHLOROPHYLL a PER CUBIC METER

Enter the concentration of Chlorophyll a in mg/m^3. Columns 25-26 are used for decimals. Place a red dash over Column 23 whenever a negative value is reported. When a red dash appears over Column 23, x overpunch Column 23.

Columns 27-30 MILLIGRAMS OF CHLOROPHYLL a PER SQUARE METER

Enter the concentration of Chlorophyll a in mg/m^2. Columns 29-30 are used for decimals. Enter the concentration opposite the first depth only.

Columns 31-34 SPECIFIC ABSORPTION COEFFICIENT OF CHLOROPHYLL a

Enter the specific absorption coefficient for Chlorophyll a. Columns 33-34 are used for decimals.

Columns 35-38 MILLIGRAMS OF CHLOROPHYLL b PER CUBIC METER

Enter the concentration of Chlorophyll b in mg/m^3. Columns 37-38 are used for decimals. Place a red dash over Column 35 whenever a negative value is reported. When a red dash appears over Column 35, x overpunch Column 35.

Columns 39-42 MILLIGRAMS OF CHLOROPHYLL b PER SQUARE METER

Enter the concentration of Chlorophyll b in mg/m^2. Columns 41-42 are used for decimals. Enter the concentration opposite the first depth only.

Columns 43-46 SPECIFIC ABSORPTION COEFFICIENT OF CHLOROPHYLL b

Enter the specific absorption coefficient for Chlorophyll b. Columns 45-46 are used for decimals.

Columns 47-50 MILLIGRAMS OF CHLOROPHYLL c PER CUBIC METER

Enter the concentration of Chlorophyll c in mg/m^3. Columns 49-50 are used for decimals. If the concentration of Chlorophyll c is reported in MSPU/m^3,follow the instructions given for Column 55 and enter the appropriate code in Column 55. Place a red dash over Column 47 whenever a negative value is reported. Whenever a red dash appears over Column 47, x overpunch Column 47.

Columns 51-54 MILLIGRAMS OF CHLOROPHYLL c PER SQUARE METER

Enter the concentration of Chlorophyll c in mg/m^2. Columns 53-54 are used for decimals. Enter the concentration opposite the first depth only. If the concentration of Chlorophyll c is reported in MSPU/m^2, follow the instructions given for Column 55 and enter the appropriate code in Column 55.

Column 55 RICHARDS SPECIFIED PIGMENT UNITS (SPU)

These units (Richards with Thompson, 1952, J. Mar. Res. 11(2):156-172) correspond to about one gram of the pigment concerned. The milliunit (MSPU) approximates a milligram of the pigment.

When the concentration of Chlorophyll c is given as MSPU per cubic meter, enter the numeral 1 in Column 55.

When the concentration of Chlorophyll c is given as MSPU per square meter, enter the numeral 2 in Column 55.

When the concentration of Chlorophyll c is given both as MSPU per cubic meter and MSPU per square meter, enter the numeral 3 in Column 55.

When the concentration of Chlorophyll c is given in milligrams of pigment, leave Column 55 blank.

Columns 56-59

SPECIFIC ABSORPTION COEFFICIENT OF CHLOROPHYLL c

Enter the specific absorption coefficient for Chlorophyll c. Columns 58-59 are used for decimals.

Columns 60-63

ASTACIN CAROTENOIDS

Enter the concentration of astacin carotenoids in milligrams per cubic meter or in MSPU per cubic meter. Columns 62-63 are used for decimals. When reported in MSPU, follow the instructions given for Column 68 and enter the appropriate code in Column 68. When not reported in MSPU, leave Column 68 blank.

When data are recorded in either milligrams per square meter or in MSPU per square meter, place a red dash over Column 60. When a red dash appears over Column 60, x overpunch Column 60. Place a red dash over Column 63 when negative values are reported. When a red dash appears over Column 63, x overpunch Column 63.

Columns 64-67

NON-ASTACIN CAROTENOIDS

Enter the concentration of non-astacin carotenoids in milligrams per cubic meter or in MSPU per cubic meter. Columns 66-67 are used for decimals. When reported in MSPU, follow the instructions given for Column 68 and enter the appropriate code in Column 68. When not reported in MSPU, leave Column 68 blank.

When data are reported in either milligrams per square meter or in MSPU per square meter, place a red dash over Column 64. When a red dash appears over Column 64, x overpunch Column 64. Place a red dash over Column 67 when negative values are reported. When a red dash appears over Column 67, x overpunch Column 67.

Column 68

RICHARDS SPECIFIED PIGMENT UNITS (SPU)

These units correspond to about one gram of the pigment concerned. The milliunit (MSPU) approximates a milligram of the pigment.

When the concentration of only the astacin carotenoids is reported in MSPU, enter the numeral 1 in Column 68.

When the concentration of only the non-astacin carotenoids is reported in MSPU, enter the numeral 2 in Column 68.

When the concentration of both astacin and non-astacin carotenoids is reported in MSPU, enter the numeral 3 in Column 68.

Columns 69-71 SPECIFIC ABSORPTION COEFFICIENT FOR THE ASTACIN CAROTENOIDS

Enter the specific absorption coefficient for the astacin carotenoids. Column 71 is used for tenths.

Columns 72-74 SPECIFIC ABSORPTION COEFFICIENT FOR THE NON-ASTACIN CAROTENOIDS

Enter the specific absorption coefficient for the non-astacin carotenoids. Column 74 is used for tenths.

Column 75

Do not code. This column is reserved for future use.

Column 76 CARD TYPE

The numeral 3 appears in Column 76.

Columns 77-78 CARD NUMBER

Enter the card number in Columns 77-78. The card number increases by one for each sample depth, in order of increasing depth. The first card number of Card Type 3 follows the last card number of Card Type 2. For example, if the last card number of Card Type 2 was 07, enter the number 08 in Columns 77-78 of Card Type 3 and follow with 09, 10, 11, etc.

Columns 79-80 DECK NUMBER

The number 24 appears in Columns 79-80.

NATIONAL OCEANOGRAPHIC DATA CENTER

PHYTOPLANKTON PIGMENT DATA FORM

NODC-3167/34 (4-65)

CARD TYPE—1

NODC REFERENCE NUMBER		MARSDEN SQUARE			ENV.		PERIOD OF DAY	GMT DATE			SAMPLING TIME				LATITUDE			LONGITUDE			COUNTRY	INSTITUTION	ORIGINATOR'S CRUISE NUMBER	ORIGINATOR'S STATION NUMBER	VOLUME OF WATER FILTERED	FILTER TYPE	PORE SIZE OF FILTER	SOLVENT		REFERENCE STANDARD	PRESSURE REDUCTION	PIG. ASSAY. TECH.	SPECTROPHOTOMETER					CARD TYPE	CARD NUMBER	DECK NUMBER
											LOCAL TIME		GMT																				MAKE AND MODEL	CALIBRATION DATE		CALIBRATION REFERENCE				
IDENTITY NUMBER	CONSECUTIVE STATION NUMBER	10° SQUARE	5° SQUARE	1° SQUARE	TYPE	DEPTH RANGE		MONTH	DAY	YEAR	HOUR	1/10	HOUR	1/10	DEGREES	MINUTES	N/S	DEGREES	MINUTES	E/W								TYPE	CONCENTRATION					MONTH	YEAR					
1 2 3 4 5	6 7 8	9 10 11	12	13 14	15	16	17	18 19	20 21	22 23	24 25	26	27 28	29	30 31	32 33	34	35 36 37	38 39	40	41 42	43 44	45 46 47 48	49 50 51 52 53	54 55 56 57	58	59 60	61	62 63	64	65 66	67	68	69 70	71 72	73	74 75	76	77 78	79 80
																																						1	0 1	2 4

REMARKS

VESSEL

CRUISE NO.

STATION NO.

GENERAL OCEAN AREA

SENIOR SCIENTIST

CODED BY

CARD TYPE—2

DEPTH OF WATER SAMPLE	OPTICAL DENSITIES (O.D.) OF PIGMENTS DETERMINED AT VARIOUS WAVE LENGTHS (O.D. CORRECTED FOR THE BLANK)																		LENGTH OF LIGHT PATH	FINAL VOLUME OF SOLVENT		CARD TYPE	CARD NUMBER	DECK NUMBER
	480 mμ			510 mμ			630 mμ			645 mμ			663 mμ			750 mμ								
	O.D.	HALF BAND WIDTH		O.D.	HALF BAND WIDTH		O.D.	HALF BAND WIDTH		O.D.	HALF BAND WIDTH		O.D.	HALF BAND WIDTH		O.D.	HALF BAND WIDTH							
		FROM	TO		FROM	TO		FROM	TO		FROM	TO		FROM	TO		FROM	TO						
20 21 22	23 24 25	26 27	28 29	30 31 32	33 34	35 36	37 38 39	40 41	42 43	44 45 46	47 48	49 50	51 52 53	54 55	56 57	58 59 60	61 62	63 64	65 66	67 68	69 70 71 72 73 74 75	76	77 78	79 80
																						2	0 2	2 4
																						2		2 4
																						2		2 4
																						2		2 4
																						2		2 4
																						2		2 4
																						2		2 4

CARD TYPE—3

SAMPLE DEPTH	CHLOROPHYLL a			CHLOROPHYLL b			CHLOROPHYLL c				CAROTENOIDS						CARD TYPE	CARD NUMBER	DECK NUMBER
	mg/m^3	mg/m^2	SPECIFIC ABSORPTION COEFFICIENT	mg/m^3	mg/m^2	SPECIFIC ABSORPTION COEFFICIENT	mg/m^3	mg/m^2	MSPU	SPECIFIC ABSORPTION COEFFICIENT	ASTACIN	NON-ASTACIN	MSPU	SPECIFIC ABSORPTION COEFFICIENT					
											mg/m^3	mg/m^3		ASTACIN	NON-ASTACIN				
20 21 22	23 24 25 26	27 28 29 30	31 32 33 34	35 36 37 38	39 40 41 42	43 44 45 46	47 48 49 50	51 52 53 54	55	56 57 58 59	60 61 62 63	64 65 66 67	68	69 70 71	72 73 74	75	76	77 78	79 80
																	3		2 4
																	3		2 4
																	3		2 4
																	3		2 4
																	3		2 4
																	3		2 4
																	3		2 4

ZOOPLANKTON DECK

Coding the Zooplankton Data Form

CARD TYPE 1

Columns 1-5

IDENTITY NUMBER

These columns provide a cumulative identification reference which is assigned by the NODC prior to processing. This number must be obtained from the NODC for cards punched outside the NODC.

Columns 6-8

CONSECUTIVE STATION NUMBER

Station numbers will be assigned and coded by the NODC unless the card is punched outside the NODC. Stations will be numbered consecutively and will start at 001 for each new cruise regardless of originator's numbering.

Columns 9-11

MARSDEN TEN-DEGREE SQUARE

Enter the number of the Marsden ten-degree square. A Marsden Square Chart is provided in Appendix I to help locate the station's position according to the Marsden Square System.

Column 12

MARSDEN FIVE-DEGREE SQUARE

Enter the number of the Marsden five-degree (quadrant) square. See Appendix I.

Columns 13-14

MARSDEN ONE-DEGREE SQUARE

Enter the number of the Marsden one-degree square. This is obtained by uniting the unit numbers of the degrees latitude and degrees longitude, respectively. For example, the one-degree square for the position 35°20'N., 148°10'W. is 58.

Columns 15-16

ENVIRONMENT

Enter whichever is applicable according to code. Column 15 must be filled in; estimate the environment type if necessary.

Column 15

TYPE

0 - Inland waters
1 - Littoral zone
2 - Harbor
3 - Estuary
4 - Shelf
5 - Slope
6 - Canyon
7 - Rise or ridge
8 - Plain
9 - Deep, including trench and trough

Column 16

DEPTH RANGE

0 - 0-50 m
1 - 51-100 m
2 - 101-200 m
3 - 201-500 m
4 - 501-1000 m
5 - 1001-2000 m
6 - 2001-3000 m
7 - 3001-4000 m
8 - 4001-6000 m
9 - > 6000 m

Column 17

PERIOD OF DAY OF SAMPLING

Enter whichever is applicable according to code.

1 - 0000-0600 hours
2 - 0600-1200 hours
3 - 1200-1800 hours
4 - 1800-2400 hours

When the above code is not applicable, enter as follows.

5 - A.M.
6 - P.M.
7 - Period covers both A.M. and P.M.

Columns 18-19

MONTH

Enter the month as determined by GMT using Arabic numerals 01 through 12.

Columns 20-21

DAY

Enter day of month as determined by GMT. Use Arabic numerals 01 through 31.

Columns 22-23 YEAR

Enter last two digits of year as determined by GMT.

Columns 24-26 LOCAL TIME OF SAMPLING

Enter the hour and tenths of an hour when sampling was initiated. Table 1 converts minutes to tenths of an hour.

Columns 27-29 GREENWICH MEAN TIME (GMT) OF SAMPLING

Enter the hour and tenths of an hour when sampling was initiated. Table 1 converts minutes to tenths of an hour. Table 2 converts local time to GMT.

Columns 30-34 LATITUDE

Enter the latitude in degrees and minutes. Enter N or S in Column 34.

Columns 35-40 LONGITUDE

Enter the longitude in degrees and minutes. Enter E or W in Column 40.

Columns 41-42 COUNTRY

Enter the NODC Country Code as shown in Table 3.

Columns 43-44 INSTITUTION

Enter the institution responsible for the data analysis as shown in the Institution Code in Table 4.

Columns 45-48 ORIGINATOR'S CRUISE NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the cruise by the originator. Leave blank if unknown.

Columns 49-53 ORIGINATOR'S STATION NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the station by the originator.

Columns 54-55 NAVIGATIONAL SYSTEM

Enter the Navigational System Code as shown in Table 5.

Columns 56-60 DEPTH TO BOTTOM

Enter uncorrected sounding depth in meters. If depth is corrected, enter a red dash over the numeral in Column 56. When a red dash appears over Column 56, x overpunch Column 56. Table 6 converts fathoms to meters. Table 7 converts feet to meters.

Columns 61-64 UPPER DEPTH OF SAMPLING

Enter depth in meters. Table 6 converts from fathoms to meters. Table 7 converts from feet to meters. Enter a zero in Column 64 if the sample was collected at the surface and prefix zeros in Columns 61-63. When point sampling (by water sampler or pump versus integrated sampling by net between two depths) occurred, enter the depth of sampling in Columns 61-64 and leave Columns 65-68 blank.

Columns 65-68 LOWER DEPTH OF SAMPLING

Enter depth in meters. Repeat above entry when a horizontal haul was made.

Columns 69-70 TYPE OF SAMPLING DEVICE

Enter whichever is applicable according to code.

Column 69

1 - Pump
2 - Net, cylindrical
3 - Net, cylindrical conical
4 - Net, double conical
5 - High speed samplers
6 - Continuous recorders, Hardy, etc.
7 - Multiple nets

Column 70

1 - Net, without flow meter, remaining open at all times

2 - Net, without flow meter, closing after completion of sampling

3 - Net, with flow meter located at or near mouth, remaining open at all times

4 - Net, with flow meter located at or near the tail end of the net, remaining open at all times

5 - Net, with flow meter located at or near the mouth, closing after completion of sampling

6 - Net, with flow meter located at or near the tail end of the net, closing after completion of sampling

Column 71 FLOW METER TYPE

Enter the type of flow meter as shown in Appendix III.

Column 72 TYPE OF HAUL

Enter whichever is applicable according to code:

1 - Vertical
2 - Horizontal
3 - Oblique

Columns 73-75 MOUTH DIAMETER OF PLANKTON SAMPLER

Enter the diameter of the mouth opening in centimeters.

Column 76 CARD TYPE

The numeral 1 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 01 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 25 appears in Columns 79-80.

ZOOPLANKTON DECK

Coding the Zooplankton Data Form

CARD TYPE 2

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-21 FILTERING EFFICIENCY

Enter the ratio of the area of the net at its opening to the area of the effective filtering surface to the nearest hundredth.

Columns 22-23 MESH APERTURE OF NETTING

Enter the first two significant figures giving the mesh aperture to hundredths of a millimeter. When the aperture is one millimeter or greater, enter the tenths and hundredths numerals in Columns 22-23, respectively, and a red dash over the numeral in Column 22.

Column 24 NETTING MATERIAL

Enter whichever is applicable according to code:

1 - Nylon
2 - Silk
3 - Cotton
4 - Metal
9 - Other

Columns 25-26 TYPE AND MAKE OF PLANKTON NET

Enter according to code given in Appendix IV.

Columns 27-29 DURATION OF SAMPLING

Enter the duration of sampling in minutes. When the duration of sampling exceeds 16 hours (960 minutes), enter the number of hours in Columns 27 and 28; enter the tenths of hours in Column 29. When hours and tenths of hours are entered, place a red dash over Column 27. When a red dash is entered over Column 27, x overpunch Column 27.

Column 30 SHIP SAMPLING SPEED

Enter the ship's speed at time of sampling in knots. Use zero if the ship is anchored or drifting. Use letters to designate ship's speed greater than 9 knots: A for 10 knots, B for 11 knots, etc. The letter O is to be omitted.

Columns 31-34 VOLUME OF WATER FILTERED

Enter volume of water filtered in cubic meters. When the volume exceeds 9999 m^3, apply the following code: A for 10,000, B for 11,000, C for 12,000, etc. Enter the appropriate letter in Column 31 followed by the hundreds, tenths, and units in Columns 32, 33, and 34, respectively. Ex.:12576 m^3 would be entered as C576.

Column3 35-37 WET WEIGHT OF SAMPLE

Enter the wet weight of sample in grams per cubic meter.

Columns 38-39 DRY WEIGHT OF SAMPLE

Enter dry weight of sample in milligrams per cubic meter.

Columns 40-41 LOSS ON IGNITION

Enter loss on ignition (dry weight minus ash weight) in milligrams per cubic meter.

Columns 42-44 DISPLACEMENT VOLUME OF SAMPLE

Enter displacement volume of sample in milliliters per thousand cubic meters.

Column 45 METHOD APPLIED FOR MEASUREMENT

Enter whichever is applicable according to code.

1 - Large organisms were removed prior to volume analysis.
2 - Large organisms were left in sample during analysis.

Column 46

MINIMUM SIZE OF ORGANISMS REMOVED PRIOR TO VOLUME ANALYSIS

Enter the smallest size of organisms that were removed prior to volume analysis in centimeters. If smallest size removed was 10 cm or greater, enter a zero. When size is expressed in unit volume, enter as follows.

A - $\overline{<}$ 5 cc
B - $\underline{>}$ 5 cc but $<$ 10 cc
C - $\overline{>}$ 10 cc

Columns 47-49

AGE OF PLANKTON SAMPLE WHEN MEASURED

Enter, in Columns 47 and 48, the approximate number of days or months the sample has been stored before being examined. The first digit is 0 when the number is less than 10. After 99 days, use months. Enter the following code in Column 49.

D - Day(s)
M - Month(s)

Columns 50-51

KJELDAHL NITROGEN

Enter the nitrogen content of the sample as determined by the Kjeldahl method in micrograms per cubic meter.

Columns 52-53

CARBON CONTENT

Enter the carbon content of the sample in micrograms per cubic meter.

Column 54

TAXONOMIC STATUS

Enter whichever is applicable according to code.

1 - Sample taxonomically unanalyzed
2 - Sample enumerated to family level or above
3 - Sample enumerated to generic level or below

Columns 55-59

POPULATION DENSITY

Enter the number of zooplankton organisms per cubic meter of water.

Columns 60-62

TOTAL NUMBER OF SPECIES

Enter total number of species as given or after computation.

Columns 63-64

NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE

Enter number of species as given or after computation.

Columns 65-66

Do not code. These columns are reserved for future use.

Columns 67-70

SMITHSONIAN OCEANOGRAPHIC SORTING CENTER (SOSC) ACCESSION NUMBER

Enter the SOSC accession number.

Columns 71-75

LIST OF TAXA

Enter according to code:

1 - Present in aliquot
2 - Present in sample, but not found in aliquot
3 - Searched for, but not found in sample

Column 71	Protozoa
Column 72	Foraminifera
Column 73	Radiolaria
Column 74	Tintinnidae
Column 75	Dinoflagellata

Column 76

CARD TYPE

The numeral 2 appears in Column 76.

Columns 77-78

CARD NUMBER

The number 02 appears in Columns 77-78.

Columns 79-80

DECK NUMBER

The number 25 appears in Columns 79-80.

ZOOPLANKTON DECK

Coding the Zooplankton Data Form

CARD TYPE 3

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-71

LIST OF TAXA

Enter according to code.

1 - Present in aliquot
2 - Present in sample, but not found in aliquot
3 - Searched for, but not found in sample

Enter the code for the taxa marked with an asterisk even though these major taxa have been identified to the given subtaxa.

Column 20	Siphonophora
Column 21	Other Hydromedusae
Column 22	Scyphozoa
Column 23	Ctenophora
Column 24	Platyhelminthes
Column 25	Chaetognatha
Column 26	*Gastropoda
Column 27	Pteropoda
Column 28	Heteropoda
Column 29	Nudibranchs
Column 30	Cephalopoda
Column 31	Polychaeta
Column 32	Nemertea
Column 33	Cladocera
Column 34	Ostracoda
Column 35	*Copepoda
Column 36	Calanoida
Column 37	Cyclopoida
Column 38	Harpacticoida
Column 39	Isopoda
Column 40	Euphausiacea
Column 41	Mysidacea
Column 42	Decapoda
Column 43	*Amphipoda
Column 44	Gammaridae

Column 45	Hyperiidae
Column 46	Cumacea
Column 47	*Thaliacea
Column 48	Salpidae
Column 49	Doliolidae
Column 50	Pyrosomidae
Column 51	Ascidiacea
Column 52	Larvacea
Column 53	Anthozoa larvae
Column 54	Pelecypoda larvae
Column 55	Gastropoda larvae
Column 56	Cephalopoda larvae
Column 57	Decapoda (Crust.) larvae
Column 58	Stomatopoda larvae
Column 59	Cirripedia larvae
Column 60	Copepoda larvae
Column 61	Bryozoa larvae
Column 62	Brachiopoda larvae
Column 63	Nemertea larvae
Column 64	Platyhelminthes larvae
Column 65	Annelida larvae
Column 66	Trochophore larvae
Column 67	Echinodermata larvae
Column 68	Protochordate larvae
Column 69	Fish eggs
Column 70	Fish larvae
Column 71	Phytoplankton retained

Columns 72-75

Do not code. These columns are reserved for future use.

Column 76 CARD TYPE

The numeral 3 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 03 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 25 appears in Columns 79-80.

NATIONAL OCEANOGRAPHIC DATA CENTER

ZOOPLANKTON DATA FORM

NODC-3167/36 (4-65)

CARD TYPE—1

NODC REFERENCE NUMBER		MARSDEN SQUARE			ENV.		PERIOD OF DAY	GMT DATE			TIME				LATITUDE			LONGITUDE			COUNTRY	INSTITUTION	ORIGINATOR'S CRUISE NUMBER	ORIGINATOR'S STATION NUMBER	NAVIGATIONAL SYSTEM	DEPTH TO BOTTOM	DEPTH OF SAMPLING		TYPE OF SAMPLING DEVICE	FLOWMETER TYPE	TYPE OF HAUL	MOUTH DIAMETER OF PLANKTON SAMPLER	CARD TYPE	CARD NUMBER	DECK NUMBER
											LOCAL TIME		GMT																						
IDENTITY NUMBER	CONSECUTIVE STATION NUMBER	10° SQUARE	5° SQUARE	1° SQUARE	TYPE	DEPTH RANGE		MONTH	DAY	YEAR	HOUR	1/10	HOUR	1/10	DEGREES	MINUTES	N/S	DEGREES	MINUTES	E/W							UPPER DEPTH	LOWER DEPTH							
1 2 3 4 5	6 7 8	9 10 11	12	13 14	15	16	17	18 19	20 21	22 23	24 25	26	27 28	29	30 31	32 33	34	35 36 37	38 39	40	41 42	43 44	45 46 47 48	49 50 51 52 53	54 55	56 57 58 59 60	61 62 63 64	65 66 67 68	69 70	71	72	73 74 75	76	77 78	79 80
																																	1	0 1	2 5

REMARKS

VESSEL

CRUISE NO.

STATION NO.

GENERAL OCEAN AREA

SENIOR SCIENTIST

CODED BY

CARD TYPE—2

FILTERING EFFICIENCY	NET			DURATION OF SAMPLING	SHIP SAMPLING SPEED	VOLUME OF WATER FILTERED	WET WEIGHT OF SAMPLE	DRY WEIGHT OF SAMPLE	LOSS ON IGNITION	DISPLACEMENT VOLUME OF SAMPLE	METHOD OF MEASUREMENT	MINIMUM SIZE REMOVED	AGE OF PLANKTON SAMPLE WHEN MEASURED	KJELDAHL NITROGEN	CARBON CONTENT	TAXONOMIC STATUS	POPULATION DENSITY	TOTAL NUMBER OF SPECIES	NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE		SOSC ACCESSION NUMBER	PROTOZOA	FORAMINIFERA	RADIOLARIA	TINTINNIDAE	DINOFLAGELLATA	CARD TYPE	CARD NUMBER	DECK NUMBER
	MESH APERTURE	NETTING MATERIAL	TYPE AND MFGR.																										
20 21	22 23	24	25 26	27 28 29	30	31 32 33 34	35 36 37	38 39	40 41	42 43 44	45	46	47 48 49	50 51	52 53	54	55 56 57 58 59	60 61 62	63 64	65 66	67 68 69 70	71	72	73	74	75	76	77 78	79 80
																											2	0 2	2 5

CARD TYPE—3

SIPHONOPHORA	OTHER HYDROMEDUSAE	SCYPHOZOA	CTENOPHORA	PLATYHELMINTHES	CHAETOGNATHA	GASTROPODA	PTEROPODA	HETEROPODA	NUDIBRANCHS	CEPHALOPODA	POLYCHAETA	NEMERTEA	CLADOCERA	OSTRACODA	COPEPODA	CALANOIDA	CYCLOPOIDA	HARPACTICOIDA	ISOPODA	EUPHAUSIACEA	MYSIDACEA	DECAPODA	AMPHIPODA	GAMMARIDAE	HYPERIIDAE	CUMACEA	THALIACEA	SALPIDAE	DOLIOLIDAE	PYROSOMIDAE	ASCIDIACEA	LARVACEA	ANTHOZOA LARVAE	PELECYPODA LARVAE	GASTROPODA LARVAE	CEPHALOPODA LARVAE	DECAPODA (CRUST.) LARVAE	STOMATOPODA LARVAE	CIRRIPEDIA LARVAE	COPEPODA LARVAE	BRYOZOA LARVAE	BRACHIOPODA LARVAE	NEMERTEA LARVAE	PLATYHELMINTHES LARVAE	ANNELIDA LARVAE	TROCHOPHORE LARVAE	ECHINODERMATA LARVAE	PROTOCHORDATE LARVAE	FISH EGGS	FISH LARVAE	PHYTOPLANKTON RETAINED		CARD TYPE	CARD NUMBER	DECK NUMBER
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72 73 74 75	76	77 78	79 80
																																																					3	0 3	2 5

BENTHOS DECK

Coding the Benthos Data Form

CARD TYPE 1

Columns 1-5 IDENTITY NUMBER

These columns provide a cumulative identification reference which is assigned by the NODC prior to processing. This number must be obtained from the NODC for cards punched outside the NODC.

Columns 6-8 CONSECUTIVE STATION NUMBER

Station numbers will be assigned and coded by the NODC unless the card is punched outside the NODC. Stations will be numbered consecutively and will start at 001 for each new cruise regardless of originator's numbering.

Columns 9-11 MARSDEN TEN-DEGREE SQUARE

Enter the number of the Marsden ten-degree square. A Marsden Square Chart is provided in Appendix I to help locate the station's position according to the Marsden Square System.

Column 12 MARSDEN FIVE-DEGREE SQUARE

Enter the number of the Marsden five-degree (quadrant) square. See Appendix I.

Columns 13-14 MARSDEN ONE-DEGREE SQUARE

Enter the number of the Marsden one-degree square. This is obtained by uniting the unit numbers of the degrees latitude and degrees longitude, respectively. For example, the one-degree square for the position 35°20'N., 148°10'W. is 58.

Columns 15-16 ENVIRONMENT

Enter whichever is applicable according to code. Column 15 must be filled in; estimate the environmental type if necessary.

Column 15 TYPE	Column 16 DEPTH RANGE
0 - Inland waters	0 - 0-50 m
1 - Littoral zone	1 - 51-100 m
2 - Harbor	2 - 101-200 m
3 - Estuary	3 - 201-500 m
4 - Shelf	4 - 501-1000 m
5 - Slope	5 - 1001-2000 m
6 - Canyon	6 - 2001-3000 m
7 - Rise or ridge	7 - 3001-4000 m
8 - Plain	8 - 4001-6000 m
9 - Deep, including trench or trough	9 > 6000 m

Column 17 PERIOD OF DAY OF SAMPLING

Enter whichever is applicable according to code.

1 - 0000-0600 hours
2 - 0600-1200 hours
3 - 1200-1800 hours
4 - 1800-2400 hours

When the above code is not applicable, enter as follows.

5 - A.M.
6 - P.M.
7 - Period covers both A.M. and P.M.

Columns 18-19 MONTH

Enter the month as determined by GMT using Arabic numerals 01 through 12.

Columns 20-21 DAY

Enter day of month as determined by GMT. Use Arabic numerals 01 through 31.

Columns 22-23 YEAR

Enter last two digits of year as determined by GMT.

Columns 24-26 LOCAL TIME OF SAMPLING

Enter the hour and tenths of an hour when sampling was initiated. Table 1 converts minutes to tenths of an hour.

Columns 27-29 GREENWICH MEAN TIME (GMT) OF SAMPLING

Enter the hour and tenths of an hour when sampling was initiated. Table 1 converts minutes to tenths of an hour. Table 2 converts local time to GMT.

Columns 30-34 LATITUDE

Enter the latitude in degrees and minutes. Enter N or S in Column 34.

Columns 35-40 LONGITUDE

Enter the longitude in degrees and minutes. Enter E or W in Column 40.

Columns 41-42 COUNTRY

Enter the NODC Country Code as shown in Table 3.

Columns 43-44 INSTITUTION

Enter the institution responsible for the data analysis as shown in the Institution Code in Table 4.

Columns 45-48 ORIGINATOR'S CRUISE NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the cruise by the originator. Leave blank if unknown.

Columns 49-53 ORIGINATOR'S STATION NUMBER

Enter the number, alphabetic or alpha-numeric designator, or its closest equivalent assigned to the station by the originator.

Columns 54-55 NAVIGATIONAL SYSTEM

Enter the Navigational System Code as shown in Table 5.

Columns 56-60 DEPTH TO BOTTOM

Enter uncorrected sounding depth in meters. If depth is corrected, enter a red dash over the numeral in Column 56. When a red dash appears over Column 56, x overpunch Column 56. Table 6 converts fathoms to meters. Table 7 converts feet to meters.

Column 61 SAMPLING DEVICE

Enter whichever is applicable according to code?

1 - Trawl
2 - Dredge
3 - By hand, diver
4 - By hand, shore collection
5 - Fixed gear
9 - Other

Columns 62-63 WIDTH OF GEAR AT THE MOUTH WHEN IN OPERATION

Enter the mouth width in meters.

Columns 64-65 SAMPLING CAPACITY OF GEAR

Enter gear sampling capacity in cubic meters.

Columns 66-67 DURATION OF SAMPLING

Enter duration of sampling in minutes. When the duration exceeds 99 minutes, enter the number of hours in Columns 66 and tenths of an hour in Column 67. When hours and tenths of an hour are recorded, enter a red dash over Column 66. When a red dash appears over Column 66, x overpunch Column 66.

Column 68 SHIP SAMPLING SPEED

Enter ship's speed at time of sampling in knots. Use zero if the ship is anchored or drifting. Use letters to designate ship's speed above 9 knots; A = 10 knots, B = 11 knots, etc. The letter O is to be omitted.

Column 69 BOTTOM TYPE

Enter whichever is applicable according to code:

1 - Sand
2 - Muddy sand
3 - Sandy mud
4 - Mud
5 - Gravel
6 - Gravel and sand
7 - Hard clay
8 - Rock
9 - Shell
A - Shelly sand
B - Shelly mud
C - Coral
D - Clay
E - Clayey silt
F - Silty clay
G - Sand-silt-clay
H - Clayey sand
I - Silty sand
J - Sand and rock
K - Shell-mud-sand
L - Sandy silt
M - Silty clay and rock

Columns 70-74 SURFACE FEATURES OF THE SEA FLOOR

Indicate the presence of the following material by entering the numeral 1 in the appropriate column(s).

Column 70 - Boulders
Column 71 - Nodules
Column 72 - Cobbles
Column 73 - Pebbles
Column 74 - Shells or shell fragments

Column 75 BOTTOM PHOTOGRAPHS

Enter whichever is applicable according to code.

1 - Color, stereo
2 - Black & white, stereo
3 - Color, single
4 - Black & white, single
5 - More than one type

Column 76 CARD TYPE

The numeral 1 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 01 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 26 appears in Columns 79-80.

BENTHOS DECK

Coding the Benthos Data Form

CARD TYPE 2

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-21 — TOTAL VOLUME OF SAMPLE

Enter total volume of sample in cubic decimeters.

Columns 22-24 — VOLUME OF SAMPLE RETAINED

Enter volume of sample retained in cubic centimeters.

Columns 25-28 — WET WEIGHT OF SAMPLE

Enter wet weight of sample in grams.

Columns 29-31 — AMOUNT OF INORGANIC PORTION RETAINED

Enter amount of inorganic portion retained in cubic millimeters.

Columns 32-34 — WEIGHT OF LIVING MATTER

Enter the weight of living matter in grams per cubic meter.

Column 35 — METHOD OF DETERMINING THE WEIGHT OF LIVING MATTER

Enter whichever is applicable according to code:

1 - Computed
2 - Chemical
9 - Other

Column 36 COLLECTION METHOD

Enter whichever is applicable according to code.

1 - By hand
2 - Sieve
3 - Shaker table
9 - Other

Column 37 SMALL ORGANISMS

Enter whichever is applicable according to code.

1 - Retained
2 - Discarded
3 - Lost

Columns 38-39 MINIMUM SIZE RETAINED

Enter the minimum size of the organisms retained in millimeters. When less than one millimeter, enter to hundredths, and place a red dash over Column 38. When a red dash appears over Column 38, x overpunch Column 38.

Column 40 TAXONOMIC STATUS

Enter whichever is applicable according to code.

1 - Sample taxonomically unanalyzed
2 - Sample enumerated to the family level
3 - Sample enumerated to the generic level or below

Columns 41-44 POPULATION DENSITY

Enter the number of organisms per square meter of bottom.

Columns 45-47 TOTAL NUMBER OF SPECIES

Enter total number of species as given or after computation.

Columns 48-49 NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE

Enter number of species as given or after computation.

Columns 50-55

Do not code. These columns are reserved for future use.

Columns 56-59 SMITHSONIAN OCEANOGRAPHIC SORTING CENTER (SOSC) ACCESSION NUMBER

Enter the SOSC accession number.

Columns 60-75 LIST OF TAXA

Enter according to code.

1 - Present in sample
2 - Searched for, but not found in sample

Column 60	Radiolaria
Column 61	Ciliata
Column 62	Porifera
Column 63	Hydrozoa
Column 64	Scyphozoa
Column 65	Alcyonaria
Column 66	Gorgonacea
Column 67	Pennatulacea
Column 68	Other Alcyonaria
Column 69	Actiniaria
Column 70	Madreporaria
Column 71	Zoanthidea
Column 72	Antipatharia
Column 73	Ceriantharia
Column 74	Platyhelminthes
Column 75	Aschelminthes

Column 76 CARD TYPE

The numeral 2 appears in Column 76.

Columns 77-78 CARD NUMBER

The number 02 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 26 appears in Columns 79-80.

BENTHOS DECK

Coding the Benthos Data Form

CARD TYPE 3

Columns 1-19

These columns are identical to those of Card Type 1 and need not be filled in. The information is reproduced from Card Type 1.

Columns 20-72 LIST OF TAXA

Enter according to code.

1 - Present in sample
2 - Searched for, but not found in sample

Column 20	Nematoda
Column 21	Nemertea
Column 22	Gastrotricha
Column 23	Kinorhyncha
Column 24	Priapulida
Column 25	Bryozoa
Column 26	Ectoprocta
Column 27	Entoprocta

Enter the code in Column 25 (Bryozoa) even though the phylum had been divided into the Ectoprocta and Entoprocta.

Column 28	Pogonophora
Column 29	Phoronida
Column 30	Chaetognatha
Column 31	Brachiopoda
Column 32	Monoplacophora
Column 33	Amphineura
Column 34	Scaphopoda
Column 35	Cephalopoda
Column 36	Pelecypoda
Column 37	Gastropoda
Column 38	Prosobranchiata
Column 39	Opisthobranchiata

Enter the code in Column 37 (Gastropoda) even though the class had been divided into Prosobranchiata and Opisthobranchiata.

Column 40	Sipunculida
Column 41	Echiurida
Column 42	Archiannelida
Column 43	Oligochaeta
Column 44	Polychaeta
Column 45	Crustacea
Column 46	Cirripedia
Column 47	Natantia
Column 48	Palinura
Column 49	Astacura
Column 50	Hippidea
Column 51	Galatheidea
Column 52	Thalassinidea
Column 53	Paguridea
Column 54	Brachyura
Column 55	Stomatopoda
Column 56	Isopoda
Column 57	Tanaidacea
Column 58	Amphipoda
Column 59	Cumacea
Column 60	Ostracoda
Column 61	Pycnogonida
Column 62	Asteroidea
Column 63	Crinoidea
Column 64	Holothurioidea
Column 65	Echinoidea
Column 66	Ophiuroidea
Column 67	Ascidiacea
Column 68	Hemichordata
Column 69	Cephalochordata
Column 70	Other invertebrates
Column 71	Fishes
Column 72	Algae

Columns 73-75

Do not code. Reserved for future use.

Column 76 CARD TYPE

The numeral 3 appears in Column 76.

Column 77-78 CARD NUMBER

The number 03 appears in Columns 77-78.

Columns 79-80 DECK NUMBER

The number 26 appears in Columns 79-80.

NATIONAL OCEANOGRAPHIC DATA CENTER

BENTHOS DATA FORM

NODC-3167/32 (4-65)

CARD TYPE—1

NODC REFERENCE NUMBER		MARSDEN SQUARE			ENV.			GMT DATE			TIME				LATITUDE			LONGITUDE															SURFACE FEATURES OF THE SEA FLOOR								
											LOCAL TIME		GMT																												
IDENTITY NUMBER	CONSECUTIVE STATION NUMBER	10° SQUARE	5° SQUARE	1° SQUARE	TYPE	DEPTH RANGE	PERIOD OF DAY	MONTH	DAY	YEAR	HOUR	1/10	HOUR	1/10	DEGREES	MINUTES	N/S	DEGREES	MINUTES	E/W	COUNTRY	INSTITUTION	ORIGINATOR'S CRUISE NUMBER	ORIGINATOR'S STATION NUMBER	NAVIGATIONAL SYSTEM	DEPTH TO BOTTOM	SAMPLING DEVICE	WIDTH OF GEAR AT THE MOUTH WHEN IN OPERATION	SAMPLING CAPACITY OF GEAR	DURATION OF SAMPLING	SHIP SAMPLING SPEED	BOTTOM TYPE	BOULDERS	NODULES	COBBLES	PEBBLES	SHELLS	BOTTOM PHOTOGRAPHS	CARD TYPE	CARD NUMBER	DECK NUMBER
1 2 3 4 5	6 7 8	9 10 11	12	13 14	15	16	17	18 19	20 21	22 23	24 25	26	27 28	29	30 31	32 33	34	35 36 37	38 39	40	41 42	43 44	45 46 47 48	49 50 51 52 53	54 55	56 57 58 59 60	61	62 63	64 65	66 67	68	69	70	71	72	73	74	75	76	77 78	79 80
																																							1	0 1	2 6

REMARKS

VESSEL

CRUISE NO.

STATION NO.

GENERAL OCEAN AREA

SENIOR SCIENTIST

CODED BY

CARD TYPE—2

TOTAL VOLUME OF SAMPLE	VOLUME OF SAMPLE RETAINED	WET WEIGHT OF SAMPLE	AMOUNT OF INORGANIC PORTION RETAINED	WEIGHT OF LIVING MATTER	METHOD OF DETERMINATION	COLLECTION METHOD	SMALL ORGANISMS	MINIMUM SIZE RETAINED	TAXONOMIC STATUS	POPULATION DENSITY	TOTAL NUMBER OF SPECIES	NUMBER OF SPECIES CONSTITUTING 90% OF SAMPLE		SOSC ACCESSION NUMBER	RADIOLARIA	CILIATA	PORIFERA	HYDROZOA	SCYPHOZOA	ALCYONARIA	GORGONACEA	PENNATULACEA	OTHER ALCYONARIA	ACTINIARIA	MADREPORARIA	ZOANTHIDEA	ANTIPATHARIA	CERIANTHARIA	PLATYHELMINTHES	ASCHELMINTHES	CARD TYPE	CARD NUMBER	DECK NUMBER
20 21	22 23 24	25 26 27 28	29 30 31	32 33 34	35	36	37	38 39	40	41 42 43 44	45 46 47	48	49 50 51 52 53 54 55	56 57 58 59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77 78	79 80
																															2	0 2	2 6

CARD TYPE—3

NEMATODA	NEMERTEA	GASTROTRICHA	KINORHYNCHA	PRIAPULIDA	BRYOZOA	ECTOPROCTA	ENTOPROCTA	POGONOPHORA	PHORONIDA	CHAETOGNATHA	BRACHIOPODA	MONOPLACOPHORA	AMPHINEURA	SCAPHOPODA	CEPHALOPODA	PELECYPODA	GASTROPODA	PROSOBRANCHIATA	OPISTHOBRANCHIATA	SIPUNCULIDA	ECHIURIDA	ARCHIANNELIDA	OLIGOCHAETA	POLYCHAETA	CRUSTACEA	CIRRIPEDIA	NATANTIA	PALINURA	ASTACURA	HIPPIDEA	GALATHEIDEA	THALASSINIDEA	PAGURIDEA	BRACHYURA	STOMATOPODA	ISOPODA	TANAIDACEA	AMPHIPODA	CUMACEA	OSTRACODA	PYCNOGONIDA	ASTEROIDEA	CRINOIDEA	HOLOTHURIOIDEA	ECHINOIDEA	OPHIUROIDEA	ASCIDIACEA	HEMICHORDATA	CEPHALOCHORDATA	OTHER INVERTEBRATES	FISHES	ALGAE		CARD TYPE	CARD NUMBER	DECK NUMBER
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73 74 75	76	77 78	79 80
																																																						3	0 3	2 6

TABLE 1

Tenths Conversion

Conversion from seconds (of position) or minutes (of time) to tenths of minutes or hours

Range of Secs. or Mins.	Tenths of Mins. or Hrs.
00 - 05	0
06 - 11	1
12 - 17	2
18 - 23	3
24 - 29	4
30 - 35	5
36 - 41	6
42 - 47	7
48 - 53	8
54 - 59	9

TABLE 2

Conversion from local time to Greenwich mean time (GMT)

WEST LONGITUDE

TIME-ZONE CONVERSION TABLE

EAST LONGITUDE

PRECEDING DAY

FOLLOWING DAY

+12	+11	+10	+9	+8	+7	+6	+5	+4	+3	+2	+1	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	−11	−12
Time Zone Y 172°30'	X 157°30'	W 142°30'	V 127°30'	U 112°30'	T 97°30'	S 82°30'	R 67°30'	Q 52°30'	P 37°30'	O 22°30'	N 07°30'	GMT Z 07°30'	A 22°30'	B 37°30'	C 52°30'	D 67°30'	E 82°30'	F 97°30'	G 112°30'	H 127°30'	I 142°30'	K 157°30'	L 172°30'	M
24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01
02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02
03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03
04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04
05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05
06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06
07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07
08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10
11	12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
22	23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24 / 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

EXPLANATION:

If day change (diagonal) line is crossed from right to left, subtract one day; from left to right, add one day.

To convert from local time to any other time, locate local time in zone column and proceed horizontally to zone wanted. Example 05 in L (- 11) time is 18 GMT of preceding day.

TABLE 3

NODC COUNTRY CODE

COUNTRY	CODE
ALBANIA	72
ALGERIA	AL
ANGOLA	AN
ARGENTINA	08
AUSTRALIA	09
AUSTRIA	10
BELGIUM	11
BRAZIL	14
BULGARIA	15
BURMA	12
CANADA	18
CEYLON	19
CHILE	20
CHINA	21
COLOMBIA	22
CONGO (BRAZZAVILLE)	RC
COSTA RICA	CR
CUBA	CU
DAHOMEY	DA
DENMARK	26
FINLAND	34
FRANCE	35
GERMANY	06
GHANA	GH
GREECE	36
GREENLAND	GL
GUINEA	GU
ICELAND	46
INDIA	41
INDONESIA	42
IRELAND	45
ISRAEL	47
ITALY	48
IVORY COAST	IC
JAPAN	49
KOREA	24

TABLE 3 (CONT'D)

COUNTRY	CODE
MALAGASY REPUBLIC	55
MALAYSIA	MS
MAURITIUS	MA
MEXICO	57
MONACO	MO
MOROCCO	56
MOZAMBIQUE	MZ
NETHERLANDS	64
NETHERLANDS ANTILLES	NA
NEW CALEDONIA	59
NEW ZEALAND	61
NIGERIA	NI
NORWAY	58
PANAMA	PA
PAKISTAN	62
PERU	65
PHILIPPINES	66
POLAND	67
PORTUGAL	68
RUMANIA	73
SENEGAL	SE
SIERRA LEONE	SL
SOUTH AFRICA	91
SOVIET UNION	90
SPAIN	29
SUDAN	SU
SWEDEN	77
THAILAND	86
TUNISIA	88
TURKEY	89
UNITED ARAB REPUBLIC (EGYPT)	27
UNITED KINGDOM	74
UNITED STATES OF AMERICA	31
URUGUAY	92
VENEZUELA	93
VIET-NAM	94
WEST INDIES FEDERATION	WI
YUGOSLAVIA	95
ZANZIBAR	ZA

TABLE 4

INSTITUTION CODE

Albania (72)

Fisheries Management Research Station (Durres)	01

Algeria (AL)

Castiglione Agriculture and Fishery Experimental Station	01
Oceanographic Institute of Algeria (Algiers)	02

Angola (AN)

Council for Overseas Investigations, Center for Fisheries Biology, Angola Branch (Baio Farta)	01

Argentina (08)

Argentine Antarctic Institute (Buenos Aires)	01
Mar del Plata Marine Biological Institute (Mar del Plata)	02
Mar del Plata Station of Marine Biology and Fisheries Technology (Puerto Mar del Plata)	03
Puerto Deseado Marine Biological Station (Puerto Deseado)	04
Puerto Quequen Hydrobiological Station of the National Institute for Natural Science Research (Puerto Quequen)	05

Australia (09)

Australian Museum (Sydney)	02
CSIRO Marine Biological Laboratory (Cronulla)	03
Heron Island Research Station (Heron Island, Queensland)	04

Australia (09) (Cont'd)

Marine Biological Station (Port Moresby, N. G.)	05
The Marine Laboratory (Zoology Dept.), University of Adelaide (Adelaide)	06
The Marine Laboratory (Zoology Dept.), University of New England (Armidale)	07
Victoria Department of Fisheries and Wildlife, Marine and Freshwater Laboratories (Melbourne)	08
Western Australia Fisheries Department (Perth)	09

Belgium (11)

The Belgium Royal Institute for Natural Sciences (Brussels)	01
Institute for Marine Research (Ostende)	02
Institute for Scientific Research in Central Africa (Brussels)	03

Brazil (14)

Oswaldo Cruz Institute, Hydrobiological Laboratory (Pinheiro Island)	01
San Sebastian Marine Biological Laboratory (Sao Sebastiao)	02
University of Recife, Institute of Oceanography (Recife)	03
University of Sao Paulo, Oceanographic Institute (Sao Paulo)	04

Bulgaria (15)

Institute of Fishery Research (Varna)	01

Burma (12)

Union of Burma Applied Research Institute (Rangoon)	01

Canada (18)

Bellairs Research Institute, McGill University (See West Indies Federation)	
Bowdoin Scientific Station (St. John, New Brunswick)	01
Fisheries Research Board of Canada (Ottawa)	
Arctic Unit (Montreal)	02
Atlantic Oceanographic Group (Dartmouth, Nova Scotia)	11
Biological Station (London, Ontario)	04
Biological Station (St. Andrews, New Brunswick)	05
Biological Station (St. John's, Newfoundland)	06
Biological Station, (Nanaimo, British Columbia)	07
Pacific Oceanographic Group, (Nanaimo, British Columbia)	10
National Research Council of Canada, Atlantic Regional Laboratory (Halifax, Nova Scotia)	09
Nova Scotia Research Foundation (Halifax, Nova Scotia)	03
Quebec Department of Fisheries, Biological Center (Quebec)	08
Quebec Department of Fisheries, Laboratory of Marine Biology (Quebec)	12
Quebec Department of Fisheries, La Tabatiere Experimental Fishing Station (Quebec)	13
Quebec Ministry of Fisheries and Game, Nabisipi Station (Quebec)	14
University of British Columbia, Institute of Fisheries (Vancouver, British Columbia)	15
University of British Columbia, Institute of Oceanography (Vancouver, British Columbia)	16
Vancouver Public Aquarium Association Laboratory (Vancouver, British Columbia)	17
Bedford Institute of Oceanography (Dartmouth, Nova Scotia)	18
Dalhousie University Institute of Oceanography (Halifax, Nova Scotia)	19

Ceylon (19)

Ceylon Department of Fisheries, Fisheries Research Station (Colombo)	01

Chile (20)

Chilean Navy	01
Ministry of Agriculture, Dept. Fish and Game, Fisheries Laboratory (Valparaiso)	02
San Antonio Fishery Biology Station (San Antonio)	03
University of Chile, Center for Zoological Investigations, Dept. Hydrobiology (Santiago)	04
University of Chile, Marine Biological Station (Valparaiso)	05
University of Chile of the North Zone, Dept. Scientific Investigations of Antofagasta, Marine Biological Station (Antofagasta)	06
University of Concepción, Central Institute of Biology (Concepción)	07
Zoological Institute, Southern University of Chile (Valdivia)	08

Columbia (22)

Columbian Navy	01

Congo (Brazzaville) (RC)

Oceanographic and Fisheries Center (Brazzaville)	01

Costa Rica (CR)

Inter-American Tropical Tuna Commission, Costa Rica Branch (Puntarenas)	01

Cuba (CU)

Cuban Institute of Technological Investigations (Havana)	01

Cuba (CU) (Cont'd)

Fisheries Research Center (Havana)	02
University of Oriente, Laboratory of Marine Biology (Santiago de Cuba)	03
University of Villanueva, Dept. Marine Research (Havana)	04

Dahomey (DA)

Center for Scientific Study and Applied Fishery Technology (Cotonou)	01

Denmark (26)

Carlsberg Foundation, Marine Laboratory (Esbjerg)	01
Collections of the Carlsberg Foundation's DANA Expeditions (Charlottenlund)	02
Copenhagen University, Marine Biological Laboratory (Elsinore)	03
Copenhagen University Zoological Museum (Copenhagen)	04
Danish Institute for Fishery and Marine Research (Charlottenlund)	05
Denmarks Aquarium, Physiological Laboratory (Charlottenlund)	06
Fisheries Research Laboratory, Faeroes (Faeroe Islands)	07
The Isejord - Laboratory (Skibby)	08

Germany (06)

Council for the Development of Bremen Lands, the Institute for Marine Research (Bremerhaven)	01
Helgoland Biological Stations (Helgoland and List auf Sylt)	02
Institute for Coastal and Inland Fisheries (Hamburg-Altona)	03

Germany (06) (Cont'd)

Institute for Nets and Gear Investigation (Hamburg-Altona)	04
Institute for Sea Fisheries (Hamburg-Altona)	05
Max Planck Society for the Promotion of the Sciences, Max Planck Institute for Marine Biology (Wilhelmshaven)	06
Norderney Research Station (Friesian Islands)	07
Senckenberg Association for Scientific Research, "Senckenberg" Institute for Marine Geology and Biology (Wilhelmshaven)	08
University of Hamburg, Institute for Hydrobiology and Fisheries Science (Hamburg-Altona)	09
University of Hamburg, Zoological Institute and Museum, Division of Hydrobiology (Hamburg)	10
University of Kiel, Institute for Marine Science (Kiel)	11

Malaysia (MS)

Fisheries Research Laboratories, Malaya (Penang)	01
Tropical Fish Culture Research Institute (Malacca)	02

Finland (34)

Biological Laboratory of the Institute of Marine Research (Helsinki)	01
Finnish Ministry of Agriculture and Fisheries, Bureau for Fisheries Research (Helsinki)	02
University of Turku, Marine Biological Station (Lohm and Turku)	03
University of Helsinki, Tvaerminne Zoological Station (Helsinki and Tvaerminne)	04

France (35)

Arcachon Biological Station (Arcachon)	01
Arago Laboratory (Banyuls-sur-Mer)	02
Biarritz Station of Applied Hydrobiology (Biarritz)	03
Catholic University of Lille, Biological Station, Charles Maurice Laboratory (Ambleteuse)	04
Center of Scientific Studies and Research of Biarritz (Biarritz)	05
Center for Terrestrial and Limnetic Ecology (Marseille)	06
College de France, Marine Biological Laboratory, Concarneau (Concarneau)	07
Group d'Etudes et de Recherches Sous-marines (Toulon)	08
Laboratory of Bacterial Chemistry and Biological Corrosion (Bouches du Rhone)	09
Marine Laboratory of Luc-sur-Mer (Luc-sur-Mer)	10
Marine Station of Endoume (Marseille)	11
National Museum of Natural History (Paris)	12
Oceanographical Institute (Paris)	13
Oceanographic Research Center (La Rochelle and Antibes)	14
Roscoff Biological Station (Roscoff)	15
Scientific and Technical Institute of Marine Fisheries	
Arcachon Laboratory	16
Auray Laboratory	17
Biarritz Laboratory	18
Boulogne-sur-Mer Laboratory	19
La Rochelle Laboratory	20
La Tremblade Laboratory	21
Roscoff Laboratory	22
Sete Laboratory	23

France (35) (Cont'd)

University of Lille, Institute of Regional Marine Biology (Wimereux)	24
University of Paris, Laboratory of Marine Botany (Paris)	25
University of Rennes, Laboratory of Marine Biology (Le Croisic)	26
Zoological Station of Villefranche (Villefranche-sur-Mer)	27

Greece (36)

The Marine Biochemistry Laboratory (Limni)	01

Greenland (GL)

Copenhagen University, Arctic Station (Disko Island)	01
The Ministry for Greenland, Greenland Fisheries Organization, Fisheries Laboratory (Godthaeb)	02

Hong Kong (74)

Hong Kong Fisheries Research Station (Aberdeen)	01

Iceland (46)

Fisheries Research Institute (Reykjavik)	01

India (41)

Andhra University, Department of Zoology, Field Marine Laboratory (Waltair)	02
Annamalai University, Marine Biological Station (Porto Novo)	03
Central Inland Fisheries Research Institute (Barrackpore)	04

India (41) (Cont'd)

Central Marine Fisheries Research Station (Manadapam Camp)	05
Madras State Department of Fisheries (Madras)	06
Maharashtra State Department of Fisheries, Marine Biological Research Station (Ratnagiri)	07
Institute of Science, Department of Zoology (Bombay)	08
The Marine Biological Stations, West Hill (Vizhinjam, Thiruvalla, Perumanoor)	09
Taraporevala Aquarium and Marine Biological Research Station (Bombay)	10
University of Kerala, Department of Marine Biology and Fisheries (Trivandrum)	11
University of Madras, Zoological Research Laboratory (Madras)	01

Indonesia (42)

Central Research Institute for Hydrobiology and Fisheries (Bogor, Pasar Minggu, Danau Panggang, Makassar, Palembang)	02
Inland Fisheries Research Institute (Bogor)	03
Institute of Marine Research (Jakarta)	04

Ireland (45)

University College, Cork Biology Station (Lough Ine)	01

Israel (47)

Hebrew University-Hadassah Medical School, Laboratory for Fish Diseases (Jerusalem)	01
Hebrew University, Department of Botany, Algal Laboratory (Jerusalem)	02
Sea Fisheries Research Station (Haifa)	03

Italy (48)

Central Hydrobiological Laboratory (Rome)	01
"Diacinto Cestoni" Aquarium and Marine Biological Laboratory (Livorno)	02
Italian Center for Thalassographic Studies (Venice)	03
Italian Institute for Thalassographic Studies (Venice)	04
Laboratory for the Study of the Radioactive Contamination of the Sea (Fiascherino)	05
Marine Biological Institute of the Adriatic (Venice)	06
Messina Institute of Experimental Thalassography (Messina)	07
Naples Zoological Station (Naples)	08
Taranto Institute of Experimental Thalassography (Taranto)	09
Trieste Institute of Experimental Thalassography (Trieste)	10
Tyrrhenian Center for Thalassographic Studies (Genoa)	11
University of Bologna, Fano Marine Biological Laboratory (Fano)	12
University of Messina, Hydrobiological Institute (Messina)	13
University of Padua, Chioggia Hydrobiological Station (Chioggia)	14

Ivory Coast (IC)

Ministry of Animal Production, Center for Oceanographic Research (Abidjan)	01

Japan (49)

Central Meteorological Observatory	03
Fisheries Agency (Tokyo)	39
Hakodate Marine Observatory	04
Hiroshima University, Faculty of Fisheries and Animal Husbandry (Hiroshima)	13
Hiroshima University, Mukaishima Marine Biological Station (Hiroshima)	22
Hokkaido Gakugei University, Shirikishinai Marine Station for Biological Instruction (Shirikishinai)	43
Hokkaido Regional Fisheries Research Laboratory (Yoichi)	35
Hokkaido University, Akkeshi Marine Biological Station (Akkeshi)	08
Hokkaido University, Faculty of Fisheries, Oshoro Marine Biological Station (Otaru)	09
Hokkaido University, Faculty of Science, Institute of Algological Research (Muroran)	10
Japan Sea Regional Fisheries Research Laboratory (Niigata)	11
Japan University, Marine Biological Station (Mabori)	12
Japanese Hydrographic Office	01
Kagawa Prefectual Fisheries Experimental Station (Kagawa-ken)	14
Kagoshima University, Faculty of Fisheries (Kagoshima)	15
Kochi University, Usa Marine Biological Station (Usa)	16
Kyoto University, Department of Fisheries and Misaki Marine Biological Institute (Misaki)	17
Kyoto University, Seto Marine Biological Laboratory (Shirahama)	18

Japan (49) (Cont'd)

Kyushu University, Institute of Fisheries, Fisheries Research Laboratory (Jukuoka)	19
Meteorological Agency, Marine Division (Kobe, Hakodate, Nagasaki)	20
Mie Prefectural Fisheries Experimental Station (Mie-ken)	21
Nagasaki Marine Observatory	05
Nagasaki University, Fisheries Institute (Nagasaki)	23
Nagoya University, Fisheries Laboratory (Anjo)	24
Nagoya University, Sugashima Marine Biological Station (Sugashima)	25
Naikai Regional Fisheries Research Laboratory (Hiroshima)	26
Niigata University, Sado Marine Biological Station (Aikawa)	27
Nonkai Regional Fisheries Research Laboratory (Kochi-shi)	28
Okayama University, Tamano Marine Laboratory	29
Prefectural University of Mie, Faculty of Fisheries (Tsu)	30
Seikai Regional Fisheries Research Laboratory (Nagasaki-shi)	31
Tohoku Regional Fisheries Research Laboratory (Suginoiriomote)	32
Tohoku University, Faculty of Agriculture, Department of Fisheries and Onagawa Fisheries Laboratory (Onagawa)	33
Tohoku University, Marine Biological Station (Asamushi)	34
Tokai Regional Fisheries Research Laboratory (Tokyo)	07

Japan (49) (Cont'd)

Tokyo Kyoidu University, Shimoda Marine Biological Station (Shimoda)	36
Tokyo University, Faculty of Agriculture, Fisheries Laboratory (Shinmaiko, Ikawazu)	37
Tokyo University, Faculty of Science, Misaki Marine Biological Station (Misaki)	38
Tokyo University of Fisheries (Tokyo)	02
Tokyo University of Fisheries, Kominato Marine Biological Laboratory (Awa-Kominato)	40
Whales Research Institute (Tokyo)	41
Yokohama National University, Manazuru Marine Laboratory for Science Education (Iwa)	42

Korea (24)

Korea Central Fisheries Experimental Station (Pusan)	01
Marine Products Experimental Station (Pusan)	02
Pusan Fisheries College, Department of Sea Produce (Pusan)	03

Malagasy Republic (55)

Madagascar Institute of Scientific Research, Oceanographic and Fishery Station (Nossi Be)	01

Mauritius (MA)

Mauritius Institute (Port Louis)	01

Mexico (57)

Autonomous University of Baja California, Marine Research Center, College of Marine Science (Ensenada)	01

Mexico (57) (Cont'd)

Fisheries Department and Allied Industries, Marine and Fresh-Water Biological Laboratories (Mazatlan, Guaymas)	02
Technologic Institute of Veracruz, Marine Biological Station (Veracruz)	03

Monaco (MO)

Oceanographic Museum of Monaco (Monaco)	01

Morocco (56)

Cherifiem Scientific Institute (Rabat)	01
Marine Fisheries Institute of Morocco (Casablanca)	02

Mozambique (MZ)

Maritime Department, Marine Biological Station (Lourenco Marques)	01

Netherlands (64)

Laboratory for Anti-Fouling Research (Den Helder)	01
Netherlands Institute for Fishery Investigations (Ijmuiden)	02
Netherlands Institute of Sea Research (Den Helder)	03
Royal Netherlands Academy of Sciences, Hydrobiological Institute, Department for Estuarine Research (Zeeland)	04

Netherlands Antilles (NA)

Caribbean Marine Biological Institute (Curacao)	01

New Caledonia (59)

Noumea Aquarium, Biological Marine Station (Noumea)	02
Oceanographic Laboratory of the Institute of French Oceania (Noumea)	01

New Zealand (61)

Auckland University, Marine Biological Station (Auckland)	01
New Zealand Marine Department, Fisheries Laboratory (Wellington)	02
New Zealand Oceanographic Institute (Wellington)	03
Portobello Marine Biological Station (Portobello)	04

Norway (58)

The Directorate of Fisheries, Institute of Marine Research (Bergen)	01
Norwegian Institute of Seaweed Research (Trondheim)	02
The Floedevigen Biological Station (Arendal)	03
Tromsoe Museum, Marine Biological Station (Tromsoe)	04
Trondheim Biological Station (Trondheim)	05
University of Bergen Biological Station (Espegrend)	06
University of Oslo, Biological Station (Droebak)	07
University of Oslo, Institute of Marine Biology Section A (Oslo)	08
University of Oslo, Institute of Marine Biology Section B (Blindern)	09
University of Oslo, the State Institute of Whale Research (Oslo)	10

Pakistan (62)

Pakistan Ministry of Food and Agriculture, Marine Fisheries Department (Karachi)	01
Zoological Survey Department, Marine Biological Research Laboratory (Karachi)	02

Peru (65)

Guano Company (Lima)	03
Marine Resources Research Institute (Callao)	04
Peru Ministry of Agriculture, Department of Fish and Game, Division of Fisheries Research, Hydrobiological Laboratory (Lima)	05

Philippines (66)

Dagat-Dagatan Salt-Water Fishery Experimental Station (Quezon City)	01
University of the Philippines, College of Fisheries, Department of Inland Fisheries (Quezon City)	02
University of the Philippines, College of Fisheries, Department of Marine Fisheries (Manila)	03
University of the Philippines, Marine Biological Station (Oriental Mindoro)	04

Poland (67)

Biological Station Gorki Wschodnie (Sobieszewo via Danzig)	01
Sea Fisheries Institute (Kolobrzeg, Swinoujscie)	02

Portugal (68)

Council for Overseas Investigations, Center for Fisheries Biology (Lisbon)	01
Ministry of the Navy, Marine Biological Institute (Lisbon)	02
Zoological Institute and Marine Zoological Station "Dr. August Nobre" (Oporto)	03

Republic of Guinea (GU)

Ministry of Rural Economics, Marine Fisheries Technology Section (Conakry)	01

Republic of Panama (PA)

Inter-American Tropical Tuna Commission, Panama Laboratory (Balboa)	01

Republic of South Africa (91)

Oceanographic Research Institute, University of Natal (Natal)	01
Republic of South Africa Department of Commerce and Industries, Division of Sea Fisheries (Cape Town)	02
Rhodes University, Department of Ichthyology (Grahamstown)	03
University of Cape Town, Department of Oceanography (Rondebosch)	04

Republic of Vietnam (94)

Oceanographic Institute of Nhatrang (Nhatrang)	01

Roumanian People's Republic (73)

Acvarium Public "Prof. Ioan Borcea" (Constanta)	01
Marine Research Station (Constanta)	02
Marine Zoological Station "Prof. Ioan Borcea" (Constanta)	03
Sulina Marine Research Station (Sulina)	04

Senegal (SE)

Fisheries Research Center, Joal (Joal)	01

Senegal (SE) (Cont'd)

French African Institute, Marine Biology Department (Dakar)	02
Oceanographic Laboratory of Tiaroye/Mer-Senegal (Dakar)	03

Sierra Leone (SL)

Ministry of Natural Resources, Fisheries Division (Freetown)	01

Spain (29)

Canary Island Oceanographic Laboratory (Canary Islands)	01
Institute of Fishery Research (Barcelona, Blanes Cadiz, Castellon, Vigo)	02
Malaga Laboratory (Malaga)	03
Palma de Mallorca Oceanographic Laboratory (Palma de Mallorca)	04
Santander Oceanographic Laboratory (Santander)	05
Spanish Institute of Oceanography (Madrid)	06
Vigo Oceanographic Laboratory (Vigo)	07

Sudan (SU)

Sudan Ministry of Animal Resources, Marine Research Laboratory (Khartoum)	01

Sweden (77)

Gothenburg University, Marine Botanical Institute (Gothenburg)	01
The Royal Board of Fisheries (Lysekil, Drottnigholm)	02

Sweden (77) (Cont'd)

Marine Zoological Station at Kristineberg (Fiskebackskil)	03
Uppsala University, Institute for Physiological Botany (Uppsala)	04
Uppsala University, Klubbans Biological Station (Fiskebackskil)	05

Taiwan (China) (21)

National Taiwan University, Institute of Fishery Biology (Taipei)	01
Taiwan Fisheries Research Institute (Chilung)	02

Thailand (86)

The Ministry of Agriculture, Department of Fisheries (Chundhaburi Province, Prachuab Kirikhan, Patalung Rayong)	02

Tunisia (88)

Salammbo Oceanographic Station (Salammbo)	01

Turkey (89)

Fisheries Directorate of the Meat and Fish Office (Istanbul)	01
Hydrobiological Research Institute (Trabzon, Canakkal)	02

Union of Soviet Socialist Republics (90)

AS Estonian SSR (Tallinn)	01
AS Ukrainian SSR (Kiev)	02
Institute of Hydrobiology, AS USSR (Kiev)	03
Institute of Microbiology, AS USSR (Moscow)	04

Union of Soviet Socialist Republics (90) (Cont'd)

Institute of Oceanology, AS USSR (Moscow)	05
Institute of Zoology, AS USSR (Leningrad)	06
Kola Branch, AS USSR (Kirovsk)	07
Sevastopol Biological Research Station, AS USSR (Sevastopol)	08
The All-Union Research Institute of Marine Fisheries and Oceanography (VNIRO) (Arkhangelsk)	09
The Azerbaijan Fisheries Research Laboratory ASERNIRL (Baku)	10
The Azov and Black Sea Research Institute of Marine Fisheries and Oceanography AZCHERNIRO (Kerch)	11
The Baltic Research Institute of Marine Fisheries and Oceanography (BALTNIRO)(Kaliningrad)	12
The Caspian Research Institute of Marine Fisheries and Oceanography (DASPNIRO) (Astrakhan)	13
The Latvian Fisheries Research Institute (Riga)	14
The Pacific Research Institute of Fisheries and Oceanography (TINRO) (Khabarovsk, Petropavlovsk-Kamchatskii, Magadan, Sakhalinskaya Oblast, Okhotsk)	15
The Polar Research and Designing Institute of Marine Fisheries and Oceanography PINRO (Murmansk)	16
Yakutsk Branch, AS USSR (Alma-Alta)	17

United Arab Republic (27)

Alexandria Institute of Hydrobiology (Alexandria)	01
University of Alexandria, Department of Oceanography (Alexandria)	02
University of Cairo, Hydrobiological Institute (Ataga)	03
University of Cairo, Institute of Oceanography (Cairo)	04
University of Cairo, Marine Biological Station (Al-Ghardaqa)	05

United Kingdom (England) (74)

Fisheries Laboratory, Burnham-on-Crouch (Burnham-on-Crouch)	02
Fisheries Laboratory, Lowestoft (Lowestoft)	03
Radiobiological Laboratory (Lowestoft)	04
University of Durham, King's College, Dove Marine Laboratory (Cullercoats)	05
National Institute of Oceanography (Wormley)	06
The Plymouth Laboratory of the Marine Biological Association of the United Kingdom (Plymouth)	07
United Kingdom Atomic Energy Authority, Radiobiology Group, Health and Safety Branch (Cumberland)	08
University of Liverpool, Marine Biological Station (Port Erin)	09
University of London, Queen Mary College, Marine Biological Laboratory (Whitstable)	10

(Scotland)

Gatty Marine Laboratory and Wellcome Laboratory of Comparative Pharmacology (Fife)	11
Institute of Seaweed Research (Midlothian)	12
The Marine Laboratory, Aberdeen (Aberdeen)	13
The Oceanographic Laboratory (Edinburgh)	14
Scottish Marine Biological Association, Marine Station, Millport (Millport)	15

(Wales)

British Ministry of Agriculture, Fisheries and Food, Fisheries Experiment Station (Conway)	16
Federated University of Wales, Marine Biological Station (Anglesey)	17

United States of America (31)

United States of America (31) (Cont'd)

United States of America (31) (Cont'd)

New York University (New York, N. Y.)	88
Oregon Fish Commission Research Laboratories (Clackamas, Ore.)	23
Oregon Institute of Marine Biology (Charleston, Ore.)	89
Oregon State University (Corvallis, Ore.)	03
Pacific Marine Station, Univ. of the Pacific (Dillon Beach, Calif.)	90
Princeton University, Dept. of Geology (Princeton, N. J.)	91
Robert A. Taft Sanitary Engineering Center, Shellfish Sanitation Laboratory (Gig Harbor, Wash.)	92
Scripps Institution of Oceanography (La Jolla, Calif.)	01
Texas A & M University, Dept. of Oceanography and Meteorology (College Station, Tex.)	24
Texas State Game and Fish Commission Laboratories (Rockport, Tex.)	93
The Johns Hopkins University, Department of Oceanography (Baltimore, Md.)	70
University of Alaska (College, Alaska)	C1
University of California, Dept. of Mineral Technology (Berkeley, Calif.)	C2
University of California, Marine Laboratory (Santa Barbara, Calif.)	78
University of Chicago, Dept. of the Geophysical Sciences (Chicago, Ill.)	C3
University of Connecticut, Marine Research Laboratory (Storrs, Conn.)	C4
University of Delaware Marine Laboratories (Lewes, Del.)	C5
University of Florida Marine Laboratory (Cedar Key, Fla.)	C6

United States of America (31) (Cont'd)

University of Georgia Marine Institute (Sapelo Island, Ga.)	C7
University of Kansas, Dept. of Geology (Lawrence, Kan.)	C8
University of Miami, Institute of Marine Science (Miami, Fla.)	25
University of Michigan (Ann Arbor, Mich.)	C9
University of North Carolina, Institute of Fisheries Research (Morehead City, N. C.)	D1
University of Puerto Rico, Institute of Marine Biology (Mayaguez, P. R.)	D2
University of Southern California, The Allan Hancock Foundation for Scientific Research (Los Angeles, Calif.)	19
University of Texas, Institute of Marine Science (Port Aransas, Tex.)	D3
University of Washington, College of Fisheries and Fisheries Research Institute (Seattle, Wash.)	D4
University of Washington, Department of Oceanography (Seattle, Wash.)	09
University of Washington, Laboratory of Radiation Biology	72
University of Wisconsin (Madison, Wis.)	D5

United States of America (31) (Cont'd)

U. S. Coast and Geodetic Survey	10
U. S. Coast Guard	06
U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries	
Biological Laboratory, Auke Bay, Alaska	94
" " Beaufort, N. C.	95
" " Boothbay Harbor, Me.	96
" " Brunswick, Ga.	97
" " Galveston, Tex.	98
" " Gulf Breeze, Fla.	99
" " Honolulu, Hawaii	A1
" " La Jolla, California	A2
" " Marine Mammal Research (Seattle, Wash.)	A3
" " Miami, Fla.	A4
" " Milford, Conn.	A5
" " Oxford, Md.	A6
" " San Diego, Calif.	A7
" " Seattle, Wash.	A8
" " Stanford, Calif.	A9
" " Washington, D. C.	B1
" " Woods Hole, Mass.	B2
Ichthyological Laboratory (Washington, D. C.)	B3
U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Sports Fisheries	
Sandy Hook Marine Laboratory (Highlands, N. J.)	B4
U. S. National Museum (Smithsonian Institution)	B5
U. S. Naval Arctic Research Laboratory (Point Barrow, Alaska)	B6
U. S. Naval Oceanographic Office (Suitland, Md.)	07
U. S. Naval Postgraduate School, Dept. of Meteorology and Oceanography (Monterey, Calif.)	B7
U. S. Naval Radiological Defense Laboratory (San Francisco, Calif.)	B8
U. S. Naval Underwater Sound Laboratory (New London, Conn.)	08

United States of America (31) (Cont'd)

U. S. Navy Electronics Laboratory (San Diego, Calif.)	20
U. S. Navy Mine Defense Laboratory (Panama City, Fla.)	B9
Virginia Institute of Marine Science (Glouchester Point, Va.)	28
Walla Walla College Biological Station (Anacortes, Wash.)	D6
Washington State Department of Fisheries, Biological Division Laboratory (Quilcene, Wash.)	D7
Washington University, Department of Geology and Geological Engr. (St. Louis, Mo.)	D8
William F. Clapp Laboratories, Inc. (Duxbury, Mass.)	53
Woods Hole Oceanographic Institution (Woods Hole, Mass.)	02

Uruguay (92)

Oceanography and Fishery Service, Department of Science and Technology (Punta del Este)	02

Venezuela (93)

Venezuela Ministry of Agriculture and Livestock, Division of Fish and Game, Fishery Biology Laboratory (Caiguire-Cumana Estado Sucre)	01
Margarita Marine Research Station (Punta de Piedras)	02
University of Oriente, Oceanographic Institute (Cumana)	03

West Indies Federation (WI)

Bellairs Research Institute, McGill Univ. (St. James, Barbados)	01
University of the West Indies, Marine Laboratory at Port Royal (Port Royal, Jamaica)	02

Yugoslavia (95)

Biological Institute, Dubrovnik (Dubrovnik)	01
Biological Institute, Rovinj/Istra (Rovinj/Istra)	02
Institute of Oceanography and Fisheries (Split)	03

Zanzibar (ZA)

Laboratory of the East African Marine Fisheries Research Organization (Zanzibar)	01

TABLE 5

NAVIGATIONAL SYSTEMS CODE

1 - CONSOL
2 - DECCA NAVIGATOR
3 - DECCA SURVEY
4 - DECCA HI-FIX
5 - TWO-RANGE DECCA
6 - DECTRA
7 - DELRAC
8 - ELECTRONIC POSITION INDICATOR (EPI)
9 - GEE
10 - GEODIMETER (MARK I, II, III, AND IV)
11 - LAMBDA DECCA
12 - LORAC
13 - LORAN A
14 - LORAN B
15 - LORAN C
16 - MARINE AUTOTRAVERSE POSITIONER (MAP)
17 - MICRODIST (ELECTROTAPE)
18 - MICROWAVE POSITION-FIXING SYSTEM (MPFS)
19 - NAVARHO
20 - OMEGA (RADUX)
21 - PULSED LIGHT RANGING EQUIPMENT
22 - RAYDIST (E, R, N, AND ER)
23 - RAYDIST (DM)
24 - SHORAN (HIRAN)
25 - RANA
26 - TELLUROMETER (HYDRODIST) AERODIST) (MICRODISTANCER)
27 - SOFAR
28 - RAFOS
29 - SATELLITE NAVIGATION

TABLE 6

Depth

Conversion from fathoms to meters
(1 fathom = 1.8288 meters)

Fathoms	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Meters	0	0	0	1	1	1	1	1	1	2

Fathoms	0	1	2	3	4	5	6	7	8	9
00	0000	0002	0004	0005	0007	0009	0011	0013	0015	0016
10	0018	0020	0022	0024	0026	0027	0029	0031	0033	0035
20	0037	0038	0040	0042	0044	0046	0048	0049	0051	0053
30	0055	0057	0059	0060	0062	0064	0066	0068	0069	0071
40	0073	0075	0077	0079	0080	0082	0084	0086	0088	0090
50	0091	0093	0095	0097	0099	0101	0102	0104	0106	0108
60	0110	0112	0113	0115	0117	0119	0121	0123	0124	0126
70	0128	0130	0132	0134	0135	0137	0139	0141	0143	0144
80	0146	0148	0150	0152	0154	0155	0157	0159	0161	0163
90	0165	0166	0168	0170	0172	0174	0176	0177	0179	0181
100	0183	0185	0187	0188	0190	0192	0194	0196	0198	0199
110	0201	0203	0205	0207	0208	0210	0212	0214	0216	0218
120	0219	0221	0223	0225	0227	0229	0230	0232	0234	0236
130	0238	0240	0241	0243	0245	0247	0249	0251	0252	0254
140	0256	0258	0260	0262	0263	0265	0267	0269	0271	0272
150	0274	0276	0278	0280	0282	0283	0285	0287	0289	0291
160	0293	0294	0296	0298	0300	0302	0304	0305	0307	0309
170	0311	0313	0315	0316	0318	0320	0322	0324	0326	0327
180	0329	0331	0333	0335	0336	0338	0340	0342	0344	0346
190	0347	0349	0351	0353	0355	0357	0358	0360	0362	0364
200	0366	0368	0369	0371	0373	0375	0377	0379	0380	0382
210	0384	0386	0388	0390	0391	0393	0395	0397	0399	0401
220	0402	0404	0406	0408	0410	0411	0413	0415	0417	0419
230	0421	0422	0424	0426	0428	0430	0432	0433	0435	0437
240	0439	0441	0443	0444	0446	0448	0450	0452	0454	0455
250	0457	0459	0461	0463	0465	0466	0468	0470	0472	0474
260	0475	0477	0479	0481	0483	0485	0486	0488	0490	0492
270	0494	0496	0497	0499	0501	0503	0505	0507	0508	0510
280	0512	0514	0516	0518	0519	0521	0523	0525	0527	0529
290	0530	0532	0534	0536	0538	0539	0541	0543	0545	0547

TABLE 6 (Cont'd)

Depth

Conversion from fathoms to meters
(1 fathom = 1.8288 meters)

Fathoms	00	10	20	30	40	50	60	70	80	90
300	0549	0567	0585	0604	0622	0640	0658	0677	0695	0713
400	0732	0750	0768	0786	0805	0823	0841	0860	0878	0896
500	0914	0933	0951	0969	0988	1006	1024	1042	1061	1079
600	1097	1116	1134	1152	1170	1189	1207	1225	1244	1262
700	1280	1298	1317	1335	1353	1372	1390	1408	1426	1445
800	1463	1481	1500	1518	1536	1554	1573	1591	1609	1628
900	1646	1664	1682	1701	1719	1737	1756	1774	1792	1811

Fathoms	000	100	200	300	400	500	600	700	800	900
1000	1829	2012	2195	2377	2560	2743	2926	3109	3292	3475
2000	3658	3840	4023	4206	4389	4572	4755	4938	5121	5304
3000	5486	5669	5852	6035	6218	6401	6584	6767	6949	7132
4000	7315	7498	7681	7864	8047	8230	8412	8595	8778	8961
5000	9144	9327	9510	9693	9876	10058	10241	10424	10607	10790

TABLE 7

Depth

Conversion from feet to meters (tenths)
(1 foot = 0.3048 meter)

Feet	0	1	2	3	4	5	6	7	8	9
00	0.0	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7
10	3.0	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8
20	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8
30	9.1	9.4	9.8	10.1	10.4	10.7	11.0	11.3	11.6	11.9
40	12.2	12.5	12.8	13.1	13.4	13.7	14.0	14.3	14.6	14.9
50	15.2	15.5	15.8	16.2	16.5	16.8	17.1	17.4	17.7	18.0
60	18.3	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7	21.0
70	21.3	21.6	21.9	22.3	22.6	22.9	23.2	23.5	23.8	24.1
80	24.4	24.7	25.0	25.3	25.6	25.9	26.2	26.5	26.8	27.1
90	27.4	27.7	28.0	28.3	28.7	29.0	29.3	29.6	29.9	30.2
100	30.5	30.8	31.1	31.4	31.7	32.0	32.3	32.6	32.9	33.2
110	33.5	33.8	34.1	34.4	34.7	35.1	35.4	35.7	36.0	36.3
120	36.6	36.9	37.2	37.5	37.8	38.1	38.4	38.7	39.0	39.3
130	39.6	39.9	40.2	40.5	40.8	41.1	41.5	41.8	42.1	42.4
140	42.7	43.0	43.3	43.6	43.9	44.2	44.5	44.8	45.1	45.4
150	45.7	46.0	46.3	46.6	46.9	47.2	47.5	47.9	48.2	48.5
160	48.8	49.1	49.4	49.7	50.0	50.3	50.6	50.9	51.2	51.5
170	51.8	52.1	52.4	52.7	53.0	53.3	53.6	53.9	54.3	54.6
180	54.9	55.2	55.5	55.8	56.1	56.4	56.7	57.0	57.3	57.6
190	57.9	58.2	58.5	58.8	59.1	59.4	59.7	60.0	60.4	60.7
200	61.0	61.3	61.6	61.9	62.2	62.5	62.8	63.1	63.4	63.7
210	64.0	64.3	64.6	64.9	65.2	65.5	65.8	66.1	66.4	66.8
220	67.1	67.4	67.7	68.0	68.3	68.6	68.9	69.2	69.5	69.8
230	70.1	70.4	70.7	71.0	71.3	71.6	71.9	72.2	72.5	72.8
240	73.2	73.5	73.8	74.1	74.4	74.7	75.0	75.3	75.6	75.9
250	76.2	76.5	76.8	77.1	77.4	77.7	78.0	78.3	78.6	78.9
260	79.2	79.6	79.9	80.2	80.5	80.8	81.1	81.4	81.7	82.0
270	82.3	82.6	82.9	83.2	83.5	83.8	84.1	84.4	84.7	85.0
280	85.3	85.6	86.0	86.3	86.6	86.9	87.2	87.5	87.8	88.1
290	88.4	88.7	89.0	89.3	89.6	89.9	90.2	90.5	90.8	91.1

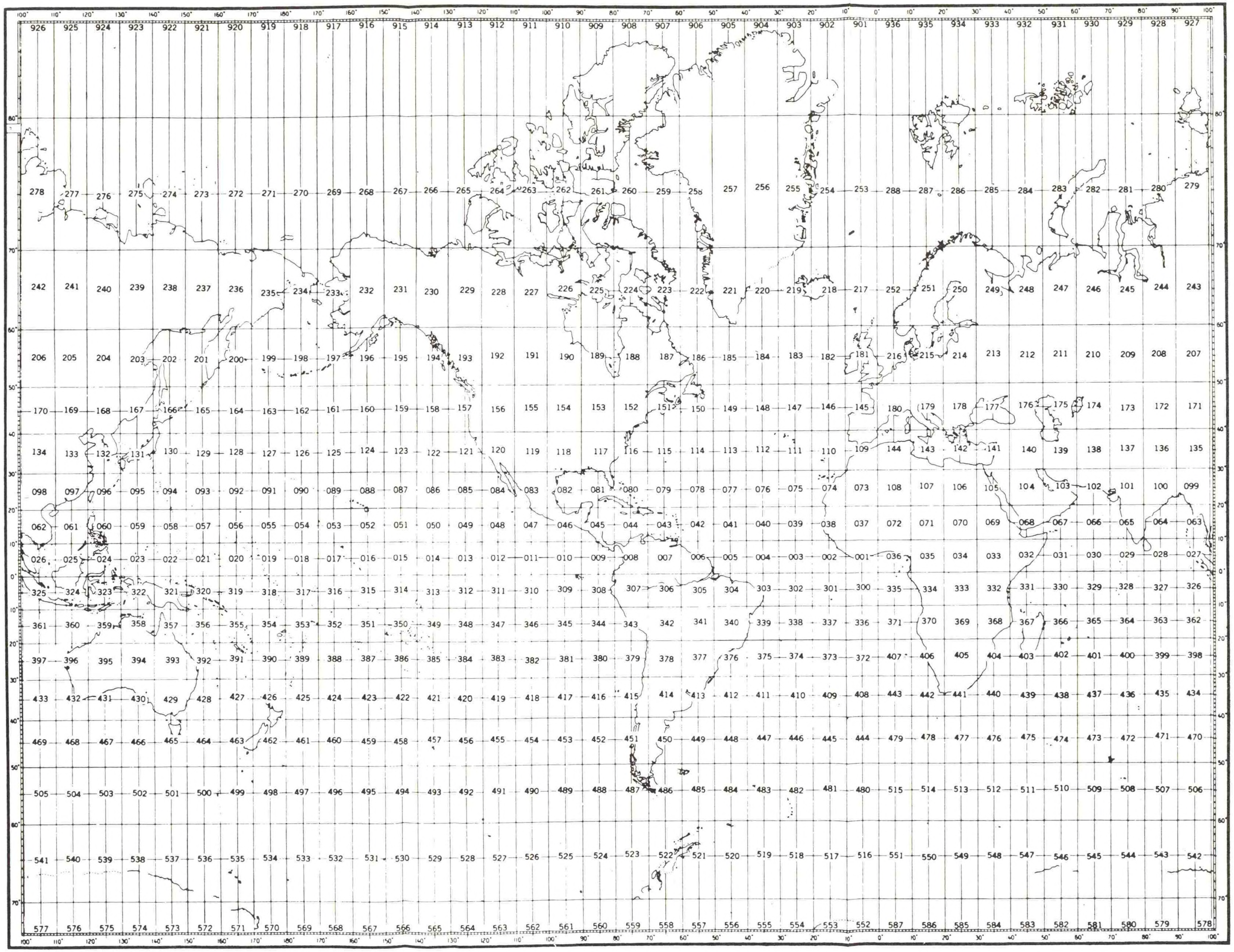
TABLE 7 (Cont'd)

Conversion from feet to meters (tenths)
(1 foot = 0.3048 meter)

Feet	00	10	20	30	40	50	60	70	80	90
300	91.4	94.5	97.5	100.6	103.6	106.7	109.7	112.8	115.8	118.9
400	121.9	125.0	128.0	131.1	134.1	137.2	140.2	143.3	146.3	149.4
500	152.4	155.4	158.5	161.5	164.6	167.6	170.7	173.7	176.8	179.8
600	182.9	185.9	189.0	192.0	195.1	198.1	201.2	204.2	207.3	210.3
700	213.4	216.4	219.5	222.5	225.6	228.6	231.6	234.7	237.7	240.8
800	243.8	246.9	249.9	253.0	256.0	259.1	262.1	265.2	268.2	271.3
900	274.3	277.4	280.4	283.5	286.5	289.6	292.6	295.7	298.7	301.8
1000	304.8	307.8	310.9	313.9	317.0	320.0	323.1	326.1	329.2	332.2
1100	335.3	338.3	341.4	344.4	347.5	350.5	353.6	356.6	359.7	362.7
1200	365.8	368.8	371.9	374.9	378.0	381.0	384.0	387.1	390.1	393.2
1300	396.2	399.3	402.3	405.3	408.4	411.5	414.5	417.6	420.6	423.7
1400	426.7	429.8	432.8	435.9	438.9	442.0	445.0	448.1	451.1	454.2
1500	457.2	460.2	563.3	466.3	469.4	472.4	475.5	478.5	481.6	484.6
1600	487.7	490.7	493.8	496.8	499.9	502.9	506.0	509.0	512.1	515.1
1700	518.2	521.2	524.3	527.3	530.4	533.4	536.4	539.5	542.5	545.6
1800	548.6	551.7	554.7	557.8	560.8	563.9	566.9	570.0	573.0	576.1
1900	579.1	582.2	585.2	588.3	591.3	594.4	597.4	600.5	603.5	606.6
2000	609.6	612.6	615.7	618.7	621.8	624.8	627.9	630.9	634.0	637.0
2100	640.1	643.1	646.2	649.2	652.3	655.3	658.4	661.4	664.5	667.5
2200	670.6	673.6	676.7	679.7	682.8	685.8	688.8	691.9	694.9	698.0
2300	701.0	704.1	707.1	710.2	713.2	716.3	719.3	722.4	725.4	728.5
2400	731.5	734.6	737.6	740.7	743.7	746.8	749.8	752.9	755.9	759.0
2500	762.0	765.0	768.1	771.1	774.2	777.2	780.3	783.3	786.4	789.4
2600	792.5	795.5	798.6	801.6	804.7	807.7	810.8	813.8	816.9	819.9
2700	823.0	826.0	829.1	832.1	835.2	838.2	841.2	844.3	847.3	850.4
2800	853.4	856.5	859.5	862.6	865.6	868.7	871.7	874.8	877.8	880.9
2900	883.9	887.0	890.0	893.1	896.1	899.2	902.2	905.3	908.3	911.4
3000	914.4	917.4	920.5	923.5	926.6	929.6	932.7	935.7	938.8	941.8
3100	944.9	947.9	951.0	954.0	957.1	960.1	963.2	966.2	969.3	972.3
3200	975.4	978.4	981.5	984.5	987.6	990.6	993.6	996.7	999.7	1002.8

APPENDIX I (A)

(SHEET—2)

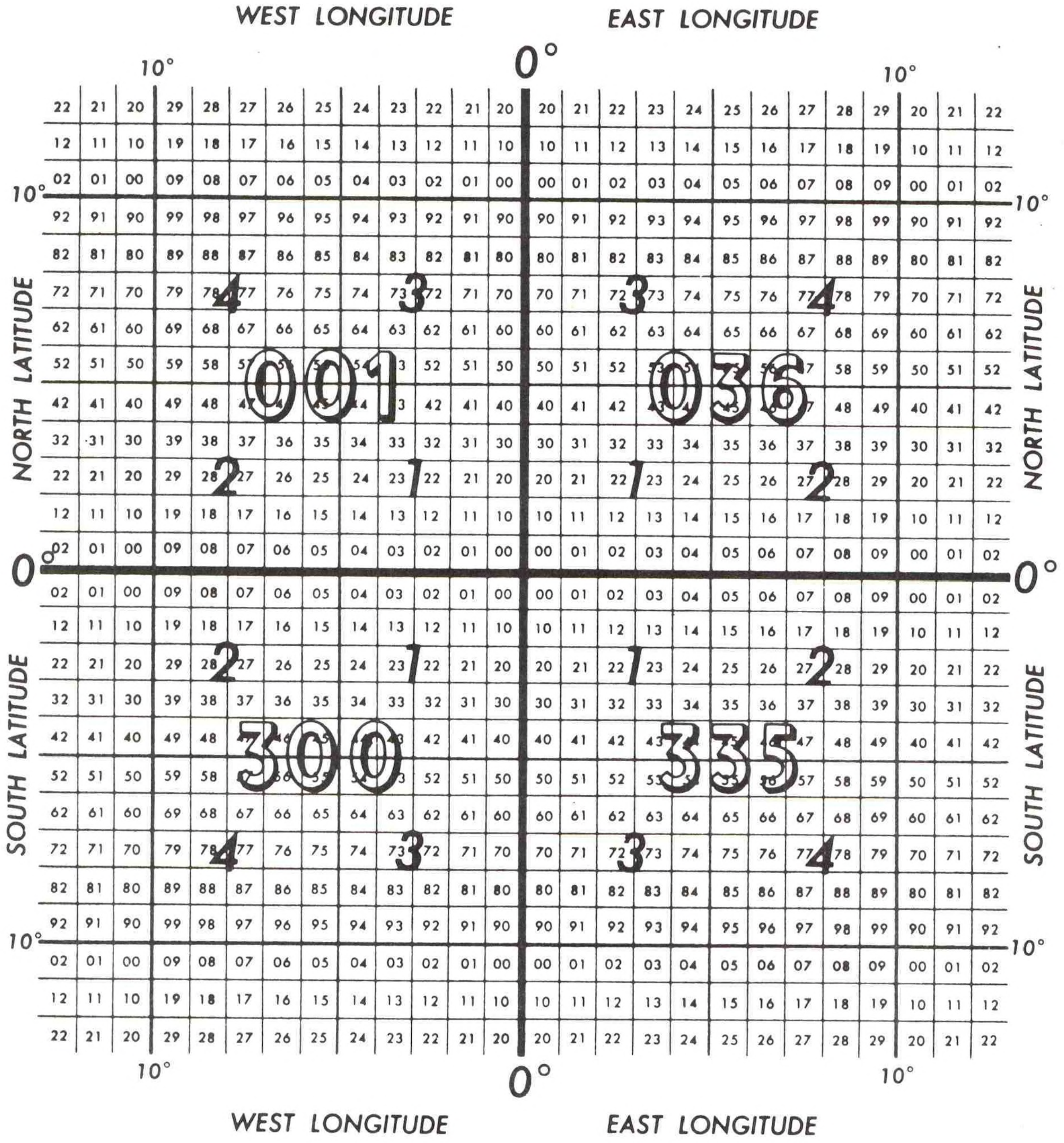


MARSDEN SQUARE CHART

APPENDIX I (B)

(SHEET–1)

ONE DEGREE DIVISIONS OF MARSDEN SQUARES



85 ONE DEGREE SQUARE

4 QUADRANT

001 MARSDEN SQUARE

APPENDIX II

SPECTROPHOTOMETER CODE

Code	
A	Bausch and Lomb Spectronic 20
B	Bausch and Lomb Spectronic 340
C	Beckman DB Spectrophotometer
D	Beckman DK-2 Spectrophotometer
E	Beckman DU Spectrophotometer
F	Cary Model 14 Recording Spectrophotometer
G	Carl Zeiss Model 50 21 04 Spectrophotometer
H	Carl Zeiss Model 50 21 05 Spectrophotometer
I	Carl Zeiss Model 50 21 08 Spectrophotometer
J	Carl Zeiss Model 50 22 21 Spectrophotometer
K	Coleman Autoset Spectrophotometer Model 30
L	Coleman Junior Spectrophotometer Model 6A or 6D
M	Hitachi Perkin-Elmer Model 139 Spectrophotometer
N	Perkin-Elmer Model 202 Spectrophotometer
O	Unicam SP 500 Spectrophotometer
Z	Other

APPENDIX III

FLOWMETER CODE

Code	Manufacturer	Type
A	Bergen Nautik	Dial, 3 hands
B	G.M./Kahl	Counter
C	G.M./Kahl	Dial, 4 hands
D	Hydro-Bios	-
E	Hydrow.	For high speed plankton sampler "HAI"
F	Rigosha	Dial, 3 hands
G	Rigosha	Dial, 4 hands
H	TSK	Dial, 3 hands
I	TSK	Dial, 4 hands
O	Other	

NOTE: Information for Appendix III was obtained from International Marine Science, Vol, II, No. 1, Jan. 1964, pp. 27-28. UNESCO, Place de Fontenoy, Paris -7^{e}, France.

APPENDIX IV

PLANKTON NET AND SAMPLER CODE

Code	Manufacturer	Type	Mouth dia. (cm.)	Total length (cm.)	Gauge No.
1	Lab. Oceanogr.	Standard net, vertical, closing	50	260	3
2	Lab. Oceanogr.	Standard net, vertical, closing	50	260	25
3	Lab. Oceanogr.	Standard net, horizontal, closing	50	260	3
4	Lab. Oceanogr.	Standard net, horizontal, closing	50	260	25
5	Hydro-Bios	Apstein net, surface	25	50	25
6	Hydro-Bios	Apstein, vertical, open, with head cone	15	50	25
7	Hydro-Bios	Apstein, vertical, closing, with head cone	15	50	25
8	Lab. Oceanogr.	Apstein, vertical, closing, with head cone	20	110	20
9	Lab. Oceanogr.	Apstein, vertical, closing, with head cone	20	110	25
10	Hydro-Bios	Hensen net	-	-	25
11	Lab. Oceanogr.	Hensen net without protecting net	73	250	3
12	Lab. Oceanogr.	Hensen net with protecting net	73	250	3
13	Hydro-Bios	Nansen closing net, with head cone	70	-	13 or 25
14	M.B.A.	Indian Ocean Standard Net (IOSN)	113	400	3
15	Hydro-Bios	IOSN, with Hansen bucket	113	400	3
16	Hydro-Bios	IOSN, with bucket with bayonet joint and window	113	400	3
17	Rigosha	IOSN	113	400	3
18	TSK	IOSN	113	400	3
19	Lab. Oceanogr.	Stranin net, with crow-foot and swivel	200	800	-
20	Lab. Oceanogr.	Stranin net, with crow-foot and swivel	100	400	-
21	Rigosha	NORPAC net	45	180	3
22	TSK	NORPAC net	45	180	3
23	Rigosha	Plankton net for oblique haul	100	590	00 or 3
24	G.M./Kahl	Plankton nets	1/		2/
25	Hydro-Bios	Plankton net, without head cone	40	100	25

1/ Mouth opening diameters: 5", 12", 30", and 40".
2/ Silk gauge No. 2: 00, 0, 2, 5, 10, 12, 15, 18, and 20.

APPENDIX IV (Cont'd)

Code	Manufacturer	Type	Mouth dia. (cm.)	Total length (cm.)	Gauge No.
26	Hydro-Bios	Plankton net, with head cone	-	100	25
27	Hydro-Bios	Plankton net, with head cone and closing device	-	100	25
28	Rigosha	Marutoku-A net	45	118	3
29	TSK	Marutoku-A net	45	118	3
30	Rigosha	Marutoku-B net	45	100	3
31	TSK	Marutoku-B net	45	100	3
32	Rigosha	Kitahara surface net	30	120	13
33	Rigosha	Kitahara quantitative net, with head cone, open	24	110	13
34	TSK	Kitahara quantitative net, with head cone, open	24	110	13
35	Rigosha	Maruchi net	130	450	3
36	TSK	Maruchi net	30	450	3
37	Rigosha	Marukawa closing net	30	110	13
38	Rigosha	O-net, open with head cone	36	110	3
39	Rigosha	C-net, closing	30	110	3
40	Hydro-Bios	Small plankton net	15	40	25
41	Wildlife supply	Plankton net, with head cone	15	30	20
42	G.M./Kahl	Lamont Multiple Plankton Sampler 3/	50x50	150	8
43	Juday net				
44	Discovery net				

3/ 3-square mouth nets, pressure-operated closing-opening devices.

APPENDIX IV (Cont'd)

Code	Manufacturer	Type	Mouth dia. (cm.)	Body dia. (cm.)	Length (cm.)	Net (meshes/inch)
45	Hydro-Bios	Hempel large-size sampler	19	50	230	40
46	A. Wuttke	High Speed Plankton Sampler "HAI"	-	50	232	-
47	A. Wuttke	Plankton sampler	-	25	116	-
48	Oceanic Inst.	Plankton sampler with flowmeter	-	50	250	-
49	Hydro Products	High speed plankton sampler Model 850	4/			5/
50	G.M./Kahl	High speed plankton sampler Model Gulf-V	-	44	140	50
51	G.M./Kahl	High speed plankton sampler Model Gulf-V	-	30	105	50
52	G.M./Kahl	High speed, Isaacs-Kidd Model	2,5	7,5	90	"
53	Hydro-Bios	Apstein Plankton Sampler	1,2	3,0	22	-
54	Rigosha	Tamura's Surface Sampler	2,0	8,0	50	No. 13
55	Rigosha	Motoda's Surface Sampler	2,0	-	20	No. 3/13
56	G.M./Kahl	Clark-Bumpus Automatic P.S.	12,5	-	-	Nos. 2/10/20
57	G.M./Kahl	Clark-Bumpus Automatic P.S.	30		105	6/
58	Rigosha	Clark-Bumpus Automatic P.S.	13			Nos. 3/16

4/ 8", 10", or 12".
5/ 24, 30, or 50 meshes/inch.
6/ Nos. 0, 2, 6, 8, 10, or 20.

NOTE: Information for Appendix IV was obtained from International Marine Science, Vol. II, No. 1, Jan. 1964, pp. 27-28. UNESCO, Place de Fontenoy, Paris -7^{e}, France.