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ICES OCEANOGRAPHIC FORMAT

Introduction

The following pages provide a detailed description of the formats used by ICES for the exchange of oceanographic (water bottle or CTD) station data. Submitters of data should, if at all possible, use either of the formats described here. Receivers of data from ICES will receive it in only the first described format, the ICES Oceanographic 'punch card' format but software is normally supplied with any request to help the user read data sets prepared in this format, including an export facility to data bases and spreadsheets. The user should note that this format has been modified from that published by ICES in 1979 in several important respects. In particular provision was made to include position information to .01 of a degree, and time to the nearest minute. Other changes include a re-definition of the > (greater than) overpunch in the nutrient fields (type '56' chemistry record was replaced by type '76') and record type 'P6' was introduced to accommodate the very high nutrient levels reported from some coastal regions. In both of these record types chlorophyll 'a' is stored to only one decimal place (the '56' record type was 2 decimal places).

From early 1994, additional features were added to the format (03 record) to accommodate extra decimal places common in CTD records. This affected only columns previously used for derived quantities (sigma-t, dynamic depth).

For data received after ca 1997 parameters not supported by the above record types were included by the inclusion of the '0Z' record (Additional Parameter Record). This record type allows for any number of parameters, so long as it is specified in the BODC/JGOFS data dictionary.

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ICES Format Specification
HYDROMASTER RECORD
Position 79-80 = "0J"

Position	Parameter	Description
01-02	Country	Coded according to IOC country codes.
03-04	Ship	Coded according to IOC ship codes.
05-08	Station No.	Station number (within a given year start counting one at the 1 Jan 0000
09-12	Latitude	Geographical latitude in degrees and minutes (decimals see below).
13-17	Longitude	Geographical longitude in degrees and minutes (decimals see below).
18	Quadrant	Indicator of quadrant on globe:
		0 = Latitude North Longitude East
		1 = Latitude North Longitude West
		2 = Latitude South Longitude East
		3 = Latitude South Longitude West
		0° Latitude is defined as being North
		0° Longitude is defined as being East
		180° Longitude is defined as being West
		North, South relative to the equator
		East, West relative to Greenwich meridian
19-21	Year	Last 3 digits of year.
22-23	Month	Number of the month within a year
24-25	Day	Number of the day within a month
26-27	Time	Starting time of hydrographic station in UTC (minutes given later).
28-31	Depth	Corrected depth to bottom in meters
32-45	None	Reserved (usually specifies origin of data)
46-64	None	Weather information (rarely used in recent data)
65-66	Latitude ct'd	Decimals of Latitude minutes
67-68	Longitude ct'd	Decimals of Longitude minutes
69-70	Time ct'd	Minutes of time
71-74	None	Reserved
75-77	Secchi	Secchi Disk Depth (metre, 1 implied decimal)
78	None	
79	Indicator	Always "0" (Zero)
80	Record Type	Always "J" (Juliett)

HYDROGRAPHY RECORD

Position 80-80 = "3"

Position	Parameter	Description
01-27	Parameter	Copy of contents of positions 01-27 in the Hydromaster record.
28-31	Depth/Pressure	Depending on value in column 41 (d/p): depth (meters) or Pressure (decibar). No implied decimals (but see 41-49)
32-35	Temperature	Temperature given in degrees Celsius (°C). 2 implied decimal places. Negative temperatures are indicated by "}" (Closing Brace) in field 32
36-40	Salinity	Salinity given in PSS-78 scale for post-1978 data. 3 implied decimal places
41-41	d/p	Specifies whether pressure (p) or depth(d). If field not 'p' or 'd', then depth (meters) assumed.
42-49	CTD Decimals	Depending on a 'p' or 'd' in column 41 then 42-43 is extra decimal places for pressure (p), or depth (d), 45-46 is extra decimal places for temperature; 48-49 is extra decimal places for salinity (historical data sets may have sigma-t in 41-45)
50-57	Unused	or derived quantities
58-60	Oxygen	Oxygen given in ml/l (if position 78 = "K" then /kg). 2 implied decimals
61-64	None	Reserved for derived quantities
65-76	None	Reserved
77	Method	Method of salinity determination
		1 = Titration by routine method
		2 = Titration by special precision method
		3 = Conductivity method precision (<)= 0.01
		4 = Conductivity method precision (>) 0.01
78	Unit Indicator	Not K = Oxygen in ml/l (per volume)
		K = Oxygen in ml/kg (per mass)
79	Indicator	Indicator for interpolation with depth
		0 = No interpolation, T and S observed
		1 = Both T and S have been interpolated
		8 = T has been interpolated, S observed
		9 = T has been observed, S interpolated
80	Record type	Always "3" (Three)

HYDROCHEMISTRY RECORD
(Position 79-80 = "76" or *Position 79-80 = "P6" or Position 79-80 = "56")

Position	Parameter	Description
01-27	Parameter	Copy of contents of positions 01-27 in the Hydromaster record.
28-31	Depth/Pressure	Pressure (decibars) or Depth (meters). No implied decimals. Assumes unit as in "03" record above.
32-35	Temperature	Temperature given in degrees Celsius (°C). 2 implied decimals. Negative temperatures are indicated by "}" (Closing Brace) in field 32
36-39	Salinity	Salinity given in PSS-78 scale for post-1978 data. 2 implied decimals.
40-42	Oxygen	Oxygen given in ml/l (if position 78 = "K" then /kg). 2 implied decimals.
43-45	Phosphate	Phosphate Phosphorus given in µmol/l (if position 78 = "K" then µmol/kg). 2 implied decimals (* 1 implied decimal)
46-48	Phosphorus	Total Phosphorus given in µmol/l (if position 78 = "K" then µmol/kg). 2 implied decimals (* 1 implied decimal)
49-51	Silicate	Silicate Silicon given in µmol/l (if position 78 = "K" then µmol/kg). 1 implied decimal (* 0 implied decimal)
52-54	Nitrate	Nitrate Nitrogen given in µmol/l (if position 78 = "K" then µmol/kg). 1 implied decimal (* 0 implied decimal)
55-57	Nitrite	Nitrite Nitrogen given in µmol/l (if position 78 = "K" then µmol/kg). 2 implied decimals (* 1 implied decimal)
58-60	Ammonium	Ammonium Nitrogen given in µmol/l (if position 78 = "K" then µmol/kg). 1 implied decimal (* 0 implied decimal)
61-63	Nitrogen	Total Nitrogen given in µmol/l (if position 78 = "K" then µmol/kg). 1 implied decimal (* 0 implied decimal)
64-66	Hydrog. Sulph.	Hydrogen Sulphide Sulphur given in µmol/l (if position 78 = "K" then µmol/kg). 1 implied decimal (* 0 implied decimal)
67-69	pH	Hydrogen Ion Concentration. 2 implied decimals
70-73	Alkalinity	Alkalinity given in meq/l (if position 78 = "K" then meq/kg). 3 implied decimals
74-76	Chlorophyll a	Chlorophyll a given in µg/l (if position 78 = "K" then µg/kg). 1 implied decimal (if 56 record, 2 implied decimals)
77	None	Reserved
78	Unit Indicator	Not K = All Chemistry units in /l (per volume)
		K = All Chemistry units in /kg (per mass)
79	Indicator	Always "7" (Seven) (**or "P" in which case all nutrients and H2S X10, ie decimals-1)
80	Record type	Always "6" (Six)

*P6 records

**P6 records be derived from 76 records only. In P6 records only the nutrients and H_2S are times 10. pH, alkalinity and chlorophyll are untouched.

If nitrite is not reported, but nitrate is then the value in the nitrate field is assumed to represent nitrate + nitrite.

ADDITIONAL PARAMETER RECORD
(Position 79-80 = "0Z")

Position	Parameter	Description
01-27	Parameter	Copy of contents of positions 01-27 in the Hydromaster record.
28-31	Depth/Pressure	Pressure (decibars) or Depth (meters). No implied decimals. Assumes unit as in "03" record above.
32-39	Parameter Code	8 Character Code as used by BODC in its BODC/JGOFS Data Dictionary
40-49	Data Value	Value of parameter in free format. Value might be expressed in scienific notation. Store any data flag, e.g., < in position 49
50-78	Description	Abbreviated full name of parameter followed by units (in parenthesis). Units normally expressed as given in BODC/JGOFS Data Dictionary
79	Indicator	Always "0" (zero)
80	Record type	Always "Z" (zed)

General Rule for Coding Data into Fields (not 0Z record type)

All fields for which a value is given should be "0" (Zero) filled to the left, fields where no value is given must be left blank. If within a field the rightmost positions are left blank, it is assumed that the measurement accuracy did not allow determination of this decimal position; e.g. Temperature measured is 2.3° C the

Temperature field given "023 " (Zero, Two, Three, Blank).

Coding of values too big for Field Width and Qualifiers
In all chemistry fields, including the oxygen field in the hydrographic record, a provision is made to accommodate values which are too big for the field width provided. In case e.g. oxygen exceeds the value of 9.99 ml/l you have to subtract 10.00 from the value observed, enter this new value and recode the first digit of the field according to the conversion for overpunch type 11 (see below). The value of 19.99 is used to indicate a value out of range, coded as "R99" (Romeo, Nine, Nine). Hence the highest value which can be reported is for oxygen 19.98 ml/l. For substances which are reported to only 1 decimal place, e.g. nitrate these numbers are 199.9 and 199.8 respectively.

If the value found seems unrealistic you recode the second digit in the field according to the following scheme: 1 mapped into "J", 2 mapped into "K" etc. Note however that "0" is mapped into asci character 125 ("}"). This conversion is referred to overpunch type 11. An overpunch in column 31 should be made when the depth has been obtained by application of an unprotected thermometer in this depth. That a depth is questionable is indicated by an overpunch 11 in column 29.

If there are traces found below the threshold of the reporting format ((<)0.01 or (<)0.1 respectively) you code "00}" (Zero, Zero, Closing Brace).

If for some reason the value can be observed only as being below a certain threshold, this threshold value is given and the last digit is recoded according to overpunch type 12, ie 1 mapped into "A", 2 into "B" etc and 0 into ascii character 123 ("{")

The recoding according to Table 1 of the second digit within a field applied as well to T and S in the hydrographic records, indicating questionable values.

The left columns in Tables 1 and 2 show the digits to be recoded, the right columns the replacement characters. Table 3 show character encoding to ASCII and EBCDIC

Table 1 **Table 2**   **Table 3**

				Char	ASCII	EBCDIC
0	}	0	{			
1	J	1	A	blank	32	064
2	K	2	B	0	48	240
3	L	3	C	1	49	241
4	M	4	D	2	50	242
5	N	5	E	3	51	243
6	O	6	F	4	52	244
7	P	7	G	5	53	245
8	Q	8	H	6	54	246
9	R	9	I	7	55	247
				8	56	248
				9	57	249
				A	65	193
				B	66	194
				C	67	195
				D	68	196
				E	69	197
				F	70	198
				G	71	199
				H	72	200
				I	73	201
				J	74	209
				K	75	210
				L	76	11
				M	77	212
				N	78	213
				O	79	214
				P	80	215
				Q	81	216
				R	82	217
				{	123	192
				}	125	208

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