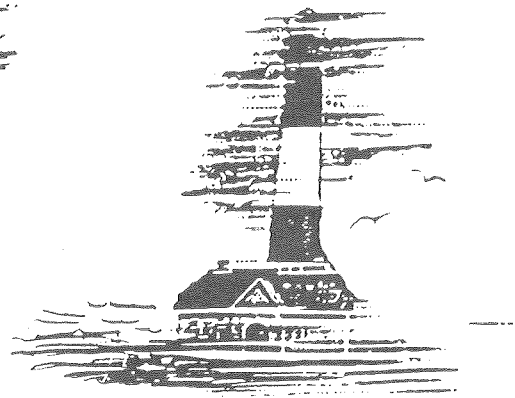
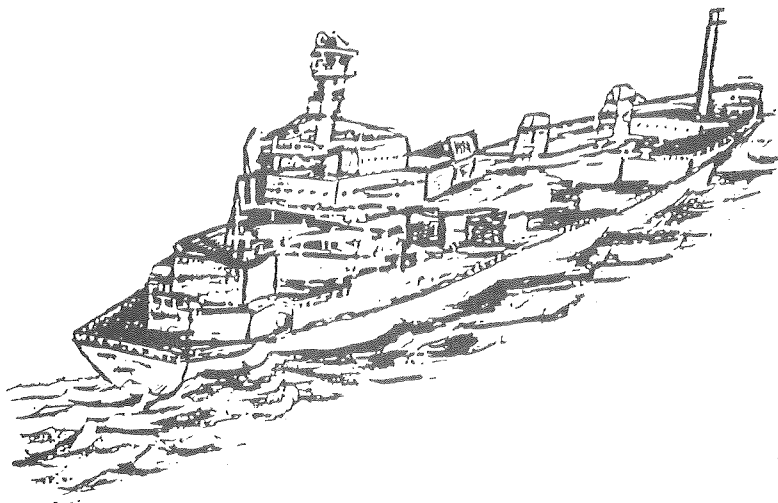
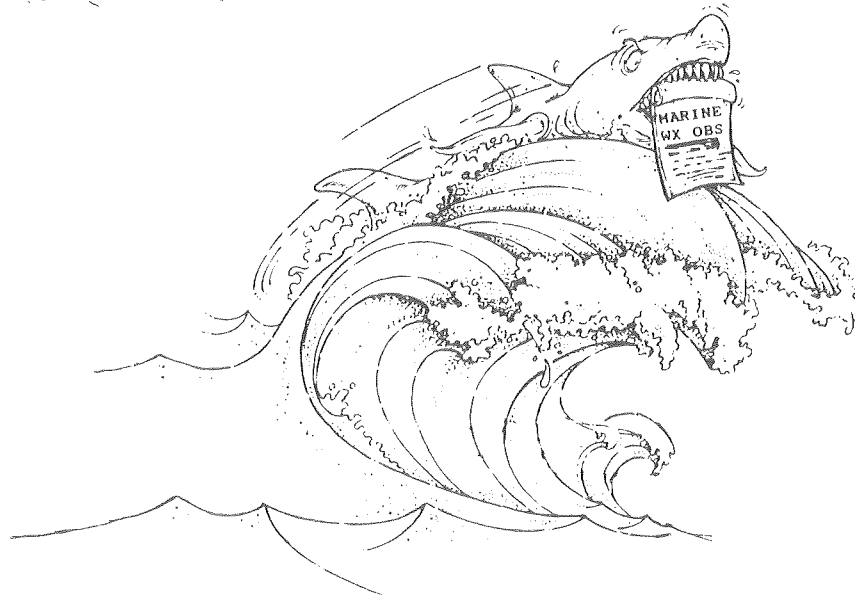
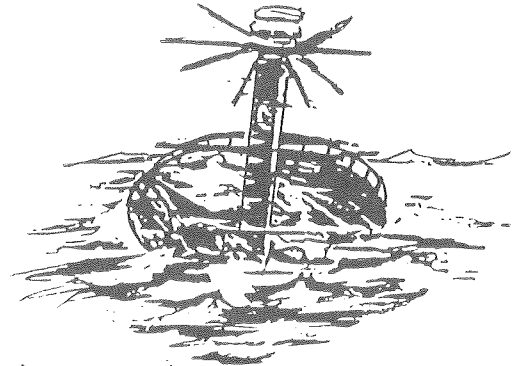
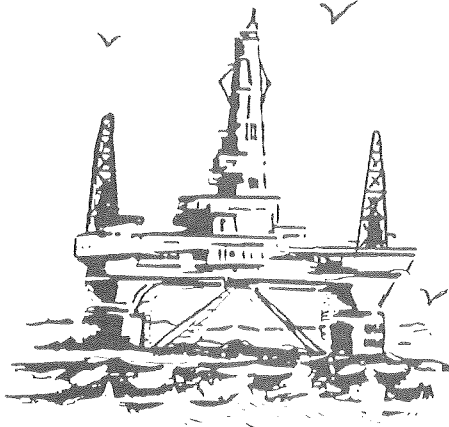


MARINE WEATHER OBSERVATIONS



The term "marine weather observations" generally refers to weather and climate data recorded at the surface; in the open ocean, near the coast, or in large inland waters such as the Great Lakes. Model output such as computer - produced ocean wave analyses are also valuable sources of marine information for some applications. There are several sources of marine data archived at NCDC. These include:

1. Ships' weather reports are available in a variety of formats and codes extending back in time to the 1820s. Some of these data are in computer media, while some are in manuscript only. Over 100 million ship observations are on file, covering all oceans of the world. The primary international ship code for open ocean vessels is described in tabular form in this publication. It has been in effect since 1982 and is still in use as of 1992 (when this was written). It is quite similar to previous codes in many respects. The location of transient ship data is heavily biased to the primary shipping lanes of the world.
2. Several types of data buoys (both fixed and drifting) provide large numbers of observations. Coastal Marine Automated Network (C-MAN) stations provide data from fixed platforms close to the coast (such as offshore light towers or jetties). Records of this type generally start in the 1970s, but have become much more numerous during the 1980s and '90s. For earlier years, light vessels provided manual observations.
3. Fixed ocean weather stations, also known as Ocean Station Vessels (OSVs) provided surface and upper air observations beginning with the WWII years. About a dozen operated in the North Atlantic, and five in the North Pacific. Although most were phased out during the mid 1970s, (some being replaced by buoys), a couple still take records periodically in the North Atlantic, and one or two also operate near South Africa.
4. Model output from numerical analyses are produced by NOAA and the U.S. Navy. The data are in grid point form and generally begin in the 1970s, although some pressure and sea surface temperature analyses begin in the mid to late 1800s. Most of this type of data can be retrieved relatively easily for large areas for a brief time period because they are stored in time sequence. Wind and wave data from Navy models have also been stored by grid point, so it is fairly economical to retrieve a single point for the total available period of record.
5. Satellite products, and blended satellite - buoy - ship products (primarily sea surface temperature) are available mainly since the late 1970s. However, some satellite products date back to the 1960s. Imagery, maps, and digital data are available.

6. Summarized products are available in a variety of formats and media. This includes global, basin-wide, coastal and other special purpose atlases in books, microforms, magnetic media, and CD-ROMs. Tropical and extratropical cyclone data are also available. In addition, the Comprehensive Ocean - Atmosphere Data Set (COADS) was produced by NOAA and the National Center for Atmospheric Research (NCAR), and is distributed by NCAR, P.O. Box 3000, Boulder CO 80307, phone (303) 497-1216. It includes both observations and summaries in binary form.

Acknowledgement: This document was prepared by Robert G. Quayle with assistance from Joe Elms and David McKittrick. September 21, 1992

SHIP'S CODE

This Code has been prepared as a ready reference to the Ship Synoptic Code FM13-IX and as a supplement to the National Weather Service Observing Handbook No. 1 (NWSOH No. 1).

BBXX (SPREP) or (STORM) **D D** **YYGG**_{i_w} **99L_aL_aL_a** **Q_cL_oL_oL_oL_o**
i_Ri_xhVV **Nddff** **00fff** **1s_nTTT** **2s_nT_dT_dT_d** **4PPPP** **5appp** **7wwW₁W₂**
8N_hC_LC_MC_H **222D_sv_s** **0s_nT_wT_wT_w** **2P_wP_wH_wH_w** **3d_{w1}d_{w1}d_{w2}d_{w2}**
4P_{w1}P_{w1}H_{w1}H_{w1} **5P_{w2}P_{w2}H_{w2}H_{w2}** **6I_sE_sE_sR_s** **ICE** **c_iS_ib_iD_iZ_i**

BBXX	YY DAY OF THE MONTH
INDICATOR FOR WEATHER REPORT FROM A SEA STATION	The first day of the month is reported as 01, the second day as 02, etc. Report the day as reckoned according to UTC. This may be different from the day according to your local time zone. Note also that the day reported with the 0000 UTC observation is the UTC day which is just beginning, not the UTC day which has just ended.
SPREP or STORM	GG ACTUAL TIME OF OBSERVATION TO THE NEAREST WHOLE HOUR GMT
Special report and Storm message flags to precede the call sign under specified conditions. See NWSOH No. 1 for details.	Use the actual time at which the barometer was read to the nearest hour, for example: 0552 UTC=06: 1446 UTC=15: 2356 UTC=00, not 24 (in this case, YY represents the new day just beginning). Report the weather at 0000, 0600, 1200, and 1800 ZULU, and every 3 hours when within 300 miles of a named tropical storm or hurricane, from the Great Lakes, and when within 200 miles of the U.S. and Canadian coasts. Send SPREP or STORM reports as appropriate.
D D	SHIP'S RADIO CALL SIGN

i_w **WIND INDICATOR**

Code *i_w* as 3 if wind speed is estimated (knots).
Code *i_w* as 4 if wind speed is measured with an anemometer (knots).

99 **INDICATOR FOR SHIP'S POSITION GROUPS**

L_aL_aL_a **LATITUDE IN DEGREES AND TENTHS**

This is always reported in three figures. To change minutes of latitude to tenths of degrees, divide the minutes by 6, disregarding the remainder. See NWSOH No. 1 for table.

Examples: 0 45' (N or S) is coded as 007
34 05' (N or S) is coded as 340

Q_c **QUADRANT OF THE GLOBE**

The figure for *Q_c* shows whether the latitude is north or south, and the longitude east or west. Select the appropriate figure from this table.

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

For positions on the equator, and on the Greenwich or 180th meridian, either of the two appropriate figures may be used.

L_oL_oL_oL_o **LONGITUDE IN DEGREES AND TENTHS**

This is always reported in four figures. To change minutes of longitude to tenths of degrees, divide the minutes by 6, disregarding the remainder. See NWSOH No. 1 for table.

Examples: 0 16' (E or W) is coded as 0002
81 23' (E or W) is coded as 0813
146 58' (E or W) is coded as 1469

i_R **PRECIPITATION DATA INDICATOR**

Code *i_R* as 4 (preprinted in logbook). This indicates that the precipitation group is omitted because the precipitation amount is not available.

i_x **WEATHER DATA INDICATOR**

When weather group 7wwW₁W₂ is:
included Code *i_x* as: 1
omitted (no significant weather to report) 2

h **HEIGHT ABOVE THE SEA OF THE BASE OF THE LOWEST CLOUD SEEN**

If sky is clear or has only Cirrus-type clouds, code *h* as 9.

Code figs.	Height in metres	Height in feet
0	0 to 50	160 or less
1	50 to 100	160 to 330
2	100 to 200	330 to 660
3	200 to 300	660 to 1000
4	300 to 600	1000 to 2000
5	600 to 1000	2000 to 3300
6	1000 to 1500	3300 to 5000
7	1500 to 2000	5000 to 6600
8	2000 to 2500	6600 to 8200
9	2500 or more, or no clouds	8300 or more, no clouds

Sky obscured by fog or snow

Use higher code figure for heights at dividing line.

VV **VISIBILITY**

Code figs.	Visibility in	Visibility m/km	Visibility in yd./naut. mi.	Code figs.
90	less than	50 m	less than 55 yd.	90
91	50 but less than	200 m	55 but less than 220 yd.	91
92	200 but less than	500 m	220 but less than 550 yd.	92
93	500 but less than	1000 m	550 but less than 1/2 n. mi.	93
94	1 but less than	2 km	1/2 but less than 1 n. mi.	94
95	2 but less than	4 km	1 but less than 2 n. mi.	95
96	4 but less than	10 km	2 but less than 5 n. mi.	96
97	10 but less than	20 km	5 but less than 11 n. mi.	97
98	20 but less than	50 km	11 but less than 27 n. mi.	98
99	50 km or more		27 n. mi. or more	99

The visibility ranges corresponding to various weather types are as follows:

90 } Heavy snow, heavy drizzle	Fog, thick haze	90
91 } Heavy snow, heavy drizzle	Fog, thick haze	91
92 } Heavy snow, heavy drizzle	Fog, thick haze	92
93 } Moderate snow, moderate drizzle		93
94 } Heavy rain	Mist, haze	94
95 } Heavy rain	Mist, haze	95
96 } Moderate rain	Mist, haze	96
97 } Moderate rain	Mist, haze	97
98 } Light rain	Mist, haze	98
99 } Light rain	Mist, haze	99

N **FRACTION OF THE SKY COVERED BY CLOUDS OF ALL TYPES**

Code figs.	Fraction of sky covered
0	Cloudless (omit cloud group 8N _n C _L C _M C _H)
1	1 eighth or less, but not zero
2	2 eighths
3	3 eighths
4	4 eighths
5	5 eighths
6	6 eighths
7	7 eighths or more but not totally covered
8	8 eighths, sky completely covered by clouds
9	Sky obscured by fog, snow, or other meteorological phenomena Cloud cover indiscernible for reasons other than Code fig. 9

dd		TRUE DIRECTION, IN TENS OF DEGREES, FROM WHICH THE WIND IS BLOWING	
Code figure		Code figure	
00	Calm		
01	5 -14	21	205 -214
02	15 -24	22	215 -224
03	25 -34	23	225 -234
04	35 -44	24	235 -244
05	45 -54	25	245 -254
06	55 -64	26	255 -264
07	65 -74	27	265 -274
08	75 -84	28	275 -284
09	85 -94	29	285 -294
10	95 -104	30	295 -304
11	105 -114	31	305 -314
12	115 -124	32	315 -324
13	125 -134	33	325 -334
14	135 -144	34	335 -344
15	145 -154	35	345 -354
16	155 -164	36	355 - 4
17	165 -174	99	Variable or all directions.
18	175 -184		
19	185 -194		
20	195 -204		

ff	WIND SPEED IN KNOTS
(See next page)	

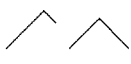
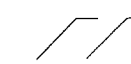
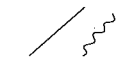
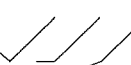

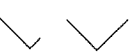



fff	HIGH SPEED WIND OF 99 KNOTS OR GREATER
Omit from the report when wind speed is less than 99 knots. For wind of 99 knots or greater. Code ff in GROUP Nddff as 99, and Code fff with actual wind speed.	

S_n	SIGN OF TEMPERATURE
S _n is used to indicate the sign of the dry bulb temperature (TTT), the dew point temperature, (T _d T _d T _d), and the sea surface temperature (T _w T _w T _w)	
Code figs.	
0	Temperature is positive or zero
1	Temperature is negative

TTT	DRY BULB TEMPERATURE IN DEGREES AND TENTHS, CELSIUS
Examples:	12.1 C: TTT=121 and S _n =0 4.2 C: TTT=042 and S _n =0 0.8 C: TTT=008 and S _n =0 -0.8 C: TTT=008 and S _n =1 -6.2 C: TTT=062 and S _n =1

T_dT_dT_d	DEW POINT TEMPERATURE IN WHOLE DEGREES CELSIUS
The slash (/) indicates that the tenths value of the dew point temperature is not available. Determine the dew point from the table on the back of this card. See NWSOH No. 1 for observing instructions and more complete table.	
Examples:	9 C: T _d T _d T _d =09/ and S _n =0 -9 C: T _d T _d T _d =09/ and S _n =1 -15 C: T _d T _d T _d =15/ and S _n =1

PPPP	SEA LEVEL PRESSURE IN MILLIBARS AND TENTHS
When the sea level pressure is 1000 mb or more, the initial 1 is omitted when coding:	
Examples:	992.4 mb: PPPP = 9924 1000.0 mb: PPPP = 0000 1002.8 mb: PPPP = 0028 1032.1 mb: PPPP = 0321

a	CHARACTERISTIC OF PRESSURE TENDENCY DURING THE THREE HOURS PRECEDING THE TIME OF OBSERVATION		
See NWSOH No. 1 for observing instructions.			
Code Figs.	Description	Net change in pressure	
0		Rising, then falling	Higher or no change
1		Rising, then steady; or rising, then rising more slowly	Pressure now higher than three hours ago
2		Rising (steadily or unsteadily)	
3		Falling or steady, then rising; or rising, then rising more rapidly	
4		Steady	No change
5		Falling, then rising	Lower or no change
6		Falling, then steady; or falling, then falling more slowly	Pressure now lower than three hours ago
7		Falling (steadily or unsteadily)	
8		Steady or rising, then falling; or falling, then falling more rapidly	

ppp	AMOUNT OF PRESSURE TENDENCY IN THE THREE HOURS PRECEDING THE TIME OF OBSERVATION
pp is expressed in millibars and tenths. For example, if the net three-hour pressure change is:	
0.0 mb, ppp = 000	4.7 mb, ppp = 047
0.4 mb, ppp = 004	10.2 mb, ppp = 102
Note: U.S., PMO's set barometers to read sea level pressure. See NWSOH No. 1 for other methods.	

ff

WIND SPEED IN KNOTS

This table is based on sea conditions over deep water with a fully developed sea. There will be frequent cases where the sea will not be fully developed because the wind has not blown long enough over a sufficient distance (fetch). Other factors such as currents and water depth will also affect the look of the sea. See NWSOH No. 1 for photos and explanations.

Code Figs. (Knots)	Mean Speed	Beau- fort	Description	Sea criterion when sea fully developed	Probable ht. of waves in m (ft)			
					Average	Maximum		
00	00	0	Calm	Sea like a mirror				
01 - 03	02	1	Light Air	Ripples with the appearance of scales are formed, but without foam crests	0.1	(1/4)	0.1	(1/4)
04 - 06	05	2	Light breeze	Small wavelets, still short but more pronounced, crests have a glassy appearance and do not break	0.2	(1/2)	0.3	(1)
07 - 10	09	3	Gentle breeze	Large wavelets, crests begin to break; foam of glassy appearance; perhaps scattered white horses	0.6	(2)	1	(3)
11 - 16	13	4	Modt. breeze	Small waves, becoming longer; fairly frequent white horses ...	1	(3 1/2)	1.5	(5)
17 - 21	19	5	Fresh breeze	Moderate waves, taking a more pronounced long form; many white horses are formed (chance of some spray)	2	(6)	2.5	(8 1/2)
22 - 27	24	6	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere (probably some spray)	3	(9 1/2)	4	(12)
28 - 33	30	7	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind	4	(13 1/2)	5.5	(19)
34 - 40	37	8	Gale	Moderately high waves of greater length; edges of crests begin to break into the spindrift; the foam is blown in well-marked streaks along the direction of the wind	5.5	(18)	7.5	(25)
41 - 47	44	9	Strong gale	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble and roll over; spray may affect visibility	7	(23)	10	(32)
48 - 55	52	10	Storm	Very high waves with long overhanging crests; the resulting foam, in great patches, is blown in dense white streaks along the direction of the wind; on the whole, the surface of the sea takes a white appearance; tumbling of the sea becomes heavy and shock-like; visibility affected	9	(29)	12.5	(41)
58 - 63	60	11	Violent Storm	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves); the sea is completely covered with long white patches of foam lying along the direction of the wind; everywhere the edges of the wave crests are blown into froth; visibility affected	11.5	(37)	16	(52)
64 and over	-	12	Hurricane	The air is filled with foam and spray; sea completely white with driving spray; visibility very seriously affected	14	(45)		

Note: For winds of 99 knots, or greater, use 99 for ff, and report wind speed in group 00ff; e.g. for a wind from 100° true at 125 knots, dd = 10, ff = 99, and fff = 125.

WW

PRESENT WEATHER

The weather code is arranged in priority order. Reading down the list, select the first applicable (most severe) weather condition that you observe and enter the code number for **ww**.

59-99 PRECIPITATION AT SHIP AT TIME OF OBSERVATION

95-99 THUNDERSTORM AT TIME OF OBSERVATION

- 99 Heavy thunderstorm with hail*
- 98 Thunderstorm with duststorm or sandstorm
- 97 Heavy thunderstorm with rain and/or snow, but no hail*
- 96 Slight or moderate thunderstorm with hail*
- 95 Slight or moderate thunderstorm with rain and/or snow, but no hail*

* Includes hail, ice pellets or snow pellets

94-91 THUNDERSTORM DURING THE PAST HOUR BUT NOT AT THE TIME OF OBSERVATION

Note: Use code **29** if there is no precip. at time of observation.

- 94 Moderate or heavy snow, or rain and snow mixed, or hail*
- 93 Slight snow, or rain and snow mixed, or hail*
- 92 Moderate or heavy rain
- 91 Slight rain

} *Thunderstorm in past hour*

* Includes hail, ice pellets or snow pellets

85-90 SOLID PRECIPITATION IN SHOWERS		30-39 (Not likely to be used in ship reports)	
Slight	Moderate or heavy	Slight or moderate	Heavy
89 Shower of hail*, no thunder	90	38 Blowing snow, high (above eye level)	39
87 Shower of snow pellets or ice pellets†	88	36 Drifting snow, low (below eye level)	37
85 Shower of snow	86	32 Duststorm or sandstorm, increasing	35
†With or without rain, or rain and snow mixed		31 Duststorm or sandstorm, unchanging	34
*Includes hail, ice pellets or snow pellets		30 Duststorm or sandstorm, decreasing	33
80-84 RAIN SHOWERS		20-29 PHENOMENA IN PAST HOUR BUT NOT AT TIME OF OBS.	
84 Shower of rain and snow mixed, moderate or heavy		29 Thunderstorm, with or without precipitation	
83 Shower of rain and snow mixed, slight		28 Fog (in past hour but not at time of obs.)	
82 Violent rain shower		27 Shower(s) of hail*, or of hail* and rain mixed	
81 Moderate or heavy rain shower		26 Shower(s) of snow, or of rain and snow mixed	
80 Slight rain shower		25 Shower(s) of rain	
70-79 SOLID PRECIPITATION NOT FALLING AS SHOWERS		24 Freezing drizzle or freezing rain	} <i>Not falling as showers</i>
79 Ice pellets		23 Rain and snow mixed, or ice pellets	
78 Isolated star-like snow crystals (with or without fog)		22 Snow	
77 Snow grains (with or without fog)		21 Rain (not freezing)	
76 Diamond dust (with or without fog)		20 Drizzle (not freezing) or snow grains	
		*Includes hail, ice pellets or snow pellets.	
Intermittent	Continuous	18-19 SQUALLS, FUNNEL CLOUDS	
74 Heavy snow in flakes	75	19 Funnel cloud(s) seen in past hour or at time of observation	
72 Moderate snow in flakes	73	18 Squalls (no. precip.) in past hour or at time of observation	
70 Slight snow in flakes	71	13-16 PHENOMENA WITHIN SIGHT BUT NOT AT SHIP	
60-69 RAIN (NOT FALLING AS SHOWERS)		16 Precip. within 3 naut. mi. — reaching surface	} <i>Fog not deeper than 10 m (33 ft.)</i>
Slight	Moderate or heavy	15 Precip. beyond 3 naut. mi. — reaching surface	
68 Rain or drizzle with snow	69	14 Precipitation in sight, not reaching surface	
66 Freezing rain	67	13 Lightning visible, no thunder heard	
Intermittent	Continuous	10-12 MIST AND SHALLOW FOG	
64 Heavy rain	65	12 Shallow fog - more or less continuous	
62 Moderate rain	63	11 Shallow fog in patches	
60 Slight rain	61	10 Mist (Visibility 1/2 Nautical mi. or more)	
50-59 DRIZZLE		04-09 HAZE, DUST, SAND OR SMOKE	
Slight	Moderate or heavy	09 Duststorm or sandstorm within sight	
58 Drizzle and rain mixed	59	08 Dust whirls in past hour (NOT FOR MARINE USE)	
56 Freezing drizzle	57	07 Blowing spray at the ship	
Intermittent	Continuous	06 Widespread dust suspended in the air	
54 Heavy drizzle	55	05 Dry haze	
52 Moderate drizzle	53	04 Visibility reduced by smoke	
50 Slight drizzle	51	00-03 CHANGE OF SKY DURING PAST HOUR	
00-49 NO PRECIPITATION AT SHIP AT TIME OF OBSERVATION		Code figs.	
17 Thunder at time of observation, no precipitation at ship		03 Clouds generally forming or developing	
40-49 FOG AT THE TIME OF OBSERVATION		02 State of the sky on the whole unchanged	
(Visibility in fog is less than 1/2 naut. mi.)		01 Clouds dissolving or becoming less developed	
Sky visible	Sky invisible	00 Cloud development not observable	
48 Fog, depositing rime	49	NOTE: if ww can only be coded as 00, 01, 02 or 03 and W₁ and W₂ can only be coded as 0, 1 or 2 then the weather group 7wwW₁W₂ may be omitted. See symbol 1.	
46 Fog, has begun or thickened in past hour	47		
44 Fog, no change in past hour	45		
42 Fog, has become thinner in past hour	43		
41 Fog in patches			
40 Fog at a distance but not at ship in past hour			

W1 and W2	PAST WEATHER
<p>The code figures for W₁, W₂ and ww together should give as complete a description as possible of the weather which has occurred since the previous main synoptic hour (0000, 0600, 1200, or 1800 GMT).</p> <p>W₁ and W₂ should describe the types of weather, usually different from that being reported by ww, which occurred since the previous main synoptic hour.</p> <p>If two or more different types of reportable weather occurred, the type having the highest code figure (the primary type) is reported by W₁; and the type having the second highest code figure (the secondary type) is reported by W₂.</p> <p>If the past weather has been continuous and unchanging during the entire period, W₁ and W₂ will be the same code.</p> <p>The table is listed in priority order starting with the most significant weather.</p> <p>Code figs.</p> <p>9 Thunderstorm(s) with or without precipitation</p> <p>8 Shower(s)</p> <p>7 Snow, or rain and snow mixed</p> <p>6 Rain</p> <p>5 Drizzle</p> <p>4 Fog or thick haze (visibility was less than 1/2 nautical mile)</p> <p>3 Sandstorm, duststorm, or blowing snow</p> <p>2 Cloud cover more than 1/2 throughout period</p> <p>1 Cloud cover more than 1/2 for part of period, and 1/2 or less for another part of period</p> <p>0 Cloud cover 1/2 or less throughout period</p>	

N_h	FRACTION OF THE SKY COVERED BY ALL THE C_L CLOUD(S) PRESENT, OR IF NO C_L CLOUD IS PRESENT, THE FRACTION COVERED BY ALL THE C_M CLOUD(S) PRESENT
<p>Code figs.</p> <p>0 No C_L or C_M clouds present</p> <p>1 1 eighth or less, but not zero</p> <p>2 2 eighths</p> <p>3 3 eighths</p> <p>4 4 eighths</p> <p>5 5 eighths</p> <p>6 6 eighths</p> <p>7 7 eighths or more but not totally covered</p> <p>8 8 eighths: sky totally covered</p> <p>9 Amount of C_L (or C_M) cloud cannot be estimated</p> <p>NOTE: If the sky is clear (no clouds), or if the sky is obscured by fog or heavy snow, then the cloud group 8N_hC_LC_MC_H may be omitted.</p>	

Cloud types are listed in priority order in the following tables. The most significant will be listed first. See NWSOH No. 1 for additional information.

C_L	CLOUDS OF TYPES STRATOCUMULUS (Sc) STRATUS (St), CUMULUS (Cu), AND CUMULONIMBUS (Cb)
<p>Code figs.</p> <p>9 Cb with a clearly fibrous top, often anvil-shaped; with or without other Cb, or Cu, Sc, St or ragged Cu or St of bad weather.</p> <p>3 Cb the tops of which, at least partially, lack sharp outlines, but are clearly not fibrous or anvil-shaped; Cu, Sc or St may also be present.</p> <p>4 Sc formed by the spreading out of Cu; Cu may also be present.</p> <p>8 Cu and Sc not formed by the spreading out of Cu; the bases of the Cu and Sc at different levels.</p> <p>2 Cu of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, with or without other Cu or Sc, all having their bases at same level.</p> <p>Codes 1, 5, 6 and 7 are of equal priority. Choose the cloud type that is predominant.</p> <p>1 Cu with little vertical extent and seemingly flattened, and/or ragged Cu other than of bad weather.</p> <p>5 Sc not formed by the spreading out of Cu.</p> <p>6 St in a more or less continuous layer, and/or in ragged shreds; but no ragged St of bad weather.</p> <p>7 Ragged St and/or ragged Cu, both of bad weather, usually below As or Ns.</p> <p>0 No Sc, St, Cu or Cb clouds present.</p> <p>/ Sc, St, Cu and Cb invisible owing to darkness.</p>	

C_M	CLOUDS OF TYPES ALTOCUMULUS (Ac), ALTOSTRATUS (As) AND NIMBOSTRATUS (Ns)
<p>Code figs.</p> <p>9 Ac of a chaotic sky, generally at several levels.</p> <p>8 Ac with sproutings like small towers or battlements, or Ac having the appearance cumulus-shaped tufts.</p> <p>7 Either: (a) Ac in two or more layers, opaque in places, not increasing. (b) Opaque layer of Ac, not increasing. (c) Ac together with As or Ns.</p> <p>6 Ac resulting from the spreading out of Cu (or Cb).</p> <p>5 Ac, semi-transparent; in bands or Ac in one or more layers, progressively invading the sky; these Ac clouds generally thicken as a whole.</p> <p>4 Patches (often almond or fish-shaped) of Ac, mostly semi-transparent; clouds occur at one or more levels and continually change in appearance.</p> <p>3 Ac, mostly semi-transparent; cloud elements change only slowly and are all at a single level.</p> <p>2 Either As, most of which is sufficiently dense to hide the sun or moon; or Nimbostratus.</p> <p>1 Ac, mostly semi-transparent, through which the sun or moon may be weakly visible, as through ground glass.</p> <p>0 No Ac, As or Ns clouds present</p> <p>/ Ac, As, and Ns invisible owing to darkness, or because of an over cast layer of C_L cloud.</p>	

CH CLOUDS OF TYPES CIRRUS (Ci), CIRROCUMULUS (Cc) AND CIRROSTRATUS (Cs)

Code figs.

9 Cc alone, or Cc with Ci and/or Cs, but the Cc is predominant.

7 Veil of Cs covering the whole sky.

8 Cs not increasing and not covering the whole sky.

6 Ci (often in converging bands) and Cs, or Cs alone; in either case spreading over the sky and generally thickening, the continuous veil extends more than 45° above the horizon, but does not cover the whole sky.

5 Same as code 6 above, except that the continuous veil does not reach 45° above the horizon.

4 Ci in the form of hooks and/or filaments, progressively invading the sky; they generally become thicker as a whole.

3 Dense Ci, often anvil-shaped, being the remains of the upper parts of a Cb.

1 Ci in the form of filaments, strands or hooks, not progressively invading the sky.

2 Either: (a) Dense Ci in patches or tangled sheaves, not increasing, which sometimes seem to be the remains of the upper part of a Cb. (b) Ci with sproutings like small turrets or battlements, or Ci having the appearance of cumulus-shaped tufts.

0 No Ci, Cc or Cs clouds present.

/ Ci, Cc and Cs invisible owing to darkness, or because of a continuous layer of lower clouds.

PwPw, Pw1Pw1, Pw2Pw2

PERIOD OF THE WAVES IN SECONDS

$P_w P_w$ —Period of the sea waves, in seconds

$P_{w1} P_{w1}$ —Period of the predominant swell waves, in seconds

$P_{w2} P_{w2}$ —Period of the secondary swell waves, in seconds

Determine (by estimation or measurement) the average period, in seconds, of the larger well-formed waves of the wave system (sea or swell) being observed.

See next column for $d_{w1} d_{w1} d_{w2} d_{w2}$.

dw1dw1, dw2dw2

TRUE DIRECTION, IN TENS OF DEGREES, FROM WHICH THE SWELL WAVES ARE COMING

$d_{w1} d_{w1}$ — True direction of the predominant swell waves

$d_{w2} d_{w2}$ — True direction of the secondary swell waves

See wind direction **dd** for table

When only one swell system is reported, its direction is given by $d_{w1} d_{w1}$ in the group $3d_{w1} d_{w1} d_{w2} d_{w2}$ and $d_{w2} d_{w2}$ is coded as "/".

Ds SHIP'S COURSE (TRUE) MADE GOOD DURING THE THREE HOURS PRECEDING THE TIME OF OBSERVATION

Code figs.	True direction	Code figs.	True direction
0	Ship hove to	5	SW
1	NE	6	W
2	E	7	NW
3	SE	8	N
4	S	9	Unknown

HwHw, Hw1Hw1, Hw2Hw2

HEIGHT OF WAVES

$H_w H_w$ = Height of the sea waves

$H_{w1} H_{w1}$ = Height of the waves in the predominant swell system

$H_{w2} H_{w2}$ = Height of the waves in the secondary swell system

Estimate the average height of the larger well-formed waves of the wave system (sea or swell) being observed. THE CODE IS DIRECT READING IN UNITS OF HALF-METERS.

Code figs.	Height in ft.	Code figs.	Height in ft.	Code figs.	Height in ft.
00	Less than 1	10	16 or 17	20	32 to 33
01	1 or 2	11	18	21	34 or 35
02	3 or 4	12	19 or 20	22	36
03	5	13	21 or 22	23	37 or 38
04	6 or 7	14	23	24	39 or 40
05	8 or 9	15	24 or 25	25	41
06	10	16	26 or 27	26	42 or 43
07	11 or 12	17	28	27	44 or 45
08	13	18	29 or 30	//	Not determined
09	14 or 15	19	31		

To obtain the code figures for heights over 45 feet, multiply the height in feet by 0.6 and round off the result to the nearest whole number.

Vs SHIP'S AVERAGE SPEED MADE GOOD DURING THE THREE HOURS PRECEDING THE TIME OF OBSERVATION

Code figs.	Avg. Speed	Code figs.	Avg. Speed
0	0 knot	5	21 to 25 knots
1	1 to 5 knots	6	26 to 30 knots
2	6 to 10 knots	7	31 to 35 knots
3	11 to 15 knots	8	36 to 40 knots
4	16 to 20 knots	9	Over 40 knots

TwTwTw SEA SURFACE TEMPERATURE IN DEGREES AND TENTHS, CELSIUS

Examples: 8.4°C: $T_w T_w T_w = 084 S_n = 0$
 0.4°C: $T_w T_w T_w = 004 S_n = 0$
 -0.7°C: $T_w T_w T_w = 007 S_n = 1$
 -1.5°C: $T_w T_w T_w = 015 S_n = 15$

Please indicate method of measuring $T_w T_w T_w$. If by induction manifold, indicate depth in meters. If depth is 10 meters (33 feet) or more, record $T_w T_w T_w$ on the record, but do not transmit it as part of the radio weather report. If the thermometer cannot be read to a tenth of a degree enter a slash "/" for the tenth digit; e.g. $T_w T_w T_w = 18/$.

I_s	CAUSE OF ICE ACCRETION ON SHIPS	R_s	RATE OF ICE ACCRETION ON SHIPS
Code figs. 1 Icing from ocean spray 2 Icing from fog 3 Icing from spray and fog 4 Icing from rain 5 Icing from spray and rain		Code figs. 0 Ice not building up 1 Ice building up slowly 2 Ice building up rapidly 3 Ice melting or breaking up slowly 4 Ice melting or breaking up rapidly	

E_sE_s	THICKNESS OF ICE ACCRETION IN CENTIMETERS				
Measure maximum thickness to nearest whole centimeter, or to nearest quarter of an inch. Code E _s E _s according to the following table:					
Code figs. (cm)	Inches	Code figs. (cm)	Inches	Code figs. (cm)	Inches
00	Less than 1/4	08	3 or 3 1/4	16	6 1/4
01	1/4 or 1/2	09	3 1/2	17	6 1/2 or 6 3/4
02	3/4	10	3 3/4 or 4	18	7 or 7 1/4
03	1 to 1 1/4	11	4 1/4 or 4 1/2	19	7 1/2
04	1 1/2 or 1 3/4	12	4 3/4	20	7 3/4 or 8
05	2	13	5 or 5 1/4	21	8 1/4
06	2 1/4 or 2 1/2	14	5 1/2	22	8 1/2 or 8 3/4
07	2 3/4	15	5 3/4 or 6	23	9 or 9 1/4

C_i	CONCENTRATION OR ARRANGEMENT OF SEA ICE	
Code figs. 0 No sea ice in sight 1 Ship in open lead more than 1 nautical mile wide, or ship in fast ice with boundary beyond limit of visibility 2 Sea ice present in concentrations less than 3/10 (3/8); open water or very open pack ice 3 4/10 to 6/10 (3/8 to less than 6/8); open pack ice 4 7/10 to 8/10 (6/8 to less than 7/8); close pack ice 5 9/10 or more, but not 10/10 (7/8 to less than 8/8); very close pack ice 6 Strips and patches of pack ice with open water between 7 Strips and patches of close or very close pack ice with areas of lesser concentration between 8 Fast ice with open water, very open or open pack ice to seaward of the ice boundary 9 Fast ice with close or very close pack ice to seaward of the ice boundary / Unable to report, because of darkness, lack of visibility, or because ship is more than 1/2 nautical mile away from the ice edge.	} Sea ice concentration is uniform in the observation area } Sea ice concentration is not uniform in the observation area	} Ship in ice or within 1/2 nautical mile of the ice edge

S_i**STAGE OF DEVELOPMENT OF SEA ICE****Code
figs.**

- 0 New ice only (frazil ice, grease ice, slush ice, shuga)
- 1 Nilas or ice rind, less than 10 cm thick
- 2 Young ice (grey ice, grey-white ice), 10-30 cm thick
- 3 Predominantly new and/or young ice with some first year ice
- 4 Predominantly thin first-year ice with some new and/or young ice
- 5 All thin first-year ice (30-70 cm thick)
- 6 Predominantly medium first-year ice (70-120 cm thick) and thick first-year ice (more than 120 cm thick) with some thinner (younger) first-year ice
- 7 All medium and thick first-year ice
- 8 Predominantly medium and thick first-year ice with some old ice (usually more than 2 meters thick)
- 9 Predominantly old ice
- / Unable to report, because of darkness, lack of visibility, or because only ice of land origin is visible, or because ship is more than 1/2 nautical mile away from ice edge

b_i**ICE OF LAND ORIGIN****Code
figs.**

- 0 No ice of land origin
- 1 1-5 icebergs, no growlers or bergy bits
- 2 6-10 icebergs, no growlers or bergy bits
- 3 11-20 icebergs, no growlers or bergy bits
- 4 Up to and including 10 growlers and bergy bits - no icebergs
- 5 More than 10 growlers and bergy bits - no icebergs
- 6 1-5 icebergs with growlers and bergy bits
- 7 6-10 icebergs with growlers and bergy bits
- 8 11-20 icebergs with growlers and bergy bits
- 9 More than 20 icebergs with growlers and bergy bits - a major hazard to navigation
- / Unable to report, because of darkness, lack of visibility, or because only sea ice is visible

D_i**BEARING OF PRINCIPAL ICE EDGE****Code
figs.**

- 0 Ship in shore or flaw lead
- 1 Principal ice edge towards NE
- 2 Principal ice edge towards E
- 3 Principal ice edge towards SE
- 4 Principal ice edge towards S
- 5 Principal ice edge towards SW
- 6 Principal ice edge towards W
- 7 Principal ice edge towards NW
- 8 Principal ice edge towards N
- 9 Not determined (ship in ice)
- / Unable to report, because of darkness, lack of visibility, or because only ice of land origin is visible

Z_i**PRESENT ICE SITUATION AND TREND OVER PRECEDING 3 HOURS****Code
figs.**

- 0 Ship in open water with floating ice in sight
 - 1 Ship in easily penetrable ice; conditions improving
 - 2 Ship in easily penetrable ice; conditions not changing
 - 3 Ship in easily penetrable ice; conditions worsening
 - 4 Ship in ice difficult to penetrate; conditions improving
 - 5 Ship in ice difficult to penetrate; conditions not changing
 - 6 Ice forming and floes freezing together
 - 7 Ice under slight pressure
 - 8 Ice under moderate or severe pressure
 - 9 Ship beset
 - / Unable to report, because of darkness, lack of visibility
- } *Ship in ice*
- } *Ship in ice difficult to penetrate and conditions worsening*

T_dT_dT_d

DEW POINT CALCULATION TABLE

Subtract wet-bulb temperature from dry-bulb temperature to get "wet-bulb depression." Locate nearest depression across top of table and nearest wet-bulb temperature down the side. Read encoded dew point at intersection of wet-bulb temperature row and depression column. The dew point temperature, T_dT_dT_d, should always be less than the air temperature TTT. More extensive tables are in the NWS Observing Handbook No. 1.

Wet-Bulb Temp. (°C)	Wet-Bulb Depression °C																						
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.5
-5	-6	-7	-8	-9	-11	-13	-14	-17	-19	-20	-27	-28											
-4	-5	-6	-7	-8	-9	-11	-12	-14	-16	-18	-22	-26	-33										
-3	-3	-4	-5	-7	-8	-9	-11	-12	-14	-16	-19	-22	-26	-32	-47								
-2	-2	-3	-4	-5	-6	-7	-9	-10	-12	-14	-16	-18	-21	-25	-30	-31							
-1	-1	-2	-3	-4	-5	-6	-7	-8	-10	-11	-13	-15	-17	-20	-23	-28	-36						
0	00	-1	-2	-2	-3	-4	-5	-7	-8	-9	-10	-12	-14	-16	-19	-22	-26	-32					
+1	01	00	-1	-1	-2	-3	-4	-5	-6	-7	-9	-10	-12	-13	-15	-18	-20	-24	-29	-39			
2	02	01	01	00	-1	-2	-3	-4	-5	-6	-7	-8	-9	-11	-12	-14	-17	-19	-22	-27	-34		
3	03	02	02	01	00	-1	-1	-2	-3	-4	-5	-6	-7	-9	-10	-12	-13	-15	-18	-21	-24	-30	-30
4	04	03	03	02	01	00	01	00	-1	-2	-3	-4	-5	-7	-8	-9	-11	-12	-14	-16	-19	-22	-26
5	05	04	04	03	02	01	01	00	-1	-2	-3	-4	-5	-6	-7	-8	-9	-11	-13	-15	-17	-19	-19
6	06	06	05	04	04	03	03	02	01	01	00	-1	-2	-3	-4	-5	-6	-7	-8	-10	-11	-13	-15
7	07	07	06	06	05	04	04	03	03	02	01	01	00	-1	-2	-3	-4	-5	-6	-7	-8	-10	-11
8	08	08	07	07	06	06	05	04	04	03	03	02	01	01	00	-1	-2	-3	-4	-5	-6	-7	-8
9	09	09	08	08	07	07	06	06	05	05	04	03	03	02	01	01	00	-1	-2	-3	-4	-5	-6
10	10	10	09	09	08	08	07	07	06	06	05	05	04	03	03	02	01	00	-1	-1	-1	-2	-3
11	11	11	10	10	09	09	09	08	08	07	07	06	06	05	04	03	02	01	00	00	00	00	-1
12	12	12	11	11	11	10	10	09	09	08	08	07	07	06	06	05	05	04	04	03	02	02	01
13	13	13	12	12	12	11	11	10	10	10	09	09	08	08	07	07	06	06	05	05	04	04	03
14	14	14	13	13	13	12	12	12	11	11	10	10	10	09	09	08	08	07	07	06	06	05	05
15	15	15	14	14	14	13	13	13	12	12	11	11	10	10	10	09	09	08	08	07	07	06	06
16	16	16	15	15	15	15	14	14	14	13	13	13	12	12	11	11	11	10	10	09	09	08	08
17	17	17	16	16	16	16	15	15	15	14	14	14	13	13	13	12	12	12	11	11	10	10	10
18	18	18	18	17	17	17	16	16	16	16	15	15	15	14	14	14	13	13	13	12	12	11	11
19	19	19	19	18	18	18	17	17	17	17	16	16	16	15	15	15	15	14	14	14	13	13	13
20	20	20	20	19	19	19	19	18	18	18	17	17	17	16	16	16	16	15	15	15	14	14	14
21	21	21	21	20	20	20	20	19	19	19	19	18	18	18	17	17	17	17	16	16	16	16	15
22	22	22	22	21	21	21	21	21	20	20	20	20	19	19	19	19	18	18	18	17	17	17	17
23	23	23	23	22	22	22	22	22	21	21	21	21	20	20	20	20	20	19	19	19	19	18	18
24	24	24	24	23	23	23	23	23	22	22	22	22	22	21	21	21	21	20	20	20	20	20	19
25	25	25	25	24	24	24	24	24	24	23	23	23	23	23	22	22	22	22	21	21	21	21	21
26	26	26	26	26	25	25	25	25	25	24	24	24	24	24	23	23	23	23	22	22	22	22	22
27	27	27	27	27	26	26	26	26	26	26	25	25	25	25	24	24	24	24	24	24	23	23	23
28	28	28	28	28	27	27	27	27	27	27	26	26	26	26	26	26	25	25	25	25	25	24	24
29	29	29	29	29	28	28	28	28	28	28	27	27	27	27	27	27	27	26	26	26	26	26	25
30	30	30	30	30	29	29	29	29	29	29	29	29	28	28	28	28	28	27	27	27	27	27	27
31	31	31	31	31	31	30	30	30	30	30	30	30	29	29	29	29	29	28	28	28	28	28	28
32	32	32	32	32	32	31	31	31	31	31	31	31	30	30	30	30	30	30	29	29	29	29	29
33	33	33	33	33	32	32	32	32	32	32	32	32	32	31	31	31	31	31	31	31	30	30	30
34	34	34	34	34	34	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	31	31
35	35	35	35	35	35	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	32

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