

Composed August, 1957

MARINE SURFACE OBSERVATIONS FROM ARCTIC AND ANTARCTIC SOURCES IN THE ATLANTIC OCEAN REGION

The data for this Reference Manual was taken from several different sources as follows: (1) Danish deck logs of selected and supplementary ships for scattered periods 1860-1956, for regions north of 50°N. and between 60°W. and 20°E. (See page 2 for reporting practices). (2) Scottish Antarctic Expedition, 1902-1904, aboard the SCOTIA, between 53°-70°S. and 17°-53°W. (Page 3). (3) French Second Antarctic Expedition, 1908-1910, aboard the FOURQUOI PAS, between 52°-70°S. and 63°-122°W. (Page 4). (4) Russian Expedition aboard the G. J. SEDOV, in the vicinity of Foka Bay, Novaya Zemlya, 76°N. 60°E., for period 1912-1913, and voyage to Franz Josef Land, 80°N. 53°E., for period 1913-1914. The data was punched for six-hourly observations. Hourly data is available at NWRC for: wind direction, velocity, temperature, relative humidity, cloud amount in tenths, cloud type and direction, present weather, and additional meteorological statistical tabulations filed under microfilm reference reel 28, special study film. (Page 5). (5) British Expedition aboard the: (a) RRS DISCOVERY, 11/16/25-8/29/27, (b) RRS WM. SCORESBY, 8/25/26-2/24/38, 1/18/50-10/14/50, in the vicinity of South Georgia and South Shetland Islands, 55°S. 37°W., and 63°S. 60°W., respectively. (Page 6).

GENERAL PRACTICES

The general practices for reporting data from the various sources are as follows:

- (1) Wind and sea directions were reported in magnetic or true direction. Magnetic data was converted to true direction.
- (2) Wind velocity may have been reported in Beaufort force, knots, meters per second, kilometers per hour, and Ben Nevis Observatory Code. All data except those reported in knots were converted to Beaufort force, and punched in cols. 22-23. Those reported in knots were punched in cols. 74-75.
- (3) Sky cover or total amount of clouds was reported in tenths (punched in col. 24), eighths (punched in col. 25), and fourths. Those reported in fourths were from Danish logs of the B and C class (indicated on card with an "x" over-punch in col. 1) were converted to eighths and punched in col. 25.
- (4) Pressure was reported in (a) millimeters punched in cols. 28-31, (b) millibars punched in cols. 53-57, (c) English inches punched in cols. 66-69, (d) French inches and lines, manually converted to English inches, punched in cols. 66-69. All values not reported in millibars were then machine converted to millibars, and punched in cols. 53-57.
- (5) Temperatures for air and sea were reported in (a) degrees Centigrade punched in cols. 33-40, (b) degrees Fahrenheit punched in cols. 59-63. All were machine converted and punched in Fahrenheit values in cols. 59-63. The air-sea temperature difference was computed during conversion from degrees Centigrade to Fahrenheit. Wet bulb temperature was reported in degrees Centigrade and degrees Fahrenheit. Fahrenheit temperatures were machine converted to degrees Centigrade.
- (6) State of sea was reported in Douglas and Paris 1919 code. Converted to Paris code for punching. When sea direction (col. 43) was missing, wind direction (cols. 20-21) was punched in cols. 41-42.
- (7) The cloud types were reported and punched in the 1929 code for the period prior to 1/1949 (see Tables 9A, 11A, 12A). Thereafter, the 1949 code was in use (see Tables 9B, 11B, 12B).

UNUSUAL FEATURES

The data coming from distinctly different sources used different reporting practices and different units for reporting the same elements. This necessitated punching the same element in several fields to permit machine conversion to a common unit for data processing.

- (A) Present weather was reported in (1) Beaufort symbol code, (2) Beaufort notation code, (3) 1929, 00-99 code, (4) 1949, 00-99 code. All present weather data was converted and punched to a modified 1949, 00-99 code. During the period that used the Beaufort method, only precipitation and obscuration to vision were reported; therefore, when these values were not reported for the observation, the columns were left blank.
- (B) Cloud types were reported by various methods. When cloud type was not reported, and it was not possible to determine amounts for the varying levels, the columns were left blank rather than filling in zeros. Clouds for the period prior to 1949 were punched according to the 1929 code; thereafter, the 1949 code.
- (C) To facilitate tracing of the data back to its original source when necessary, cols. 78-80 were punched according to the code sheet number. The original records are available at the National Weather Records Center, Climatic Analysis Section, filed under Deck 197 source data.

WEATHER ELEMENTS PUNCHED

Weather elements punched varied according to the source. Data when available was punched according to the sample card on Page 7.

Data from Danish Source for Selected and Supplementary Ships Reported in the Following Manner

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"x" overpunch in col. 1 = B and C logs for period prior to 1923. "x" overpunch in col. 2 = 2 ships with identical log numbers. "x" overpunch col. 4 = selected ships. No "x" in cols. 1-4 = D and E logs, D = Period 1923-1932, E = 1933-1956.

1860-1956.

01-12.

01-31.

Reported in IST and GMT. 00, 12, observations.

(Table 1). Indicate by position.

Vicinity of 50°-60°N. to 1/10° or minutes.

Vicinity of 60°W.-20°E. to 1/10° or minutes.

(Table 2). 16 pts. of 32 pts., or 36 pts. Occasionally reported in magnetic, corrected to true direction. All data converted to 16 pts. of 32 pts.

(Table 3). In knots and Beaufort, machine converted to Beaufort when necessary. Danish sources did not report tenths.

(Table 4). In 8ths. Logs B and C reported in 4ths (indicated by "x" overpunch in col. 1) and converted to 8ths.

(Table 5). Selected ships used International 1929 code prior to 1949, and 1949 code thereafter. Supplementary ships reported only precipitation and obscuration to vision according to Table 5A.

(Table 6). Some observations reported pressure in millimeters. Machine converted to millibars, cols. 53-56.

(Table 7). In 0-9 and 90-99 code. The latter was punched by dropping the 9 from the tens position. To 1/10°C.

To 1/10°C.

(Table 2). 16 pts. of 32 pts. Also 36 pts. Magnetic changed to true direction.

(Table 8). Paris 1919 code.

Occasionally reported sea height in meters and tenths.

In 8ths.

(Tables 9 and 9A). In 1929 code prior to 1/49. 1949 code thereafter.

(Table 10).

(Tables 11 and 11A). In 1929 code prior to 1/49. 1949 code thereafter.

(Tables 12 and 12A). In 1929 code prior to 1/49. 1949 code thereafter.

(Table 13).

(Table 14). 8 points of a 32 point compass.

(Tables 6A, B and C). In millimeters, English inches, French inches and lines, and millibars.

(Table 15). Only for selected ships.

Not reported.

Not reported.

Not reported.

(Tables 6B and C). Occasionally reported in inches. When reported in French inches and lines, data was hand converted to English inches and punched in these columns. Machine converted to millibars in cols. 53-57.

Not reported.

Occasionally reported in knots. Machine converted to Beaufort in cols. 22 & 23.

Not reported.

Recorded on code sheets numbered 1-499. 36 observations to a page. The initial Danish 7,000 observations did not have these columns punched.

REFERENCE MANUAL DECK 197

Reporting Practices of the RRS SCOTIA

Scottish National Antarctic Expedition - 1902-1904

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REFERENCE MANUAL

Blank.

Period of record 1/28/03-5/4/04.

01-12.

01-31.

In IST, machine converted to GMT. 4-hourly observations.

(Table 1). Indicate by position.

Vicinity of 53°-70° S.

Vicinity of 17°-53° W.

16 points of 32 point compass.

In force scale devised by Ben Nevis Observatory, converted to Beaufort.

In tenths.

Not reported.

(Table 5). In Beaufort symbols.

Not reported.

Not reported.

Not reported.

Not reported.

(Table 2). 16 points of 32 point compass.

(Table 8). 0-9, Paris 1919 code.

Not reported.

Not reported.

K = cumulus.

Not reported.

N = nimbus, AK = altocumulus, AS = altostratus.

CK = cirrocumulus.

Not reported.

Not reported.

Machine converted from cols. 66-69.

Not reported.

To 1/10° F.

Not reported.

Not reported.

In English inches to hundredths. Machine converted to millibars
cols. 53-57.

To 1/10°. (12 punch col. 70 indicates degrees Fahrenheit).

Not reported.

Per cent reported.

799 series. Original data recorded on microfilm.

REFERENCE MANUAL DECK 197

Data from French Source Reported in the Following Manner

Second French Antarctic Expedition
1908-1910
Aboard the POURQUOI PAS
Directed by Dr. Jean Charcot

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WEATHER BUREAU, CLIMATOLOGICAL SERVICES DIV.

REFERENCE MANUAL

Blank.

1/6/10-1/30/10.

01.

06-30.

In IST and machine converted to GMT. 4-hourly observations.

(Table 1). Indicate by position.

Vicinity of 52°-70° S.

Vicinity of 63°-122° W.

16 points of 32 point compass.

In kilometers per hour.

In tenths.

Not reported.

(Table 5). In Beaufort symbols. When precipitation or obscuration of vision were not reported, these columns were not punched.

In millimeters. Machine converted to millibars cols. 53-57.

Not reported.

To 1/10°C.

To 1/10°C.

Not reported.

Not reported.

Not reported.

Not reported.

K = cumulus, KN = cumulonimbus, S = stratus.

Not reported.

N = nimbus, AK = altocumulus.

CK = cirrocumulus, C = cirrus.

Not reported.

Not reported.

Machine converted from millimeters cols. 28-31.

Not reported.

Reported and punched.

798 series. Original data recorded on microfilm.

Data from Russian Source Reported in the Following Manner

Passage aboard the G. J. SEDOV from the White Sea to Foka Bay, Novaya Zemlya, 9/1/1912-9/17/1912, 68.0°N. 41.5°E. to 76.3°N. 58.3°E. Winter Station 9/17/1912-9/6/1913, 76.0°N. 59.9°E. Passage from Novaya Zemlya to Franz Josef Land 9/7/1913-9/13/1913, 75.8°N. 57.4°E. to 79.3°N. 49.3°E. Wintered at Calm Bay, Franz Josef Land 9/14/1913-7/31/1914, 80.3°N. 52.8°E.

Blank.

1912-1914.

01-12.

01-31.

In IST machine converted to GMT. 4-hourly observations.

(Table 1). Indicate by position.

Reported in degrees and minutes.

Reported in degrees and minutes.

16 points of 32 point compass.

In meters per second at winter station, and Beaufort at sea.

In tenths.

Not reported.

(Table 5). In Beaufort symbols. When precipitation or obscuration of vision were not reported, these columns were not punched.

All pressures were reported in millimeters and were machine converted to millibars, cols. 53-57.

Not reported.

To 1/10°C.

To 1/10°C.

Not reported.

Not reported.

Not reported.

Not reported.

Seldom reported.

Not reported.

Seldom reported.

Seldom reported.

Not reported.

Not reported.

All pressures were reported in millimeters and machine converted to millibars.

Not reported.

Reported occasionally.

800-999 series. Original data recorded on microfilm.

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Data from British Source Reported in the Following Manner

- A. RRS DISCOVERY (a) 11/16/25-8/29/27, (b) 1/20/30-3/28/38
 B. RRS WM. SCORESBY (a) 8/25/26-2/24/38, (b) 1/18/50-10/14/50
 In Vicinity of South Georgia and South Shetland Islands

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REFERENCE MANUAL

Blank.

See period above.

01-12.

01-31.

In IST converted to GMT, 3 or 4-hourly observations.

(Table 1). Indicate by position.

55°S. 37°W. and 63°S. 60°W., respectively.

55°S. 37°W. and 63°S. 60°W., respectively.

(Table 2). 16 points of 32 point compass.

(Table 3). In Beaufort 00-12. (Knots for varying periods punched in cols. 74-75).

Not reported.

Not reported.

(Table 5). In Beaufort weather notation. Symbols b, bc, c, and o, were not punched. When precipitation or obscuration of vision were not reported, these columns were not punched.

Not reported in millimeters.

(Table 7). 0-9 code.

In 1/10°C.

In 1/10°C. frequently.

(Table 2). 16 points of 32 point compass.

(Table 8). In Douglas and Paris 1919 codes. Converted to Paris code for punching.

Not reported.

Not reported.

Not reported.

Not reported.

Not reported.

Not reported.

Not punched.

Not punched.

In corrected 1/10 millibar values.

Not reported.

Not reported.

Not reported.

Not reported.

All pressures reported to 1/10 millibars in cols. 53-57.

To 1/10°C. frequently.

In knots during varying periods of record.

Not reported.

500 to 797 series.

Table 1 - Q - Col. 13

Symbol Q—Octant of the Globe

CODE FIGURES	LONGITUDE	CODE FIGURES	LONGITUDE
0	North latitude: 0° W. to 90° W.	5	South latitude: 0° W. to 90° W.
1	90° W. to 180° W.	6	90° W. to 180° W.
2	180° E. to 90° E.	7	180° E. to 90° E.
3	90° E. to 0° E.	8	90° E. to 0° E.

Table 2 - dd, ds - Cols. 20-21, 41-42

Wind (dd) or Sea (ds) Direction

16 pts. of 32 pts.	36 pts.	16 pts.	Limits in Degrees	Direction
02	02	01	011-032	NNE
04	05	02	033-055	NE
06	07	03	056-077	ENE
08	09	04	078-100	E
10	11	05	101-122	ESE
12	14	06	123-145	SE
14	16	07	146-167	SSE
16	18	08	168-190	S
18	20	09	191-212	SSW
20	23	10	213-235	SW
22	25	11	236-258	WSW
24	27	12	259-280	W
26	29	13	281-303	WNW
28	32	14	304-325	NW
30	34	15	326-348	NNW
32	36	16	349-010	N
00	00	00	Calm	Calm
Blank	Blank	Blank	Missing	

Table 3 - FF, ff - Cols. 22-23, 74-75

Symbol ff or F - Wind Speed

Beaufort	MPH	Knots	MPS	Km/hr	Description
00	1	1	0.0-0.2	1	Calm
01	1-3	1-3	0.3-1.5	1-5	Light air
02	4-7	4-6	1.6-3.3	6-11	Light breeze
03	8-12	7-10	3.4-5.4	12-19	Gentle breeze
04	13-18	11-16	5.5-7.9	20-28	Moderate breeze
05	19-24	17-21	8.0-10.7	29-38	Fresh breeze
06	25-31	22-27	10.8-13.8	39-49	Strong breeze
07	32-38	28-33	13.9-17.1	50-61	Moderate gale
08	39-46	34-40	17.2-20.7	62-74	Fresh gale
09	47-54	41-47	20.8-24.4	75-88	Strong gale
10	55-63	48-55	24.5-28.4	89-102	Whole gale
11	64-72	56-63	28.5-32.6	103-117	Storm
12	73	64	32.7	118	Hurricane

Ben Nevis Obs. Code	Beaufort Force	Knots
0	0	0
0-1	1	1-3
1	2	4-6
2	3	7-10
2-3	4	11-16
3	5	17-21
3-4	6	22-27
4	7	28-33
5	8	34-40
6	9	41-47
7	10	48-55
8	11	56-63
9	12	64-71
10	12	72-80
11	12	81-89
12	12	90

Table 4 - N, N_h - Cols. 24, 25, 46

Cloud Amount in Tenths		Cloud Amount in Eighths		
Punched	10ths	Punched	8ths	4ths
0	0	0	0	0
1	1	1	1	1
2	2	2	2	1
3	3	3	3	2
4	4	4	4	2
5	5	5	5	3
6	6	6	6	3
7	7	7	7	4
8	8	8	8	4
9	9	9	9	Obscured
X	10	Blank	Blank	Missing
Blank	Obscured or Unknown			

Punch Code	Danish	Russian	British	Definition
05	D	≡	Z	Haze
10			M	Fog vis. 1100-2200 yds.
13	L		L	Lightning
14				Precipitation in sight
18			q or RQ	Squalls
36			N/S	Drifting snow
38				Blowing snow
41			JF	Fog in patches
44	Tg	≡	f or fe	Fog, sky discernible
45	Tg	≡	f or fe	Fog, sky not discernible
50		o	d	Drizzle
56		o		Freezing drizzle
57		o	df	Drizzle and Fog
60	R	o	r	Rain
65	RTR	o	R	Heavy rain
66		o		Freezing rain
67	RTg	o	rf	Rain and Fog
69		o	rs	Rain and Snow
70	S	*	s	Snow
75	StK	*	S	Heavy snow
76		*		Ice crystals
77	STg	*		Snow and Fog
79	Slud		rs	Sleet
80	RS	o		Rain showers
84	EstK	o	P	Heavy rain showers
85	SB		S(P)	Snow showers
87	SBTg		PF	Showers and Fog
89	SH		h	Hail showers
95	Torden		t	Thunder
96	H		th	Thunder and Hail

Intensity Capital letters heavy
 " 0 = Light
 " 1 = Medium
 " 2 = Heavy

Table 5A - 1949 ww code (punch in col. 26-27)

Symbol ww—Present Weather

- ww=00-49 No Precipitation at the Ship at the Time of Observation
- 00-19 No precipitation, fog, duststorm, sandstorm, or drifting snow at the ship at the time of observation or during the preceding hour, except for 09 to 12
- 00 Cloud development not observed
- 01 Clouds generally dissolving or becoming less developed
- 02 State of sky on the whole unchanged
- 03 Clouds generally forming or developing
- 04 Visibility reduced by smoke, e. g., veidt or forest fires, industrial smoke or volcanic ashes
- 05 Dry haze
- 06 Widespread dust in suspension in the air, not raised by wind at or near the ship at the time of observation
- 07 Dust or sand raised by wind at or near the ship at the time of observation, but no well developed dust devil(s), and no duststorm or sandstorm seen
- 08 Well developed dust devil(s) seen at or near the ship within last hour, but no duststorm or sandstorm
- 09 Duststorm or sandstorm within sight of ship or at ship during the last hour
- 10 Light fog (visibility 1,000 m.; 1,100 yds. or more)
- 11 Patches of
- 12 More or less
- 13 Lightning visible, no thunder heard
- 14 Precipitation within sight, but not reaching sea at the ship
- 15 Precipitation within sight, reaching sea, but distant [i. e., estimated to be more than 5 km. (3 miles) from ship]
- 16 Precipitation within sight, reaching sea, near to but not at the ship
- 17 Thunder heard, but no precipitation at the ship
- 18 Squall(s)
- 19 Funnel cloud(s) (tornado) Within sight during the past hour or waterspout)
- 20-29 Precipitation, fog or thunderstorm at the ship during the preceding hour but NOT at the time of observation
- 20 Drizzle (not freezing)
- 21 Rain (not freezing)
- 22 Snow
- 23 Rain and snow
- 24 Freezing drizzle or freezing rain
- 25 Shower(s) of rain
- 26 Shower(s) of snow, or of rain and snow
- 27 Shower(s) of hail or of hail and rain
- 28 Fog
- 29 Thunderstorm (with or without precipitation)
- 30-39 Duststorm, sandstorm, or drifting snow
- 30 Slight or moderate duststorm or sandstorm, has decreased during last hour
- 31 Slight or moderate duststorm or sandstorm, no appreciable change during last hour
- 32 Slight or moderate duststorm or sandstorm, has increased during last hour
- 33 Severe duststorm or sandstorm, has decreased during last hour
- 34 Severe duststorm or sandstorm, no appreciable change during last hour
- 35 Severe duststorm or sandstorm, has increased during last hour
- 36 Slight or moderate drifting snow, generally low
- 37 Heavy drifting snow, generally low
- 38 Slight or moderate drifting snow, generally high
- 39 Heavy drifting snow, generally high
- 40-49 Fog at the time of observation
- 40 Fog at a distance at the time of observation, but not at the ship during the last hour, the fog extending to a level above that of the observer
- 41 Fog in patches
- 42 Fog, sky discernible
- 43 Fog, sky not discernible
- 44 Fog, sky discernible
- 45 Fog, sky not discernible
- 46 Fog, sky discernible
- 47 Fog, sky not discernible
- 48 Fog, depositing rime, sky discernible
- 49 Fog, depositing rime, sky not discernible
- 50-99 Precipitation at the Ship at the Time of Observation
- 50-59 Drizzle at time of observation
- 50 Drizzle, not freezing, intermittent
- 51 Drizzle, not freezing, continuous
- 52 Drizzle, not freezing, intermittent
- 53 Drizzle, not freezing, continuous
- 54 Drizzle, not freezing, intermittent
- 55 Drizzle, not freezing, continuous
- 56 Drizzle, freezing, slight
- 57 Drizzle, freezing, moderate or thick
- 58 Drizzle and rain, slight
- 59 Drizzle and rain, moderate or heavy

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REFERENCE MANUAL

197 - DANISH MARINE

Table 5B - 1929 ww Code Continued

60-69—Rain at time of observation

60 Rain, not freezing, intermittent } Slight at time of observation
 61 Rain, not freezing, continuous }
 62 Rain, not freezing, intermittent } Moderate at time of observa-
 63 Rain, not freezing, continuous } tion
 64 Rain, not freezing, intermittent } Heavy at time of observation
 65 Rain, not freezing, continuous }
 66 Rain, freezing, slight
 67 Rain, freezing, moderate or heavy
 68 Rain or drizzle and snow, slight
 69 Rain or drizzle and snow, moderate or heavy

70-79—Solid precipitation not in showers at time of observation

70 Intermittent fall of snow flakes } Slight at time of observation
 71 Continuous fall of snow flakes }
 72 Intermittent fall of snow flakes } Moderate at time of observation
 73 Continuous fall of snow flakes }
 74 Intermittent fall of snow flakes } Heavy at time of observation
 75 Continuous fall of snow flakes }
 76 Ice needles (with or without fog)
 77 Granular snow (with or without fog)
 78 Isolated starlike snow crystals (with or without fog)
 79 Ice pellets

80-99—Showery precipitation, or precipitation with current or recent thunderstorm

80 Rain shower(s), slight
 81 Rain shower(s), moderate or heavy
 82 Rain shower(s), violent
 83 Shower(s) of rain and snow mixed, slight
 84 Shower(s) of rain and snow mixed, moderate or heavy
 85 Snow shower(s), slight
 86 Snow shower(s), moderate or heavy
 87 Shower(s) of soft or small hail with or without rain or rain and snow mixed—Slight
 88 Shower(s) of soft or small hail with or without rain or rain and snow mixed—Moderate or heavy
 89 Shower(s) of hail with or without rain or rain and snow mixed, not associated with thunder—Slight
 90 Shower(s) of hail with or without rain or rain and snow mixed, not associated with thunder—Moderate or heavy
 91 Slight rain at time of observation
 92 Moderate or heavy rain at time of observation
 93 Slight snow or rain and snow mixed or hail* at time of observation
 94 Moderate or heavy snow, or rain and snow mixed or hail* at time of observation
 95 Thunderstorm, slight or moderate, without hail* but with rain and/or snow at time of observation
 96 Thunderstorm, slight or moderate, with hail* at time of observation
 97 Thunderstorm, heavy, without hail* but with rain and/or snow at time of observation
 98 Thunderstorm combined with duststorm or sandstorm at time of observation
 99 Thunderstorm, heavy, with hail* at time of observation

Thunderstorm during the preceding hour but not at time of observation

Thunderstorm at time of observation

*Hail, small hail, soft hail.

Table 5B - 1929 ww code

Symbols ww—Present weather

00-19. ABBREVIATED DESCRIPTION OF SKY AND SPECIAL PHENOMENA

- 00 Cloudless.
- 01 Partly cloudy.
- 02 Cloudy.
- 03 Overcast.
- 04 Low fog, whether on ground or over sea.
- 05 Haze (visibility 1,000 m., 1,100 yards or more).
- 06 Dust devils seen.
- 07 Distant lightning.
- 08 Light fog (visibility between 1,000 m. and 2,000 m., 1,100 yards and 2,200 yards).
- 09 Fog at a distance, but not at station (or ship).
- 10 Precipitation within sight.

- 11 Thunder, without precipitation at station (or ship).
- 12 Duststorm within sight, but not at station (or ship).
- 13 Ugly, threatening sky.
- 14 Squally weather.
- 15 Heavy equals } in last 3 hours.
- 16 Waterspouts seen }
- 17 Visibility reduced by smoke (industrial, grass or forest fires), or volcanic ashes.
- 18 Duststorm (visibility greater than 1,000 m., 1,100 yards).
- 19 Signs of tropical storm (hurricane).

20-29. PRECIPITATION IN LAST HOUR BUT NOT AT TIME OF OBSERVATION

- 20 Precipitation (rain, drizzle, hail, snow or sleet).
- 21 Drizzle
- 22 Rain } other than } In last hour
 23 Snow } showers. } but not at
 24 Rain and snow, mixed } } time of ob-
 25 Rain shower(s). } } servation.
 26 Snow shower(s). }
 27 Hail, or rain and hail shower(s).
 28 Slight thunderstorm.
 29 Heavy thunderstorm.

30-39. DUSTSTORMS AND STORMS OF DRIFTING SNOW (visibility less than 1,000 meters, 1,100 yards)

- 30 Dust or sand storm.
- 31 Dust or sand storm has decreased.
- 32 Dust or sand storm, no appreciable change.
- 33 Dust or sand storm has increased.
- 34 Line of duststorms.
- 35 Storm of drifting snow.
- 36 Slight storm of drifting snow } generally low
 37 Heavy storm of drifting snow }
- 38 Slight storm of drifting snow } generally high.
 39 Heavy storm of drifting snow }

40-49. FOG (visibility less than 1,000 meters, 1,100 yards)

- 40 Fog.
- 41 Moderate fog in last hour } but not at time of obser-
 42 Thick fog in last hour } vation.
 43 Fog, sky discernible } has become thinner during
 44 Fog, sky not discernible } last hour.
 45 Fog, sky discernible } no appreciable change dur-
 46 Fog, sky not discernible } ing last hour.
 47 Fog, sky discernible } has begun or become thick-
 48 Fog, sky not discernible } er during last hour.
 49 Fog in patches.

50-59. DRIZZLE (precipitation consisting of numerous minute drops)

- 50 Drizzle.
- 51 Intermittent } slight drizzle.
 52 Continuous }
 53 Intermittent } moderate drizzle.
 54 Continuous }
 55 Intermittent } thick drizzle.
 56 Continuous }
 57 Drizzle and fog.
 58 Slight or moderate } drizzle and rain.
 59 Thick }

60-69. RAIN

- 60 Rain.
- 61 Intermittent } slight rain.
 62 Continuous }
 63 Intermittent } moderate rain.
 64 Continuous }
 65 Intermittent } heavy rain.
 66 Continuous }
 67 Rain and fog.
 68 Slight or moderate } rain and snow, mixed.
 69 Heavy }

70-79. SNOW

- 70 Snow (or snow and rain, mixed).
- 71 Intermittent } slight snow in flakes.
 72 Continuous }
 73 Intermittent } moderate snow in flakes.
 74 Continuous }
 75 Intermittent } heavy snow in flakes.
 76 Continuous }
 77 Snow and fog.
 78 Grains of snow (frozen drizzle).
 79 Ice crystals; or frozen raindrops (sleet—U. S. definition).

80-89. SHOWER(S)

- 80 Shower(s).
- 81 Shower(s) of slight or moderate } rain.
 82 Shower(s) of heavy }
 83 Shower(s) of slight or moderate } snow.
 84 Shower(s) of heavy }
 85 Shower(s) of slight or moderate } rain and snow.
 86 Shower(s) of heavy }
 87 Shower(s) of snow pellets
 88 Shower(s) of slight or moderate } hail, or rain and
 89 Shower(s) of heavy } hail.

90-99. THUNDERSTORM

- 90 Thunderstorm.
- 91 Rain at time } thunderstorm during last
 92 Snow, or snow and rain } hour, but not at time of
 mixed, at time } observation.
 93 Thunderstorm, slight, without hail, but with rain (or snow)
 94 Thunderstorm, slight, with hail
 95 Thunderstorm, moderate, without hail, but with rain (or snow) } at time of
 96 Thunderstorm, moderate, with hail } observation.
 97 Thunderstorm, heavy, without hail, but with rain (or snow)
 98 Thunderstorm combined with duststorm
 99 Thunderstorm, heavy, with hail

Note.—In coding present weather (ww) the observer will use the highest applicable number.

Table 5C - Conversion Table 1929 to 1949 ww code

Conversion of Present Weather from 1929 Code to 1949 Code

Punched 49 Code	29 Code	Punched 49 Code	29 Code	Punched 49 Code	29 Code
00	00-03	35	—	68	68
03	13	36	36	69	69
04	17	37	35, 37	70	71
05	05	38	38	71	70, 72
06	—	39	39	72	73
07	18	40	09	73	74
08	06	41	49	74	75
09	12	42	43	75	76
10	08	43	44	76	—
11	—	44	40, 45	77	77, 78
12	04	45	46	78	79
13	07	46	47	79	—
14	—	47	42, 48	80	80, 81
15	—	48	—	81	82
16	10	49	—	82	—
17	11	50	51	83	85
18	14, 15	51	50, 52	84	86
19	16	52	53	85	83
20	21	53	54	86	84
21	22	54	55	87	87
22	23	55	56	88	—
23	24	56	—	89	88
24	—	57	57	90	89
25	25	58	58	91	—
26	26	59	59	92	91
27	27	60	61	93	—
28	41	61	60, 62	94	92
29	28, 29	62	63	95	90, 93, 95
30	31	63	64	96	94, 96
31	30, 32	64	65	97	97
32	33, 34	65	66	98	98
33	—	66	—	99	99
34	—	67	67	—	—

6A - PPP - mm. to mbs. - Cols. 28-31, 53-57

Table 6C -

PPP - Inches to Mbs. - Cols. 66-69, 53-57

BAROMETRIC MILLIMETERS (MERCURY) INTO MILLIBARS.

1 mm. = 1.33322387 mb.

Table with 11 columns (0-9) and 11 rows (450-790) showing barometric millimeter to millibar conversion.

SMITHSONIAN TABLES.

Symbol PPP—Barometric Pressure in Tens, Units, and Tenths of Millibars

(Omit Initial "9" or "10")

Table with 16 columns (in. mb. pairs) and 20 rows showing barometric pressure conversions.

Table 6B - PPP

- French Inches to Reg. Inches - Cols. 66-69

12 Lines = 1 Paris or French Inch

Comparison of the Old French and English Barometers.

1 Paris Line = 0.088814 English Inch.

Table with 11 columns (0-9) and 20 rows (26-348) showing French to English inch conversion.

Hundredths of a Line.

Table with 10 columns (0-9) showing hundredths of a line conversion.

Table 7 - vv - Col. 32

Symbol VV - Visibility

Table with 3 columns (Code Punched, Code, Visibility Range) showing visibility codes.

Table 8 - S - Col. 43

Sea Condition

Table with 4 columns (Code Punched, Height, Paris 1919, Douglas) showing sea condition codes.

Table 9A - Cl - 1929 Code - Col. 47

Use for period prior to 1/1949

CODE TABLE XIII

Symbol Cl - Form of low cloud

Table with 2 columns (Code Figures, Form of cloud) showing cloud codes and descriptions.

Table 9A - C_L - 1949 code - Col. 47

Use for period beginning 1/1949

Symbol C_L—Clouds of Types Stratocumulus, Stratus, Cumulus, and Cumulonimbus

CODE FIGURES	DESCRIPTION
0	No stratocumulus, stratus, cumulus, or cumulonimbus clouds.
1	Cumulus with little vertical development and seemingly flattened.
2	Cumulus of considerable development, generally towering, with or without other cumulus or stratocumulus; bases all at the same level.
3	Cumulonimbus with tops lacking clear-cut outlines but distinctly not cirriform or anvil-shaped; with or without cumulus, stratocumulus, or stratus.
4	Stratocumulus formed by the spreading out of cumulus; cumulus also often present.
5	Stratocumulus not formed by the spreading out of cumulus.
6	Stratus or fractostratus or both, but not fractostratus of bad weather.
7	Fractostratus and/or fractocumulus of bad weather ("scud") usually under altostratus and nimbostratus.
8	Cumulus and stratocumulus other than those formed by the spreading out of cumulus, with bases at different levels.
9	Cumulonimbus having a clearly fibrous (cirriform) top, often anvil-shaped, with or without cumulus, stratocumulus, stratus or "scud."

Table 10 - h - Col. 48

Symbol h—Height of Base of Cloud Above Sea

CODE FIGURES	FEET	METERS
0	0 to 150	0 to 50
1	150 to 300	50 to 100
2	300 to 600	100 to 200
3	600 to 1000	200 to 300
4	1000 to 2000	300 to 600
5	2000 to 3000	600 to 1000
6	3000 to 5000	1000 to 1500
7	5000 to 6500	1500 to 2000
8	6500 to 8000	2000 to 2500
9	No cloud below 8000	No cloud below 2500

Table 11A - C_M - 1929 code - Col. 49

Use for period prior to 1/1949

Symbol C_M—Form of middle cloud

Code figures	Form of cloud
0	No middle clouds.
1	Typical altostratus, thin.
2	Typical altostratus, thick (or nimbostratus).
3	Alto cumulus, or high stratocumulus, sheet at one level only.
4	Alto cumulus in small isolated patches; individual clouds often show signs of evaporation and are more or less lenticular in shape.
5	Alto cumulus arranged in more or less parallel bands, or an ordered layer advancing over sky.
6	Alto cumulus formed by spreading out of the tops of cumulus.
7	Alto cumulus associated with altostratus or altostratus with a partially alto cumulus character.
8	Alto cumulus castellatus, or scattered cumuliform tufts.
9	Alto cumulus in several sheets at different levels, generally associated with thick fibrous veils of cloud and a chaotic appearance of the sky.

Table 11B - C_M - 1949 code - Col. 49

Use for period beginning 1/1949

Symbol C_M—Clouds of Types Alto cumulus, Altostratus, and Nimbostratus

CODE FIGURES	DESCRIPTION
0	No alto cumulus, altostratus, or nimbostratus clouds.
1	Thin altostratus (semitransparent everywhere) through which the sun or moon would be seen dimly as through ground glass.
2	Thick altostratus, or nimbostratus.
3	Thin (semitransparent) alto cumulus; not changing much; at a single level.
4	Thin (semitransparent) alto cumulus in patches (often almond or fish-shaped); cloud elements continually changing and/or occurring at more than one level.
5	Thin (semitransparent) alto cumulus in bands or in a layer gradually spreading over the sky and usually thickening as a whole; it may become partly opaque or double-layered.
6	Alto cumulus formed by the spreading out of cumulus.
7	Any of the following cases: (a) Double-layered, alto cumulus, usually opaque in parts, not increasing; (b) a thick (opaque) layer of alto cumulus, not increasing; (c) altostratus and alto cumulus both present at the same or different levels.
8	Alto cumulus in the form of cumulus-shaped tufts or alto cumulus with turrets.
9	Alto cumulus of a chaotic sky; generally at different levels; dense cirrus in patches is usually also present.

Table 12A - C_H - 1929 code - Col. 50

Use for period prior to 1/1949

Symbol C_H—Form of high cloud (cirrus cloud)

Code figures	Form of cloud
0	No upper clouds (no high clouds).
1	Cirrus, delicate, not increasing, scattered and isolated masses.
2	Cirrus, delicate, not increasing, abundant but not forming a continuous layer.
3	Cirrus of anvil clouds, usually dense.
4	Cirrus, increasing, generally in the form of hooks ending in a point or in a small tuft.
5	Cirrus (often in polar bands) or cirrostratus advancing over the sky but not more than 45° above the horizon.
6	Cirrus (often in polar bands) or cirrostratus advancing over the sky and more than 45° above the horizon.
7	Veil of cirrostratus covering the whole sky.
8	Cirrostratus not increasing and not covering the whole sky.
9	Cirrocumulus predominating, associated with a small quantity of cirrus.

Table 12B - C_H - 1949 code - Col. 50

Use for period beginning 1/1949

Symbol C_H—Clouds of Types Cirrus, Cirrostratus, and Cirrocumulus

CODE FIGURES	DESCRIPTION
0	No cirrus, cirrocumulus, or cirrostratus clouds.
1	Filaments or strands of cirrus, scattered and not increasing (often "Marcus' tails").
2	Dense cirrus in patches or twisted sheaves usually not increasing; possibly but not certainly the remains of upper parts of cumulonimbus.
3	Cirrus, often anvil-shaped; either the remains of the upper portions of cumulonimbus or part of a distant cumulonimbus the rest of which is not visible.
4	Cirrus (often hook-shaped) gradually spreading over the sky and usually thickening as a whole.
5	Cirrus and cirrostratus, often in bands converging toward the horizon; or cirrostratus alone; in either case gradually spreading over the sky and usually thickening as a whole, but the continuous layer not reaching 45° altitude.
6	Cirrus and cirrostratus, often in bands converging toward the horizon; or cirrostratus alone; in either case gradually spreading over the sky and usually thickening as a whole, and the continuous layer exceeding 45° altitude.
7	Cirrostratus covering the whole sky.
8	Cirrostratus not increasing and not covering the whole sky; cirrus and cirrocumulus may be present.
9	Cirrocumulus alone or cirrocumulus with some cirrus or cirrostratus, but the cirrocumulus being the main cirriform cloud present.

Table 13 - K - Col. 51

Character of Swell (Cols. 62-64)

Code	Approx. Height Feet	Description
0	0	No swell
1	1-6	Low swell, short or avg. length
2	1-6	Low swell, long
3	6-12	Moderate swell, short
4	6-12	Moderate swell, avg. length
5	6-12	Moderate swell, long
6	12	Heavy swell, short
7	12	Heavy swell, avg. length
8	12	Heavy swell, long
9		Confused swell
Blank		Unknown

Table 14 - D_G - Col. 52

Code figures	True direction	Code figures	True direction
0	No sea or swell or ship heave to.	6	W.
1	NE.	7	NW.
2	E.	8	N.
3	SE.	9	All directions or no definite direction.
4	S.		
5	SW.		

Table 15 - W - Col. 58

Symbol W—Past Weather

CODE FIGURES	DESCRIPTION
0	Clear or few clouds.
1	Partly cloudy or variable sky.
2	Cloudy or overcast.
3	Sandstorm or duststorm or drifting or blowing snow.
4	Fog, smoke or thick dust haze.
5	Drizzle.
6	Rain.
7	Snow or rain and snow mixed or sleet.
8	Shower(s).
9	Thunderstorm with or without precipitation.