Translation Specifications (transpec) into IMMA1 format:
US Lightship Observations Digitized by NOAA's Climate Database Modernization Program (CDMP) / National Climatic Data Center (NCDC)
Updated: 21 April 2015

A. Data provenance and background

Records of the United States Coast Guard (RG26; http://www.archives.gov/research/guide-fed-records/groups/026.html) at NARA include meteorological reports from lightships and other vessels (or shore locations), extending at least from 1819 through 1974. Entries 79 and 159 in RG26 also contain a large collection of logbooks (e.g. deck logs) and journals for lightships, light vessels, revenue cutters and tenders, as well as light stations/houses and depots. The dates for the record entries are as follows: Entry 79 (1890-1939), Entry 159 (1819-1947), and Entry 330 (1948-1972). The earliest records contain primarily only wind directions, but similar to naval deck logs, post-1860 logs adhere to the Bureau of Navigation's format standard.

The following bullets and Table 1 describe the status of a WHOI project (http://www.whoi.edu/science/GG/woos/index.html) to image and digitize an East Coast (and limited temporal) selection of the US lightship records archived at NARA:

- WHOI forms have been imaged and loaded to EV2.
- Forms types are as follows: WB Form 1210F, WB Form 615-5, ESSA Form 72-1, NOAA Form 72-1, NOAA Form 72-1A, WB Form 1083, WB Form 1082, Form 1083, WB Form 610-7, WB Form 610.6-1, WB Form 1034, WB Form 630-8, Form No. 1130-AER, SC Form 444, NOAA Form 72-5A, ESSA Form 72-5, DATAC-ER 1
- Meteorological elements vary per station and are as follows: station/lightship name, octant/quadrant, latitude/longitude, observational time (GMT/LST), wind direction, wind velocity (mph, knots, beaufort scale), wind gusts, estimated wind speed and gusts, sea-level pressure (millibars and inches), station pressure (millibars and inches), altimeter, 3 hour pressure characteristic, 3 hour pressure change, 3 hour pressure tendency exceeding 9.9 millibars, dry bulb, wet bulb and dew point temperatures (Fahrenheit and Centigrade), relative humidity, sea-water temperature (Fahrenheit and Centigrade), wave direction (1st and 2nd wave group), wave period (1st and 2nd wave group, wave height (1st and 2nd wave group), state of sea (plain language remarks), swell direction, swell (low, moderate, heavy etc..) visibility (statute miles, nautical miles, yards, feet, kilometers), present weather, past weather, max and min thermometer at observation, time of precipitation or thunderstorm, total precipitation past 6 hours, total cloud amount, low/middle/high cloud type, height of lowest cloud, amount of lowest cloud, ceiling.

Table 1. The names of the 14 lightships keyed for the WHOI project, and their approximate period(s) of record (note: which may include missing periods, in the event no data were available).

Lightship Name	*Period(s) of record*

Ambrose	1937-74
Barnegat	1947-70
Boston	1958-75
Buzzards Bay	1958-80
Chesapeake	1947-65
Delaware	1961-70
Diamond Shoals	1947-67
Five Fathoms	1957-72
Frying Pan Shoals	1936-79
Georges Shoal AFS	1956-60
Nantucket	1916-18 and 1947-82
Pollock Rip	1947-69
Portland	1956-66
Savannah	1954-64

B. Form types and file names

Depending on the original form type, the data were transcribed into various formats. Each format is denoted by a corresponding letter included in the file name, e.g. Format A, Format B,…, Format H. Format designators and the main corresponding form type are included in Table 2.

The file names and corresponding Format Type are listed in Table 3. For unknown reasons, a format designator type 'D' does not exist.

Table 2. Format designators in filenames and form types associated with that format.
Green means translation and transpec complete for R3.0.
Yellow means translation complete, but transpec information not complete for R3.0.
Red means not translated for R3.0, to be completed for future releases.

Format Designator	**Original Observational Form Types**
A	WB 1083 (Revised 1942 & 1947); WB 1082
B	WB 1083 (Revised 1949); WB 610-7; WB 610.6-1
C	WB 1210F; WB 615-5; ESSA 72-1; NOAA 72-1; NOAA 72-1A
E	WB 1034
F	WB 630-8
G	NOAA 72-5A; NOAA 72-5; DATAC-ER 1
H	WB 1130 AER; SC 444

Table 3. WHOI Filenames and Format type designator. The format designator is included in the original file names.

Vessel Name and Period of Record	**Format Designator**
Ambrose 1943-1948	A
Barnegat 1947-1948	A
Chesapeake 1947-1949	A
Diamond Shoals 1947-1949	A
Frying Pan Shoals 1947-1950	A
Nantucket 1947-1949	A
Pollock Rip 1947-1948	A
Ambrose 1949-1958	B
Barnegat 1948-1957	B
Chesapeake 1949-1957	B
Diamond Shoals 1949	B
Frying Pan Shoals 1950-1957	B
Nantucket 1949-1957	B
Pollock Rip 1951-1957	B
Portland 1956-1958	B
Ambrose 1956-1974	C
Barnegat 1956-1970	C
Boston 1958-1975	C
Buzzards Bay 1958-1961	C
Chesapeake 1958-1965	C
Delaware 1961-1970	C
Diamond Shoals 1959-1967	C
Five Fathoms 1957-1972	C
Frying Pan Shoals 1956-1964	C
Frying Pan Shoals 1965-1968	C
Nantucket 1957-1982	C
Pollock Rip 1957-1969	C
Portland 1957-1966	C
Savannah 1957-1964	C
Frying Pan Shoals 1936-1940	E
Frying Pan Shoals 1941	E
Savannah 1954-1957	E
Chesapeake 1965	F
Savannah 1960-1964	F
Boston 1972-1975	G
Buzzards Bay 1966-1980	G
Chesapeake Lightship 1966-1979	G

Diamond Shoals 1966-1974	G
Frying Pan Shoals 1968-1979	G
Ambrose 1937-1941	H
Georges Shoal AFS 1956-1960	H

C. Input format

Each of the seven formats has slightly different input. Each field will be referenced based on format type designator noted in Table 2. For reference, original keying formats are included in Appendices A-G.

D. Individual data field translation actions

Note: fields omitted from this list have no corresponding input data, and are left missing (blank), similarly with any reported data elements that are missing in the originally data forms

Table C0. IMMA *Core*

1 *YR* year UTC

Formats A ,E, F:

Input field(s): 3. Year

Translation action: *YR*=None; originally reported in UTC

Format G:

Input field(s): 10. Year

Translation action: *YR*=Form types 72-5 and 72-5a reported in LST and converted to GMT per java method *conv_GMT.*

Form type DATAC-ER reported in GMT; no action needed.

2 *MO* month UTC

Formats A, E, F:

Input field(s): 4. Month

Translation action: *MO*= None; originally reported in UTC

Format G:

Input field(s): 11. Month

Translation action: DY=Form types 72-5 and 72-5a reported in LST and converted to GMT per java method *conv_GMT.*

Form type DATAC-ER reported in GMT; no action needed.

3 *DY* day UTC

Formats A, E, F:

Input field(s): 5. Day
Translation action: *DY*= None; originally reported in UTC

Format G:

Input field(s): 12. Day
Translation action: *DY*=Form types 72-5 and 72-5a reported in LST and converted to GMT per java method *conv_GMT.*
Form type DATAC-ER reported in GMT; no action needed.

4 *HR* hour UTC

Format A: Input field(s): 6. 75th Meridian Time; 7. Obser'tion began, __th Mer. Time or th Meridian Time (L.S.T.)
Translation action: *HR*= Convert Local Time to UTC per java method *conv_GMT.*

Format E:

Input field(s): 6. Time;
Translation action: *HR*= None; originally reported in UTC
Frying Pan reporting on 12 hour clock. Time converted to 24 hour clock by adding 12 to existing hour.

Format F:

Input field(s): 7. Time of observation;
Translation action: *HR*= None; originally reported in UTC
All reports this format are in GMT regardless of indicator (input field 6: Time Indicator).

Format G:

Input field(s): 13. Time
Translation action: *HR*=Form types 72-5 and 72-5a reported in LST and converted to GMT per java method *conv_GMT.*
Form type DATAC-ER reported in GMT; no action needed.

5 *LAT* latitude

Formats A, E, F:

Input field(s): None
Translation action: *LAT*=fixed location from Mark Seiderman's 'Station_positions.xls'

Format G:

Input field(s): 4-6 (Degrees, Min, Seconds)
Translation action: *LAT*= Boston Lightship lat not reported and added as fixed location from Mark Seiderman's 'Station_positions.xls'
All other stations lat degrees, minutes, seconds converted to degrees E per java method *conv_latDecimal*.

6 *LON* longitude

Formats A, E, F:

Input field(s): None

Translation action: *LON*=fixed location from Mark Seiderman's 'Station_positions.xls' converted to Degrees East

Format G:

Input field(s): 4-6 (Degrees, Min, Seconds)

Translation action: *LON*= Boston Lightship longitude not reported and added as fixed location from Mark Seiderman's 'Station_positions.xls'.

All other stations lat degrees, minutes, seconds converted to degrees E per java method *conv_lonDecimal*.

.

7 *IM* IMMA version=1

8 *ATTC* attm count

Formats A, E,F,G:

ATTC= 2

9 *TI* time indicator

Formats A, E, F, G:

Input field(s): none

Translation action: *TI*=2 (hours plus minutes)

10 *LI* latitude/long. indic.

Formats A, E, F:

Input field(s): none

Translation action: *LI*= 2 (degrees and minutes)

Formats G:

Input field(s): none

Translation action: *LI*= 3 (high resolution [e.g. hours to hundredths])

14 *II* *ID* indicator

Formats A, E, F, G:

Input field(s): none

Translation action: *II*= 6 (station name or number [WBAN])

15 *ID* identification/call sign

Formats A, E, F:

Input field(s): 2. WBAN Number

Translation action: *ID*=NCDC-assigned WBAN number

Format G:

Input field(s): 3. WBAN Number

Translation action: *ID*=NCDC-assigned WBAN number

16 C1 country code

Formats A, E, F, G:

Input field(s): none

Translation action: *C1*=US

17 *DI* wind direction indic.

Format A, E, G:

Input field(s): none

Translation action: *DI*=3 (16 of 32-point compass)

Format F:

Input field(s): none

Translation action: *DI*=0 (36-point compass)

18 *D* wind direction (true)

Format A:

Input field(s): 34. Wind Direction (16 pt)

Translation action: Parse the alphabetic direction True codes and transform them into the appropriate numeric D value in whole degrees; or store D=361 (calm) or D=362 (variable) as applicable. [Midpoints taken from {lmirlib} function {ixdcdd}]

Format E:

Input field(s): 9. Direction.True

Translation action: Parse the alphabetic direction True codes and transform them into the appropriate numeric *D* value in whole degrees; or store D=361 (calm) or D=362 (variable) as applicable. [Midpoints taken from {lmirlib} function {ixdcdd}]

Format F:

Input field(s): 9. Direction.True

Translation action: Convert 00-36 coded values to tens of degrees (i.e 0-360); or store D=361 (calm) or D=362 (variable) as applicable using java method *conv_codedWD*.

Format G:

Input field(s): 20. Wind Direction

Translation action: Parse the alphabetic direction True codes and transform them into the appropriate numeric *D* value in whole degrees; or store D=361 (calm) or D=362 (variable) as applicable. [Midpoints taken from {lmirlib} function {ixdcdd}]

19 *WI* wind speed indicator

Format A:

Input field(s): none

Translation action: WI=7=measured (original units unknown)

Actual values measured and reported are MPH, but there is no indicator in IMMA for MPH.

Format E:

Input field(s): 10. Wind Force/Speed Units Indicator

1. Frying Pan reports only in Beaufort
   WI=5=Beaufort
2. Savannah reports both mph and knots
   WI=7=mph
   WI=4=knots

Format F:

Input field(s): none

Translation action: WI=4=knots as noted on forms

Format G:

Input field(s): none

Translation action: WI=4=knots as noted on forms

20 *W* wind speed

Format A:

Input field(s): 35. Wind velocity (mph)

Translation action: MPH converted to m/s using java method *conv_mph2ms* based on [m/s = .44704 * mph] taken from NWS wind converter:
http://www.srh.noaa.gov/images/epz/wxcalc/windConversion.pdf

Format E:

Input field(s): 11. Wind Force/Speed

Translation action:

1. Frying Pan reports only in Beaufort; converted using java method *conv_beau2ms* based on ICOADS {lmrlib} function {fxbfms}
2. Savannah reports both mph and knots;
   - mph converted using java method *conv_mph2ms* based on 1 mph = 0.4470409 m/s] taken from: List, R.J., 1966: Smithsonian Meteorological Tables. Smithsonian Institution, Washington, DC, 527.
   - Knots converted to m/s using java method *conv_knt2ms* based on ICOADS {lmrlib} function {fxktms}

Format F:

Input field(s): 11. Wind Force/Speed

Translation action: Knots converted to m/s using java method *conv_knt2ms* based on ICOADS {lmrlib} function {fxktms}

Format G:

Input field(s): 21. Wind Force/Speed

Translation action: Knots converted to m/s using java method *conv_knt2ms* based on ICOADS {lmrlib} function {fxktms}

21 VI visibility indicator

Formats A, E, F, G:

Input field(s): none

Translation action: VI=0 estimated

22 VV visibility

Format A:

Input field(s): 17. Visibility (miles and fractions)

Translation action: Original units of visibility noted in field 16 (units indicator for observed visibility) as follows:

1 = No indication as to units, e.g. 1 ½ or 3/4.
2 = Statute miles and fractions, e.g. 1 ½ miles or 3/4 M.
3 = Yards
4 = Kilometers. WMO code (00-50 & 56-99). Add additional codes as required.
5 = Feet
6 = Nautical miles and fractions, e.g. 1 ½ or ¾ NM.
All values converted to US Nautical Miles then to WMO Code 4377 (90-99) per java method *conv_VVusnm2kmcode4377*

Format E:

Input field(s): 13. Visibility
Translation action: Convert to WMO Code Table 4377 (90-99).
Dept. Commerce adopted intl nautical mile 07/01/1954 (footnote, Pg 2: List 1966) - all obs before that are assumed US nautical mile. Savannah Lightship is only file for this format that has visibility obs, and only a few before 07/1954. Processed as US Nautical Mile prior to 07/1954.

Format F:

Input field(s): 11. Visibility
Translation action: None; values reported in 90-99 code

Format G:

Input field(s): 19 Visibility
Translation action: Convert yards to Intl Nautical Miles using [yd * 0.000568183] or statute miles to Intl Nautical Miles using [nm * 0.86897658], then to WMO Code 4377 (90-99) per java method *conv_VVinm2kmcode437*

23 *WW* present weather

Formats A, G:

Input field(s): 19. ww (present weather)
Translation action: convert coded values noted below to WMO code 4677 00-99 using java method *convPresWx_Alpha*
CR = 00 ‘Cloud development not observed’
CL (cloudy and lightning) = 17 ‘Thunderstorm but no precipitation at time of observation’
HZ,-HZ,+HZ,OH = 05 'Haze'
FG,-FG,+FG,FR = 41 'fog or ice fog in patches -- at time of observation'
RN,RQ = 63 'rain, not freezing, continuous (moderate at time of observation)'
LR,-RN,SP = 61 'rain, not freezing, continuous (slight at time of observation)'
+RN = 65 'rain, not freezing, continuous (heavy (dense) at time of observation)'
RS,RW = 80 'rain shower(s), slight'
ZR = 66 'rain, freezing, slight'
DZ = 53 'drizzle, not freezing, continuous (moderate at time of observation)'

-DZ = 51 'drizzle, not freezing, continuous (slight at time of observation)'
+DZ = 55 'drizzle, not freezing, continuous (heavy (dense) at time of observation)'
ZL = 56 'drizzle, freezing, slight'
SN = 73 'continuous fall of snowflakes (moderate at time of observation)'
LS, -SN = 71 'continuous fall of snowflakes (slight at time of observation)'
+SN = 75 'continuous fall of snowflakes (heavy (dense) at time of observation)'
SS = snow showers/flurries = 85 ‘Snow shower(s), slight’
SW = 85 'Snow shower(s), slight'
SQ = 18 'squalls'
SL = sleet = 79 ‘Ice pellets’
IP or E = 79 'ice pellets'
MI,–MI,BR = 10 'mist'
HL = 96 'Thunderstorm, slight or moderate, with hail at time of observation'
HU = 82 'Rain shower(s), violent'
TS = 18 'Thunderstorm, but no precipitation at the time of observation'

Format E:

Input field(s): 14. Weather

Translation action: *WW* Field not translated to IMMA1 format due to difficulty mapping to modern WW codes.

Format F:

Input field(s): 12. Present weather

Translation action: none; values reported in 00-99 code

24 *W1* past weather

Formats A,E,F,G:

Input field(s): none

Translation action: none; not reported.

25 *SLP* sea level pressure

Format A:

Input field(s): 31. Sea-level pressure (mb) and 38. Sea-level pressure (inches).

Translation action: Use values in field 31 (SLP mb) first for direct mapping to IMMA. If blank use SLP inches in field 38 and convert to mb per java method *conv_toMb.* Values were not reported in both columns.

Format E:

Input field(s): 7. Station Pressure/Barometer (corrected); inches Hg

Translation action: SLP= in Hg converted using java method *conv_toMb* based on ICOADS {lmrlib} function {fxeimb}

Unclear if pressure is station or sea level pressure, assuming the latter.

Format F:

Input field(s): 14. Sea level pressure; millibars

Translation action: Last 3 digits reported. Add 10 or 9 for mb to tenths.

Format G:

1) Input field(s): 35. Sea level pressure
Translation action: Values in hPa'; direct mapping to IMMA
2) Input field(s): 36. Station pressure (inches)
Translation action: Convert inches of mercury (mmHg) to hPa per java method *conv_toMb*. No corrections made to sea level.
3) Input field(s): 37. Station pressure (millibars)
Translation action: Convert inches of mercury (mmHg) to hPa per java method *conv_toMb*. No corrections made to sea level.

26 *A* characteristic of PPP

Formats A,E,G:

Input field(s): none
Translation action: none; not reported.

Format F:

Input field(s): 18. Characteristic of pressure change
Translation action: none; values reported in 0-8 code

27 *PPP* amount of pressure tendency

Formats A,E,G:

Input field(s): none
Translation action: none; not reported.

Format F:

Input field(s): 19. Amount of pressure change
Translation action: convert values using java method *conv_toMbTendency* to remove decimal.

28 *IT* indic. for temperatures

Format A:

Input field(s): none [all values reported in whole and or tenths degrees F]
Translation action: *IT*=7 whole or tenths °F (mixed precision among temperature fields)

Format E:

Input field(s): none [all values reported in whole degrees F]
Translation action: *IT*=6 (whole °F)

Format F:

Input field(s): 15. Temperature/Dew Point Indicator
Translation action:

1. Savannah Lightship: IT=6 (whole °F)
2. Chesapeake Lightship: IT=3 (whole or tenths °C (mixed precision among temperature fields)

Format G:

Input field(s): 33. Air Temperature Indicator

Note – Input field 33 only gives units of the measurements (F or C) and does not indicate precision. Additional information added to IMMA field IT per the following

Translation action:

1. Buzzards Bay Lightship/Frying Pan Shoals: IT=6 (whole °F)
2. Boston Lightship: IT=2 (whole °C) or IT =6 (whole °F)

29 *AT* air temperature

Format A:

Input field(s): 21. TT (dry bulb temperature)

Translation action: *AT*= Degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

Format E:

Input field(s): 8. Temperature of the Air (Dry Bulb)

Translation action: *AT*= Degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

Format F:

Input field(s): 16. Air Temperature (Dry Bulb Temperature)

Translation Action: AT = Degrees F converted to degrees C using java method *conv_SST* (from *conv_FtoC*) based on ICOADS {lmrlib} function {fxtftc}

Format G:

Input field(s): 34. Air Temperature

Translation action: Direct mapping to IMMA for values in degrees C. Otherwise, degrees F converted to degrees C per java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

30 WBTI WBT indicator

Format A:

Input field(s): none

Translation action: If positive, WBTI = 0 = Measured. If negative, WBTI = 2 = Ice Measured

Formats E,F,G:

Input field(s): none

Translation action: none

31 WBT wet-bulb temperature

Format A:

Input field(s): 22. Wet bulb temperature

Translation action: WBT = Degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

Formats E,F,G:

Input field(s): none

Translation action: none

32 DPTI DPT indic.

Format A:

Input field(s): none

Translation action: DPTI= 1 - computed

Formats E,G:

Input field(s): none

Translation action: none

Format F:

Input field(s): none

Translation action: DPTI= 1 - computed

33 DPT dew-point temperature

Format A:

Input field(s): 24. T_S T_S (Dew point temperature)

Translation action: DPT = Degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

Formats E,G:

Input field(s): none

Translation action: none

Format F:

Input field(s): 17. Dew Point Temperature

Translation action: Degrees F converted to degrees C using java method *conv_SST* (from *conv_FtoC*) based on ICOADS {lmrlib} function {fxtftc}

34 *SI* *SST* meas. Method

Formats A,E,F,G:

Input field(s): none. Method of SST measurement is not explicitly reported

Translation action: *SI*= 9 (unknown or non-bucket)

35 *SST* sea surface temp.

Format A:

Input field(s): 36. S_PS_P Special phenomenon general data

Translation action: *SST*= Degrees F converted to degrees C using java method *conv_SST* (from *conv_FtoC*) based on ICOADS {lmrlib} function {fxtftc}

Format E:

Input field(s): 18. Sea Water Temperature [Whole Degrees F]

Translation action: *SST*= Degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

Format F:

Input field(s): 21. Sea Water Temperature

Translation action: *SST*= Degrees F converted to degrees C using java method *conv_SST* (from *conv_FtoC*) based on ICOADS {lmrlib} function {fxtftc}

Format G:

Input field(s): 32. Sea Water Temperature

Translation action: *SST*= Direct mapping to IMMA for values in degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}. Otherwise, degrees F converted to degrees C using java method *conv_temp* based on ICOADS {lmrlib} function {fxtftc}

36 *N* total cloud amount

Format A:

Input field(s): 15. N (total cloud amount)

Translation action: *N*= Tenths sky covered converted to oktas (WMO Code 2700) using java method *conv_CloudAmt* based on ICOADS {lmrlib} function {ixt1ok}

Format E:

Input field(s): 13. Cloud Amount

Translation action: *N*= Tenths sky covered converted to oktas (WMO Code 2700) using java method *conv_CloudAmt* based on ICOADS {lmrlib} function {ixt1ok}

Format F:

Input field(s): none

Translation action: none

Format G:

Input field(s): 14. Sky Condition; 15. Present weather (first entry)

Translation action: None; no direct mapping to IMMA as coded values are recorded in multiple fields, sometimes conflicting. Potential to bias values if translated.

37 NH lower cloud amount

Format A:

Input field(s): 11. N_h (amount of lowest clouds)

Translation action: N_h = the fraction of the celestial dome covered by all the C_L cloud(s) present and, if no C_L cloud present, that fraction covered by all the C_M cloud (s) present.

Values converted to oktas (WMO Code 2700) using java method *conv_CloudAmt* based on ICOADS {lmrlib} function {ixt1ok}

Formats E,F,G:

Input field(s): none

Translation action: none

38 CL low cloud type

Format A:

Input field(s): 8. C_L (low cloud type)

Translation action: Directly mapped to IMMA using WMO code table 0513); code = (0-9, /), where / = A in IMMA

Formats E,F,G:

Input field(s): none

Translation action: none

39 HI H indic.

Format A:

Input field(s): none

Translation action: H is reported and HI assumed to be 0 = estimated

Translation action: none

Formats E,F,G:

Input field(s): none

Translation action: none

40 H cloud height

Format A:

Input field(s): 10. h (height of lowest cloud)

Translation action: Direct mapping from WMO Code 1600, where / = A

Formats E,F,G:

Input field(s): none

Translation action: none

41 CM middle cloud type

Format A:

Input field(s): 11. C_M (middle cloud type)

Translation action: Direct mapping from WMO Code 0515, where / = A

Formats E,F,G:

Input field(s): none

Translation action: none

42 CH high cloud type

Format A:

Input field(s): 12. C_H (high cloud type)

Translation action: Direct mapping from WMO Code 0509, where / = A

Formats E,F,G:

Input field(s): none

Translation action: none

43 WD wave direction

Format A, E:

Input field(s): none

Translation action: none

Format F:

Input field(s): 22. Direction from which waves are coming

Translation action: none; values in 00-36 code

Format G:

Input field(s): 31. Direction of waves

Translation action: convert 16 of 32 point compass Alpha directions to WMO Code 0877 using java method *conv_WaveDir*

44 WP wave period

Format A, E:

Input field(s): none

Translation action: none

Format F:

Input field(s): 23. Period of waves

Translation action: convert 0-9 code to seconds using LMR table F2-3 (http://icoads.noaa.gov/Release_1/suppF.html) for guidance

Format G:

Input field(s): 30. Wave period

Translation action: direct mapping of seconds to IMMA

45 WH wave height

Format A, E:

Input field(s): none

Translation action: none

Format F:

Input field(s): 24. Height of waves

Translation action: direct translation of half meters expressed as whole values 0-99

Format G:

Input field(s): 25. Wave height

Translation action: Wave heights indicator in field 24 provide information on whether the values are reported in 1=No units specified on form or 2=feet.

Regardless of indicator, all values appear to be in feet and are translated to ½ meters expressed as whole values 0-99 per java method *conv_ft2m*

46 SD swell direction

Formats A,E,F:

Input field(s): none

Translation action: none

Format G:

Input field(s): 26. Swell direction

Translation action: convert 16 of 32 point compass Alpha directions to WMO Code 0877 using java method *conv_WaveDir*

47 SP Swell period

Formats A,E,F,:

Input field(s): none

Translation action: none

Format G:

Input field(s): 29. Swell period

Translation action: direct mapping of seconds to IMMA

48 SH Swell height
Formats A,E,F,:
Input field(s): none
Translation action: none
Format G:
Input field(s): 28. Swell height
Translation action: Swell height indicator in field 27 provides information on whether the values are reported in 1=No units specified on form or 2=feet.
Regardless of indicator, all values appear to be in feet and are translated to ½ meters expressed as whole values 0-99 per java method *conv_ft2m*

Table C1. Icoads attm

1 *ATTI* attm ID=1
2 *ATTL* attm length=65

6 *DCK* Deck=*703*

7 *SID* source ID=*144*

8 *PT* platform type
Input field(s): none
Translation action: PT=4 (lightship)

Table C5: IMMT-5/FM 13 (*Immt*) attm:
Format E: not applicable
Table C6: Model quality control (*Mod-qc*) attm:
Format E: not applicable
Table C7: Ship metadata (*Meta-vos*) attm: not applicable
Format E: not applicable
Table C8: Near-surface oceanographic (*Nocn*) attm: not applicable
Format E: not applicable
Table C9: Near-surface oceanographic QC (*Nocq*) attm: not applicable
Format E: not applicable
Table C10: Edited cloud report information (*Ecr*) attm: not applicable
Format E: not applicable
Table C96: ICOADS Value-added Database (*Ivad*) attm: not applicable
Format E: not applicable
Table C97: Error (*Error*) attm: not applicable
Format E: not applicable
Table C98: Unique ID (*Uida*) attm: not applicable
Format E: not applicable
E. Supplemental data (Suppl; Table C99) attm layout

All Formats: Values in comma-separated value (CSV) format and file Format (e.g. A, B,…,H) appended as the first field of supplemental record.

References

List, R.J., 1966: Smithsonian Meteorological Tables. Smithsonian Institution, Washington, DC, 527 pp.

lmrlib: http://icoads.noaa.gov/software/lmrlib

Appendix A. Format 'A' Original keying format

WB Form 1083 (6- hourly synoptic observations) revised July 1, 1942 & July 1, 1947
WB Form 1082
Form 1083
(Revised Jan 2008 ?)

Position	Contents	Instructions
1 - 30	Station Name	Left justify, blank fill; For lightships pull name off official name list provided by NCDC, if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited
38 - 41	Year	e.g. 1947
42	,	Comma delimited
43- 44	Month	Month = 01-12
45	,	Comma delimited
46-47	Day	On all the 1083 forms prior to the 1/1/1949 revision, there are usually data spanning two dates (based on local time) on each form; e.g. Aug 7, 1948 to Aug 8,

		1948. It is critical that the correct date is associated with the correct local time. In this example the 0800 LST, 1400 LST, & 2000 LST observations are from Aug 7, 1948 and the 0200 LST is from Aug 8, 1948. Right justify, zero fill.
-	Greenwich Mean Time (G.M.T.)	Do not enter this parameter.
48	,	Comma delimited
49 - 53	75^{th} Meridian Time	The 75^{th} Meridian time that the observations were scheduled to be taken was preprinted on the forms. Right justify, zero fill. These should be entered as shown here, unless different from the following: Times listed on WB Form 1083 0730 E.S.T. Enter 0730E 1330 E.S.T. Enter 1330E 1930 E.S.T. Enter 1930E 0130 E.S.T. Enter 0130E Times listed on WB Form 1082 0430 E.S.T. Enter 0430E 1030 E.S.T. Enter 1030E 1630 E.S.T. Enter 1630E 2230 E.S.T. Enter 2230E Times listed on Form No. 1083 1:30 p. Enter 0130P 7:30 p. Enter 0730P 1:30 a. Enter 0130A 7:30 a. Enter 0730A
54	,	Comma delimited
55-59	Obser'tion began, __th Mer. Time or _th Meridian Time (L.S.T.)	Enter the time the observation was actually taken based on the entry in the LST for the Meridian Time meridian time zone. For all the

		east coast lightships the time corresponds to the 75th Meridian. The entry may = the scheduled time or vary somewhat e.g. the entry may = 0800LST in which case enter 0800L in positions 55-59. If no time is entered then blank fill and the default time is the scheduled time in positions 49-53. Insure the date agrees with the time.
60	,	Comma delimited
61-62	C_L (low cloud type)	Forms state "C_L Clouds, low (type and direction)" even though the C_L code is only a one digit WMO code (Table 0513); code = (0-9, /). Lightships rarely report clouds, but when reported they usually use an alphabetic abbreviation; e.g., SC for stratocumulus or CU for cumulus, etc. When the alpha abbreviation is used, positions 61-62 shall be filled as entered on the observational form; if the WMO code is used then enter the value (0-9 or /) in position 61 and blank fill position 62. If in a rare case the observer reported a cloud direction this should be entered in positions 70-72 (D_C), assuming no other entry in the D_C field. If an entry is in the D_C field then do not key the low cloud direction. If D_C not reported and no low cloud direction available for substitution, key the middle cloud direction if available, if not available then use the high cloud direction. If none available for substitution then blank fill the field.
63	,	Comma delimited

64-65	C_M (middle cloud type)	Use same rules for keying C_M (middle cloud type) as for low cloud type positions 61-62.
66	,	Comma delimited
67-68	C_H (high cloud type)	Use same rules for keying C_H (high cloud type) as for low cloud type positions 61-62.
69	,	Comma delimited
70 - 72	D_C (clouds, direction; C_L or C_M or C_H)	D_C is a one digit WMO code (0-9) representing the 8 cardinal directions. Although rarely entered, a few examples were located for land stations which used alpha entries (e.g. N, NE, etc.) for direction rather than the code values. For either alpha or numeric code entries left justify and blank fill. If no entry in the D_C field then substitute the movement of the cloud layers as described in positions 61-62.
73	,	Comma delimited
74	h (height of lowest cloud)	h - height above the ground (sea) of the base of the lowest cloud seen code figures = (0-9 or /). h in meters.
75	,	Comma delimited
76-77	N_h (amount of lowest clouds)	N_h - the fraction of the celestial dome covered by all the C_L cloud(s) present and, if no C_L cloud present, that fraction covered by all the C_M cloud (s) present. Code figure (0-10).

		Occasionally N_h was entered as a fraction. When this occurs use the following conversion codes: Fraction — Key 1/10 — 11 2/10 or 1/5 — 15 3/10 — 31 4/10 or 2/5 — 25 5/10 or ½ — 12 6/10 or 3/5 — 35 7/10 — 71 8/10 or 4/5 — 45 9/10 — 91 If code figure (0-10) key as entered on form, right justify and blank fill.
78	,	Comma delimited
79-80	h_ch_c (Ceiling)	h_ch_c - ceiling height code 00-99. Key as entered (although it is rarely if ever reported). Ceiling is not found on WB Form 1082 or Form 1083.
81	,	Comma delimited
82-83	N (total cloud amount)	N - The fraction of the celestial dome covered by cloud in tenths, code figure = 0-10 (same as N_h). Occasionally N was entered as a fraction. When this occurs use the following conversion codes: Fraction — Key 1/10 — 11 2/10 or 1/5 — 15 3/10 — 31 4/10 or 2/5 — 25 5/10 or ½ — 12 6/10 or 3/5 — 35 7/10 — 71 8/10 or 4/5 — 45 9/10 — 91

		If code figure (0-10) key as entered on form, right justify and blank fill. Often not reported by lightships, blank fill when not reported.
84	,	Comma delimited
85	Units indicator for observed visibility	1 = No indication as to units, e.g. 1 ½ or 3/4. 2 = Statute miles and fractions, e.g. 1 ½ miles or 3/4 M. 3 = Yards 4 = Kilometers. WMO code (00-50 & 56-99). Add additional codes as required. 5 = Feet 6 = Nautical miles and fractions, e.g. 1 ½ or ¾ NM.
86	,	Comma delimited
87 - 90	V-VV (visibility; miles & fractions)	The V and VV WMO codes were used when they filled out the coded message for transmission, but for the line 10 entry they generally used miles and fractions. Observers may occasionally use nautical miles. Therefore, positions 87 (tens position) & 88 are reserved for whole miles and positions 89 & 90 for fractions of miles; e.g. if 10 miles reported, then: Position 87 = 1 Position 88 = 0 Position 89 = blank Position 90 = blank If 5 miles reported, then: Position 87 = blank Position 88 = 5 Position 89 = blank Position 90 = blank

		If vsby entry = 2 ½ miles then: Position 87 = blank Position 88 = 2 Position 89 = 1 Position 90 = 2 For fractions of miles place the numerator in position 89 and the denominator in position 90, e.g. 1/5 mile reported: Position 87 = blank Position 88 = blank Position 89 = 1 Position 90 = 5 Occasionally the visibility is entered as a decimal. When this occurs the decimal entry should be converted to a fraction. If entry less than 1/10 mile key 00 and use the following conversion codes:

Entry	Fraction	Key
0.1	1/10	11
0.2	1/5	15
0.3	3/10	31
0.4	2/5	25
0.5	½	12
0.6	3/5	35
0.7	7/10	71
0.8	4/5	45
0.9	9/10	91

91	,	Comma delimited
92	Present Weather Indicator	0 = WMO two digit numerical code (00-99) 1 = Plain language comments; e.g. Clear, overcast, rain etc…
93	,	Comma delimited
94 - 95	ww (present weather)	Left justify, blank fill.

Flurries		ww - WMO present weather code 4677 , code figures = 00-99. Enter two digit code as entered on form. If more than one entry key the higher value. Many of the lightship observers use plain language comments; e.g. Clear, Overcast, Rain, etc… In these cases key enter the following codes in positions 94 and 95: CR = Clear PC = Partly Cloudy/Blue Sky Scattered Clouds BC = Broken Clouds CY = Cloudy/Overcast/Ovc/O CL = Cloudy & Lightning HZ = Hazy/Haze/Z FG = Fog RN = Rain LR = Light Rain DZ = Drizzle/L SN = Snow LS = Light Snow SS = Snow Showers/Snow RQ = Rain Squalls SQ = Squalls FR = Fog & Rain OH = Overcast & Haze SL = Sleet RS = Rain Showers HU = Hurricane This list is subject to revision upon discovery of additional plain language comments.
96	,	Comma delimited
97	W (past weather)	W - WMO code table 4500. Code figures 0-9. Enter the value as coded (0 -9). The past weather is often not reported by lightships.
98	,	Comma delimited

99-103	TT (dry bulb temperature) (t)	Temperature (t) in ^{o}F. Position 99 = sign field; if positive blank fill, if negative enter a dash (-). Positions 100-102 = whole numbers. Most temperature are not reported to tenths of degrees F, but space is provided (Position 103) for those cases where it might be reported. Most reports will be to whole degrees F, e.g. if 47 ^{o}F is reported, then: Position 99 = blank Position 100 = blank Position 101 = 4 Position 102 = 7 Position 103 = blank (tenths of degrees F) If report to tenths of ^{o}F, e.g. 75.6 then: Position 99 = blank Position 100 = blank Position 101 = 7 Position 102 = 5 Position 103 = 6 If -5 ^{o}F is reported then: Position 99 = - Position 100 = blank Position 101 = blank Position 102 = 5 Position 103 = blank
104	,	Comma delimited
105 - 108	Wet bulb temperature (t')	Wet bulb temperature (t') in ^{o}F. Position 105 = sign field. Follow same rules as for dry bulb temperature above, e.g. if 68.3 ^{o}F reported then: Position 105 = blank Position 106 = 6 Position 107 = 8

		Position 108 = 3 (reserved for tenths of ^{o}F)
109	,	Comma delimited
110 - 112	Difference (t - t')	Difference between dry bulb and wet bulb temperatures. Positions 110 -111 whole degrees, position 112 tenths of degrees, e.g. if difference is 7.5 ^{o}F, then: position 110 = blank Position 111 = 7 Position 112 = 5 (pos.112 reserved for tenths of ^{o}F)
113	,	Comma delimited
114 - 117	T_S T_S (Dew point temperature)	Dew point temperature (^{o}F), position 114 is the sign field (blank = positive, - (dash) = negative value) 115-116 whole ^{o}F, position 117 tenths ^{o}F, e.g. if T_S T_S = 43.6 ^{o}F, then: Position 114 = blank Position 115 = 4 Position 116 = 3 Position 117 = 6
118	,	Comma delimited
119 - 121	U - Relative humidity (%)	Relative humidity (0-100%), right justify, blank fill; e.g. if 82%, then: Position 119 = blank Position 120 = 8 Position 121 = 2
122	,	Comma delimited
-	Vapor Pressure (inches)	Do not key vapor pressure. Form No. 1083 contains Sea Water Temperature rather than Vapor Pressure. Key the sea water

		temperature in Positions 168-169.
123 -126	Min. thermometer at observation	The minimum temperature since the last 6 hourly observation. Position 123 = sign field, key - (dash) for negative values and leave blank for positive values. Positions 124-125 = whole ^{o}F, & position 126 = tenths ^{o}F. For example if min temp = -5.3 ^{o}F, then: Position 123 = - Position 124 = blank Position 125 = 5 Position 126 = 3 If report = 42 ^{o}F, then: Position 123 = blank Position 124 = 4 Position 125 = 2 Position 126 = blank
127	,	Comma delimited
-	Lowest tmp. past 12, 18 or 24 hours	Do not key this parameter.
128 -132	Max. thermometer at observation	The maximum temperature since the last 6 hourly observation. Position 128 = sign field, key - (dash) for negative values and leave blank for positive values. Positions 129-131 = whole ^{o}F, & position 132 = tenths ^{o}F. For example if max temp = -1.2 ^{o}F, then: Position 128 = - Position 129 = blank Position 130 = blank Position 131 = 1 Position 132 = 2 If report = 102 ^{o}F, then: Position 128 = blank Position 129 = 1 Position 130 = 0 Position 131 = 2 Position 132 = blank

133	,	Comma delimited
-	Highest tmp. past 12, 18 or 24 hours	Do not key this parameter.
134 - 136	R_S (depth of snow on ground)	This would not be reported by lightships, only land sites. Positions 134-135 for depth in whole inches and position 136 reserved for tenths of inches. The standard practice is to report only to the nearest whole inch, but some of the entries are to tenths of inches, thus the allowance. If the entry is 2.3 inches then: Position 134 = blank Position 135 = 2 Position 136 = 3 If entry = 2, then: Position 134 = blank Position 135 = 2 Position 136 = blank
137	,	Comma delimited
138 - 142	R_t time of precipitation or thunderstorm	Time of precipitation or thunderstorms. Generally only reported by land sites. Position 142 is reserved for AM or PM. A = AM P = PM If entry = 4:10 P, then enter: Position 138 = 0 Position 139 = 4 Position 140 = 1 Position 141 = 0 Position 142 = P If entry = 11:25 AM, then: Position 138 = 1 Position 139 = 1 Position 140 = 2 Position 141 = 5 Position 142 = A

143	,	Comma delimited
144 - 147	RR total precipitation past 6 hrs	Total precipitation during the past 6 hours/ amount of precipitation measured at observation time (every 6 hours). Not reported by lightships. Precipitation in inches and hundredths, decimal implied, e.g. if 1.15 reported, then: Position 144 = blank Position 145 = 1 Position 146 = 1 Position 147 = 5
148	,	Comma delimited
149 - 153	PPP Sea-level pressure (mbs)	Sea level pressure in millibars, decimal implied, e.g. if 1017.3 reported, then: Position 149 = 1 Position 150 = 0 Position 151 = 1 Position 152 = 7 Position 153 = 3 If sea level pressure reported to whole millibars, left justify and blank fill Position 153, e.g. if 1023 reported, then Position 149 = 1 Position 150 = 0 Position 151 = 2 Position 152 = 3 Position 153 = blank e.g. if 996 reported, then Position 149 = blank Position 150 = 9 Position 151 = 9 Position 152 = 6 Position 153 = blank Note: The observer occasionally reported the sea level pressure in inches. Key as entered on form, right justify, decimal implied.
154	,	Comma delimited

155	a (3 hour pressure characteristic) tendency	Characteristic of pressure during the three hours preceding the time of the observations, code figures = 0-9.
156	,	Comma delimited
157-158	pp (3 hour pressure change)	The 3 hour pressure change was recorded in hundredths of inches and then converted to fifths of millibars in the synoptic code (not keyed), e.g. if reported as .030 or .03 or -.03 or +.030 (inches), decimal implied, then: Position 157 = 0 Position 158 = 3 Sign provided in the characteristic of pressure tendency (position 155)
-	hhh (Height 850-mb. Surface)	Do not key this parameter
-	a_3	Do not key this parameter (Pressure characteristic for 3-hour period ending 3 hours ago)
159	,	Comma delimited
160 - 162	DD Wind direction (16 pt)	Wind direction, 16 point scale, left justify, blank fill. If Calm, code as C. For example if direction = ENE, then: Position 160 = E Position 161 = N Position 162 = E If Calm reported then : Position 160 = C Position 161 = blank Position 162 = blank If SW reported then: Position 160 = S Position 161 = W Position 162 = blank

		If EXN reported then: Position 160 = E Position 161 = X Position 162 = N
163	,	Comma delimited
164 - 166	F Wind velocity (mph)	Wind velocity in mph, right justify blank fill, e.g. if 15 mph reported, then: Position 164 = blank Position 165 = 1 Position 166 = 5 If observer enters a wind velocity less than 1 mph e.g. ¼, key as calm Position 164-165 = blank Position 166 = 0 If observer enters a whole number 16 plus a fraction ½ round to the nearest whole number: 16 ½ = 17 8 ¼ = 8
167	,	Comma delimited
168 -169	S_PS_P Special phenomenon general data in the detailed If numeric, is the	Sea surface temperature (water temperature) is often reported S_PS_P field and occasionally in the S_PS_P (special phenomenon, data) for lightships. assume the entry in these fields water temperature, key in these positions; e.g. if entry = 56, then Position 166 = 5 Position 167 = 6 The temperatures should always be positive, being in ^oF and at the lightship latitudes. In some cases sea surface temperatures are measured to tenths of a degree. When this situation occurs the value should be rounded to whole degrees;

e.g. if entry = 58.5, then:
Position 168 = 5
Position 169 = 9
e.g. if entry = 42.2, then:
Position 168 = 4
Position 169 = 2

170 , Comma delimited

171 s_ps_p (special phenomenon, temperature detailed data) Occasionally the water will be entered in the s_ps_p field, in which case it should be keyed in positions 168-169. Often the "state of the sea" is reported in the s_ps_p field as a plain language word entry, e.g. "slight". Code according to the following table; e.g. slight would be keyed as:
Position 171 = 2

172 , Comma delimited

173-176 Sea-level pressure (inches) Located on Line 43 of box labeled Computation of Sea-level Pressure.

Sea-level pressure in inches, Decimal implied, e.g. if 30.06 reported, then:
Position 173 = 3
Position 174 = 0
Position 175 = 0
Position 176 = 6

State of Sea

Scale	Description	Height of wave crest to trough	Abbreviation
0	Calm	0	Calm
1	Smooth	Less than 1 foot	Sm
2	Slight	1 to 3 feet	Sl

3	Moderate	3 to 5 feet	M
4	Rough	5 to 8 feet	R
5	Very rough	8 to 12 feet	VR
6	High	12 to 20 feet	H
7	Very High	20 to 40 feet	VH
8	Precipitous	Over 40 feet	P
9	Confused	.....	Con

Note: Do not key the following parmeters from Form No. 1083:

Character of pcpn or tstm
Amount of pcpn measured at obs.
Total precipitation past 12, 18, 24 hours
5,000-foot pressure
Pressure characteristic for 3-hr. period ending 3 hours ago
Direction highest wind past 6 hours
Highest 1-minute wind velocity past 6 hours
Initials of observer
Time of filing (L.S.T.)

Note: Only key values pertaining to Sea- level pressure (inches) entered in box titled "Computation of Sea-Level Pressure".

Note: Do not key any values entered in box entitled "Spaces for Coding Observations" on Form No. 1083 or "Spaces For Coding" WB Form 1082.

Note: The following elements are those commonly reported by lightships:

Visibility
Present Weather (ww)
Dry Bulb (air temperature)
Sea Level Pressure
Wind Direction
Wind Speed (velocity)
Water Temperature (sea temperature)
State of Sea (plain language remarks - see table above)

Note:

1) Whenever an element field has a value to be keyed, but the value cannot be termined because of illegibility or non-recognizable characters by the keyer then place a tilde (~) in the last position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view the image.

2) When the keyers encounter a “/” or “x” then they are to key a dash (-).

Appendix B. Format 'B' original keying format

WB Form 1083 (6- hourly synoptic observations) revised January 1, 1949
WB Form 610-7 (Revised 1-1-1955) (Formerly WB Form 610.6-1)
WB Form 610.6-1 (Revised 1-1-1955) (Formerly WB Form 1083)

Position	Contents	Instructions
1	Form type	Set indicator to form type 1 = 1083 2 = 610-7 3 = 610.6-1
2	,	Comma delimited
3 - 30	Station Name	Left justify, blank fill; For lightships pull name off official name list provided by NCDC, if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited
38 - 41	Year	e.g. 1947
42	,	Comma delimited
43- 44	Month	Month = 01-12
45	,	Comma delimited

46-47	Day	With the introduction of the 1/1/1949 revision to the 1083 forms, the dates are supposed to be the Greenwich date and the times entered on the form (actual observation time) are supposed to be in local standard time. The scheduled times are preprinted in both Greenwich and LST. Occasionally, the observer made non-standard entries, e.g. more than one date (May 22-23). In these cases enter the first day in positions 46-47. Right justify zero fill. When more than one day entered in the "Date (GCT)" field on the form then set the indicator in position 49 to reflect the number of days, e.g. if May 22-23 then set indicator = 2.
48	,	Comma delimited
49	Day Indicator	1 = only one day indicated (Jan 6) 2 = two days indicated (May 22-23) 3 = three days indicated (Feb 3-5), this would likely indicate an error. 4 = 4 days, etc.
50	,	Comma delimited
51- 54	Observational Time	If a time is entered in the field "Observation began (LST)" then this is the time to be entered in the positions 51-54, and set the correct time indicator in position 56 (= 1). If no time is entered in this space on the form, enter the preprinted local scheduled time from the form. Again set the correct indicator in position 56 (= 2). Occasionally they may enter

		the time in Greenwich, e.g. 1730Z; set indicator in position 56 (= 3). If time entry is entered in "Observation began (LST)" field but not followed by any letter, e.g. no "E", "C", etc., then set indicator in position 56 = 4.
55	,	Comma delimited
56	Time Indicator	1 = LST (time followed by a letter, e.g. 1840E, E representing Eastern Standard time, C = Central, M = Mountain, P = Pacific & LST or L = local standard time) 2 = no time entered, scheduled LST keyed as the observed time 3 = time entered is Greenwich Mean Time, often abbreviated as GCT, GMT or Z 4 = time entered in LST field, but no letter designator following the time, e.g. entry = 1840
s	Station Identification	Do not key this parameter.
57	,	Comma delimited
58 - 61	T_d T_d (Dew point temperature) (Entry location varies according to form type)	Dew point temperature on the **1083** form may appear as observed or as coded, or both. If both present, key only the observed value. The dew point temperature on the 1083 form is located in the order as staged here in the keying format. However, on the 610-7 and 610.6-1 forms the dew point

		temperature appears just prior to the app group where the Dc (direction of clouds) appears on the 1083 forms. Other than dropping the Dc and repositioning dew point, the order of all other elements remains the same for all three form types. The dew point from the 610 forms will have to be placed out of order in the output format from where it appears on the forms. Keying rules are as follows: Position 58 is the sign field: blank if positive, dash (-) if negative, 1 if coded value keyed. whole ^{o}F, positions 59-60 (right justify, zero fill), position 61 reserved for tenths of degrees Fahrenheit; e.g. if $T_d T_d$ (observed) = 6 then: Position 58 = blank Position 59 = 0 Position 60 = 6 Position 61 = blank If $T_d T_d$ = 97 (coded value only) then Position 58 = 1 Position 59 = 9 Position 60 = 7 Position 61 = blank
62	,	Comma delimited
63-64	N (total cloud amount)	N - The fraction of the celestial dome covered by cloud. The observed entry is in tenths while the coded entry is in eighths. Key the observed if available; otherwise, key the coded value.

		If observed (0-10), right justify & zero fill; if coded value (0-9,/) right justify & blank fill. Often not reported by lightships; blank fill when not reported.
65	,	Comma delimited
66-69	dd Wind direction (36 and 32 pt)	Key coded wind direction, left justify, blank fill. When encountering numeric field the observers entered a two digit (00-36) or three digit field (000-360). Key observed wind direction (alpha code) only when the coded value (00-36)/(000-360) is not available. For alpha code key calm as C, otherwise as entered; left justify blank fill. For example, if entry = 04 then: Position 66 = 0 Position 67 = 4 Position 68 = blank Position 69 = blank If 270 reported then: Position 66 = 2 Position 67 = 7 Position 68 = 0 Position 69 = blank If Calm reported then : Position 66 = C Position 67 = blank Position 68 = blank Position 69 = blank If SW reported then: Position 66 = S Position 67 = W Position 68 = blank Position 69 = blank If NEXE reported then: Position 66 = N Position 67 = E Position 68 = X Position 69 = E
70	,	Comma delimited

71	Wind Speed Indicator	1 = Speed is measured in miles per hour. 2 = Speed is measured in knots. 3 = Speed is measured using Beaufort scale. If no units indicated leave field blank.
72	,	Comma delimited
73-75	ff (Wind Velocity) (Observed)	The wind velocity as reported in the observed column. Separate wind velocity fields are established in the output format so the keyers must insure the values as entered are placed on the observational form. Right justify blank fill.
76	,	Comma delimited
77-79	ff (Wind Velocity) (Coded)	The wind velocity as reported in the Coded column. Both the observed and coded values are keyed to assist in determining the wind speed units. Wind velocity code table listed below.
80	,	Comma delimited
81	Units indicator for observed visibility	1= no indication as to units, e.g. 1 ½ or 1/4 2 = statute miles and fractions, e.g. 1 1/2 miles or 1/4M. 3 = yards 4 = WMO code (00-50 & 56-99) Add additional codes as required 5 = feet
82	,	Comma delimited

83-86	VV (visibility as observed)	The observed visibility is supposed to be reported in statute miles and fractions. However the observer did not always follow the rules. Some visibility entries may be nautical miles. If the observed visibility column has a value entered key it over the coded value since the resolution is generally higher. Positions 83 (tens position) & 84 are reserved for whole units and positions 85 & 86 for fractions of a unit. If entry = 5 ½ miles then set position 81 = 1 Position 83 = blank Position 84 = 5 Position 85 = 1 Position 86 = 2 If entry = 10 miles, then, Position 81 = 2 Position 83 = 1 Position 84 = 0 Position 85 = blank Position 86 = blank If entry = 5 miles, then, Position 81 = 2 Position 83 = blank Position 84 = 5 Position 85 = blank Position 86 = blank If entry = 50 yards Position 81 = 3 Position 83 = blank Position 84 = blank Position 85 = 5 Position 86 = 0 Occasionally the observers entered alpha characters. Right justify and blank fill. If entry = Unlimited. Position 83 = blank Position 84 = U

		Position 85 = N Position 86 = L
87	,	Comma delimited
88	Units indicator for coded visibility	1= no indication as to units, e.g. 1 ½ or 1/4 2 = statute miles and fractions, e.g. 1 1/2 miles or 1/4M. 3 = yards 4 = WMO code (00-50 & 56-99) 5 = nautical miles and fractions, e.g. 1 ½ NM or ¼ NM Add additional codes as required Note: the coded visibility shall only be keyed if the observed visibility entry is not reported (keyed in positions 81-86).
89	,	Comma delimited
90-93	VV (Coded Visibility)	Key only if the observed visibility is not available (no entry in the observed visibility column). When it is required to be keyed (no observed visibility) follow the same rules as for keying the observed visibility (positions 81-86).
94	,	Comma delimited
95	Present Weather Indicator	0 = WMO two digit numerical code (00-99) 1 = Plain language comments; e.g. clear, overcast, rain etc.
96	,	Comma delimited
97 - 98	ww (present weather)	Left justify, blank fill.

Flurries		Key the coded present weather value when available. Present weather code (ww), code figures = 00-99. Enter two-digit code as entered on form. If more than one entry, key the higher value. Many of the lightship observers use plain language comments; e.g. Clear, Overcast, Rain, etc. In these cases key enter the following codes in positions 97 and 98: CR = Clear/Blue Sky PC = Partly Cloudy BC = Broken Clouds CY = Cloudy/Overcast/Ovc/O CL = Cloudy & Lightning HZ = Hazy/Haze/Z FG = Fog RN = Rain LR = Light Rain DZ = Drizzle/L SN = Snow LS = Light Snow SS = Snow Showers/Snow RQ = Rain Squalls SQ = Squalls FR = Fog & Rain OH = Overcast & Haze SL = Sleet RS = Rain Showers GL = Gloomy M = Missing MI = Mist HL = Hail HU = Hurricane This list is subject to revision upon discovery of additional plain language comments.
99	,	Comma delimited
100	W (past weather)	Past weather code figures 0-9. Enter the value as coded (0-9).

		The past weather is often not reported by lightships; blank fill when not reported.
101	,	Comma delimited
102-106	PPP Sea-level pressure (mbs)	Sea level pressure in millibars, decimal implied; key observed if available, otherwise, key coded. e.g. if 1017.3 reported, Position 102 = 1 Position 103 = 0 Position 104 = 1 Position 105 = 7 Position 106 = 3 If only coded value reported, e.g. 152, then: Position 102 = blank Position 103 = blank Position 104 = 1 Position 105 = 5 Position 106 = 2 Occasionally the observers reported sea-level pressure to whole millibars. When this occurs blank fill tenths position. E.g. 1027 Position 102 = 1 Position 103 = 0 Position 104 = 2 Position 105 = 7 Position 106 = blank Note: the observer occasionally reported the sea level pressure in inches. Key as entered on form, right justify, decimal implied.
107	,	Comma delimited

108-112	TT (dry bulb temperature)	Temperature is reported in °F. Position 108 = sign field; if positive blank fill, if negative enter a dash (-). Positions 109-111 = whole numbers, and position 112 is reserved for tenths of degrees Fahrenheit (if not available, blank fill position 112). Most observed temperature entries are reported to tenths of degrees F, and where available should be the keyed value. If not available key in the coded value. If 47.5 °F is reported: Position 108 = blank Position 109 = blank Position 110 = 4 Position 111 = 7 Position 112 = 5 If reported to whole °F (e.g. 75): Position 108 = blank Position 109 = blank Position 110 = 7 Position 111 = 5 Position 112 = blank (tenths position) If -5.2 °F is reported: Position 108 = - Position 109 = blank Position 110 = blank Position 111 = 5 Position 112 = 2
113	,	Comma delimited
114 - 117	Wet bulb temperature	Wet bulb temperature in °F. Position 114 = sign field. Follow same rules as for dry bulb temperature above, e.g. if 68.3 °F reported then: Position 114 = blank Position 115 = 6 Position 116 = 8

		Position 117 = 3 (reserved for tenths of ^{o}F) Occasionally, a light ship will place the water temperature (Sea) in the wet bulb field. When this occurs key the water (Sea) temperature in positions 156-157.
118	,	Comma delimited
119 - 121	Depression	Difference between dry bulb and wet bulb temperatures. Positions 119 -120 whole degrees, position 121 tenths of degrees, e.g. if difference is 7.5 ^{o}F, then: position 119 = blank position 120= 7 position 121 = 5 (pos.121 reserved for tenths of ^{o}F)
122	,	Comma delimited
123-124	N_h	N_h - amount of clouds whose height is given by “h”. Key the observed value if available, otherwise, key the coded value. If observed (0-10), right justify zero fill; if coded value (0-9,/), right justify blank fill. Often not reported by lightships; blank fill when not reported.
125	,	Comma delimited
126-127	C_L (low cloud type)	Forms state “C_L Clouds, low cloud type” even though the C_L code is only a one digit code = (0-9, /). Lightships rarely report clouds, but when reported they usually use an alphabetic abbreviation (e.g. SC for stratocumulus or CU for cumulus,

		etc.). When the alpha abbreviation is used, positions 126-127 shall be keyed as entered on the observational form unless the coded value is available; in that case, enter the value (0-9 or /) in position 126 and blank fill position 127.
128	,	Comma delimited
129-130	h (height of lowest cloud)	h - height above the ground (sea) of the base of the lowest cloud seen, code figures = (0-9 or /). h in Feet/Meters. Key coded value when available in position 129 and blank fill position 130. If only the observed value available in hundreds of feet, e.g. 5000ft = 50, then key the 50 into positions 129-130.
131	,	Comma delimited
132-133	C_M (middle cloud type)	Use same rules for keying C_M (middle cloud type) as for low cloud type positions 126-127.
134	,	Comma delimited
135-136	C_H (high cloud type)	Use same rules for keying C_H (high cloud type) as for low cloud type positions 126-127.
137	,	Comma delimited
138 - 140	D_C (clouds, direction; C_L or C_M or C_H)	D_C is a one digit WMO code (0-9) representing the 8 cardinal directions. Although rarely entered, a few examples were located for land stations which used alpha entries

		(e.g. N, NE, etc.) for direction rather than the code values. For either alpha or numeric code entries left justify and blank fill. If no D_C entry, blank fill.
141	,	Comma delimited
142	a (3 hour pressure characteristic)	Characteristic of pressure tendency during the three hours preceding the time of the observations, code figures = 0-9.
143	,	Comma delimited
144-145	pp (3 hour pressure tendency)	The 3 hour pressure change was generally recorded in hundredths of inches and then converted to tenths of millibars in the coded field. Only key enter the coded value; e.g. 34, then: Position 144 = 3 Position 145 = 4 Sign provided in the characteristic of pressure tendency (position 142)
146	,	Comma delimited
147 - 150	RR (total precipitation past 6 hrs)	Total precipitation during the past 6 hours/ amount of precipitation measured at observation time (every 6 hours). Not reported by lightships. Precipitation in hundredths of inches. Key from the observed column when available. Positions 147-148 for whole inches and positions 149-150 for hundredths of inches; e.g. if = 1.57 inches reported, then Position 147 = blank Position 148 = 1 Position 149 = 5

		Position 150 = 7 If a trace is observed, then place T in position 150 and blank fill positions 147-149.
151	,	Comma delimited
152	R_t (time of precipitation)	Time of precipitation. Enter the single digit code when available. Generally only reported by land sites.
153	,	Comma delimited
154	s (depth of snow)	If available key in the code value (0-9), otherwise blank fill.
155	,	Comma delimited
156 -157	S_PS_P Special phenomenon general data the (Water/Sea Temperature) occasionally in the s_ps_p Special phenomena (special phenomenon, detailed data detailed data) for lightships. If numeric assume the entry in these key in these positions; e.g. if entry = 56, then: Position 156 = 5 Position 157 = 6	Sea surface temperature (water temperature) is often reported in S_PS_P field and s_ps_p field If water temperature entered in the Wet Bulb field, enter in this position (156-157). The temperatures should always be positive, being in ^oF and at the lightship latitudes.
158	,	Comma delimited
159-162	d_w (Direction of waves)	d_w appears to be a misprint on the 1083 form (Revised 1-1-1949) and on subsequent 610 forms because effective Jan 1, 1949, the wave direction code (internationally established)

		should have been $d_w d_w$. Directions in tens of degrees from which waves come. 50 was added to the direction to indicate wave heights greater than 4.5 meters (see H_w code). If the wave direction is coded as a single digit code, d_w (0-9), then key into position 159 and blank fill 160-162. However, in most cases, the lightship observer entered the direction as an alpha code, e.g. NNW or NExE, in which case left justify and blank fill. If coded as per requirements (00-36, 50-86, 49 or 99), place in positions 159-160 and blank fill 162.
163	,	Comma delimited
164	P_W (period of waves)	P_W - period of waves (code figures 0-9, x or /) See note below.
165	,	Comma delimited
166	Wave height units indicator	1 = no units specified on form 2 = feet 3 = meters 4 = half meters
167	,	Comma delimited
168-169	H_w (wave height)	H_w - Mean maximum height of waves (Code figures 0-9, x or /). 50 is added to the wave direction to report wave heights greater than 4.5 meters. However, the observer would often report the wave heights in units other than the single digit code. To account for this the field has been expanded to two positions and

		the keyers are to enter the value as entered by the observer. Right justify and insure the units code (position 166) is set correctly. If the observer reports wave height as a fraction then the keyers should enter a pound sign “#” in Position 169. If the observer enters a range e.g. 1-2 key the higher value.
170	,	Comma delimited.

S	h_{85} (height of 850mb sfc.)	Do not key this parameter (height of 850 mb surface, to nearest 10 geopotential feet by omitting the units digit)
S	a_3	Do not key this parameter (a_3 - pressure tendency for 3-hour period ending 3 hours ago)
171-174	R_{24} (24 hour precipitation)	Total 24 hour precipitation to the nearest hundredth of an inch omitting the decimal point. Right justify blank fill.
175	,	Comma delimited
176-179	T_xT_x (Maximum Temperature)	Maximum temperature for the past 6 hours (degrees Fahrenheit). Key observed value if available, as it should be to tenths of a degree resolution. If positive, positions 176-178 reserved for whole degrees (right justify blank fill) and 179 for tenths of degrees. If a negative value, then position 176 is the sign field and will have a dash (-) entered. Positions 177-178 are for whole degrees and position 179 for tenths of degrees. If resolution not reported to tenths of degree Fahrenheit, then blank fill position 179.

180	,	Comma delimited
181–184	T_nT_n (Minimum Temperature)	Same rules as for maximum temperatures (positions 176-179).
185	,	Comma delimited
186	Plain language data	Occasionally, the "state of the sea" is reported in the plain language data field as a word entry, e.g. "slight", "moderate", etc. Code according to the following table; e.g. slight would be keyed as: Position 186 = 2 Also, occasionally the water (sea) temperature is reported in the plain language section. Key enter into positions 156-157 when available.

State of Sea

Scale	Description	Height of wave crest to trough	Abbreviation
0	Calm	0	Calm
1	Smooth	Less than 1 foot	Sm
2	Slight	1 to 3 feet	Sl
3	Moderate	3 to 5 feet	M
4	Rough	5 to 8 feet	R
5	Very rough	8 to 12 feet	VR
6	High	12 to 20 feet	H

7	Very High	20 to 40 feet	VH
8	Precipitous	Over 40 feet	P
9	Confused	.....	Con
C	Choppy		

Wind Velocity Code

Code figures	Beaufort Number	Description	Equivalent Speed In Knots
00	Zero	Calm	0
02	One	Light airs	1-3
05	Two	Light breeze	4-6
09	Three	Gentle breeze	7-10
13	Four	Moderate breeze	11-16
18	Five	Fresh breeze	17-21
24	Six	Strong breeze	22-27
30	Seven	High wind (moderate gale)	28-33
37	Eight	Gale (fresh gale)	34-40
44	Nine	Strong gale	41-47
52	Ten	Whole gale	48-55
60	Eleven	Storm	56-63
68	Twelve	Hurricane	64 and above

187	,	Comma delimited
188-191	Observed barometer (inches)	Barometer measured in inches. Decimal implied, e.g. if 29.97

Position 188 = 2
Position 189 = 9
Position 190 = 9
Position 191 = 7

Note: The following elements are those commonly reported by lightships:

Visibility
Present Weather (ww)
Dry Bulb (air temperature)
Sea Level Pressure
Wind Direction
Wind Speed (velocity)
Water Temperature (sea temperature)
Wave direction, period and height
State of Sea (plain language remarks - see table above)

Notes:

1. When the keyers encounter a “/” or “x” then they are to key a dash (-).

2. Whenever an element field has a value to be keyed, but the value cannot be termined because of illegibility or non-recognizable characters by the keyer then place a tilde (~) in the last position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view that image.

Appendix C. Format 'C' original CDMP keying format

WB Form 1210F (Log of Ship's Weather Observations)
WB Form 615-5 (Revised 1-17-1958) (Formerly WB Form 1210F)
ESSA Form 72-1 (Revised 1-1968)
NOAA Form 72-1
Note: NOAA Form 72-1A (Revised 1-1982) is to be keyed using the incoming records marine format (very similar forms).

Position	Contents	Instructions
1	Form type	Set indicator to form type 1 = 1210F (Octant of the globe) 2 = 615-5 (Octant of the globe) 3 = 72-1 (Quadrant of the globe)
2	,	Comma delimited
3 - 30	Station Name	Left justify, blank fill. For lightships pull name off official name list provided by NCDC; if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited

38 - 41	Year	e.g. 1947
42	,	Comma delimited
43- 44	Month	Month = 01-12
45	,	Comma delimited
46-47	Day of Month	Day of the month (01-31). Date and times correspond to Greenwich Mean Time. First field (position) on the Octant forms Fifth field (position) on the Quadrant forms (YY)
48	,	Comma delimited
_	Day of Week	Do not key this parameter
49	Octant/Quadrant	The form type indicator establishes if the value entered is an Octant or Quadrant indicator: Octant = 0,1,2,3,5,6,7,8 Quadrant = 1,3,5,7 On the forms the Octant appears immediately before the latitude, while the Quadrant appears directly after the latitude.
50	,	Comma delimited
51-53	Latitude	Latitude to tenths of degrees, right justify, zero fill, decimal implied.
54	,	Comma delimited
55-58	Longitude	Longitude -

		If **Octant** ($L_oL_oL_o$) degree and tenths (000-900), enter into position 56-58, right justify and zero fill, decimal implied, blank fill position 55. If **Quadrant** ($L_oL_oL_oL_o$) degrees and tenths, right justify zero fill, decimal implied (0000-1800).
59	,	Comma delimited
60-61	Observational Time (GG)	Greenwich Mean Time (GG). Time to the nearest hour (00-23). Key only two positions of the time (round to nearest hour - if near midnight this could also affect the day) even if four digits have been entered.
62	,	Comma delimited
63	Wind Speed indicator (i_w)	i_w only appears on the Quadrant forms. Insure it is entered correctly; blank fill for the Octant forms. i_w: 0 = m/s estimated 1 = m/s anemometer 3 = knots estimated 4 = knots anemometer
64	,	Comma delimited
65	N (total cloud amount)	N - The fraction of the celestial dome covered by cloud, in eighths (0-9, /).
66	,	Comma delimited

67-68	dd Wind direction (36 pt)	Wind direction 00-36. However, in cases where the true wind speed exceeds 99 knots, 50 is added to "dd" and only the wind speed in excess of 100 knots will be reported as "ff". Observer occasionally reported alpha characters. Alpha to numeric conversion as follows: Entry Keying Code N 36 NNE 02 NE 05 ENE 07 E 09 ESE 12 SE 14 SSE 16 S 18 SSW 21 SW 23 WSW 25 W 27 WNW 29 NW 32 NNW 34 e.g. if entry is "NEG" or "Calm" then: Position 67 = 0 Position 68 = 0
69	,	Comma delimited
70-71	ff (Wind Velocity)	Wind speed (U.S. registered ships report in knots - should match i_w), right justify zero fill. e.g. is entry is "NEG" or "Calm" then:

		Position 70 = 0 Position 71 = 0
72	,	Comma delimited
73-74	VV (visibility)	Visibility coded (VV= 90-99)
75	,	Comma delimited
76-77	ww (present weather)	Present weather code (ww), code figures = 00-99. Enter two digit code as entered on form.
78	,	Comma delimited
79	W (past weather)	Past weather code figures 0-9.
80	,	Comma delimited
81-85	Sea-level pressure	Sea-level pressure reported in millibars (to tenths) or inches (to hundredths). Key the figure from field 16 from the Octant forms and field 15 from the Quadrant forms. Field 16 restricted to three figures of the sea level pressure (measured in millibars) entered under parameter PPP. e.g. if value reported 168, then: Position 81-82 = blank Positions 83-85 = 168 Occasionally sea-level pressure (inches or millibars) entered in fields 13 and 14. Key only field 14 (Barometer Corrected) if sea level pressure is not reported in field 16. Key field 13 (Barometer as Read) only if fields 14 (Barometer Corrected) 15 and 16

		are not available. Right justify, decimal implied, blank fill. e.g. if value reported is 29.93 Positions 81 = blank Positions 82-85 = 2993 e.g. if value reported is 1016.7 Positions 81-85 = 10167
86	,	Comma delimited
87	Temperature indicator	WB Form 615-5 has a box for the observer to check to indicate if the temperature reported is in ^{o}F or ^{o}C.. If box ^{o}F checked set = 1 If box ^{o}C checked set = 2 If neither checked blank fill position 87. It is assumed that all temperatures reported on an observational form are on the same temperature scale. If not then set position 87 = 3 (mixed scales, e.g. air temp ^{o}F & Sea temp ^{o}C).
88	,	Comma delimited
89-91	TT (dry bulb temperature)	Position 89 reserved for negative sign when reported incorrectly; e.g. if TT reported as -01 then a - (dash) is to be entered in position 89 and the 01 into 90-91. If no sign reported then position 89 should be blank filled. WB Form 1210F Temperature is reported in ^{o}F. For negative temperatures 100 was supposed to be added algebraically (100-TT); e.g.

-10 °F = 90 as entered on the form.

WB Form 615-5 either °F or °C, important to capture the indicator box although not always filled in by the observer. Negative temperatures in °F were handled as above (WB Form 1210F). If negative °C then 50 was added rather than 100.

ESSA Form 72-1 air temperatures were reported in °C, with tenths value appearing in field 33 rather than in field 16 where temperature to whole °C was reported. If negative temperature, 50 was added to TT algebraically.

Enter value as it appears under TT, right justify blank fill (positions 89-90) reserved for temperature in whole degrees. If signed rather than properly coded then enter sign in position 88.

In some cases dry bulb °F temperatures are measured to tenths of a degree. When this situation occurs the value should be rounded to whole degrees °F.
e.g. if entry = 58.6
Position 89 = blank
Position 90 = 5
Position 91 = 9
e.g. if entry is 48.3
Position 89 = blank
Position 90 = 4

		Position 91 = 8
92	,	Comma delimited
93	N_h	N_h - amount of all the C_L cloud(s) present or if no C_L cloud present, the amount of all the C_M cloud (s) present. Code figures (0-9, /). Often not reported by lightships; blank fill when not reported.
94	,	Comma delimited
95	C_L (low cloud type)	C_L - low cloud type, code figures = (0-9, /). Lightships rarely report cloud types.
96	,	Comma delimited
97	h (height of lowest cloud)	h - height above the ground (sea) of the base of the lowest cloud seen code figures = (0-9 or /). Blank fill if not reported.
98	,	Comma delimited
99	C_M (middle cloud type)	C_M (middle cloud type), code fig. = (0-9, /).
100	,	Comma delimited
101	C_H (high cloud type)	C_H (high cloud type), code fig. = (0-9, /).
102	,	Comma delimited
103	D_S (Ship's Course)	Ship's course (true) made good during the 3 hours preceding time of observation. Code figures (0-

		9).
104	,	Comma delimited
105	V_S (Ship's speed)	Ship's average speed made good during the 3 hours preceding time of observation. Code figures (0-9).
106	,	Comma delimited
107	a (3 hour pressure characteristic) tendency	Characteristic of pressure during the three hours preceding the time of the observations, code figures (0-9).
108	,	Comma delimited
109-110	pp (3 hour pressure tendency)	Amount of pressure tendency (change) at station during the three hours preceding the time of the observation, expressed in tenths of millibars; e.g. if 1.2 mbs, then: Position 109 = 1 Position 110 = 2 If three hour pressure tendency exceeds 9.9 mbs key two slashes (//) and place the values in Positions 154-156. e.g. if 12.8 mbs, then: Position 109 = / Position 110 = / Sign provided in the characteristic of pressure tendency (Position 107).
111	,	Comma delimited

112-115	Dry Bulb (Octant forms)	The dry bulb temperature is repeated but supposedly at a finer resolution (tenths of degrees). However, most are observed/reported only to whole ^{o}F. Position 112 = sign field. Positive = blank, negative = dash (-). Positions 113-114 whole degrees, position 115 = tenths of degrees when available, otherwise blank fill. WB Form 615-5 either ^{o}F or ^{o}C. If negative ^{o}C then 50 was added e.g. 51 = - 1 ^{o}C.
116	,	Comma delimited
117-120	Wet Bulb (Octant forms)	Position 117 = sign field. Positive = blank, negative = dash (-). Positions 118-119 whole degrees, right justify blank fill. Position 120 = tenths of degrees; if not available blank fill. 50 was added to the value if negative; e.g. 51 = - 1 ^{o}C.
121	,	Comma delimited
122-123	Dew Point (Octant and Quadrant forms)	Dew point temperature, right justify blank fill. 50 was added to the value if negative; e.g. 51 = - 1 ^{o}C.
124	,	Comma delimited
125	Water method indicator (Quadrant forms)	Bucket = 1 Intake = 2 Both checked = 3

		Neither checked = blank
126	,	Comma delimited
127-129	Sea (Water) Temperature (All forms)	Depending on the form the scale may be F or C. Set position 87 correctly to indicate scale. Positions 127-128 whole degrees right justify, blank fill. Position 129 reserved for tenths; blank fill if not available. Negative temperature may range from -0.1 degrees C to -2.8 degrees C. If the temperature falls outside this range contact NCDC for guidance. When observed temperature is negative: Position 127 = negative (-) Position 128 = whole degree value Position 129 = tenths For negative sea water temperature values measured in degrees Centigrade the observer occasionally added 50. e.g. -0.2 = 50.2
130	,	Comma delimited
•	Air - Sea/Sea-Air	Do not key this parameter
131	t_T (Quadrant form)	t_T - tenths of air temperature
132	,	Comma delimited
133-134	$d_w d_w$ (Octant forms)	$d_w d_w$ - wave direction (direction

		from which they come) (code figures = 00-36, 49). 50 is added to the direction (code figures become 50-86, 99) to change the wave height scale. The wave refers to the higher of the sea and swell for marine observing until 1963 when two wave patterns could be reported separately (generally sea and swell- $d_w d_w P_w H_w$). A comparison between the wind direction and wave directions enables the determination of sea and swell. E.g. if entry is “Neg” or “Calm” then: Position 133 = 0 Position 134 = 0
135	,	Comma delimited
136-137	P_w (Octant forms) $P_w P_w$ (Quadrant forms)	If P_w reported place in position 136 and blank fill position 137. P_w is a coded value; if form reports $P_w P_w$ (actual seconds) then right justify and zero fill. E.g. if entry is “Neg” or “Calm” then: Position 136 = “-” (Dash) Position 137 = blank
138	,	Comma delimited
139-140	H_w (Octant forms) $H_w H_w$ (Quadrant forms)	If H_w reported, place in position 139 and blank fill position 140; if $H_w H_w$ reported, right justify and zero fill. E.g. if entry is “Neg” or “Calm” then: Position 139 = 0

Position 140 = blank
If fraction (e.g. ½) or a decimal (e.g. 0.5) is entered on octant or quadrant forms, then enter the following coding instructions in Positions 139-140:

		Entry	Key
		¼	0
		½ or 0.5	1
		1.5	3
141	,	Comma delimited	
142-143	d_wd_w (2^{nd} wave group)	This parameter ($d_wd_{w)}$ is either the second wave (pattern) direction reported on WB form 615-5 (1963 WMO code change, rarely reported) or the swell direction reported on the ESSA form 72-1 (1968 WMO code change).	
144	,	Comma delimited	
145	P_w (2^{nd} Wave group)	Although the P_w code (0-9, /) is the same value, the meaning is different prior to January 1, 1968 then after that date. In actuality it is probably more form type-related rather than date-related. The meaning is different on the WB form 615-5 from the ESSA form 72-1. This becomes an important conversion issue, but not a keying issue; key as it appears.	

146	,	Comma delimited
147-148	H_w (WB form 615-5) H_wH_w (ESSA form 72-1) (2^{nd} Wave group)	If H_w (2^{nd} wave group - below the first on the form) is reported, place in position 147 and blank fill position 148; if H_wH_w reported, right justify and zero fill.
149	,	Comma delimited
150	QC (latitude)	If the value in positions 51-53 is within 1 degree of latitude of the primary (standard) position of the lightship then: Set the QC indicator = 1 (valid entry) If outside the limits set the QC indicator = 2 (suspect latitude)
151	,	Comma delimited
152	QC (longitude)	If the value in positions 55-58 is within 1 degree of longitude of the primary (standard) position of the lightship then: Set the QC indicator = 1 (valid entry) If outside the limits set the QC indicator = 2 (suspect longitude)
153	,	Comma delimited
154-156	ppp (3 hour pressure tendency exceeding 9.9 mbs)	Amount of pressure tendency (change) at station during the three hours preceding the time of the observation, expressed in tenths

of

millibars. If the value in Positions 109-110 contains two slashes (//) then Positions 154-156 will

contain

values exceeding 9.9 mbs,

otherwise

Positions 154-156 will be blank filled. e.g. if 12.8 mbs, then:
Position 154 = 1
Position 155 = 2
Position 156 = 8

ıtes:

1. Whenever an element field has a value to be keyed, but the value cannot be determined
because of illegibility or non-recognizable characters by the keyer then place a tilde (~)
in the last position of that element field. This will provide the data user with information
that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view the image.

2. When the keyers encounter a “/” or “x” then they are to key a dash (-).

Appendix D: Format 'E' original CDMP keying format

WB Form 1034

Data Records	Contents	Instructions
1-30	Station Name	Left justify, blank fill; For lightships pull name off official name list provided by NCDC, if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited
38-41	Year	e.g. 1941
42	,	Comma delimited
43-44	Month	e.g. 01 = January 02 = February . . 12 = December
45	,	Comma delimited

46-47	Day	right justify, zero fill e.g. 01 . . . 31
48	,	Comma delimited
49-53	Time	Right justify, zero fill. Times may represent a 24 hour clock or may be entered as a.m. or p.m. times. If 24 hour clock, key time in positions 49-52 and leave position 53 blank. Entries may range from 0000-2400. e.g. if entry is 0714, then Positions 49-52 = 0714 Position 53 = blank If a.m. or p.m. times Positions 49-50 are reserved for the hour. Positions 52-53 are reserved for the minutes. Position 53 is reserved for AM or PM. Code is as follows: A= A.M. P = P.M. e.g. if entry is 730 A.M. Position 49 = 0 Position 50 = 7 Position 51 = 3 Position 52 = 0 Position 53 = A
54	,	Comma delimited
55-58	Station Pressure/ Barometer (Corrected)	Left justify, blank fill. Decimal implied. If station pressure is not available under station pressure column it may be located under the column labeled Wind Character. e.g. if entry is 30.10, then Positions 55-58 = 3010

59	,	Comma delimited
-	Pressure Tendency	Do not key this parameter
-	Pressure Change	Do not key this parameter
60-63	Temperature of the air (Dry Bulb)	Temperature is reported in whole degrees Fahrenheit. Position 60 = sign field; if positive blank fill, if negative enter a dash (-). Right justify, blank fill. e.g. if entry is 64: Positions 60-61 = blank Positions 62-63 = 64
64	,	Comma delimited
65-67	Wind Direction (16 pt)	Wind direction, 16 point scale, left justify, blank fill. If calm or 0, code as C. e.g if direction is NW Position 65 = N Position 66 = W Position 67 = blank e.g. if 0 is reported: Position 65 = C Position 66 = blank Position 67 = blank e.g. if ESE reported: Position 65 = E Position 66 = S Position 67 = E
68	,	Comma delimited
69	Wind Force/Speed Units Indicator	1 = Speed is measured in miles per hour. 2 = Speed is measured in

		knots. 3 = Force is measured using Beaufort scale 4 = No units specified on form.
70	,	Comma delimited
71-73	Wind Force/Speed	Wind speed is observed in either the column labeled force, speed or miles per hour. Right justify, blank fill. If direction or speed is calm or 0 then speed shall be keyed as follows: Positions 71-72 = blank Position 73 = 0 e.g. if entry is 12 Position 71 = blank Position 72 = 1 Position 73 = 2
74	,	Comma delimited
-	Wind Character/Sky/ Weather Conditions/ Pressure	Observations in this column were not limited to wind Station gusty, calm, etc... Observations include station pressure, sky and weather conditions. Key only station pressure information (e.g. 29.92) in Positions 55-58.
75-77	Visibility	Visibility measured in whole Miles. (rarely reaching 100 miles) e.g. 25 miles = Position 75 = blank Position 76 = 2 Position 77 = 5
78	,	Comma delimited

79-80	Cloud Amount	Frequently entered in tide height column. Total amount of clouds (0-10). Right justify and blank fill. Do not key tide parameters.
81	,	Comma delimited
82-83	Weather (First Entry)	Left justify, blank fill. Key the coded present weather value when available. Present weather code (ww), code figures = 00-99. Enter two-digit code as entered on form. If more than one entry, key the higher value. Many of the lightship observers use plain language comments: e.g. clear, cloudy, drizzle, etc. In these cases enter the following codes in Positions 82-83: CR = Clear/CLR/Light/L.T. PC = Partly Cloudy/ PT. Cloudy CL = Cloudy/Overcast/Ovc SH = Shower LS = Light Shower LT = Light Thundershower HS = Heavy Shower HT = Heavy Thundershower DZ = Drizz HZ = Haze/Hazy FG = Fog RN = Rain LR = Light Rain SN = Snow LS = Light Snow RQ = Rain Squalls SL = Sleet

84	,	Comma delimited
85-86	Weather (Second Entry)	Same rules as above for Weather (First Entry).
87	,	Comma delimited
88-89	Weather (Third Entry)	Same rules as above for Weather (Third Entry)
90	,	Comma delimited
91-92	Cloud Kind/Type	Left justify, blank fill. See breakout below.
	Cirrus	1 = C or Ci
	Cirrocumulus	2 = KC, CK, Ci.Cu, Ci-Cu, Cc
	Cirrostratus	3 = Cs, Ci.St., CI-S
	Cumulus	4 = Cu, K
	Altocumulus	5 = A.Cu, A-Cu, Ac
	Stratocumulus	6 = S-Cu, KS, St.Cu., Sc
	Stratus	7 = S, Strat, St
	Altostratus	8 = A.St., A-S, Ast., As
	Nimbostratus	9 = Nim, Nimbus, NB, N, Ns
	Nimbostratus Fractus	96 = FR NB, FrN
	Cumulus Fractus	97 = FR CU
	Stratus Fractus	98 = FR ST

	Cumulonimbus	99 = Cb
	Clear/No Clouds	0 = 0
93	,	Comma delimited
-	Cloud Direction	Do not key this parameter
-	Tide Height	Do not key this parameter
-	Tide Change/ Visibility	Observations in this column were not limited to Tide Change. Observers entered visibility measured in whole miles. Do not key the tide change parameter. Key visibility data in Positions 75-77. Key cloud amount data in Positions 79-80.
-	Tide Previous High or Low Tide Stage & Time	Do not key Previous High or Low Tide Stage & Time
-	Swells Character/State of Sea	Do not key this parameter. Data are unreliable.
-	Swells Direction/Height of waves	Do not key this parameter. Data are unreliable.
-	Swells Number per Minute	Do not key this parameter.
94-95	Sea Water Temperature	Sea water temperature located in the Remarks column prior to 8-1-52. After 8-1-52 this parameter was located under water temperature (Column 6). Temperature is reported in whole degrees Fahrenheit. e.g. if entry is 63:

Position 94 = 6
Position 95 = 3

Notes:

1. Whenever an element field has a value to be keyed, but the value cannot be determined because of illegibility or non-recognizable characters by the keyer then place a tilde (~) in the last position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view the image.

2. When the keyers encounter a “/” or “x” then they are to key a dash (-).

Appendix E: Format ‘F’ original CDMP keying format

WB Form 630-8

Position	Contents	Instructions
1 - 30	Station Name	Left justify, blank fill. For lightships pull name off official name list provided by NCDC; if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited
38 - 41	Year	e.g. 1947
42	,	Comma delimited
43- 44	Month	Month = 01-12
45	,	Comma delimited
46-47	Date of Observation (Day)	Day of the month (01-31).
48	,	Comma delimited

49	Time Indicator	0 = Time entered but no letter designator following the time, e.g. entry = 0900 1 = time entered is Greenwich Mean Time, often abbreviated as GCT, GMT or Z.
50	,	Comma delimited
51-54	Time of observation	The times represent a 24 hour clock. Entries may range from 0000-2400. e.g. if entry = 0059, then positions 52-55 = 0059.
55	,	Comma delimited
-	International index number	Do not key this parameter
56	N (total amount clouds)	N - The fraction of the celestial dome covered by cloud, in eighths (0-9, /).
57	,	Comma delimited
58-59	dd Wind direction (36 pt)	Wind direction 00-36. However, in cases where the true wind speed exceeds 99 knots, 50 is added to “dd” and only the wind speed in excess of 100 knots will be reported as “ff”.
60	,	Comma delimited
61-62	ff (Wind Speed)	Wind speed reported in knots, right justify zero fill.

63	,	Comma delimited
64-65	VV (visibility)	Visibility coded (VV= 90-99)
66	,	Comma delimited
67-68	ww (present weather)	Present weather code (ww), code figures = 00-99.
69	,	Comma delimited
70	W (past weather)	Past weather code figures 0-9.
71	,	Comma delimited
72-74	PPP Pressure (mbs) (Sea level pressure)	Millibars to tenths, last three figures of the sea level pressure entered under under parameter PPP. Right justify, decimal implied.
75	,	Comma delimited
76	Temperature/ Dew Point Indicator	If both air temperature and dew point are ^{o}C temperature indicator = 1. If both air temperature and dew point are ^{o}F temperature indicator = 2. If air temperature is ^{o}C and dew point is ^{o}F indicator = 3. If air temperature is ^{o}F and dew point is ^{o}C indicator = 4. If ^{o}C or ^{o}F does not appear on form leave temperature indicator field blank.
77	,	Comma delimited

78-81	TT Air Temperature (Dry Bulb Temperature)	Dry bulb temperatures may be recorded in degrees Fahrenheit or degrees Centigrade. It is assumed that all temperatures reported on an observational form are on the same temperature scale. Right justify, blank fill. Position 78 = sign field. Positive = blank, negative = dash (-). e.g. if entry is -1, then Position 78 = - Position 79-80 = blank Position 81 = 1 e.g. if entry is 89 Position 78-79 = blank Positions 80-81 = 89
82	,	Comma delimited
83-85	Dew Point Temperature	Dew Point temperatures may be recorded in degrees Fahrenheit or degrees Centigrade. It is assumed that all temperatures reported on an observational form are on the same temperature scale. Right justify, blank fill. Position 83 = sign field. Positive = blank, negative = dash (-).
86	,	Comma delimited
87	a Characteristic of pressure change	Characteristic of pressure tendency during the three hours preceding the time of the observations, code figures (0-8).
88	,	Comma delimited

89-90	pp Amount of pressure change	Amount of pressure tendency (change) at station during the three hours preceding the time of the observation, expressed in tenths of millibars; e.g. if 0.7 mbs, then: Position 89 = 0 Position 90 = 7
91	,	Comma delimited
92	Sea Water Temperature Indicator	1 = Centigrade 2 = Fahrenheit If ^{o}C or ^{o}F does not appear on form leave sea water temperature indicator field blank.
93	,	Comma delimited
94-95 may	909TwTw Sea Water Temperature	Sea water temperature be recorded in whole degrees Fahrenheit or whole degrees Centigrade. Right justify, blank fill. Do not key the leading three digits (909). Key only the last two digit values. e.g. if entry is 90918 Position 94 = 1 Position 95 = 8
96	,	Comma delimited
s	Wave group indicator	Do not key this parameter
97-98	d_wd_w Direction from which waves are coming	d_wd_w - wave direction (direction from which they come) (code figures = 00-36,

		49). 50 is added to the direction (code figures become 50-86, 99) to change the wave height scale.
99	,	Comma delimited
100	P_w Period of waves	P_w is a coded value; code figures = (0-9, /)
101	,	Comma delimited
102	H_w Height of waves	H_w is a coded value; code figures = (0-9, /)

2. Whenever an element field has a value to be keyed, but the value cannot be determined because of illegibility or non-recognizable characters by the keyer then place a tilde (~) in the last position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view the image.

3. When the keyers encounter a “/” or “x” then they are to key a dash (-).

Appendix F. Format ‘G’ original CDMP keying format

NOAA Form 72-5A
ESSA Form 72-5
DATAC-ER 1

Position	Contents	Instructions
1	Form type	Set indicator to form type 1 = 72-5A 2 = 72-5 3 = DATAC-ER 1
2	,	Comma delimited
3-30	Station Name	Left justify, blank fill; For lightships pull name off official name list provided by NCDC, if unsure of match then key as it appears on form.
31	,	Comma delimited
32-36	WBAN Number	Provided by NCDC as part of the official name list for lightships. If no match then use a negative number unique for the lightship (e.g. -1234). This will allow us to identify and correct later. We do not expect this to be a problem as all lightships will be identified for keying.
37	,	Comma delimited
38-59	Latitude and Longitude	Some forms contain latitude and longitude measured to tenths of minutes only, however on other forms latitude and longitude may be observed to tenths of seconds.
38-39	Latitude Degrees	Latitude range between 20-50 degrees. If latitude exceeds this range contact NCDC for guidance.

40	,	Comma delimited
41-43	Latitude Minutes	Decimal implied. N implied. Positions 41-42 = whole minutes. Range 00-59 Position 43 = tenths of minutes. Range 0-9.
44	,	Comma delimited
45-47	Latitude Seconds	Decimal implied. N implied. Positions 45-46 = whole seconds. Range 00-59 Position 47 = tenths of seconds. Range 0-9.
48	,	Comma delimited.
49-51	Longitude Degrees	Longitude range between 65-81 degrees. If longitude exceeds this range contact NCDC for guidance.
52	,	Comma delimited
53-55	Longitude Minutes	Decimal implied. W implied. Positions 53-54 = whole minutes. Range 00-59. Position 55 = tenths of minutes. Range 0-9.
56	,	Comma delimited
57-59	Longitude Seconds	Decimal implied. W implied. Position 57-58 = whole seconds. Range 00-59. Position 59 = tenths of seconds. Range 0-9.
60	,	Comma delimited
61-64	Year	e.g. 1945
65	,	Comma delimited
66-67	Month	Month = 01-12
68	,	Comma delimited
69-70	Day	Day of the month (01-31).
71	,	Comma delimited

72-75	Time	NOAA Form 72-5A and ESSA Form 72-5 use Local Standard Time (LST). DATAC-ER 1 uses Greenwich Mean Time (Z). Z implied.
76	,	Comma delimited
77-79	Sky Condition	Key as entered left justify blank fill. NOAA Form 72-5A only. e.g. if entry is C Position 77 = C Position 78-79 = blank e.g. if entry is CLR Positions 77-79 = CLR Note: When observer enters C or CL this may represent either a clear or cloudy sky condition.
80	,	Comma delimited
-	Indicator	Do not key parameter (WX) located in Column 3 on ESSA Form 72-5 and DATAC-ER 1.
81-83	Present Weather	See breakout below
81	Sign Field	+ = Heavy, Dense or Thick No symbol = Moderate (blank fill) - = Light
82-83	Present weather (First Entry)	Present weather conditions are as follows:

Wriiten On Form	Meaning	Key
C	Clear or Cloudy	C
CL	Clear or Cloudy	CL
CLR	Clear	CR
SCT	Scattered	SC
PC	Partly Cloudy	PC
BKN	Broken	BR
OVC	Overcast	OC
CY	Cloudy	CY
Haze/Hazy/H	Haze	HZ
Fog/F	Fog	FG
Rain/R	Rain	RN
Snow/S	Snow	SN
D/L/DZ	Drizzle	DZ

		ZL Freezing Drizzle ZL ZR Freezing Rain ZR IP Ice Pellets IP SW Snow Shower SW RW Rain Shower RW E Sleet E TSTM/TS Thunderstorm TS Mist Mist MI Squall Squall SQ SP Sprinkle SP e.g. if entry is Heavy Rain Position 81 = + Position 82 = R Position 83 = N Present weather conditions are also found in the remarks column on DATAC-ER 1 forms.
84	,	Comma delimited
85-87	Present Weather (Second Entry)	Same rules as above for Present Weather (First Entry). e.g. if entry is light fog Position 85 = - Position 86 = F Position 87 = G
88	,	Comma delimited
89-91	Present Weather (Third Entry)	Same rules as above for Present Weather (First Entry). e.g. if entry is snow Position 89 = blank Position 90 = S Position 91 = N
92	,	Comma delimited
93	Visibility Indicator	1 = Visibility measured in statute miles. 2 = Visibility measured in yards. 3 = Visibility measured in nautical miles. 4 = Visibility measured in feet.

94	,	Comma delimited
95-99	Visibility	Positions 95-97 restricted to whole units. Positions 98-99 reserved for fractions of a unit. e.g. if entry is 6 miles Position 95-96 = blank Position 97 = 6 Positions 98-99 = blank e.g. if entry is ¼ mile Positions 95-97 = blank Position 98 = 1 Position 99 = 4 e.g. if entry is 50 yards Positions 95-97 = blank Position 98 = 5 Position 99 = 0 If the fraction contains 2 values in the denominator 1/10, 3/10 etc.. use the following conversion table: Fraction Key 1/10 11 3/10 31 7/10 71 9/10 91
100	,	Comma delimited
101-103	Wind Direction	Left justify and blank fill. Wind direction may be measured in degrees 000-360 or 16 point wind directions which are as follows: N NNE NE ENE E ESE SE SSE S SSW SW WSW W

		WNW NW NNW C = Calm e.g. if entry is Calm Position 101 = C Position 102 = blank Position 103 = blank e.g. if entry is SSE Position 101 = S Position 102 = S Position 103 = E
104	,	Comma delimited
105-107	Wind Speed	Wind speeds reported in knots. Right justify blank fill. e.g. if entry is calm Positions 105-106 = blank Position 107 = 0 e.g. if entry is 23 Position 105 = blank Position 106 = 2 Position 107 = 3
108	,	Comma delimited
109-111	Wind Gust	Wind gust preceded by a dash (-) which is used to separate wind gust from wind speed. Wind gust may be preceded by a G. Wind gust appears in Wind speed column on ESSA Form 72-5 and DATAC-ER 1 form. Wind gust appears in remarks column on NOAA Form 72-5A e.g. occ gust to 35 knots.
112	,	Comma delimited
113	Wave Height units indicator	1 = No units specified on form. 2 = Feet
114	,	Comma delimited
115-116	Wave Height	Right justify, blank fill. Wave height listed under State of

		Sea Height on NOAA Form 72-5A. When wave height is listed as none, zero, calm or almost calm, it will appear under columns 18 - 19 on both ESSA Form 72-5 and DATAC-ER 1. Key a zero when “None”, “Calm” or “almost calm” is entered on these forms. Position 115 = blank Position 116 = 0
117	,	Comma delimited
118-120 in remarks	Swell Direction	Right justify, blank fill. Occasionally entered column. Swell direction may be measured in degrees 000-360 or 16 point swell directions which are as follows: N NNE NE ENE E ESE SE SSE SSW SW WSW W WNW NW NNW Calm or almost calm = 0
121	,	Comma delimited
122	Swell Height units indicator	1 = No units specified on form. 2 = Feet
123	,	Comma delimited
124- 125 remarks	Swell Height	Right justify, blank fill. Occasionally entered in

		column. Key a zero when “none”, “calm” or “almost calm” is entered on these forms.
126	,	Comma delimited
127-128	Swell Period	Right justify, blank fill. Occasionally entered in remarks column. Key a zero when “none”, “calm” or “almost calm” is entered on these forms.
129	,	Comma delimited
130-131	Wave Period	Right justify, blank fill. Wave Period measured in seconds. Wave Period not available on ESSA Form 72-5 or DATAC-ER 1. Key a zero when “none” “calm” or “almost calm” is entered on these forms.
132	,	Comma delimited
133-135	Direction of Waves	Right justify, blank fill. Wave direction not available on NOAA Form 72-5A. 16 point wave direction as follows: N NNE NE ENE E ESE SE SSE SSW SW WSW W WNW NW NNW Calm or almost calm = 0
136	,	Comma delimited

137-139	Sea Water Temperature	Sea water temperature should always be positive. In some cases sea water temperatures are measured to tenths of a degree. e.g. if entry = 42.6 Position 137 = 4 Position 138 = 2 Position 139 = 6
140	,	Comma delimited
141	Sea Water Temperature Indicator	1 = Centigrade 2 = Fahrenheit If ^{o}C or ^{o}F does not appear on form leave sea water indicator field blank.
142	,	Comma delimited
143-147	Air Temperature	Position 143 = sign field; if positive blank fill, if negative enter a dash (-). Positions 144-147 = whole numbers. Most temperatures are not reported to tenths of degrees F, but space is provided (Position 147) for those cases where it might be reported. If 62 degrees reported, then: Position 143 = blank Position 144 = blank Position 145 = 6 Position 146 = 2 Position 147 = blank (tenths of degrees) e.g. if entry is 55.9 Position 143 = blank Position 144 = blank Position 145 = 5 Position 146 = 5 Position 147 = 9 e.g. if entry is -2 Position 143 = - Position 144 = blank Position 145 = blank Position 146 = 2 Position 147 = blank

148	,	Comma delimited
149	Air Temperature Indicator	1 = Centigrade 2 = Fahrenheit If ^{o}C or ^{o}F does not appear on form leave air temperature indicator field blank.
150	,	Comma delimited
151-154	Sea-level Pressure	Sea-level pressure in inches, decimal implied, e.g. if 29.96 reported, then: Position 151 = 2 Position 152 = 9 Position 153 = 9 Position 154 = 6
155	,	Comma delimited
156-160	Station Pressure (Inches)	Right justify, blank fill. Decimal implied. May be entered as inches to thousandths of an inch. If entered to hundredths leave Position 160 blank. e.g. if entry is 30.167, then Positions 156-160 = 30167 e.g. if entry is 29.87, then Positions 156-159 = 2987 Position 160 = blank
161	,	Comma delimited
162-166	Station Pressure (Millibars)	Right justify, blank fill. Decimal implied. Entry may include only the last three values of the pressure reading leaving the first one or two positions implied, e.g. if the observed value was 1026.3 millibars only the 263 would be entered on the form by the observer. If e.g. the observed value was 996.2 only 962 may be entered on the form. Key whatever the entry is, e.g. if the entry was 962, then Position 162 = blank Position 163 = blank Position 164 = 9 Position 165 = 6

		Position 166 = 2 However if the entry was 962.5 Position 162 = blank Position 163 = 9 Position 164 = 6 Position 165 = 2 Position 166 = 5 If entry were 1014.2, then Positions 162-166 = 10142
-	Remarks	Do not key remarks on ESSA Form 72-5 Key remarks pertaining to present weather which are found on DATAC-ER 1. e.g. rain, fog etc… (see present weather conditions list Positions 82-83). Key remarks pertaining to swell direction (Positions 118-120), swell height (Positions 124-125), and swell period (Positions 127-128) on NOAA Form 72-5A.

Notes:

1. Whenever an element field has a value to be keyed, but the value cannot be determined because of illegibility or non-recognizable characters by the keyer, then place a tilde (~) in the last position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested, the user can view the image.

2. When the keyers encounter a “/” or “x” then they are to key a dash (-).

Appendix G. Format ‘H’ original CDMP keying format

Form No. 1130-AER
SC Form 444

Data Records	Contents	Instructions
1	Form Type	See indicator to form type 1 = 1130-AER 2 = SC Form 444
2	,	Comma delimited
3-7	WBAN Number	Auto filled from NCDC WBAN list
8	,	Comma delimited
9-12	Year	e.g. 1934
13	,	Comma delimited
14-15	Month	e.g. 01 = January 02 = February 12 = December
16	,	Comma delimited
17-18	Day	Right justify, zero fill e.g. 01, 02, ...31
19	,	Comma delimited
20	Type	Key only the hourly observations, these may end near the hour, near the half hour or near the quarter hour depending on the time period. Key only those records that contain a “R” as part of the designator. e.g. if = R, then Position 20 = R. When the type column contains a “check mark” or there is no entry this represents an observation taken between normal observation times.

21	,	Comma delimited
22-25	Time	Local standard time (LST). The times represent a 24 hour clock Key times in positions 22-25. Entries may range from 0000-2400. e.g. if entry = 0542, then positions 22-25 = 0542.
26	,	Comma delimited
-	Sky Code	Do not key this parameter.
-	Classification	Do not key this parameter.
27-31	Ceiling	See breakout below
27	Ceiling Classification	U= UNL= Unlimited (>9750 ft) A =Aircraft report B = Balloon E = Estimated M = Measured P = Precipitation ceiling V = Variable ceiling W = Indefinite ceiling + = Last observed height of ceiling balloon before it disappeared without reaching the clouds. When the cloud ceiling occurs above the first cloud layer the ceiling classification is entered in Column 4 (Sky) rather than Column 3 (Ceiling).
28-31	Ceiling height in feet	right justify, blank fill e.g. 2000 = 2000 if 800 Pos 28 = blank Pos 29 = 8 Pos 30 = 0 Pos 31 = 0 if entered as 3 THSD then, Pos 28 = 3

		Pos 29 = 0 Pos 30 = 0 Pos 31 = 0 If entries are to nearest hundred feet continue to right justify blank fill (these will be adjusted by the conversion program) e.g. if entry = 20, then Pos 28 = blank Pos 29 = blank Pos 30 = 2 Pos 31 = 0 If entry = 200 then Pos 28 = blank Pos 29 = 2 Pos 30 = 0 pos 31 = 0 If entry is zero the Pos 28-30 = blank Pos 31 = 0 Note: If 10,000 (Circular N instructions sets the threshold at 9751 feet) or higher place a "U" in position 31 and blank fill positions 28-30.
32	,	Comma delimited
33-36	Height of First Cloud Layer	Same rules as for ceiling height positions 28-31. e.g. if 2000 is reported, then, position 33 = 2 34 = 0 35 = 0 36 = 0 Occasionally the height for a cloud layer as above will appear in the "Remarks" section. It will have to be located and entered into the correct position.
37	,	Comma delimited

38	Sky Conditions	numerical codes representing the possible sky conditions: 0 = clear or less than .1 coverage 1 = thin scattered 2 = scattered 3 = dark scattered 4 = thin broken 5 = broken 6 = dark broken 7 = thin overcast 8 = overcast 9 = dark overcast x = obscuration 10/l0ths obscuration * = partial obscuration (-X)
38	First Cloud Layer Amount (Sky Conditions)	e.g. HI SCT CLDS = 2 BRKN CLDS = 5 HI THIN OVC = 7 If skies are clear (no clouds) the entry should be clear (clr); then position 38 = 0 ; occasionally the observer entry may be "no clouds". Again position 38 = 0. If field blank then leave blank. Sky condition may also be represented by symbols as below: Open Circle = Clear Circle surrounding a single vertical mark = Scattered Circle surrounding two vertical marks = Broken Circle surrounding a plus sign = Overcast The aforementioned symbols may have a + or - sign preceding which indicate the following: + = dark - = thin the symbols above followed by a black slant (/) indicates high cloud e.g.  = Clear; no clouds

		 = Scattered Clouds  = Broken Clouds  = Overcast X = total obscuration - X = partial obscuration  / = Hi Overcast
39	High cloud indicator	Back slash (/) following the first cloud entry symbol indicates high cloud. e.g. if entry is one of the following:  / = Hi Scattered Clouds  / = Hi Broken Clouds  / = Hi Overcast Then position 39 = / If the entry is before the use of symbols when it was written in abbreviations, e.g. "Hi BRKN CLDS' or "Hi OVC," or "Hi SCTD CLDS", etc. then also key a / in position 39. Note: if SCTD CLDS/2000 is reported the / above does not mean high cloud as it does not follow a symbol.
40	,	Comma delimited
41-46 there	Second cloud layer (Where Reported)	Same rules as for first cloud group above (Positions 33-39) except

		is no high cloud indicator in Position 41.
41-44	Height of Second Cloud Layer	e.g. ⊕ / 45 ◐ reported, then Position 41 = blank 42 = blank 43 = 4 44 = 5
45	,	Comma delimited
46	Second Cloud Layer Amount	Position 46 = 2 (Scattered clouds in example above)
47	,	Comma delimited
48-53 layer	Third Cloud Layer	Same rules as for second cloud
	(Where Reported)	(Positions 41- 46). A third layer is generally not reported but when it is it is located in the "Remarks" section.
48-51	Height of Third Cloud layer	e.g. Sky conditions ⊕ ◐ Remarks E16 ⊕ 8 ◐ Position 48 = blank Position 49 = blank Position 50 = 0 Position 51 = 8 The following positions would have been keyed for the first cloud layer based on information in the remarks column. Position 33 = blank Position 34 = blank Position 35 = 1 Position 36 = 6 The E is not to be keyed.
52	,	Comma delimited

53	Third Cloud Layer Amount	See example above for the amount of the third cloud layer Position 53 = 2 (Scattered)
54	,	Comma delimited

55-59	Visibility (statute or nautical miles and fractions)	Positions 55-57 restricted to whole miles (rarely reaching 100 miles) and positions 58-59 for fractions of a mile. Fractions are only reported when visibility is less than 4 miles
		e.g. 10 miles =
		Position 55 = blank
		56 = 1
		57 = 0
		58 = blank
		59 = blank
		if vsby = 1/5 then;
		Position 55-57 = blank
		58 = 1
		59 = 5
		if vsby = 1 3/4 miles then;
		Position 55-56 = blank
		57 = 1
		58 = 3
		59 = 4
		Note 1: if unlimited (UNL) visibility reported then 9 fill positions 55-57 and blank fill positions 58-59
		
		Coding instructions for fractions of a mile:
		
		Entry Key
		1/10 10
		1/16 16
		1/8 18
		1/4 14
		5/16 56
		3/8 38
		1/2 12
		5/8 58

		3/4 34 7/8 78
60	,	Comma delimited
61-69	Weather Conditions	Position 61 = rain/freezing rain/rain showers Position 62 = hail Position 63 = thunderstorms/snow/ snow showers Position 64 = mist/freezing mist/ drizzle/freezing drizzle Position 65 = fog/ground fog/haze Position 66 = rain squall/snow squall/ice crystals Position 67 = haze/smoke Position 68 = sleet/ice fog Position 69 = sprinkling/damp haze/ tornado/waterspout/ funnel cloud Note: The observers may use the weather codes/symbols (e.g. ZR) or they may abbreviate the weather conditions i.e. MDT FRZG RAIN. See Codes below
61	Rain/Freezing Rain/ Rain Showers/	0 = Heavy Rain (R+) 1 = Moderate Rain (R) 2 = Light Rain (R-) 3 = Very Light Rain (R - -) 4 = Heavy Freezing Rain (ZR+) 5 = Moderate Freezing Rain (ZR) 6 = Light Freezing Rain (ZR-) 7 = Very Light Freezing Rain (ZR - -) 8 = Heavy Rain Showers (RW+) 9 = Moderate Rain Showers (RW) A = Light Rain Showers (RW-) B = Very Light Rain Showers (RW--)
62	Hail	0 = Heavy Hail (HL+)

		1 = Moderate Hail (HL) 2 = Light Hail (HL-) 3 = Heavy Hail (A+) 4 = Moderate Hail (A) 5 = Light Hail (A-) 6 = Heavy Small Hail (AP+) 7 = Moderate Small Hail (AP) 8 = Light Small Hail (AP-)
63	Thunderstorm/ Snow/ Snow Showers	0 = Heavy (Severe) Thunderstorm (T+) 1 = Moderate Thunderstorm (T) 2 = Mild Thunderstorm (T-) 3 = Heavy Snow (S+) 4 = Moderate Snow (S) 5 = Light Snow (S-) 6 = Very Light Snow (S- -) 7 = Heavy Snow Showers (SW+) 8 = Moderate Snow Showers (SW) 9 = Light Snow Showers (SW-) A = Very Light Snow Showers (SW- -) B = Light Snow Flurries (SF-) C = Snow Flurries (SF)
64	Mist/Freezing Mist/ Drizzle/Freezing Drizzle	0 = Heavy Mist (MI+) 1 = Mist or Light Mist (MI-) 2 = Very Light Mist (MI- -) 3 = Heavy Freezing Mist (ZMI+) 4 = Light Freezing Mist (ZMI-) 5 = Very Light Freezing Mist (ZMI-) 6 = Heavy Drizzle (L+) 7 = Moderate Drizzle (L) 8 = Light Drizzle (L-) 9 = Very Light Drizzle (L- -) A = Heavy Freezing Drizzle (ZL+) B = Moderate Freezing Drizzle (ZL) C = Light Freezing Drizzle (ZL-) D = Very Light Freezing Drizzle (ZL--)
65	Fog/Ground Fog	0 = Thick (Dense) Fog (F+) or (DF+) 1 = Dense Fog (FF)

		2 = (Moderate) Fog (F) 3 = Light Fog (F-) 4 = Very Light Fog (F- -) 5 = Thick (Dense) Ground Fog (GF+) 6= Dense Ground Fog (GFF) 7 = Moderate Ground Fog (GF) 8 = Light Ground Fog (GF-) 9 = Very Light Ground Fog (GF- -)
66	Rain Squall/ Snow Squall/ Ice Crystals	0 = Severe Rain Squall (RQ+) 1 = Moderate Rain Squall (RQ) 2 = Mild Rain Squall (RQ-) 3 = Severe Snow Squall (SQ+) 4 = Moderate Snow Squall (SQ) 5 = Mild Snow Squall (SQ-) 6 = Heavy Ice Crystals (IC+) 7 = Moderate Ice Crystals (IC) 8 = Light Ice Crystals (IC-) 9 = Very Light Ice Crystals (IC- -)
67	Haze/Smoke	0 = Thick Haze (H+) I = Hazy (Dry Haze) (H) 2 = Light Haze (H-) or (Lt. z) 3 = Very Light Haze (H- -) 4 = Heavy (Thick) Smoke (K+) 5 = Moderate Smoke (Smoky) (K) 6 = Light Smoke (K-) 7 = Very Light Smoke (K- -) 8 = Hazy (Dry Haze) & Light Smoke (H K-) 9 = Hazy (Dry Haze) & Moderate Smoke (H K) A = Hazy (Dry Haze) & Heavy (Thick) Smoke (H K+) B = Thick Haze & Light Smoke (H+ K-) C = Thick Haze & Moderate Smoke (H+ K) D = Thick Haze & Heavy (Thick) Smoke (H+ K+)
68	Sleet/Ice Fog	0 = Heavy Sleet (SL+) or (E+) I = Moderate Sleet (SL) or (E)

		2 = Light Sleet (SL-) or (E-) 3 = Very Light Sleet (SL- -) or (E- -) 4 = Thick (Dense) Ice Fog (IF+) 5 = Dense Ice Fog (IFF) 6 = Moderate Ice Fog (IF) 7 = Light Ice Fog (IF-) 8 = Very Light Ice Fog (IF- -)
69	Sprinkling/Damp Haze/ Tornado/Waterspout/ Funnel Cloud/Blowing Spray	0 = Light Sprinkle (SP-) 1 = Sprinkling (SP) 2 = Damp Haze (F- -) 3 = TORNADO (Always spelled out in capital letters) 4 = WATERSPOUT (Always spelled out in capital letters) 5 = FUNNEL CLOUD (Always spelled out in capital letters) 6 = Light Blowing Spray (BY-) 7 = Blowing Spray (BY) 8 = Heavy Blowing Spray (BY+)
70	,	Comma delimited
71- 75	Air Temperature	Air Temperature in Fahrenheit to tenths of a degree where available, decimal implied. Often the air temperature appears twice, once to tenths of a degree and in whole degrees. On the 1130-AER forms the air temp appears twice initially under the temperature and dew point column (whole degrees) and also under the thermometers dry column (whole degrees). On the SC Form 444 the air temperature is entered to whole degrees under temp, but under the dry bulb heading it is entered to tenths of a

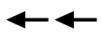
		degree. Key the value entered as the Dry Bulb. Position 71 = sign field; if positive blank fill, if negative enter a dash (-) Positions 72-74 whole degrees Position 75 = tenths of degree e.g. Temp. = 43.6 Pos. 71 = blank Pos. 72 = blank Pos 73 = 4 Pos 74 = 3 tenths of degrees pos. 75 = 6 e.g. if temp. entry = 3; then, Position 71 = blank Position 72 = blank Position 73 = blank Position 74 = 3 Position 75 = blank, if temp entry, however, was = 3.0; then pos. 75 = 0 If entry was 102.2 degrees F then Pos 71 = blank Pos 72-75 = 1022
76	,	Comma delimited
77-79	Dew Point Temperature	Dew point temperatures over the years have been provided in two ways: The actual temperature to whole degrees F or the dew point depression in whole degrees (the number of degrees less than the air temperature). In some cases they may transition from depression to actual degrees within a single form. Rules for keying the dew point areas follows: If the keyer is unsure which is represented key the values as indicated on the form heading. If dew point temperature (also remember that a wet bulb temperature may have been

		inserted so they could compute the dew point in which both values may appear in the same entry box) then:
Position 77		(sign field) = blank if positive dew point temperature. Position 77 = - (minus) if negative dew point temperature. Position 77 = 1 if dew point depression.
		Positions (78-79) = dew point temperature or dew point depression, right justify and blank fill. A dew point depression is always an absolute value. e.g. if dew point temp = 50, then Pos. 77 = blank Pos. 78 = 5 Pos. 79 = 0 If dew point depression = 2, then Pos. 77 = 1 Pos. 78 = blank Pos. 79 = 2
80	,	Comma delimited
81-83	Wind Direction	16 point wind directions, during this period two standards were used the alpha codes and the arrow indicators:
		Alpha Codes that follow shall be keyed as entered; left justify and blank fill. N NNE NE ENE E ESE SE SSE SSW

SW
WSW
W
WNW
NW
NNW
C = Calm

16 point scale represented by arrows

Entry	Keying code	Meaning
C	00	Calm
	11	N
	12	NNE
	18	NNW
	22	NE
	32	ENE



33

E

34

ESE

44

SE

54

SSE

55

S

56

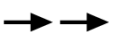
SSW

66

SW

76

WSW



77

W

78

WNW

88

NW

Note: The observer would occasionally only insert one arrow
rather than two for those directions
where both arrows were the same
i.e. 11, 22, 33, 44, 55, 66, 77, 88.
e.g. if entry is ESE
Position 81 = E
Position 82 = S
Position 83 = E
e.g. if entry is 88
Position 81 = blank
Position 82 = 8
Position 83 = 8

		If entry is calm caution should be taken regarding the conversion to alpha or numerical characters.
84	,	Comma delimited
85	Wind Speed Indicator	1 = Speed is measured in miles per hour. 2 = Speed is measured in knots. 3 = Speed is measured in meters per second. 4 = Speed is estimated in miles per hour. 5 = Speed is measured using Beaufort scale.
86	,	Comma delimited

87-89	Wind Speed	Wind speeds, right justify, blank fill.
		e.g. if entry = 4
		Positions 87- 88 = blank
		Position 89 = 4
		if entry = 15 mph, then
		Position 87 = blank
		Position 88 = 1
		Position 89 = 5
		if entry = 105 mph, then
		Position 87 = 1
		Position 88 = 0
		Position 89 = 5
		if entry = Calm
		Positions 87-88 = blank
		Position 89 = 0
		If wind velocity indicator = 4, then wind speed was reported using the following U.S. Weather Bureau descriptive terms. The mid-point

		value of each range is keyed into the velocity field (Positions 87-89) as indicated in the following table: Descriptive Term — Mid-Point Wind Speed (M.P.H) Light (Lt) — 4 Gentle (Gtl) — 10 Moderate (Mdt) — 15 Fresh — 21 Strong — 31 Gale — 46 Whole Gale — 63 Hurricane — 78
90	,	Comma delimited
91	Estimated wind speed	If the wind speed was estimated the letter E is placed immediately after the speed, e.g. 35E. If the E appears place it in position 91, otherwise, leave position 91 blank
92	,	Comma delimited
93	Character of the wind	If following the wind speed one of the following letters appear use the following codes for position 93: code — symbol — meaning 1 — G- or - — Fresh gust 2 — G or + — Strong gust 3 — G+ — Severe Gust 4 — V — Variable 5 — Q — Squall Occasionally they may be written above the wind speed, e.g. SVR GSTS NW-34
94	,	Comma delimited
95-97	Wind Gust	Wind Gust information usually found in the remarks column

		preceded by a G e.g. if entry is 45 then Position 95 = blank Position 96 = 4 Position 97 = 5
98	,	Comma delimited
99	Estimated wind gust	If the wind gust was estimated an E is placed immediately after the speed, e.g. 62E. If the E appears place it in Position 99, otherwise, leave Position 99 blank.
100	,	Comma delimited
101-105	Barometer Station Pressure (Inches)	The barometric station pressure is not a mandatory entry on the 1130-AER forms. On the SC Form 444 the station pressure is a mandatory entry and is usually recorded to a thousandth of an inch. If available key to inches and thousandths, decimal implied. e.g. if 28.232 entered. Positions 101-105 = 28232 If only recorded to hundredths of an inch, e.g. 28.23, then positions 101-105 = 2823 position 105 = blank, when 4 digits entered left justify blank fill. Occasionally, the observer will only enter 3 digits by dropping the leading digit, e.g. 28.23 would be entered as 823 (units and hundredths digits only). In this example positions 101 = blank Position 102 = 8 Position 103 = 2 Position 104 = 3 Position 105 = blank

106	,	Comma delimited
107-111	Sea Level Pressure (Millibars)	Barometric Sea Level pressure is a required entry on the SC Form 444. Right justify, blank fill, decimal implied. This field reserved for entries in millibars only if reported in inches key in following field. The entries often include only the last three values of the pressure reading leaving the first one or two positions implied, e.g. if the observed value was 1012.7 millibars only the 127 would be entered on the form by the observer. If e.g. the observed value was 998.2 millibars only 982 may be entered on the form. Key whatever the entry is, e.g. if the entry was 982, then Position 107 = blank Position 108 = blank Position 109 = 9 Position 110 = 8 Position 111 = 2 However if the entry was 998.2, then Position 107 = blank Position 108 = 9 Position 109 = 9 Position 110 = 8 Position 111 = 2 If entry were 1012.7, then positions 107-111 = 10127
112	,	Comma delimited
113-116	Barometric pressure Sea Level (inches)	Barometric Sea Level pressure in inches is occasionally entered by the observer even though it is not a required entry. Positions 113-114

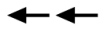
		are reserved for whole inches and positions 115-116 for hundredths of an inch. However, the observer often drops the leading value, e.g. 30.05 inches is entered on the form as 005 and 29.98 inches as 998. Right justify the entry and blank fill if necessary. The decimal is implied. Positions 113-114 should generally range between 29 and 30 (this is the reason the leading digit can be dropped) and in no instances should the sea level pressure value in inches be below 28 or above 31. e.g. Barometer (sea level) = 30.28 Positions 113-116 = 3028 , if entered as 028, then position 113 = blank and positions 114-116 = 028. In the QA between a cross check could be made the sea level pressure in millibars versus inches if both available.
117	,	Comma delimited
118-120	Altimeter	The entries do not include the first digit but only the units position in inches and the value to the nearest hundredth of an inch. Decimal implied in observer entry. e.g. if the entry = 968 Positions 118-120 = 968
121	,	Comma delimited
-	Remarks and Supplemental Coded Data	Do not key entries in Columns 13, 14A or 14B unless otherwise noted.
-	Observers Initials	Do not key this parameter. Column 15 on SC Form 444 and last column

		on 1130-AER forms. Sometimes the observers placed their initials to the left of Column 1 (Type).
-	Time (l.s.t.)	Column 16 on SC Form 444. Do not key this parameter. Even though this column is not being keyed the keyers should be aware that the time entered in this column may not match the time entered in Column 2. The time in this column is approximately 4 hours behind the time entered in Column 2. The time difference must be noted before keying the entries which follow.
122-126	Dry Bulb Temperature	Dry bulb temperature not a required entry, when available key, decimal implied. Dry bulb measured to whole degrees Fahrenheit (F) on 1130-AER form and tenths of degrees F on SC Form 444. Position 122 = sign field. Positive = blank, negative = -. Left justify, blank fill. Positions 123-125 = whole degrees. Position 126 = tenths of a degree. e.g. if entry is 31 Positions 121-122 = blank Position 124 = 3 Position 125 = 1 Position 126 = blank e.g. if entry is -7.6 Position 122 = - Position 123-124 = blank Position 125 = 7 Position 126 = 6
127	,	Comma delimited

128-131	Wet Bulb Temperature	The Wet Bulb Temperature is not a required entry on the 1130-Aer form series (no position provided on the form during the earlier years) and is only occasionally entered along with the temperature so the mandatory Dew Point Temperature can be computed and entered. However, on the SC Form 444 forms the wet bulb temperature became a mandatory entry. The wet bulb temperature value always lies between the air temperature (dry bulb) and dew point temperature. Follow the same rules as for the air temperature entry above except that a wet bulb temperature of 100 F is unrealistic and therefore one less position is required. Pos. 128 = sign field Pos. 129-130 = whole degrees F Pos. 131 = tenths position Leave field blank when no entry available.
132	,	Comma delimited
133-135	Relative Humidity	The relative humidity is not a required entry but when available is measured to the nearest percent. Right justify, blank fill. e.g. if entry is 83 Position 133 = blank Position 134 = 8 Position 135 = 3
136	,	Comma delimited
137-138	Total Sky Cover	Right justify, blank fill. Values are 0-10. e.g. if entry is 7

		Position 137= blank Position 138 = 7
139	,	Comma delimited
- Do	Clouds and Obscuring Phenomena	Columns 22-35 on SC Form 444. not key these parameters.
140-141	Total Opaque Sky Cover	Right justify, blank fill. e.g. if entry is 1 Position 140 = blank Position 141 = 1
142	,	Comma delimited
143	Pressure Tendency	values = 0-9
144	,	Comma delimited
145-147	Net 3-Hour Change	Right justify, zero fill. Leading decimal implied. Values may range from 000 to 999. e.g. if entry is .027 Position 145 = 0 Position 146 = 2 Position 147 = 7
148	,	Comma delimited
149-151 temperature)	3 Hour Sea Temp	Sea temperature (water should always be positive and is measured in tenths of degrees Fahrenheit (F) on SC Form 444. Form AER-1130 sea temp is measured in whole degrees and is located in the "Remarks" section. Decimal implied. e.g. if entry is 47.8, then: Position 149-151 = 478
152	,	Comma delimited

153-156	3 Hour Sea State	SC Form 444 only. Positions 153-154 = wave height values. Position 155-156 = direction of waves. 16 point wind directions, during this period arrow indicators were used to indicate the direction of waves. 16 point scale represented by arrows:

Entry	Keying code	Meaning
C	00	Calm
	11	N
	12	NNE
	18	NNW
	22	NE
	32	ENE
	33	E
	34	ESE
	44	SE
	54	SSE

		55	S
		56	SSW
		66	SW
		76	WSW
		77	W
		78	WNW
		88	NW
157	,	Comma delimited	
158	Sea State	Form No. 1130-AER only. Located in the “remarks” section. Use the following codes: 0 = Calm 1 = Smooth 2 = Slight 3 = Moderate 4 = Rough 5 = Very Rough 6 = High 7 = Very High 8 = Precipitous 9 = Confused A = Choppy B = Light	

		If any terms not listed above are entered in the sea state category use the next available letter which falls in the alphabet to code. When a new term is added, contact me for verification.
159	,	Comma delimited
160-162	Sea Swell Direction	N NNE NE ENE E ESE SE SSE SSW SW WSW W WNW NW NNW
163	,	Comma delimited
164-165	Sea Swell	Form No. 1130-AER only. Located in the “remarks” column under the heading Sea. Use the following codes: 0 = No swell 1 = Low swell, short or average length 2 = Low swell, long 3 = Moderate swell, short 4 = Moderate swell, average length 5 = Moderate swell, long 6 = Heavy swell, short 7 = Heavy swell, average length 8 = Heavy swell, long 9 = Confused swell

10 = Gentle
11 = Light
12 = Moderate
13 = Heavy

Notes:

1) If only one entry in the Temperature/Dew Point column assume the entry is the air temperature
and key accordingly.

2) Ensure that whenever the observer entered a ditto (") mark that the proper value is keyed.

3) Whenever an element field has a value to be keyed, but the value cannot be determined because of illegibility or non-recognizable characters by the keyer then place a tilde (~) in the last
position of that element field. This will provide the data user with information that an entry was made by the observer but could not be keyed. If sufficiently interested the user can view the image.

4) Sometimes the observer uses the letter “M” to represent missing data. “M” should always be keyed
rather than leaving the entry blank or keying a “zero”.

5) Do not key any values entered on the left margins of the observation forms.

6) When the keyers encounter a “/” or “x” then they are to key a dash (-).