

UPPER AIR OBSERVATIONS SUMMARY OF CONSTANT PRESSURE DATA



Upper air temperature, humidity, dew point, wind direction and speed, and height of pressure levels above mean sea level are obtained from radiosondes (radio transmitters carried aloft by balloons) which frequently reach heights of 100,000 feet. The number of radiosonde stations operated by U.S. weather services and cooperating countries is now about 130, of which approximately 94 are now mini-computer stations; most take soundings at 00 and 12 GMT. Data from other countries are also available, but in different formats.

Urban low-level sounding stations were activated in early 1969 to provide detailed information about air temperature and wind flow between the surface and 700 millibars (about 10,000 feet). NCC processes and retains on magnetic tape wind information recorded at each one-half minute interval of these soundings and for all significant level data.

Beginning in late 1969, stations began to convert to a digital format through the use of a time-shared computer. In March 1974, some upper air stations began processing their data by mini-computer, and after a two-year conversion, most upper air data were being processed by mini-computer. These changes have altered the form in which data are retained (see pages 3 and 4).

ADIABATIC CHARTS (MF3-31A, B,C)

Station personnel evaluate the sounding from the recorder record (not shown). The three traces on the Adiabatic Charts—Temperature (T), Relative Humidity (RH) and Pressure-Altitude (PA) — are plotted and the appropriate information at prescribed levels is read from the traces and entered in the Constant Pressure Blocks (see 1 and 2, for example, on page 2). These traces describe the vertical structure of a small volume of the atmosphere at the time of the sounding. Detailed Adiabatic Charts are routinely prepared for only the U. S. operated upper air stations not taking auto-raobs. MF3-31A contains data from the surface to 400 mbs.; MF3-31B contains data from 400 to 100 mbs.; and MF3-31C contains data from 100 to 1.5 mbs or sounding termination. Information for each sounding is evaluated at a number of pressure levels which are defined in two special ways: Mandatory and Significant. Mandatory pressure levels are those required for teletype transmission. Significant levels are indicated on the Adiabatic Chart to describe significant variations noted in the sounding as compared to prescribed tolerances which are given in FMH-3...etc. To accurately recreate the temperature profile, the temperature at significant points must be used with those at other levels. An examination of levels 5, 6 and 7 of the temperature trace on the sample form (3 on page 2) will show this in some detail. Significant level and mandatory level data are available on magnetic tape. Additional levels are generated by the NCC computer processing and these are indicated as being interpolated at the time of processing.

Copies of the Adiabatic Charts, either full size or right half only and Summary of Constant Pressure Data (see page 5) can be provided for the cost of reproduction. The digital data extracted from the Adiabatic Charts are available on magnetic tape; information about the magnetic tape formats will be furnished upon request. Cost and time estimates for all products and/or services will be supplied upon request.

Constant Pressure Blocks
10740 74.34 26.3
26370 74 26.0
26571 26.0 27

BASELINE CHECK READINGS

Bar	Therm	Wet
2240	70.9	25.0
77.5		15.5

RELATIVE HUMIDITY

Bar	Temp	Wet	Rel Hum
2240	70.9	25.0	15.5
77.5			36%

CODED MESSAGE FOR TRANSMISSION

TT 51001 12260 920M 2112Z
1200Z 00001 19412 2000Z 15517
1040Z 20212 2020Z 05059 22015
3057Z 14131 21551 40744 24370
24231 20246 21511 22069 20204
6511 22021 15371 59511 21061
10634 43411 27023 81116 10211
21561 12220 22521 0
Y.V. 51001 12240 00016 21622
11921 12163 22283 14625 33828
-- -- SFC

LEGEND FOR CONSTANT PRESSURE BLOCKS

DATA AS ENTERED ON PUNCHED CARD

Column	Altitude (ft)	Temperature (C)
11, 12, 13	Relative Humidity (%)	Dew Point (C)
14	Direction (degrees)	Wind Speed (knots)

LEGEND FOR PLOTTED CURVES

PA - Pressure, Altitude, Temperature, etc.

1 - Temperature (C)
RH - Relative Humidity (%)

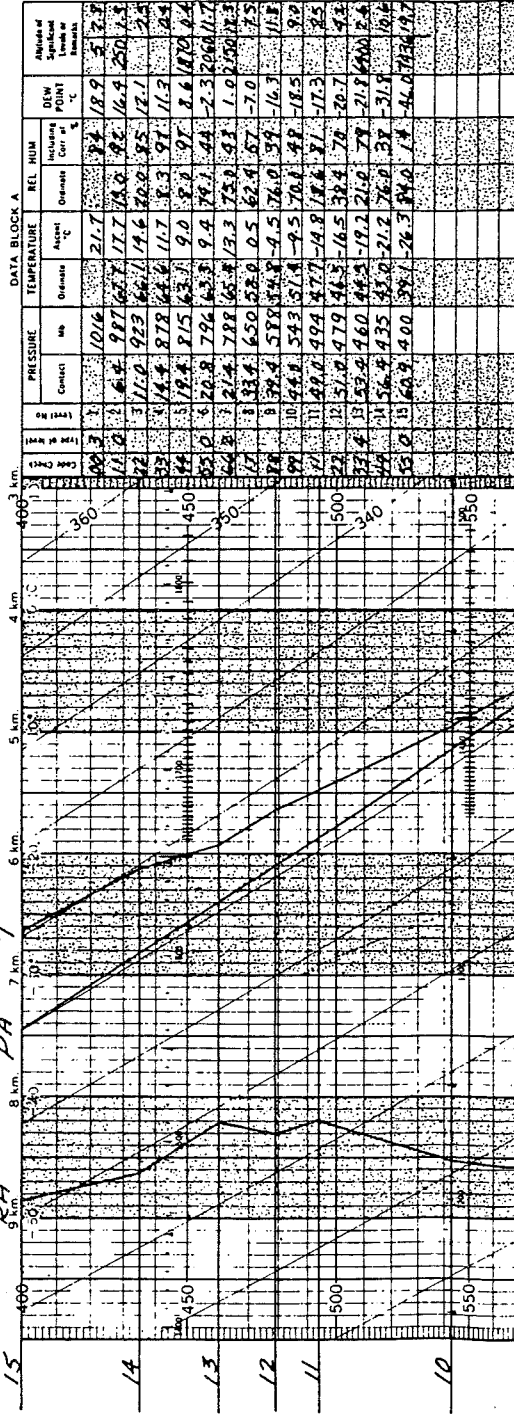
Drawn by Larry Hargrett
Verified by R. Barnes
Inspected by

DATE AND RELEASE TIME

Year	Month	Day	Time
98	11	31	1715
1981	11	1	00

Altitude No. 186
Station Lake Charles, La.
(Municipal Airport)

U.S. 30° 01' N Long 93° 13' W
Prepared by the Coast and Geodetic Survey
Washington D.C. 20540



SURFACE OBSERVATION AT RELEASE

Station	Pressure	Temp	Wet	Wind	Clouds	Weather
29 99 0052	10.5	10.5	7.5	4.4		

RELATIVE HUMIDITY

Temp	Wet	Rel Hum
71	7	84
190	4	

WIND

Direction	Speed
190	4

CLOUDS AND WEATHER
757 3 CU

REMARKS

10130 3130 5.4
25559 52 3.6
29018 279 7.0

Constant Pressure Blocks

7350 10.9
265 7
2020 9.3
54 7
262 7

DATE AND RELEASE TIME

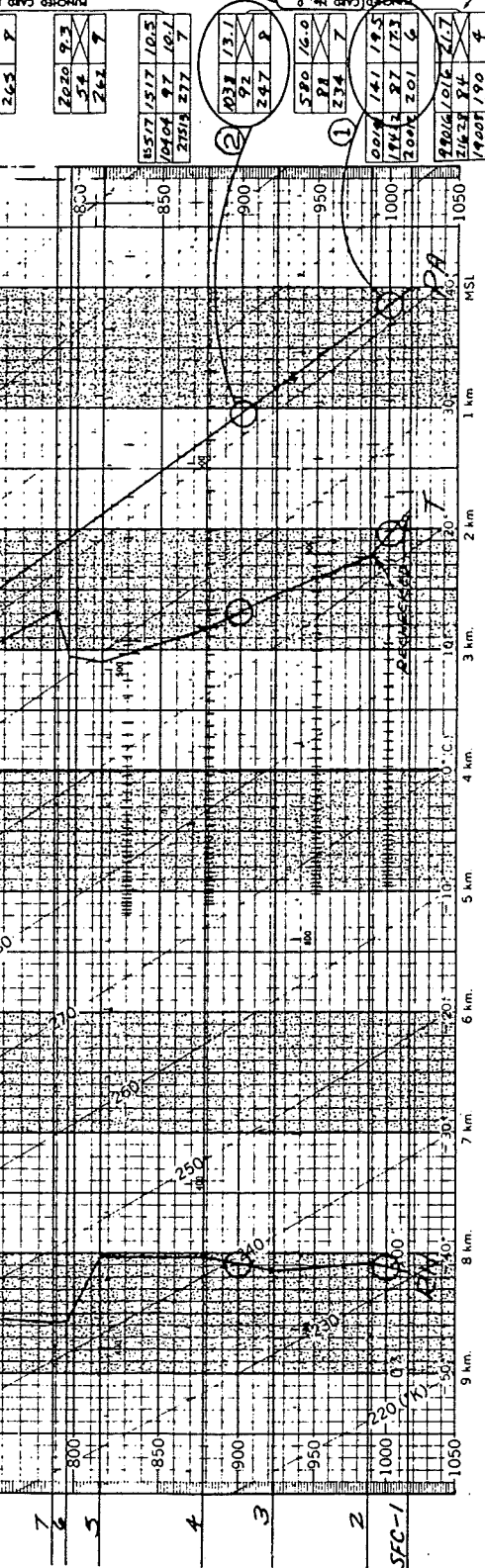
1537 1517 10.3
2404 97 10.1
27518 277 7

Constant Pressure Blocks

1038 13.1
297 8
580 16.0
234 7
2018 141 18.5
184 27 123
2004 201 6

Constant Pressure Blocks

9016 1016 11.7
716 24 6
19201 190 4



15 PA T
14
13
12
11
10
9
8
7
6
5
4
3
2
SFC-1

DATE 101069 TIME A-MO F-EG STATION 1115 349 1456 94789

TIME	PRESS	M-MSL	TEMP	DP-DEP
0	1018.6	5	8.7	8.7
1	1000	106	8.1	8.2
2	987	377	8.1	8.2
3	976	643	8.7	8.7
4	967	1066	6.9	11.7
5	950	1434	4.4	13.6
6	935	1975	4.4	10.1
7	925	2387	8.8	5.8
8	916	2831	8.5	4.5
9	906	3286	6.7	5.1
10	898	3767	7.8	8.6
11	890	4274	10.4	7.2
12	881	4807	11.6	4.7
13	872	5366	14.7	16.4
14	863	5950	19.9	16.7
15	854	6569	24.3	9.5
16	845	7223	28.6	8.4
17	836	7912	33.3	7.9
18	827	8636	39.6	6.6
19	818	9405	46.1	9.9
20	809	10228	53.9	9.9

MIN	M-AS	DIR	S-MPS	FT-MSL
0	0	0	5.1	16
1	161	59	10.4	546
2	432	73	9.9	1498
3	714	87	5.3	3266
4	977	91	5.3	3921
5	1430	94	3.6	4053
6	1478	93	5	4867
7	1724	78	4.7	5673
8	1970	45	5.9	6479
9	2267	77	6.9	7319
10	2569	0	0	8239
11	2834	0	0	9269
12	3065	870	11.8	10426
13	3261	864	17.7	11733
14	3422	853	19.1	13133
15	3548	853	20.8	14604
16	3639	856	23.7	16141
17	3699	855	25.6	17855
18	3736	849	26.8	19689
19	3752	846	28.1	21683
20	3756	844	28.3	23859
21	3748	844	28.5	26227
22	3728	848	28.6	28780
23	3699	842	30.8	31570
24	3654	842	30.8	34731

P-RB	DIR	S-KTS
1000	50	16
850	93	10
700	40	7
500	0	0
400	35	39
300	845	55
M-K-FT DIR S-KTS		
1	80	14
2	90	10
3	95	11
4	70	10
5	70	11
6	70	7
7	70	7
8	35	7
9	35	7
10	360	11
11	345	6
12	0	0
13	0	0
14	0	0
15	85	46
16	85	71
17	845	55

DATE 101069 TIME A-MO F-EG STATION 1115 349 1456 94789

TIME	PRESS	M-MSL	TEMP	DP-DEP
31-6	300	9161	-26.1	9999
32-8	250	10357	-35.9	9999
33-7	243	10528	-37.1	9999
34-1	230	10676	-36.1	9999
35-2	220	11160	-53.9	9999
36-4	200	11771	-55.8	9999
37-6	150	13601	-56.8	9999
38-8	100	14964	-56.8	9999
39-3	50	16164	-59.8	9999
40-3	65	17175	-61.1	9999
41-7	78	17715	-58	9999
42-7	70	18398	-61.1	9999
43-3	64	18949	-60.3	9999
44-0	50	20409	-37.1	9999
45-3	37	22399	-38.3	9999
46-4	30	23724	-36.4	9999
47-5	20	26385	-31.9	9999
48-6	17	27387	-48.5	9999

MIN	M-AS	DIR	S-MPS	FT-MSL
36	9617	842	86.6	31569
37	9947	842	30.8	32650
38	10276	845	34.7	33731
39	10597	848	34.4	34814
40	10844	847	31.7	35601
41	11104	847	33.1	36446
42	11427	848	38.5	37305
43	11766	852	38.5	38117
44	12076	852	40.7	39035
45	12366	855	38.5	40052
46	12696	855	38.9	41670
47	13006	859	36.1	42688
48	13316	863	35.9	43705
49	13687	864	36.6	44725
50	13944	862	33.7	45765
51	14261	862	35.3	46805
52	14578	861	33.9	47844
53	14895	861	37.7	48884
54	15205	861	35.4	49924
55	15515	861	35.4	51005
56	15825	861	35.4	52086
57	16135	861	35.4	53167
58	16445	861	35.4	54248
59	16755	861	35.4	55329
60	17065	861	35.4	56410
61	17375	861	35.4	57491
62	17685	861	35.4	58572
63	17995	861	35.4	59653
64	18305	861	35.4	60734
65	18615	861	35.4	61815
66	18925	861	35.4	62896
67	19235	861	35.4	63977
68	19545	861	35.4	65058
69	19855	861	35.4	66139
70	20165	861	35.4	67220
71	20475	861	35.4	68301
72	20785	861	35.4	69382
73	21095	861	35.4	70463
74	21405	861	35.4	71544
75	21715	861	35.4	72625
76	22025	861	35.4	73706
77	22335	861	35.4	74787
78	22645	861	35.4	75868
79	22955	861	35.4	76949
80	23265	861	35.4	78030
81	23575	861	35.4	79111
82	23885	861	35.4	80192
83	24195	861	35.4	81273
84	24505	861	35.4	82354
85	24815	861	35.4	83435
86	25125	861	35.4	84516
87	25435	861	35.4	85597
88	25745	861	35.4	86678
89	26055	861	35.4	87759
90	26365	861	35.4	88840
91	26675	861	35.4	89921
92	26985	861	35.4	91002
93	27295	861	35.4	92083
94	27605	861	35.4	93164
95	27915	861	35.4	94245
96	28225	861	35.4	95326
97	28535	861	35.4	96407
98	28845	861	35.4	97488
99	29155	861	35.4	98569

P-RB	DIR	S-KTS
250	243	67
200	250	75
150	263	71
100	275	62
70	270	41
50	275	16
30	335	6
20	50	16
M-K-FT DIR S-KTS		
35	850	65
50	865	71
70	890	14

The listings shown are printouts from a time-share computer. The observation was taken on October 10, 1969 (101069) at 1115 Greenwich Mean Time (GMT) at John F. Kennedy International Airport (Station 94789). This was the 349th observation taken there in 1969 (A.-No. 349). The listings shown on the left are for the first part of the sounding; listings on the right are for higher levels.

Section 1 Lists pressure, height and temperature data for the significant and mandatory pressure surfaces. The first column is the time in minutes from the beginning of the ascent (TIME); the second is pressure in millibars (PRESS); the third is height in meters above Mean Sea Level (M-MSL); the fourth is temperature in °C (TEMP); and the fifth column is the depression of the dewpoint from the temperature in °C.

Section 2 Lists wind direction and speed and height data for each minute of the ascent. The first column is minutes after the start of the ascent (MIN); the second is height in meters above the surface (M-AS); the third is wind direction (DIR) in degrees from North (measured clockwise and where 360 is North); the fourth is wind speed in meters per second (S-MPS); and the fifth column is height in feet above Mean Sea Level (FT-MSL).

Section 3 Lists wind direction and speed in knots for the mandatory pressure levels.

Section 4 Lists wind direction and speed in knots for selected heights in thousands of feet above MSL.

Section 5 Lists direction and speed in knots of significant winds for heights in thousands of feet above MSL.

MEAN WIND--SFC TO 5000 FT 60 13
MEAN WIND--5000 TO 10000 FT 60 9

SIG. WINDS	H-K-FT	DIR	S-KTS
1	60	80	20
2	65	11	11
3	95	11	11
4	65	18	18
5	18	360	11
6	13	355	11
7	81	270	33
8	81	255	37
9	81	260	60

DATE TIME A.NO F.EQ STATION
 750404 0 185 1213.3 70308

TIME PRESS M-MSL TEMP DP-DEP
 0.000 1004.2 10 0.9 0.0
 SUPER 1004.2 1000.0 MB IS 11.763 DEG/KM
 0.200 1000.0 44 0.5 0.1
 2.200 928.0 649 4.5 0.0
 4.400 863.0 1238 1.6 0.2
 SUPER 863.0 850.0 MB IS 10.69 DEG/KM
 4.900 850.0 1360 0.3 5.0
 5.500 834.0 1513 -0.3 5.7
 6.300 814.0 1707 -1.6 3.7
 7.000 796.0 21884 -2.8 5.0
 04.700 774.0 28596 -3.0 8.0
 94.600 795 30715 -49.5 9999.0
 95.890 10.0 31035 -48.8 9999.0

MIN M-AS DIR S-KTS FT-MSL
 0 0 180 14 33
 1 276 201 31 937
 2 578 199 38 1930
 3 853 194 41 2832
 4 1121 196 41 3711
 5 1376 198 38 4546
 6 1624 197 37 5360
 7 1874 201 41 6182
 8 2177 205 47 7175
 9 2447 205 46 8060
 10 2717 202 45 8948
 11 2997 202 46 9867
 12 3291 202 50 10830
 13 3604 198 58 11856
 14 3808 198 65 12855
 15 3978 202 65 13785
 21 29185 110 25 95780
 92 29607 113 26 97167
 93 30029 102 28 98553
 94 30452 105 32 99938

ASC RATE SURFACE TO 400 MB LEVEL IS 285

ASC RATE 400 TO 10 MB LEVEL IS 338

The 11stings shown are printouts for a station equipped with a minf-computer. The observation was taken at midnight GMT (Time 0) on April 4, 1975 (750404) at St. Paul Island, Alaska (Station 70308). This was the 185th observation taken there in 1975 (A.No. 185).

Section ① 11sts pressure, height and temperature data for the significant and mandatory pressure surfaces. The first column is the time in minutes from the start of the ascent (TIME); the second is the pressure in millibars (PRESS); the third is the height of the pressure level in meters above Mean Sea Level (M-MSL); the fourth is the air temperature in °C (TEMP); and the fifth column is the depression of the dewpoint (DP-DEP) from the air temperature in °C. The hundredths and the thousandths of minutes in the first column, if different than 00, denote special aspects about the data for that time:

- .010 - begin missing data or end doubtful temperature and begin missing data.
- .020 - end missing data or end missing data and begin doubtful temperatures.
- .030 - begin doubtful temperature.
- .040 - end doubtful temperature.
- .005 - begin missing humidity.
- .006 - end missing humidity.
- .090 - extrapolated data (used for mandatory levels only).

The entry SUPER indicates superadiabatic lapse rate. The data shown indicate the upper and lower pressure levels of the superadiabatic layer and the actual lapse rate through the layer in °C/Km.

Section ② 11sts wind direction and speed and height data for each minute of the ascent. The first column is minutes after the start of the ascent (MIN); the second is height in meters above the surface (M-AS); the third is wind direction (DIR) in degrees from North (measured clockwise and where 360 is North); the fourth is wind speed in knots (S-KTS); and the fifth column is height in feet above Mean Sea Level (FT-MSL).

SUMMARY OF CONSTANT PRESSURE DATA (WBAN 2)

This is a monthly summary routinely prepared for all U. S. operated upper air stations. The input data are those shown in the Constant Pressure Blocks on the Adiabatic Charts. (See page 2) The number of pages varies between eight and ten for each station and time period, by individual month. Data shown on page "0" are: Surface, 1000, 950, and 900 mbs.; data on page "1" are for the 850, 800, 750 and 700 mbs., etc. Orders for this form should specify the pressure surface(s) needed. Hours of observation are currently 0000 and 1200 Greenwich Mean Time, although prior to June 1957 upper air observations were scheduled at 0300 and 1500 GMT, and over the years, some stations have taken from one to four, or more observations per day. The circled numbers 1, 2, and 3, on the WBAN-33 Form correspond to similar entries on the Adiabatic Chart on page 2. Item 4 shows the location of the Resultant Wind Direction (theta) in degrees, and the Resultant Wind Speed (Vr), in meters per second.

SUMMARY OF CONSTANT PRESSURE DATA WBAN 33

Table with columns for station name (Station Lake Charles La), observation time (0300, 0900, 1500, 2100), pressure surfaces (1000, 950, 900 mbs), and various meteorological data including temperature, wind speed, and direction. Includes circled numbers 1, 2, 3, and 4.

Actual Size 8 1/2" x 15"

RESULTANT WIND DIRECTION (theta): The angle of the resultant derived from theta = arctan (sum X / sum Y)

where X and Y are the zonal and meridional wind components, respectively.

SUM OF ZONAL COMPONENTS (sum X): Each wind observation is resolved into its zonal component (X) and meridional component (Y).

Zonal components are positive from the west and negative from the east. If |Vi| and theta_i are the speed and direction of an individual observation, theta_i being the angle from which the wind is blowing, measured clockwise from North or zero degrees, then sum X = sum |Vi| sin (theta_i + pi)

SUM OF MERIDIONAL COMPONENTS (sum Y): sum Y = sum |Vi| cos (theta_i + pi)

where components from the south are positive and components from the north are negative.

RESULTANT WIND SPEED (Vr): Magnitude of the resultant wind vector is computed as follows: Vr = sqrt((sum X)^2 + (sum Y)^2) / N

