

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.

DATE 101069 TIME A-MO F-EG STATION
101069 1115 349 1436 94789

TIME	PRESS	H-MSL	TEMP	DP-DEP
0	1018.6	3	8.1	4.2
1	1000	106	8.1	8.1
2	987	377	8.1	8.1
3	974	643	8.1	8.1
4	961	1066	8.1	8.1
5	948	1634	8.1	8.1
6	935	2244	8.1	8.1
7	922	2904	8.1	8.1
8	909	3614	8.1	8.1
9	896	4374	8.1	8.1
10	883	5184	8.1	8.1
11	870	6044	8.1	8.1
12	857	6954	8.1	8.1
13	844	7914	8.1	8.1
14	831	8924	8.1	8.1
15	818	9984	8.1	8.1
16	805	11094	8.1	8.1
17	792	12354	8.1	8.1
18	779	13664	8.1	8.1
19	766	15024	8.1	8.1
20	753	16434	8.1	8.1
21	740	17894	8.1	8.1
22	727	19404	8.1	8.1
23	714	20964	8.1	8.1
24	701	22574	8.1	8.1
25	688	24234	8.1	8.1
26	675	25944	8.1	8.1
27	662	27704	8.1	8.1
28	649	29514	8.1	8.1
29	636	31374	8.1	8.1
30	623	33284	8.1	8.1
31	610	35244	8.1	8.1
32	597	37254	8.1	8.1
33	584	39314	8.1	8.1
34	571	41424	8.1	8.1
35	558	43584	8.1	8.1
36	545	45794	8.1	8.1
37	532	48054	8.1	8.1

MIN	H-AS	DIR	S-MPS	FT-MSL
0	0	0	0	16
1	161	37	10.4	346
2	432	73	9.9	1498
3	716	07	5.3	3748
4	977	91	5.3	3881
5	1200	74	5.6	4033
6	1478	93	5	4867
7	1784	78	4.7	5673
8	1970	63	5.9	6479
9	2267	77	4.9	7279
10	2569	66	0	8079
11	2834	0	0	8879
12	3104	0	0	9679
13	3379	0	0	10479
14	3659	0	0	11179
15	3934	0	0	11879
16	4214	0	0	12579
17	4489	0	0	13279
18	4769	0	0	13979
19	5044	0	0	14679
20	5324	0	0	15379
21	5604	0	0	16079
22	5879	0	0	16779
23	6159	0	0	17479
24	6434	0	0	18179
25	6714	0	0	18879
26	6989	0	0	19579
27	7269	0	0	20279
28	7544	0	0	20979
29	7824	0	0	21679
30	8104	0	0	22379
31	8379	0	0	23079
32	8659	0	0	23779
33	8934	0	0	24479
34	9214	0	0	25179
35	9489	0	0	25879
36	9769	0	0	26579
37	10044	0	0	27279

P-MS	DIR	S-KTS
1000	50	16
850	95	10
700	40	7
500	0	0
400	855	39
300	845	55
200	815	80
100	80	14
50	90	10
0	95	11
0	70	10
0	70	11
0	70	7
0	35	7
18	360	11
14	245	6
16	0	0
80	0	0
85	855	46
30	845	55

DATE 101069 TIME A-MO F-EG STATION
101069 1115 349 1436 94789

TIME	PRESS	H-MSL	TEMP	DP-DEP
34.6	300	9161	-86.1	9999
35.8	250	10347	-55.9	9999
36.7	243	10528	-37.1	9999
40.1	230	10876	-36.1	9999
41.2	220	11140	-33.9	9999
43.1	200	11701	-33.8	9999
46.9	150	13101	-36.8	9999
53.8	181	14984	-39.8	9999
58.6	100	16164	-39.8	9999
60.3	85	17171	-61.1	9999
61.7	78	17715	-58	9999
63.7	70	18398	-61.1	9999
65.3	64	18949	-60.5	9999
70	50	20499	-58.3	9999
75.3	37	23299	-56.4	9999
78.4	30	23724	-56.4	9999
85	20	24385	-51.9	9999
88	17	24387	-48.3	9999

MIN	H-AS	DIR	S-MPS	FT-MSL
34	9417	842	86.4	31369
35	9747	848	30.6	32850
36	10276	845	34.7	34721
39	10597	848	34.4	34784
40	10648	847	31.7	35001
41	11104	847	33.4	36446
42	11427	848	34.5	37505
43	11746	848	38.5	38617
44	12076	852	40.7	39652
45	12416	855	38.5	40652
46	12494	855	36.9	41670
47	13006	859	36.1	42688
48	13318	863	35.9	43705
49	13627	868	36.6	44725
50	13944	868	33.7	45765
51	14281	862	35.3	46805
52	14578	861	37.7	47844
53	14895	861	37.7	48884
54	15203	861	15.2	49924
55	15503	869	11.4	50969
56	15824	869	9.7	52014
57	16144	878	9.7	53059
58	16464	874	8.1	54104
59	16784	866	8.1	55149
60	17104	862	6.5	56194
61	17424	808	6.8	57239
62	17744	808	6.8	58284
63	18064	808	9.8	59329
64	18384	808	9.8	60374
65	18704	808	9.8	61419
66	19024	808	9.8	62464
67	19344	808	9.8	63509
68	19664	808	9.8	64554
69	19984	808	9.8	65599
70	20304	808	9.8	66644
71	20624	808	9.8	67689
72	20944	808	9.8	68734
73	21264	808	9.8	69779
74	21584	808	9.8	70824
75	21904	808	9.8	71869
76	22224	808	9.8	72914
77	22544	808	9.8	73959
78	22864	808	9.8	75004
79	23184	808	9.8	76049
80	23504	808	9.8	77094
81	23824	808	9.8	78139
82	24144	808	9.8	79184
83	24464	808	9.8	80229
84	24784	808	9.8	81274
85	25104	808	9.8	82319
86	25424	808	9.8	83364
87	25744	808	9.8	84409

P-MS	DIR	S-KTS
850	845	67
800	850	75
150	835	68
100	875	68
70	870	41
50	875	16
30	335	6
20	50	16
16	0	0
35	850	65
30	845	71
70	890	18

The listings shown are printouts from a time-shared 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 (H-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--5FC TO 5000 FT 80		MEAN WIND--5000 TO 10000 FT 40		SIG. WINDS			
M	K-FT	DIR	S-KTS	M	K-FT	DIR	S-KTS
1	60	80	80	40	850	77	77
2	85	11	11	51	845	71	71
3	95	11	11	54	870	41	41
4	65	18	18	54	870	30	30
5	360	11	11	68	865	15	15
6	360	11	11	71	810	18	18
7	355	11	11	73	870	19	19
8	810	33	33	76	885	15	15
9	855	37	37	86	82	14	14
10	840	60	60	89	75	18	18

DATE 750404 TIME 0 A.NO 185 F.EQ 1213.3 STATION 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	928.0	44	0.5	0.1
2.200	863.0	649	4.5	0.0
4.400	850.0	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	874.0	28506	03.0	pp.10
94.600	883.0	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	3670	202	65	16785
01	29185	110	29	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 listings shown are printouts for a station equipped with a mini-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) lists 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 temperature.
- .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) 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 knots (S-KTS); and the fifth column is height in feet above Mean Sea Level (FT-MSL).

SUMMARY OF CONSTANT PRESSURE DATA (WBAN-33)

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 (θ) in degrees, and the Resultant Wind Speed (V_r), in meters per second.

SUMMARY OF CONSTANT PRESSURE DATA WBAN 33

STATION	TIME	3000		2000		1000		500		300		200		100		SURFACE	TIME
		DIR	SPD	DIR	SPD	DIR	SPD	DIR	SPD	DIR	SPD	DIR	SPD	DIR	SPD		
03537	00	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	01	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	02	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	03	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	04	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	05	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	06	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	07	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	08	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	09	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	10	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	12	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	13	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	14	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	15	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	16	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	17	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	18	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	19	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	20	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	21	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	22	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	23	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	24	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	25	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	26	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	27	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	28	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	29	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11
03537	30	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11	0110	11

Actual Size θ 1/2" x 15"

RESULTANT WIND DIRECTION (θ): The angle of the resultant derived from $\theta = \arctan \frac{EX}{EY}$

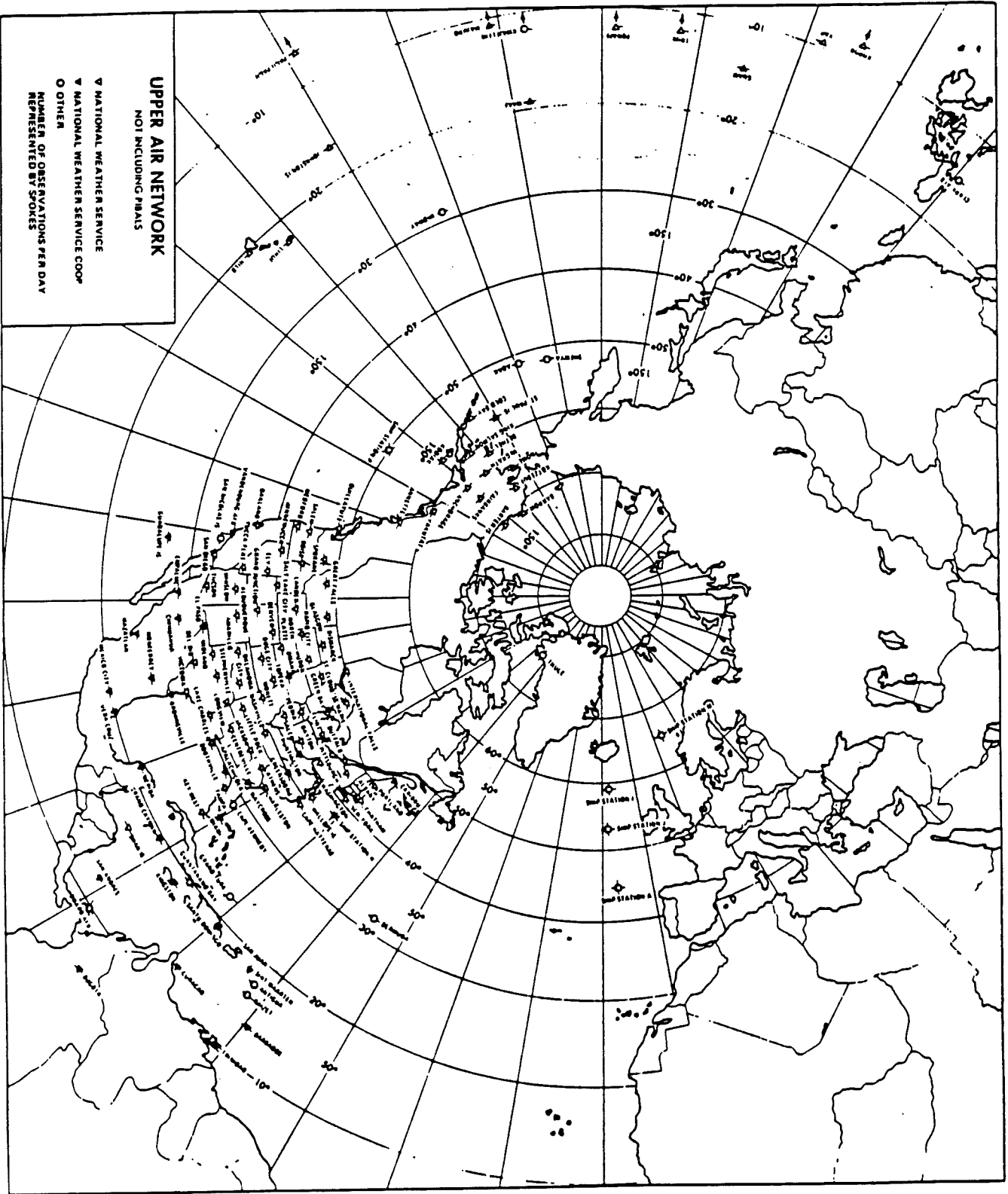
where X and Y are the zonal and meridional wind components, respectively.

SUM OF ZONAL COMPONENTS (EX): 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 $|V_i|$ and θ_i are the speed and direction of an individual observation, θ_i being the angle from which the wind is blowing, measured clockwise from North or zero degrees, then $EX = \sum |V_i| \sin(\theta_i + \pi)$

SUM OF MERIDIONAL COMPONENTS (EY): $EY = \sum |V_i| \cos(\theta_i + \pi)$

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

RESULTANT WIND SPEED (V_r): Magnitude of the resultant wind vector is computed as follows: $V_r = \sqrt{EX^2 + EY^2}$



UPPER AIR NETWORK
 NOT INCLUDING FBAS

▽ NATIONAL WEATHER SERVICE
 ▲ NATIONAL WEATHER SERVICE COOP
 ○ OTHER

NUMBER OF OBSERVATIONS PER DAY
 REPRESENTED BY SPOKES