



WINDS ALOFT COMPUTATION SHEET WINDS ALOFT SUMMARY FORM

SAMPLE FORMS
OF
RECORDS AVAILABLE

AT
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, NORTH CAROLINA 28801

Direction and speed of upper winds at U. S. operated stations have been determined by several methods over the years. The two most common are: PIBAL (pilot balloon--a balloon tracked by theodolite) and RAWIN (a balloon with target tracked by radar or radio direction-finder often as a part of a radiosonde observation).

WINDS ALOFT COMPUTATION SHEET (WBAN-20):

Azimuth and elevation angles are recorded on this form at one minute intervals during the balloon ascent, (1). The height of the balloon above the surface and the distance the balloon has drifted from the observation point are determined and entered in the appropriate columns. The position of the balloon at each minute (determined by the azimuth angle and the distance from observation point) is plotted (2) and the wind direction and speed are then evaluated for each minute up to 7 km. and for every even minute above 7 km., and entered on the form, (3). Wind data are entered in the appropriate blocks for digitizing and teletype transmission. Maximum wind speed data are entered when speeds reach 45 meters per second (100 mph), (4). Wind directions are currently coded to the nearest 5° and the wind speeds are coded in knots for transmission, (5). These data are entered in degrees and meters per second in the punched card data blocks, (6). While data from both types of observations (PIBAL AND RAWIN) are recorded on the WBAN-20, the form has been modified over the years. Changes in the wind direction code and in reporting units of wind speed (miles/hour to knots) are noted, along with other changes, in reference manual for Tape Data Family (TDF) 9740 (formerly Card Deck #535), which is available from this Center on request.

MAGNETIC TAPE FORMAT (TDF-9740):

The tape contains wind direction and speed at a set of specified heights above mean sea level, except for the first three fields which contain wind data for the surface, 150 meters above surface, and 300 meters above the surface. Data from punched card data blocks on the Winds Aloft Computation Sheet (6) are keyed onto tape. The information on the tape is then listed on the Winds Aloft Summary Form (WBAN-22 shown on Page 4). Routine keying of these data was discontinued January 1, 1965 for all National Weather Service stations, except the six Ocean Station Vessels. Effective with August 1968 data keying was discontinued for those six stations. Keying of these data for Navy stations was terminated September 1, 1965 and on March 1, 1967 for U. S. Army Signal Corps stations.

RECORDS SERVICES AVAILABLE AT THE NATIONAL CLIMATIC CENTER:

Upper wind data are available from U. S. operated stations on original forms, magnetic tape, summary form, microfilm and in publications. In addition special unpublished data summaries are available for the cost of duplication. The type and form of record requested may depend upon the application to a particular problem. For this reason, a full discussion of data availability and format is mutually beneficial prior to placing an order. Cost-time estimates for products and/or services will be furnished on request. For additional information, write to the Director, National Climatic Center, Federal Building, Asheville, N. C. 28801 or telephone (704) 258-2850, extension 683.

Identification
 Columbia, Mo.
 38° 58' N 92° 22' W
 LST-90ft Meridian EL238
 Rawinsonde WBRT-57

U.S. DEPARTMENT OF COMMERCE
 ESSA
 WEATHER BUREAU
WINDS-ALOFT COMPUTATION SHEET
 (LAND STATION FORM)
 WBAN-20

Actual Time (M.S.T.)	Year	Month	Day	Time
	1963	Dec	31	1714
Scheduled (G.M.T.)				
	1963	Dec	31	2314

Ascension No. 1

Page 1

Nominal weight of balloon 600 gr DA 318 Orientation 360° South North Rawinsonde Time-Altitude Data

Slant range (m.) (yds.)	Pibal Ht. above (M.S.L.)	Pibal Ht. above (G.M.S.L.)	Altitude (m.)	Elevation angle °		Distance from observation point (m.)	Azimuth angle	Wind	
				Observed	Smoothed			Direction ° 360° = N	Speed (m.p.h.)
	216	230	1	250	44.7	260	131.1	138	5.0
	414	428	2	560	44.1	580	138.3	153	5.4
	612	626	3	860	44.7	870	148.8	176	5.3
	810	824	4	1170	45.3	1160	157.4	191	4.0
	1008	1022	5	1460	48.6	1280	163.4	238	1.7
	1206	1220	6	1730	55.2	1200	166.0	330	2.4
	1404	1418	7	2000	63.0	1200	166.5	357	3.6
	1602	1616	8	2350	71.1	800	161.1	14	4.0
	1800	1814	9	2610	76.2	640	144.6	30	5.7
	1998	2012	10	2900	78.0	620	164.9	10	8.6
	2196	2210	11	3190	73.1	970	69.1	38	10.3
	2394	2408	12	3470	66.7	1490	52.1	51	13.2
	2592	2606	13	3740	57.9	2350	41.1	27	18.4
	2790	2804	14	4040	50.7	3600	37.3	34	16.4
	2988	3002	15	4310	43.6	4300	38.0	42	14.3
	3186	3200	16	4610	41.2	5300	39.1	45	16.7
	3384	3398	17	4900	37.9	6300	40.4	49	18.7
	3582	3596	18	5150	34.6	7500	42.3	49	19.0
	3780	3794	19	5410	32.3	8600	42.8	49	18.1
	3978	4002	20	5700	30.7	9600	43.1	48	
	4176	4190	21	5990	29.4	10600	43.3	51	12.0
	4374	4388	22	6210	29.0	11000			
	4572	4586	23	6510	28.5				
	4770	4784	24	6810	28.2				
	4968	5002	25	7030	28.0				
	5166	5180	26						
						14200	45.6	27	
						15200	45.5	29	
						16250	45.7	31	
						17300	46.4	33	
						18400	47.7	35	
						19200	48.5	37	
						20250	49.3	39	
						21300	48.6	41	
						22100	48.1	43	
						22300	48.2	44	
						22600	48.2	44	
						22800	47.9	47	
						23200	48.0	48	
							47.5	49	
						23800	46.7	50	

The approximate size of the original form is 10 1/2" x 13"

Contact	Pressure (mb.)	Altitude (m., m.s.l.)	Elapsed time (min.)
5	1000	238	0.0
10	948	630	1.8
15	888	1170	3.4
20	830	1710	5.2
25	774	2270	7.2
30	720	2810	9.2
35	669	3400	11.1
40	618	4000	13.1
45	572	4590	15.3
50	525	5200	17.5
55	482	5830	19.9
60	440	6490	22.2
65	400	7180	24.6
70	362	7880	27.2
75	327	8560	29.8
80	293	9290	32.4
85	262	10000	35.0
90	232	10780	37.7
95	204	11600	40.4
100	178	12420	43.1
105	154	13400	46.4
110	132	14360	49.4
115	112	15380	52.6
120	92	16600	56.1
125	74	17930	60.0
130	56	19690	64.4
135	39	21900	70.2
140	22	25630	79.4
143	10	31817	89.5
144	8	32321	91.9

Punched Card Data

Altitude (m.)	Direction (degrees)	Speed (m.p.h.)	Card No.	Altitude (m.)	Direction (degrees)	Speed (m.p.h.)	Card No.
120	4	17	4	17	51	11	11
150	130	26	8	26	50	9	9
180	140	32	9	32	54	9	9
0.5	140	30	10	30	66	10	10
1.0	170	41	11	41	30	9	9
1.5	205	3	42	42	43	7	7
2.0	335	2	47	47	47	4	4
2.5	11	4	49	49	22	6	6
3	31	7	51	51	352	6	6
4	26	18	62	62	310	5	5
5	48	18	71	71	322	5	5
6	49	16	72	72	340	4	4

Coded Data for Transmission

PP12445	23931	6607	1410	1610	1810	2006	2273	3514	3607
0209	0313	0323	0333	0433	0537	0530	0521	50518	0518
50417	00412	50309	03510	33109	09996	03406	72716	02823	
82644	03650	72555	02553	02677	22615	62491			

Maximum Wind Speed Data

Min. alt. wind speed 45 m.p.s. or more (M.M.S.L.)	32790
Alt. of Maximum wind speed (M.M.S.L.)	32338
Dir. (degrees) and speed (m.p.s.) of Max. wind	23747
Max. alt. wind speed 45 m.p.s. or more (M.M.S.L.)	32328

Reason for termination **BURST**

Computer **H.J. EMERY**
 Verifier **L.M. Labman**

wind direction to whole degrees

wind speed in meters per second

U. S. DEPARTMENT OF COMMERCE
WEATHER BUREAU

0 = SINGLE THEODOLITE
1 = DOUBLE THEODOLITE
2 = RAVAL SINGLE THEOD.
3 = SCS-288 AND SCS-225
4 = SCS-254 AND SCS-242
5 = SCS-418
6 = SCS-438
7 = SA-7 RADAR
8 = QAO-1 OR QAO-1A
9 = OTHER

WINDS ALOFT SUMMARY FORM

WBAN 22

WIND DATA FOR STANDARD LEVELS (METERS ABOVE SEA LEVEL)

ELEV. (METERS)		LOCAL TIME		MERIDIAN		STATION		LAT.		LONG.																					
024		CST		09U		COLUMBIA MISSOURI		38 58 N		092 22 W																					
CARD NO.	STATION NO OR QA 1 1 1	ACTUAL TIME OF RELEASE (G. C. T.)				WIND DIRECTION		WIND SPEED		WIND SPEED		TYPE OF EQUIPMENT																			
		TR	MO	DAY	HR	DIR	SPD	DIR	SPD	DIR	SPD																				
1	13983	64	01	01	00	1	120	04	130	04	144	05	140	05	170	05	205	03	335	02	011	04	031	07	026	18	048	18	049	16	8
1		64	01	02	00	1	265	06	257	08	257	11	250	10	297	12	300	14	300	13	308	13	319	16	332	29	327	30	327	25	8
1		64	01	03	00	1	200	08	207	16	211	20	210	19	233	26	249	27	253	22	249	21	245	21	249	17	260	22	263	30	8
1		64	01	04	00	1	260	04	276	08	290	12	287	11	307	16	316	18	305	20	310	19	310	21	285	24	268	36	250	45	8
1		64	01	05	00	1	260	05	252	09	245	12	248	12	240	13	258	15	270	13	275	11	282	12	273	16	285	14	280	15	8
1		64	01	06	00	1	180	03	192	08	203	12	202	11	206	13	220	16	223	21	228	22	237	22	238	26	239	24	238	36	8
1		64	01	07	00	1	250	02	234	04	223	06	224	05	254	07	290	10	287	11	268	13	271	16	276	16	275	17	278	24	8
1		64	01	08	00	1	150	07	149	10	146	14	147	13	158	16	190	13	203	11	203	11	206	13	224	20	218	28	225	31	8
1		64	01	09	00	1	170	05	195	07	229	09	220	08	246	12	240	12	241	10	242	10	233	20	219	30	214	30	216	48	8
1		64	01	10	00	1	300	05	293	07	287	11	288	11	286	15	291	20	302	29	302	29	300	28	302	27	300	29	294	26	8
1		64	01	11	00	1	130	07	133	08	134	13	135	13	172	16	194	17	200	14	216	17	220	17	238	18	250	22	252	31	8
1		64	01	12	00	1	130	06	127	06	127	05	116	06	082	04	094	06	170	04	220	08	217	10	217	10	217	27	211	47	8
1		64	01	13	00	1	350	10	352	12	360	15	359	14	008	20	030	23	040	17	034	10	034	10	034	10	034	10	034	10	8
1		64	01	14	00	1	270	04	280	04	300	03	294	03	324	04	336	06	356	09	356	09	356	09	356	09	356	09	356	09	8
1		64	01	15	00	1	240	05	238	09	235	16	236	15	257	20	281	21	281	21	281	21	281	21	281	21	281	21	281	21	8
1		64	01	16	00	1	220	05	220	07	221	12	220	10	245	17	245	17	245	17	245	17	245	17	245	17	245	17	245	17	8
1		64	01	17	00	1	210	03	210	04	216	05	212	05	212	05	212	05	212	05	212	05	212	05	212	05	212	05	212	05	8
1		64	01	18	00	1	260	04	257	09	255	13	255	13	255	13	255	13	255	13	255	13	255	13	255	13	255	13	255	13	8
1		64	01	19	00	1	160	08	162	12	162	12	162	12	162	12	162	12	162	12	162	12	162	12	162	12	162	12	162	12	8
1		64	01	20	00	1	290	10	290	10	290	10	290	10	290	10	290	10	290	10	290	10	290	10	290	10	290	10	290	10	8
1		64	01	21	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	22	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	23	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	24	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	25	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	26	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	27	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	28	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	29	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	30	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8
1		64	01	31	00	1	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	200	10	8

The approximate size of the original form is 8 1/2" x 13 1/2"

WINDS ALOFT SUMMARY (WBAN-22):

Wind direction and wind speed at specified heights above the surface obtained from PIBALS and RAWINS are listed on this form in station, year, month, day, by hour of observation. Scheduled hours of observations changed on June 1, 1957 from 03, 09, 15 and 2100 Greenwich Mean Time to 00, 06, 12 and 1800 GMT. Although routine preparation of this form was discontinued January 1, 1965, it is available for at least a five to ten year period prior to that date for a large number of U. S. operated stations.

Provisions exist on these forms for listing wind direction and speed at heights up to 42,000 meters. The first page (Card No. 1 shown in the left column on the form) contains data in 12 five column fields from the surface through 6,000 meters; Page 2 (Card No. 2) contains data from 7,000 through 18,000 meters, when available, etc. The appropriate page (Card No.) is shown along with the heights in the headings below the station name.

These fields have varied over the years and, in general, wind observations reached greater heights in the early 1960's than in the 1940's or 1950's. High level wind data (above 50,000 meters) are available in published and summarized form for selected stations in the Rocketsonde network.