POSITIONS AND AREAS OF SUN SPOTS—Continued

| Date | Eastern standard time | Mt. Wilson group number | Heliographic | | | Area | | Total area for each day | Observatory |
|---|---|---|---|---|---|---|---|---|---|
| | | | Diff. in longitude | Longitude | Latitude | Spot | Group | | |
| *1937* | *h. m.* | | ° | ° | ° | | | | |
| Dec. 29 | 11 55 | 5712 | −32.0 | 92.9 | −16.0 | ------- | 48 | ------- | Do. |
| | | 5704 | −19.0 | 105.9 | +12.5 | ------- | 194 | ------- | |
| | | 5707 | −9.0 | 115.9 | +19.0 | ------- | 24 | ------- | |
| | | 5711 | −9.0 | 115.9 | +14.5 | ------- | 12 | ------- | |
| | | 5710 | +8.0 | 132.9 | −14.5 | ------- | 36 | ------- | |
| | | 5699 | +23.0 | 147.9 | −11.0 | ------- | 242 | ------- | |
| | | 5703 | +26.0 | 150.9 | −20.0 | ------- | 582 | ------- | |
| | | 5702 | +30.0 | 154.9 | +10.0 | ------- | 36 | ------- | |
| | | 5695 | +59.0 | 183.9 | +10.0 | ------- | 194 | 1,368 | |
| Dec. 30 | 12 12 | 5712 | −19.0 | 92.5 | −15.0 | ------- | 97 | ------- | Mt. Wilson. |
| | | 5704 | −6.0 | 105.5 | +13.0 | ------- | 194 | ------- | |
| | | 5707 | +7.5 | 119.0 | +19.0 | ------- | 24 | ------- | |
| | | 5710 | +22.0 | 133.5 | −14.5 | 36 | ------- | ------- | |
| | | 5709 | +26.0 | 137.5 | −16.0 | ------- | 24 | ------- | |
| | | 5699 | +36.0 | 147.5 | −11.0 | ------- | 242 | ------- | |
| | | 5703 | +39.0 | 150.5 | −21.0 | ------- | 485 | ------- | |
| | | 5702 | +45.0 | 156.5 | +10.0 | ------- | 36 | ------- | |
| | | 5695 | +70.0 | 181.5 | +9.0 | ------- | 97 | 1,235 | |
| Dec. 31 | 11 20 | 5713 | −75.0 | 23.8 | +5.0 | ------- | 388 | ------- | U. S. Naval. |
| | | 5712 | −7.0 | 91.8 | −15.0 | ------- | 145 | ------- | |
| | | 5704 | +9.0 | 107.8 | +12.5 | ------- | 97 | ------- | |
| | | 5707 | +20.0 | 118.8 | +19.5 | ------- | 73 | ------- | |
| | | 5710 | +37.0 | 135.8 | −14.5 | 24 | ------- | ------- | |
| | | 5709 | +40.0 | 138.8 | −15.0 | ------- | 48 | ------- | |
| | | 5699 | +50.0 | 148.8 | −11.0 | ------- | 242 | ------- | |
| | | 5703 | +53.0 | 151.8 | −20.0 | ------- | 339 | ------- | |
| | | 5702 | +58.0 | 156.8 | +11.0 | 24 | ------- | 1,380 | |

Mean daily area for 30 days=1,252.

PROVISIONAL SUNSPOT RELATIVE NUMBERS, DECEMBER 1937

[Dependent alone on observations at Zurich and its station at Arosa]

[Furnished through the courtesy of Prof. W. Brunner, Eidgen. Stern-Warte, Zurich, Switzerland]

| December 1937 | Relative numbers | December 1937 | Relative numbers | December 1937 | Relative numbers |
|---|---|---|---|---|---|
| 1 | 14 | 11 | *Ec* 72 | 21 | 86 |
| 2 | *Wc* 33 | 12 | 70 | 22 | *Ecd* 90 |
| 3 | -------- | 13 | *Mc* 107 | 23 | *Ec* 107 |
| 4 | -------- | 14 | *Macd* 112 | 24 | -------- |
| 5 | 55 | 15 | *Wac* 141 | 25 | *a* |
| 6 | -------- | 16 | *Ec* 155 | 26 | -------- |
| 7 | -------- | 17 | ---------- | 27 | *aa* 125 |
| 8 | -------- | 18 | 109 | 28 | *a* 103 |
| 9 | -------- | 19 | *a* 124 | 29 | *Mc* 113 |
| 10 | 56 | 20 | *b* 107 | 30 | *Mc* 111 |
| | | | | 31 | *ad* 112 |

Mean, 21 days=95.3

*a*=Passage of an average-sized group through the central meridian.
*b*=Passage of a large group or spot through the central meridian.
*c*=New formation of a group developing into a middle sized or large center of activity; *E*: on the eastern part of the sun's disc; *W*: on the western part; *M*: in the central circle zone.
*d*=Entrance of a large or average-sized center of activity on the east limb.

# AEROLOGICAL OBSERVATIONS

[Aerological Division, D. M. LITTLE in Charge]

By LOYD A. STEVENS

Mean free-air data, based on airplane weather observations during December 1937, are given in tables 1 to 3. A description of the methods by which the various monthly means and normals therein are computed may be found in the aerological sections of the MONTHLY WEATHER REVIEW for January and March 1937.

It will be noted that many of the "normals" are based on only 3 years of observations. Conclusions based on departures from such short period "normals" must be used with caution.

The mean surface temperatures for December (see chart I) were, in general, above normal over the Rocky Mountain and Pacific coast regions and over portions of the North Atlantic and southern New England States; elsewhere they were below normal. The greatest positive departures (+3° C. to +4° C.) occurred over portions of the Rocky Mountains while the greatest negative departures (−1° C. to −2° C.) occurred over a region whose center was approximately over the state of Illinois.

With a few exceptions, the mean free-air temperatures for the month, up to 5 kilometers, were below normal. The most significant exception occurred over Oakland, Calif., where the temperature was above normal at all levels, the greatest positive departure from normal (+1.5° C.) occurring at 0.5 and 1 kilometer. The greatest negative departures at all levels occurred over the region of the Great Lakes (−4.3° C. at Sault Ste. Marie at 1.5 km) with a secondary center of large negative departures over Spokane, Wash. (−3.0° C. at 4 and 5 km) in the higher levels. The highest mean temperatures occurred over San Diego up to 2 kilometers and over Pensacola above 2 kilometers. The lowest mean temperatures occurred over Fargo at 0.5 kilometer and over Sault Ste. Marie at all other levels. The mean free-air temperatures for December were lower than for November by 4° C. to 8° C. over the northern part of the country. This difference in temperature between the 2 months decreased toward the south, however, and amounted to only 1° to 3° C. over the southern part of the country. The greatest decrease in the mean temperature occurred over Fargo at 0.5 kilometer where the value for December (−12.3° C.) was 9.1° C. lower than that for November (−3.2° C.).

The mean free-air relative humidities, shown in table 2, were above normal over most of the country at all levels. Minus departures were confined largely to the Northeastern States in the lower levels and to Pensacola at all except the 0.5 kilometer level. The greatest positive departure (+14 percent) occurred over San Diego at 3 kilometers while the greatest negative departure (−11 percent) occurred over Pensacola at both 3 and 5 kilometers.

The mean free-air barometric pressures are shown in table 3. In general there was a decrease in the average pressures for December as compared with those for November except that in the lower levels there were small increases of 1 to 2 millibars at most stations. The mean free-air isobaric charts, as drawn from the values in table 3, were characterized by well-defined statistical centers of low pressure over the region of the Great Lakes; the lowest mean pressures for the entire country occurring at Sault Ste. Marie, Mich., at all levels. The highest mean pressures occurred over Pensacola, Fla., at all levels. Over the eastern part of the country there was a pronounced steepening of the south to north pressure gradient in December as compared with November but a slight decrease in gradient occurred over the western part of the country.

Free-air resultant winds, based on pilot-balloon observations made near 5 a.m. (75th meridian time), are shown in table 4. In general the resultant directions were re-

markably close to the normal at nearly all stations and at all levels. The most outstanding exceptions occurred at San Diego where the current directions at 0.5 and 1 kilometer were E. (93°) and ESE. (123°), respectively, while the corresponding normal directions are N. (2°) and NNW. (344°). Resultant velocities were for the most part, near normal. The greatest positive departure from normal (+6.0 m. p. s.) occurred over Nashville at 2.5 kilometers and the greatest negative departure (−3.9 m. p. s.) occurred over San Diego at 5 kilometers.

Table 5 shows the maximum free-air wind velocities and their directions for various sections of the United States during December as determined by pilot-balloon observations. The extreme maximum for the month was 80.4 meters per second from the northeast at an altitude of 5,520 meters above sea level over Las Vegas, Nev.

The mean monthly specific humidities and equivalent potential temperatures for the month are shown in tables 2 and 3, respectively. There was a decrease in the average specific humidities of December as compared with November over the greater portion of the country in the lower levels. In the upper levels, however, most of the southern stations showed either no change or slight increases. The greatest decrease (−1.8 grams) occurred over Maxwell Field at 0.5 kilometer and the greatest increase (+0.7 gram) occurred over San Diego at 3 kilometers. The mean equivalent potential temperatures for December were lower than for November by amounts ranging from 2° A. over San Diego to 13° A. over Fargo at 0.5 kilometer and ranging between 1° A. over San Diego to 6° A. over Sault Ste. Marie at 5 kilometers. The lowest mean specific humidities and equivalent potential temperatures occurred over Fargo in the lower levels and over Sault Ste. Marie in the upper levels. The highest mean specific humidities occurred over San Diego at all levels up to 4 kilometers. The highest equivalent potential temperatures likewise occurred over San Diego up to 3 kilometers and over Pensacola at 4 and 5 kilometers.

The weather for the month over the eastern part of the country was dominated largely by the frequent passage of rather cold and dry Pp air masses and by relatively few invasions of Ta air. Consequently both the mean temperature and average precipitation were below normal over that area. Over the western part of the country the weather was influenced greatly by the development of large and unusually deep low pressure areas over the north Pacific Ocean during two different periods of the month; the circulation about these Lows brought in great quantities of warm moist Tp air over the Pacific coast and Rocky Mountain regions. This accounted largely for the high average temperatures and excess precipitation which occurred over that part of the country during the month.

TABLE 1.—*Mean free-air temperatures (t), °C. obtained by airplanes during December 1937. ("Dep." represents departure from "normal" temperature)*

| Stations | Number of obs. | Altitude (meters) m. s. l. | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Surface | | 500 | | 1,000 | | 1,500 | | 2,000 | | 2,500 | | 3,000 | | 4,000 | | 5,000 | |
| | | t | Dep. | t | Dep. | t | Dep. | t | Dep. | t | Dep. | t | Dep. | t | Dep. | t | Dep. | t | Dep. |
| Barksdale Field [1] (Shreveport), La. (52 m) | 19 | 5.4 | | 5.5 | | 4.8 | | 3.6 | | 2.2 | | 0.0 | | −1.4 | | −6.7 | | | |
| Billings, Mont.[2] (1,090 m) | 31 | −3.3 | −0.3 | | | | | −0.4 | −0.5 | −2.2 | −0.8 | −5.1 | −0.9 | −8.2 | −0.7 | −14.5 | −0.7 | −21.0 | −0.6 |
| Boston, Mass.[1] (5 m) | 22 | −2.7 | −0.6 | −4.6 | −1.7 | −5.8 | −1.6 | −6.6 | −1.5 | −7.3 | −1.1 | −8.5 | −0.5 | −10.3 | −0.1 | −15.5 | −0.3 | | |
| Cheyenne, Wyo.[2] (1,873 m) | 31 | −3.5 | +0.1 | | | | | | | −2.1 | −0.2 | −2.7 | −0.8 | −4.7 | −0.2 | −10.7 | −0.3 | −17.5 | −0.3 |
| Chicago, Ill.[2] (187 m) | 29 | −4.3 | −2.2 | −5.0 | −3.0 | −5.1 | −2.8 | −5.1 | −2.5 | −6.3 | −2.7 | −7.7 | −2.7 | −9.7 | −2.4 | −13.7 | −1.4 | −19.3 | −0.8 |
| Coco Solo, Canal Zone.[2] (15 m) | 19 | 24.6 | | 22.9 | | 20.4 | | 17.7 | | 15.1 | | 12.9 | | 10.5 | | 4.6 | | −1.5 | |
| El Paso, Tex.[2] (1,194 m) | 31 | 4.4 | +0.6 | | | | | 6.7 | +0.1 | 4.6 | −0.8 | 2.6 | −0.6 | 0.5 | −0.5 | −4.8 | −0.4 | −11.4 | −0.7 |
| Fargo, N. Dak.[2] (274 m) | 31 | −13.9 | −1.5 | −12.3 | −1.1 | −9.2 | −0.4 | −8.7 | −1.2 | −9.3 | −1.1 | −10.8 | −0.8 | −12.9 | −0.7 | −18.0 | −0.4 | −23.7 | +0.1 |
| Kelly Field (San Antonio), Tex.[1] (206 m) | 8 | 9.7 | | 9.7 | | 8.1 | | 6.8 | | 5.6 | | 3.3 | | 1.8 | | −3.6 | | −10.4 | |
| Lakehurst, N. J.[3] (39 m) | 22 | −1.3 | +0.3 | −1.5 | 0.0 | −3.1 | 0.0 | −3.9 | 0.0 | −6.1 | −0.7 | −7.9 | −0.3 | −10.5 | −0.7 | −16.7 | −1.5 | −20.4 | +0.4 |
| Maxwell Field (Montgomery), Ala.[1] (52 m) | 28 | 6.9 | +1.6 | 6.9 | +0.1 | 5.9 | −0.3 | 5.3 | −0.4 | 3.9 | −0.6 | 2.2 | −0.7 | 0.5 | −0.3 | −4.6 | +0.1 | −10.5 | −0.2 |
| Mitchel Field (Hempstead, Long Island), N. Y.[1] (29 m) | 27 | −0.7 | +0.9 | −1.9 | +0.4 | −3.2 | +0.4 | −4.3 | +0.1 | −5.4 | +0.3 | −6.7 | +0.8 | −8.6 | +1 | −14.0 | +1.1 | | |
| Nashville, Tenn.[2] (180 m) # | 30 | 2.7 | +0.9 | 2.8 | 0.0 | 1.7 | −0.3 | 0.2 | −0.8 | −0.9 | −0.9 | −2.5 | −0.5 | −4.5 | −0.4 | −9.0 | −0.3 | −15.4 | −0.4 |
| Norfolk, Va.[2] (10 m) | 20 | 2.3 | −1.7 | 2.7 | −0.6 | 1.8 | −0.1 | 0.0 | −0.5 | −0.8 | 0.0 | −2.0 | +0.6 | −3.9 | +0.7 | −7.7 | +1.5 | −12.3 | +2.3 |
| Oakland, Calif.[2] (2 m) § | 31 | 9.0 | +0.7 | 11.8 | +1.5 | 10.6 | +1.5 | 8.9 | +1.4 | 6.4 | +1.3 | 3.8 | +1.1 | 1.0 | +1.0 | −5.4 | +0.9 | −12.3 | +0.7 |
| Oklahoma City, Okla.[2] (391 m) | 27 | 1.4 | −0.6 | 2.5 | −0.8 | 3.5 | −1.5 | 2.7 | −1.3 | 1.7 | −0.7 | 0.1 | −0.3 | −2.0 | +0.1 | −7.0 | +0.4 | −13.3 | +0.9 |
| Omaha, Nebr.[2] (300 m) | 31 | −4.9 | −0.7 | −4.4 | −1.0 | −3.0 | −1.2 | −3.2 | −2.3 | −4.0 | −2.0 | −5.6 | −1.5 | −7.6 | −1.1 | −13.5 | −1.2 | −19.9 | −1.1 |
| Pearl Harbor, T. H.[3] (6 m) | 31 | 20.6 | −1.5 | 20.6 | +0.5 | 17.3 | +1.0 | 14.4 | +0.9 | 12.8 | +1.1 | 11.3 | +1.4 | 9.4 | +1.9 | 4.1 | +2.2 | −2.0 | +1.7 |
| Pensacola, Fla.[3] (13 m) | 23 | 8.3 | −0.7 | 9.5 | −0.4 | 9.2 | −0.4 | 8.4 | −0.2 | 7.2 | −0.1 | 5.5 | +0.1 | 3.7 | +0.3 | −1.7 | −0.1 | −6.5 | +0.6 |
| St. Thomas, Virgin Islands,[2] (8 m) | 31 | 25.7 | | 21.3 | | 17.6 | | 14.6 | | 13.2 | | 12.1 | | 9.8 | | 4.6 | | −1.7 | |
| Salt Lake City, Utah [2] (1,288 m) | 31 | −0.4 | | | | | | 1.8 | | 0.5 | | −2.0 | | −4.4 | | −9.3 | | −15.6 | |
| San Diego, Calif.[3] (10 m) | 31 | 10.3 | −1.5 | 14.3 | +1.1 | 12.7 | +0.6 | 9.8 | −0.1 | 7.6 | −0.1 | 5.1 | −0.2 | 2.4 | −0.4 | −3.5 | −0.3 | −9.8 | −0.1 |
| Sault Ste. Marie, Mich.[2] (221 m) | 28 | −8.9 | | −9.2 | | −10.9 | | −11.6 | | −12.1 | | −14.1 | | −15.8 | | −20.3 | | −26.2 | |
| Scott Field (Belleville), Ill.[1] (135 m) | 13 | −4.5 | | −4.5 | | −4.8 | | −5.6 | | −5.9 | | −7.1 | | −8.8 | | −12.9 | | −19.3 | |
| Seattle, Wash.[2] (10 m) | 8 | 6.0 | | 5.1 | | 2.9 | | 1.3 | | −0.5 | | −3.4 | | −6.0 | | −12.0 | | | |
| Selfridge Field (Mount Clemens), Mich.[1] (177 m) | 25 | −6.1 | −1.9 | −6.3 | −2.9 | −7.9 | −3.5 | −9.4 | −4.2 | −10.3 | −3.8 | −11.3 | −3.2 | −13.2 | −3.0 | −18.0 | −3.1 | −23.6 | −2.8 |
| Spokane, Wash.[2] (597 m) | 31 | 0.7 | +0.5 | | | −0.9 | −1.1 | −2.4 | −2.2 | −4.3 | −2.7 | −6.7 | −2.9 | −9.5 | −2.9 | −15.8 | −3.0 | −22.2 | −3.0 |
| Washington, D. C.[3] (13 m) | 30 | 0.8 | +0.1 | 1.4 | +0.6 | −0.1 | +0.6 | −1.4 | +0.4 | −2.2 | +0.5 | −4.0 | +0.4 | −6.4 | −0.1 | −11.4 | −0.5 | −17.1 | −0.7 |
| Wright Field (Dayton), Ohio [1] (244 m) | 17 | −4.6 | −0.7 | −4.4 | −1.0 | −4.6 | −1.3 | −4.6 | −0.9 | −6.1 | −1.0 | −7.7 | −0.8 | −9.6 | −0.7 | −13.8 | −0.5 | −19.3 | −0.3 |

[1] Army.
[2] Weather Bureau.
[3] Navy.

*December 1937.*—Observations taken about 4 a. m. 75th meridian time, except by Navy stations along the Pacific coast and Hawaii where they are taken at dawn.

NOTE.—The departures are based on normals covering the following total number of observations made during the same month in previous years, including the current month (years of record are given in parentheses following the number of observations): Billings, 123 (4); Boston, 126 (6); Cheyenne, 124 (4); Chicago, 87 (3); El Paso, 93 (3); Fargo, 119 (4); Lakehurst, 93 (4); Maxwell Field, 98 (4); Mitchel Field, 97 (4); Nashville, #112 (4); Norfolk, 101 (5); Oakland, §81 (3); Oklahoma City, 114 (4); Omaha, 208 (7); Pearl Harbor, 137 (5); Pensacola, 171 (8); San Diego, 220 (9); Selfridge Field, 79 (3); Spokane, 116 (4); Washington, 154 (7); Wright Field, 82 (4).

#Combined with Murfreesboro data (ending June 26, 1937.
§Combined with Sunnyvale data (ending September 1935).

TABLE 2.—*Mean free-air relative humidities (R. H.), in percent, and specific humidities (q), in grams/kilogram, obtained by airplanes during December 1937. (Dep. represents departure from "normal" relative humidity)*

| Stations | Number of observations | Surface q | Surface R. H. Mean | Surface R. H. Dep. | 500 q | 500 R. H. Mean | 500 R. H. Dep. | 1,000 q | 1,000 R. H. Mean | 1,000 R. H. Dep. | 1,500 q | 1,500 R. H. Mean | 1,500 R. H. Dep. | 2,000 q | 2,000 R. H. Mean | 2,000 R. H. Dep. | 2,500 q | 2,500 R. H. Mean | 2,500 R. H. Dep. | 3,000 q | 3,000 R. H. Mean | 3,000 R. H. Dep. | 4,000 q | 4,000 R. H. Mean | 4,000 R. H. Dep. | 5,000 q | 5,000 R. H. Mean | 5,000 R. H. Dep. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barksdale Field, La | 19 | 4.2 | 77 | ---- | 3.7 | 63 | ---- | 3.4 | 57 | ---- | 3.4 | 59 | ---- | 2.8 | 51 | ---- | 2.5 | 49 | ---- | 2.2 | 44 | ---- | 1.4 | 38 | ---- | ---- | ---- | ---- |
| Billings, Mont | 31 | 2.4 | 71 | +3 | ---- | ---- | ---- | ---- | ---- | ---- | 2.5 | 57 | 0 | 2.3 | 56 | +1 | 2.0 | 58 | +1 | 1.8 | 61 | +1 | 1.2 | 60 | +1 | 0.8 | 59 | +2 |
| Boston, Mass | 22 | 2.2 | 72 | +1 | 2.0 | 71 | +2 | 1.9 | 69 | +1 | 1.9 | 69 | +5 | 1.8 | 65 | +7 | 1.6 | 60 | +5 | 1.3 | 55 | +1 | 1.0 | 52 | 0 | ---- | ---- | ---- |
| Cheyenne, Wyo | 31 | 2.7 | 72 | +7 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2.8 | 66 | +5 | 2.6 | 61 | +6 | 2.3 | 60 | +6 | 1.5 | 57 | +5 | 1.0 | 55 | +5 |
| Chicago, Ill | 29 | 2.4 | 84 | 0 | 2.3 | 83 | +3 | 2.1 | 74 | +3 | 1.9 | 65 | +2 | 1.8 | 61 | +4 | 1.6 | 56 | +4 | 1.5 | 55 | +5 | 1.2 | 54 | +6 | 0.8 | 55 | +11 |
| Coco Solo, Canal Zone | 19 | 17.8 | 93 | ---- | 16.8 | 91 | ---- | 14.5 | 87 | ---- | 12.5 | 84 | ---- | 10.9 | 81 | ---- | 8.2 | 67 | ---- | 6.4 | 58 | ---- | 4.5 | 53 | ---- | 3.0 | 49 | ---- |
| El Paso, Tex | 31 | 4.5 | 77 | +4 | ---- | ---- | ---- | ---- | ---- | ---- | 4.3 | 58 | +1 | 3.6 | 56 | +4 | 3.2 | 53 | +3 | 2.6 | 48 | +4 | 1.7 | 41 | +5 | 1.0 | 37 | +5 |
| Fargo, N. Dak | 31 | 1.0 | 75 | −6 | 1.2 | 75 | −3 | 1.5 | 69 | −2 | 1.6 | 64 | +1 | 1.6 | 63 | +5 | 1.5 | 62 | +6 | 1.3 | 62 | +9 | 0.9 | 59 | +8 | 0.6 | 58 | +9 |
| Kelly Field, Tex | 8 | 6.4 | 80 | ---- | 6.4 | 71 | ---- | 5.9 | 74 | ---- | 5.7 | 74 | ---- | 4.9 | 66 | ---- | 4.6 | 69 | ---- | 4.2 | 66 | ---- | 2.6 | 59 | ---- | 2.4 | 73 | ---- |
| Lakehurst, N. J | 22 | 2.5 | 72 | −3 | 2.3 | 63 | −5 | 2.1 | 61 | −5 | 1.8 | 54 | −4 | 1.7 | 54 | 0 | 1.6 | 54 | 0 | 1.3 | 55 | +3 | 0.9 | 54 | +5 | 0.7 | 52 | +5 |
| Maxwell Field, Ala | 28 | 4.7 | 75 | −2 | 4.0 | 62 | −2 | 3.9 | 60 | +2 | 3.4 | 50 | +3 | 3.1 | 49 | +7 | 2.6 | 44 | +6 | 2.5 | 45 | +8 | 2.0 | 45 | +10 | 1.4 | 43 | +10 |
| Mitchel Field, N. Y | 27 | 2.6 | 74 | −3 | 2.4 | 70 | −2 | 2.2 | 67 | −1 | 2.0 | 62 | +1 | 1.8 | 56 | +1 | 1.7 | 53 | +1 | 1.5 | 49 | +1 | 1.1 | 52 | +6 | ---- | ---- | ---- |
| Nashville, Tenn | 30 | 3.8 | 81 | −2 | 3.8 | 77 | +3 | 3.6 | 76 | +8 | 3.1 | 68 | +8 | 2.8 | 62 | +9 | 2.5 | 59 | +9 | 2.2 | 59 | +12 | 1.8 | 56 | +12 | 1.0 | 50 | +8 |
| Norfolk, Va | 20 | 3.3 | 75 | +4 | 3.0 | 62 | 0 | 2.8 | 57 | −1 | 2.5 | 55 | +4 | 2.3 | 52 | +7 | 2.1 | 48 | +5 | 1.8 | 46 | +6 | 1.3 | 42 | +8 | 1.0 | 41 | +10 |
| Oakland, Calif | 31 | 6.0 | 85 | +7 | 5.6 | 62 | −2 | 5.0 | 56 | −2 | 4.0 | 48 | −2 | 3.5 | 47 | 0 | 3.0 | 43 | 0 | 2.2 | 39 | −2 | 1.5 | 36 | −2 | 1.0 | 39 | 0 |
| Oklahoma City, Okla | 27 | 3.7 | 84 | +2 | 3.7 | 76 | 0 | 3.4 | 63 | +1 | 3.3 | 60 | +3 | 3.0 | 55 | +4 | 2.7 | 51 | +4 | 2.2 | 47 | +4 | 1.5 | 43 | +3 | 1.0 | 40 | +2 |
| Omaha, Nebr | 31 | 2.2 | 84 | −1 | 2.3 | 79 | −1 | 2.4 | 71 | +3 | 2.3 | 66 | +10 | 2.1 | 59 | +8 | 1.9 | 58 | +10 | 1.8 | 57 | +10 | 1.2 | 58 | +12 | 0.8 | 55 | +10 |
| Pearl Harbor, Territory of Hawaii | 31 | 12.9 | 86 | +7 | 11.9 | 75 | −1 | 10.7 | 78 | −2 | 9.2 | 76 | +2 | 7.1 | 61 | 0 | 5.2 | 46 | −3 | 3.7 | 35 | −6 | 2.0 | 25 | −7 | 1.3 | 23 | −5 |
| Pensacola, Fla | 23 | 5.7 | 86 | +1 | 5.8 | 76 | +1 | 5.0 | 63 | −2 | 4.6 | 56 | −2 | 3.6 | 45 | −6 | 2.8 | 38 | −10 | 2.4 | 34 | −11 | 1.7 | 31 | −9 | 1.1 | 28 | −11 |
| St. Thomas, Virgin Islands | 31 | 15.4 | 75 | ---- | 14.8 | 89 | ---- | 13.1 | 94 | ---- | 10.9 | 89 | ---- | 8.3 | 70 | ---- | 5.4 | 46 | ---- | 3.8 | 35 | ---- | 1.5 | 18 | ---- | 1.0 | 16 | ---- |
| Salt Lake City, Utah | 31 | 3.6 | 86 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.8 | 73 | ---- | 3.3 | 67 | ---- | 2.8 | 65 | ---- | 2.4 | 60 | ---- | 1.7 | 53 | ---- | 1.1 | 53 | ---- |
| San Diego, Calif | 31 | 6.5 | 84 | +12 | 7.0 | 66 | +5 | 6.0 | 59 | +8 | 5.0 | 55 | +9 | 4.1 | 50 | +10 | 3.4 | 47 | +11 | 3.0 | 46 | +14 | 1.9 | 41 | +12 | 1.1 | 39 | +9 |
| Sault Ste. Marie, Mich | 28 | 1.7 | 83 | ---- | 1.8 | 85 | ---- | 1.6 | 83 | ---- | 1.4 | 71 | ---- | 1.2 | 61 | ---- | 1.0 | 62 | ---- | 1.0 | 62 | ---- | 0.7 | 62 | ---- | 0.4 | 55 | ---- |
| Scott Field, Ill | 13 | 1.9 | 71 | ---- | 1.7 | 60 | ---- | 1.6 | 54 | ---- | 1.6 | 54 | ---- | 1.7 | 55 | ---- | 1.7 | 56 | ---- | 1.5 | 55 | ---- | 1.0 | 46 | ---- | 0.7 | 42 | ---- |
| Seattle, Wash | 8 | 5.0 | 87 | ---- | 4.6 | 80 | ---- | 3.7 | 72 | ---- | 3.4 | 67 | ---- | 2.6 | 55 | ---- | 1.9 | 49 | ---- | 1.5 | 44 | ---- | 0.8 | 34 | ---- | ---- | ---- | ---- |
| Selfridge Field, Mich | 25 | 2.1 | 85 | 0 | 2.0 | 82 | +2 | 1.7 | 74 | 0 | 1.5 | 69 | +6 | 1.4 | 63 | +7 | 1.2 | 55 | +7 | 1.0 | 53 | +6 | 0.8 | 51 | +6 | 0.6 | 51 | +5 |
| Spokane, Wash | 31 | 3.6 | 86 | 0 | ---- | ---- | ---- | 3.5 | 88 | +1 | 3.2 | 82 | +5 | 2.6 | 74 | +4 | 2.1 | 68 | +1 | 1.8 | 66 | +1 | 1.2 | 65 | +5 | 0.7 | 62 | +5 |
| Washington, D. C | 30 | 2.9 | 72 | 0 | 2.7 | 62 | −3 | 2.5 | 60 | −1 | 2.5 | 62 | +3 | 2.4 | 60 | +6 | 2.2 | 57 | +7 | 1.8 | 54 | +9 | 1.1 | 44 | +1 | 0.7 | 38 | −1 |
| Wright Field, Ohio | 17 | 2.2 | 81 | −1 | 2.3 | 76 | −2 | 2.0 | 64 | −4 | 1.8 | 57 | 0 | 1.7 | 56 | +4 | 1.7 | 57 | +7 | 1.5 | 55 | +8 | 1.2 | 57 | +11 | 0.8 | 51 | +7 |

TABLE 3.—*Mean free-air barometric pressures (P), in mb, and equivalent potential temperatures ($\Theta_e$), in °A., obtained by airplanes during December 1937*

| Station | Number of observations | Surface P | Surface $\Theta_e$ | 500 P | 500 $\Theta_e$ | 1,000 P | 1,000 $\Theta_e$ | 1,500 P | 1,500 $\Theta_e$ | 2,000 P | 2,000 $\Theta_e$ | 2,500 P | 2,500 $\Theta_e$ | 3,000 P | 3,000 $\Theta_e$ | 4,000 P | 4,000 $\Theta_e$ | 5,000 P | 5,000 $\Theta_e$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barksdale Field, La | 19 | 1,018 | 289 | 963 | 292 | 906 | 296 | 852 | 300 | 801 | 302 | 753 | 304 | 707 | 307 | 623 | 309 | ---- | ---- |
| Billings, Mont | 31 | 891 | 286 | ---- | ---- | ---- | ---- | 846 | 293 | 795 | 297 | 746 | 298 | 700 | 299 | 614 | 302 | 537 | 305 |
| Boston, Mass | 22 | 1,019 | 275 | 957 | 277 | 898 | 281 | 842 | 285 | 790 | 290 | 741 | 293 | 695 | 296 | 609 | 301 | ---- | ---- |
| Cheyenne, Wyo | 31 | 810 | 295 | ---- | ---- | ---- | ---- | ---- | ---- | 797 | 298 | 748 | 302 | 702 | 304 | 617 | 307 | 541 | 308 |
| Chicago, Ill | 29 | 998 | 275 | 959 | 277 | 900 | 282 | 844 | 287 | 792 | 291 | 742 | 294 | 696 | 297 | 610 | 303 | 535 | 307 |
| Coco Solo, Canal Zone | 19 | 1,008 | 347 | 954 | 348 | 901 | 344 | 850 | 341 | 802 | 340 | 755 | 335 | 712 | 333 | 630 | 332 | 557 | 332 |
| El Paso, Tex | 31 | 884 | 300 | ---- | ---- | ---- | ---- | 851 | 306 | 801 | 307 | 753 | 309 | 707 | 311 | 624 | 313 | 548 | 315 |
| Fargo, N. Dak | 31 | 986 | 263 | 958 | 267 | 897 | 276 | 841 | 282 | 788 | 287 | 738 | 291 | 692 | 293 | 606 | 298 | 529 | 301 |
| Kelly Field, Tex | 8 | 999 | 300 | 965 | 302 | 908 | 306 | 854 | 309 | 804 | 311 | 755 | 313 | 710 | 316 | 626 | 317 | 551 | 320 |
| Lakehurst, N. J | 22 | 1,017 | 277 | 958 | 281 | 900 | 284 | 844 | 288 | 793 | 290 | 743 | 294 | 697 | 296 | 611 | 298 | 535 | 305 |
| Maxwell Field, Ala | 28 | 1,017 | 291 | 964 | 294 | 907 | 298 | 853 | 302 | 802 | 304 | 753 | 307 | 708 | 310 | 624 | 314 | 549 | 317 |
| Mitchel Field, N. Y | 27 | 1,017 | 278 | 958 | 281 | 900 | 285 | 844 | 288 | 792 | 292 | 743 | 295 | 697 | 298 | 611 | 302 | ---- | ---- |
| Nashville, Tenn | 30 | 1,001 | 286 | 962 | 290 | 904 | 293 | 850 | 296 | 798 | 299 | 749 | 301 | 703 | 305 | 618 | 309 | 543 | 311 |
| Norfolk, Va | 20 | 1,022 | 282 | 962 | 287 | 903 | 291 | 849 | 293 | 798 | 298 | 748 | 301 | 703 | 304 | 618 | 309 | 544 | 314 |
| Oakland, Calif | 31 | 1,019 | 297 | 960 | 304 | 904 | 307 | 851 | 307 | 801 | 308 | 752 | 310 | 708 | 310 | 623 | 312 | 548 | 314 |
| Oklahoma City, Okla | 27 | 975 | 287 | 962 | 289 | 905 | 294 | 850 | 299 | 799 | 302 | 750 | 305 | 705 | 307 | 620 | 310 | 546 | 312 |
| Omaha, Nebr | 31 | 985 | 275 | 960 | 278 | 902 | 285 | 846 | 290 | 794 | 294 | 745 | 297 | 699 | 300 | 613 | 303 | 537 | 306 |
| Pearl Harbor, Territory of Hawaii | 31 | 1,014 | 328 | 958 | 331 | 904 | 330 | 852 | 328 | 802 | 326 | 755 | 324 | 711 | 323 | 629 | 323 | 556 | 325 |
| Pensacola, Fla | 23 | 1,023 | 295 | 964 | 301 | 908 | 305 | 854 | 308 | 804 | 309 | 756 | 310 | 710 | 313 | 627 | 316 | 553 | 320 |
| St. Thomas, Virgin Islands | 31 | 1,015 | 341 | 959 | 340 | 905 | 336 | 853 | 333 | 804 | 329 | 757 | 325 | 713 | 324 | 632 | 322 | 558 | 324 |
| Salt Lake City, Utah | 31 | 874 | 294 | ---- | ---- | ---- | ---- | 852 | 299 | 800 | 301 | 751 | 303 | 704 | 305 | 618 | 309 | 542 | 311 |
| San Diego, Calif | 31 | 1,016 | 300 | 959 | 311 | 904 | 312 | 850 | 311 | 801 | 312 | 753 | 313 | 708 | 314 | 625 | 315 | 550 | 317 |
| Sault Ste. Marie, Mich | 28 | 990 | 270 | 955 | 272 | 895 | 275 | 838 | 279 | 785 | 283 | 735 | 286 | 688 | 289 | 601 | 295 | 524 | 298 |
| Scott Field, Ill | 13 | 1,005 | 273 | 959 | 277 | 900 | 281 | 844 | 286 | 791 | 291 | 742 | 295 | 696 | 298 | 611 | 303 | 537 | 306 |
| Seattle, Wash | 8 | 1,021 | 291 | 962 | 294 | 904 | 294 | 850 | 297 | 798 | 298 | 748 | 299 | 703 | 300 | 617 | 302 | ---- | ---- |
| Selfridge Field, Mich | 25 | 999 | 273 | 958 | 276 | 899 | 278 | 842 | 281 | 790 | 286 | 739 | 289 | 693 | 292 | 607 | 297 | 530 | 302 |
| Spokane, Wash | 31 | 949 | 288 | ---- | ---- | 903 | 290 | 847 | 293 | 795 | 295 | 745 | 296 | 700 | 298 | 613 | 300 | 537 | 302 |
| Washington, D. C | 30 | 1,022 | 280 | 962 | 285 | 903 | 288 | 848 | 292 | 797 | 296 | 748 | 299 | 702 | 300 | 616 | 304 | 541 | 308 |
| Wright Field, Ohio | 17 | 994 | 275 | 962 | 278 | 902 | 282 | 846 | 287 | 794 | 290 | 744 | 294 | 698 | 297 | 612 | 302 | 536 | 307 |

TABLE 4.—*Free-air resultant winds (meters per second) based on pilot-balloon observations made near 5 a. m. (E. S. T.) during December 1937*

[Wind from N=360°, E=90°, etc.]

| Altitude (m) m. s. l. | Albuquerque, N. Mex. (1,554 m) | | Atlanta, Ga. (309 m) | | Billings, Mont. (1,088 m) | | Boston, Mass. (15 m) | | Cheyenne, Wyo. (1,873 m) | | Chicago, Ill. (192 m) | | Cincinnati, Ohio (153 m) | | Detroit, Mich. (204 m) | | Fargo, N. Dak. (274 m) | | Houston, Tex. (21 m) | | Key West, Fla. (11 m) | | Medford, Oreg. (410 m) | | Nashville, Tenn. (194 m) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity |
| | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | |
| Surface | 354 | 1.0 | 319 | 1.8 | 262 | 3.9 | 295 | 2.5 | 274 | 3.5 | 251 | 1.9 | 221 | 1.0 | 256 | 2.5 | 321 | 1.2 | 46 | 1.8 | 50 | 3.3 | 137 | 0.6 | 226 | 0.9 |
| 500 | ----- | ----- | 295 | 2.2 | ----- | ----- | 302 | 5.9 | ----- | ----- | 259 | 3.9 | 234 | 3.6 | 263 | 4.1 | 308 | 1.8 | 111 | 3.0 | 79 | 6.2 | 137 | 1.6 | 239 | 5.6 |
| 1,000 | ----- | ----- | 273 | 4.1 | ----- | ----- | 299 | 7.8 | ----- | ----- | 279 | 5.0 | 272 | 6.9 | 275 | 7.5 | 308 | 4.2 | 170 | 0.4 | 103 | 4.8 | 185 | 3.9 | 261 | 8.2 |
| 1,500 | ----- | ----- | 268 | 4.9 | 261 | 8.8 | 292 | 9.3 | ----- | ----- | 273 | 7.9 | 269 | 8.8 | 286 | 6.8 | 298 | 6.2 | 280 | 5.1 | 124 | 2.3 | 220 | 7.3 | 271 | 9.5 |
| 2,000 | 315 | 3.5 | 286 | 7.3 | 281 | 8.4 | 286 | 10.1 | 282 | 5.1 | 284 | 9.2 | 274 | 10.0 | 284 | 6.9 | 300 | 5.4 | 280 | 5.7 | 127 | 1.1 | 235 | 10.6 | 276 | 9.9 |
| 2,500 | 303 | 5.9 | 292 | 9.6 | 283 | 9.8 | 279 | 12.4 | 293 | 9.8 | 280 | 8.3 | ----- | ----- | 283 | 8.5 | 290 | 10.6 | 275 | 7.9 | 317 | 1.1 | ----- | ----- | 285 | 14.6 |
| 3,000 | 294 | 6.7 | 282 | 12.9 | 279 | 11.6 | 253 | 15.3 | 292 | 11.3 | ----- | ----- | ----- | ----- | ----- | ----- | 291 | 13.0 | 247 | 9.2 | 310 | 1.7 | ----- | ----- | ----- | ----- |
| 4,000 | 296 | 10.4 | ----- | ----- | 291 | 12.9 | ----- | ----- | 294 | 11.6 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 5,000 | 290 | 8.2 | ----- | ----- | ----- | ----- | ----- | ----- | 272 | 9.3 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |

| Altitude (m) m. s. l. | Newark, N. J. (14 m) | | Oakland, Calif. (8 m) | | Oklahoma City, Okla. (402 m) | | Omaha, Nebr. (306 m) | | Pearl Harbor, Hawaii[1] (68 m) | | Pensacola, Fla.[1] (24 m) | | St. Louis, Mo. (170 m) | | Salt Lake City, Utah (1,294 m) | | San Diego, Calif. (15 m) | | Sault Ste. Marie, Mich. (198 m) | | Seattle, Wash. (14 m) | | Spokane, Wash. (603 m) | | Washington, D. C. (10 m) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity | Direction | Velocity |
| | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | | ° | |
| Surface | 281 | 2.4 | 79 | 1.5 | 282 | 0.1 | 314 | 2.0 | 4 | 1.7 | 19 | 2.5 | 247 | 2.2 | 168 | 2.2 | 46 | 0.7 | 265 | 0.5 | 152 | 1.7 | 192 | 2.0 | 312 | 1.2 |
| 500 | 308 | 7.6 | 18 | 2.2 | 343 | 1.0 | 315 | 3.4 | 71 | 2.4 | 40 | 3.2 | 260 | 5.9 | ----- | ----- | 93 | 1.1 | 291 | 2.2 | 196 | 5.4 | ----- | ----- | 297 | 6.0 |
| 1,000 | 288 | 8.7 | 14 | 3.0 | 303 | 4.9 | 304 | 6.4 | 100 | 2.4 | 271 | 2.8 | 274 | 9.3 | ----- | ----- | 123 | 0.8 | 307 | 5.2 | 212 | 3.7 | 193 | 3.6 | 288 | 7.4 |
| 1,500 | 282 | 13.2 | 332 | 1.9 | 302 | 6.9 | 306 | 8.1 | 115 | 1.3 | 293 | 4.9 | 276 | 9.4 | 187 | 3.0 | 318 | 1.4 | 325 | 4.2 | 236 | 4.8 | 218 | 8.0 | 270 | 9.0 |
| 2,000 | 265 | 14.1 | 308 | 1.9 | 298 | 8.4 | 300 | 9.5 | 301 | 0.6 | 305 | 5.1 | 290 | 11.9 | 224 | 2.6 | 343 | 2.6 | ----- | ----- | 256 | 5.5 | 231 | 9.5 | 273 | 10.6 |
| 2,500 | 262 | 13.1 | 286 | 2.4 | 299 | 9.5 | 294 | 10.1 | 354 | 1.8 | 291 | 5.6 | 284 | 14.3 | 261 | 3.7 | 330 | 3.2 | ----- | ----- | ----- | ----- | 251 | 9.4 | 276 | 11.3 |
| 3,000 | ----- | ----- | 295 | 3.1 | 300 | 10.1 | 300 | 11.1 | 318 | 1.9 | ----- | ----- | 298 | 12.7 | 274 | 6.0 | 349 | 4.1 | ----- | ----- | ----- | ----- | ----- | ----- | 275 | 13.3 |
| 4,000 | ----- | ----- | 270 | 7.3 | ----- | ----- | ----- | ----- | 305 | 6.6 | ----- | ----- | ----- | ----- | 293 | 6.5 | 356 | 6.5 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 5,000 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 297 | 10.6 | ----- | ----- | ----- | ----- | 318 | 5.6 | 323 | 0.2 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |

[1] Navy stations.

TABLE 5.—*Maximum free-air wind velocities (meters per second) for different sections of the United States, based on pilot balloon observations during December 1937*

| Section | Surface to 2,500 meters (m. s. l.) | | | | | Between 2,500 and 5,000 meters (m. s. l.) | | | | | Above 5,000 meters (m. s. l.) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum velocity | Direction | Altitude (m), m. s. l. | Date | Station | Maximum velocity | Direction | Altitude (m), m. s. l. | Date | Station | Maximum velocity | Direction | Altitude (m), m. s. l. | Date | Station |
| Northeast [1] | 36.0 | NNW | 1,360 | 14 | Boston, Mass. | 36.4 | WSW | 4,600 | 12 | Boston, Mass. | 36.0 | WSW | 6,280 | 1 | Cleveland, Ohio. |
| East Central [2] | 32.7 | SW | 1,360 | 18 | Washington, D. C. | 42.0 | WSW | 4,890 | 19 | Knoxville, Tenn. | 42.2 | WSW | 5,070 | 19 | Knoxville, Tenn. |
| Southeast [3] | 26.8 | WSW | 1,720 | 23 | Jacksonville, Fla. | 38.0 | WSW | 4,480 | 9 | Spartanburg, S. C. | 33.1 | WNW | 6,480 | 12 | Charleston, S. C. |
| North Central [4] | 38.8 | NNW | 1,870 | 31 | Bismarck, N. Dak. | 35.2 | WNW | 2,530 | 25 | Fargo, N. Dak. | 43.1 | NNW | 6,850 | 10 | Fargo, N. Dak. |
| Central [5] | 35.8 | W | 2,500 | 8 | Evansville, Ind. | 41.6 | W | 3,820 | 25 | Omaha, Nebr. | 40.5 | WNW | 6,160 | 9 | Omaha, Nebr. |
| South Central [6] | 30.5 | W | 1,360 | 22 | Brownsville, Tex. | 37.1 | WSW | 4,810 | 24 | Fort Worth, Tex. | 45.4 | W | 6,610 | 18 | Amarillo, Tex. |
| Northwest [7] | 39.3 | SW | 1,770 | 26 | Spokane, Wash. | 43.4 | NNW | 5,000 | 21 | Pendleton, Oreg. | 49.0 | NNW | 5,580 | 21 | Pendleton, Oreg. |
| West Central [8] | 52.5 | WSW | 2,480 | 27 | Cheyenne, Wyo. | 52.2 | WSW | 2,670 | 27 | Cheyenne, Wyo. | 66.0 | WNW | 11,290 | 30 | Redding, Calif. |
| Southwest [9] | 41.4 | SW | 1,550 | 26 | Havre, Mont. | 64.2 | NNE | 3,910 | 20 | Burbank, Calif. | 80.4 | NE | 5,520 | 20 | Las Vegas, Nev. |

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

# AEROLOGICAL OBSERVATIONS FOR THE YEAR 1937

[Aerological Division, D. M. LITTLE in Charge]

By LOYD A. STEVENS

In tables 1 to 3 below are shown the mean free-air temperatures, relative humidities, specific humidities, and equivalent potential temperatures obtained by airplane observations during the year 1937. Departures from normal for mean temperatures and relative humidities are given for nine stations where the length of record is 3 or more years. (See footnote to table.) Similar departures for specific humidity and equivalent potential temperature are not shown as these elements were not computed and tabulated previous to January 1937.

Due to the relatively short period on which the normal data are based at most stations, too much dependence should not be placed in the departures therefrom.

A summary of the aerological activities of the Weather Bureau during the year 1937 follows: Regular airplane flights were maintained at 12 stations in continental United States by private operators under contract with the Weather Bureau. Similar flights were made by the War Department in cooperation with the Weather Bureau at eight stations and by the Navy Department at nine