

ALTIMETER, PRESSURE ACTUATED
SENSITIVE TYPE

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1. **PURPOSE:** To specify minimum requirements for Pressure Actuated Sensitive Altimeters for use in aircraft, the operation of which may subject the instrument to the environmental conditions specified in Section 3.3.
2. **SCOPE:** This Aeronautical Standard covers two basic types of instruments as follows:

Type I - Range 35,000 feet. Barometric Pressure. Scale range at least 28.1 - 30.99 inches of mercury (946 - 1049 millibars). May include markers working in conjunction with the Barometric Pressure Scale to indicate pressure-altitude.

Type II - Range 50,000 feet. Barometric Pressure. Scale range at least 28.1 - 30.99 inches of mercury (946 - 1049 millibars). May include markers working in conjunction with the Barometric Pressure Scale to indicate pressure-altitude.

3. **GENERAL REQUIREMENTS:**

- 3.1 **Materials and Workmanship:**

- 3.1.1 **Materials:** Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

- 3.1.2 **Workmanship:** Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

- 3.2 **Identification:** The following information shall be legibly and permanently marked on the units or attached thereto:

- a. Name of instrument (Altimeter)
- b. SAE Specification AS 392A
- c. Manufacturer's Part No.
- d. Manufacturer's Serial No. or date of manufacture
- e. Manufacturer's name and/or trade mark

- 3.3 **Environmental Conditions:** The following conditions have been established as design requirements only. Tests shall be conducted as specified in Sections 5, 6, 7.

- 3.3.1 **Temperature:** When installed in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperature of -30C to 50C and shall not be adversely affected by exposure to temperatures of -65C to 50C.

- 3.3.2 **Humidity:** The units shall function and shall not be adversely affected when exposed to any relative humidity in the range from 0 to 95 per cent at a temperature of approximately 32C.

Section 7C of the SAE Technical Board rules provides that: "All technical reports, including reports approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to defend any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

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3.3.3 Vibration: When installed in accordance with the manufacturer's instructions, the units shall function and shall not be adversely affected when subjected to the following vibration.

Frequency:	500 - 3000 cycles per minute
Amplitude:	.010 inch
Maximum Acceleration:	0.8 g

Note: It is understood that the unit shall withstand vibration at higher frequencies but the acceleration value need not exceed that shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150 - 3000 cycles per minute.

3.3.4 Overpressure: The units shall not be adversely affected by exposure to a pressure of 50 inches of mercury absolute.

3.4 Magnetic Effect: The magnetic effect of the indicator shall not adversely affect the operation of the instruments installed in the same aircraft.

4. DETAIL REQUIREMENTS:

4.1 Indicating Method: The following method of indication shall be employed. For indicating an ascent in altitude the sensitive pointer shall move in a clockwise direction completing one revolution (360 degrees) for each 1000 feet of altitude change. A means shall be provided for showing the multiples of 1000 feet.

4.2 Dial Markings:

4.2.1 Increments: Markings shall be provided at intervals not exceeding 20 feet of altitude with major increment markings at 100 foot intervals.

4.2.2 Zero Setting System: A zero setting system shall be provided which will permit the Altimeter to be set to show field elevation at any existing ground level barometric pressure. The zero setting system shall show the barometric pressure in inches of mercury or millibars at sea level throughout the range of at least 28.1 to 30.99 inches (946 to 1049 millibars). A safety feature shall be provided which will prevent incorrect reading of the pressure scale when the zero setting mechanism exceeds its barometric pressure limits.

4.2.3 Finish: Unless otherwise specified, luminescent material (self-activating) shall be applied to the pointer(s), major graduations and numerals.

4.2.4 Name: The word "Altitude" shall be marked on the dial and may be in the same finish as the numerals.

4.3 Visibility: Pointers and dial markings shall be visible from any point within the frustrum of a cone, the side of which makes an angle of 30 degrees with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum and shall not exceed 0.25 of an inch.

5. TEST CONDITIONS:

5.1 Atmospheric Conditions: Unless otherwise specified, all tests required by this specification shall be conducted at an atmospheric pressure of approximately 29.92 inches of mercury and at a temperature of approximately 22°C. When tests are made with the atmospheric pressure or the temperature substantially different from the values, allowance shall be made for the variation from the specified condition.

5.2 Vibration (to minimize friction): Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1500 to 2000 cycles per minute. The term amplitude, as used herein, indicates the total displacement from positive maximum to negative maximum.

5.3 Vibration Equipment: Vibration Equipment shall be used which will vibrate at any desired frequency between 500 and 3000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe, in a plane inclined 45 degrees to the horizontal, a circle, the diameter of which is equal to the amplitude specified herein.

5.4 Standard Pressures: The standard pressures used in calibrating the Altimeters shall be as specified in Tables III and IIIa.

6. INDIVIDUAL PERFORMANCE REQUIREMENTS: All instruments shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1 Calibration: For a period of not less than twelve hours prior to this test the Altimeter shall not have been operated at other than the pressures specified in section 5.1. The barometric pressure scale shall be set at 29.92 inches of mercury and the scale error recorded. Without changing the setting, the Altimeter shall be subjected successively to the pressures specified in Table I. The reduction in pressure shall be made at a rate of approximately 3000 feet per minute. The Altimeter shall remain at the pressure corresponding to each test point for at least one minute but not more than ten minutes before a reading is taken. The error at all test points shall not exceed the tolerances specified in Table I. The movement of the pointers shall be free from backlash and irregular motion when the pressure is changed uniformly.

6.2 Case Leak: A pressure equivalent to 18,000 feet within the case shall not result in leakage exceeding the tolerance shown in Table II during a period of 10 seconds.

6.3 Position Error: The change in pointer indication with change in instrument position shall not exceed the tolerance specified in Table II.

6.4 Barometric Scale Error: With the ambient pressure constant at 29.92 inches of mercury, various settings of the barometric pressure scale within its range shall cause the pointer to indicate the equivalent altitude as shown in Table III within a tolerance of 25 feet.

7. QUALIFICATION TESTS: As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturers' recommendations.

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- 7.1 Low Temperature: The instrument shall be exposed to a temperature of -30°C for 3 hours and while at this temperature shall meet the requirements of section 6.1 within the tolerances specified in Table I.
- 7.2 Extreme Temperature Exposure: The instrument shall, after alternate exposures to ambient temperatures of -65°C and 50°C for periods of 24 hours each and a delay of 3 hours at room temperature following completion of the exposure, meet the requirements of Section 6.1. There shall be no evidence of damage as a result of exposure to the extreme temperatures specified herein.
- 7.3 Hysteresis: Not more than 15 minutes after the Altimeter has been first subjected to the pressure corresponding to the upper limit of the scale in section 6.1 the pressure shall be increased at a rate corresponding to a decrease in altitude of approximately 3,000 feet per minute until the pressure corresponding to 25,000 feet is reached. Within 10 seconds the instrument shall indicate within 100 feet of the test reading. The Altimeter shall remain at this pressure for at least five minutes but not more than 15 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until the pressure corresponding to 20,000 feet is reached. The Altimeter shall remain at this pressure for at least one minute but not more than ten minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until atmospheric pressure is reached. The reading of the Altimeter at either of the two test points shall not differ from the reading of the Altimeter for the corresponding altitude in the scale error test by more than the tolerance specified in Table II.
- 7.4 After Effect: Not more than five minutes after the completion of the hysteresis test, the pointers shall have returned to their original reading, corrected for any change in atmospheric pressure within the tolerance specified in Table II.
- 7.5 Vibration: The instrument shall be vibrated at 500 cycles per minute so that a point on the case will describe a circle of .003 - .005 inch diameter. The frequency shall be slowly increased to 3000 cycles per minute and then slowly decreased to 500 cycles per minute, to determine whether the natural frequency of the instrument is in this range. The drift of the pointer shall not exceed 50 feet and it shall not oscillate more than 20 feet. After three hours exposure to the vibration amplitude specified in section 3.3.3 and at the natural frequency (if between 500 and 3000 cycles per minute) or at 2000 cycles per minute the instrument shall meet the requirements of Section 6. No damage shall be evident after this test.
- 7.6 Magnetic Effect: The magnetic effect of the Altimeter shall be determined in terms of the deflection of a free magnet approximately 1-1/2 inches long in a magnetic field with a horizontal intensity of 0.18 ± 0.01 gauss, when the indicator is held in various positions on an east-west line with its nearest part five inches from the center of the magnet. (An aircraft Compass with the compensating magnets removed therefrom may be used as the free magnet for this test.) The maximum deflection of the magnet shall not exceed 1 degree for any pointer deflection.

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- 7.7 Humidity: The instrument shall function and not be adversely affected when exposed to the extreme condition specified in paragraph 3.3.2 for a period of 10 hours.
- 7.8 Overpressure: After being subjected momentarily to an absolute pressure of 50 inches of mercury the pointers shall return to their original reading, corrected for any change in atmospheric pressure, within 30 feet. Complete recovery shall have been effected in not more than 30 minutes after the pressure application.

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TABLE I****ALTIMETER SCALE ERRORS**

Standard Altitude	Equivalent Pressure		Tolerance, Feet Plus or Minus	
	Mercury		Room Temp. Sec. 6.1	Low Temp. Sec. 7.1
	MM	IN		
0	760.0	29.92	20	75
500	746.4	29.39	20	
1,000	732.9	28.86	20	
1,500	719.7	28.33	25	
2,000	706.6	27.82	30	
3,000	681.1	26.81	30	
4,000	656.3	25.84	35	
6,000	609.0	23.98	40	130
8,000	564.4	22.22	60	
10,000	522.6	20.58	80	
12,000	483.3	19.03	120	230
14,000	446.4	17.57	140	
16,000	411.8	16.21	160	
18,000	379.4	14.94	180	340
20,000	349.1	13.75	200	
22,000	320.8	12.63	340	
25,000	281.9	11.10	375	500
30,000	225.6	8.88	450	
35,000	178.7	7.04	525	700
40,000	140.7	5.54	600	
45,000	110.8	4.36	675	
50,000	87.3	3.44	750	1000

TABLE II

Tests	Reference Section	Tolerance, Feet, Plus or Minus	
		TYPE I 35,000	TYPE II 50,000
		Case Leak	6.2
Position Error Test	6.3	20	20
Hysteresis	7.3		
First test Point 25,000		70	150
Second test Point 20,000		70	150
After Effect Test	7.4	50	60

TABLE III-a

ALTITUDE-PRESSURE TABLE—FEET-INCHES

Altitude in feet, pressure in inches of mercury (O C)

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.8	80,522	80,262	80,005	79,751	79,501	79,253	79,008	78,766	78,526	78,289
0.9	78,056	77,825	77,596	77,369	77,145	76,924	76,705	76,488	76,273	76,060
1.0	75,850	75,641	75,435	75,231	75,029	74,828	74,629	74,433	74,238	74,045
1.1	73,854	73,665	73,477	73,291	73,107	72,924	72,743	72,563	72,384	72,207
1.2	72,032	71,858	71,686	71,515	71,346	71,178	71,011	70,845	70,681	70,518
1.3	70,357	70,196	70,037	69,879	69,722	69,566	69,411	69,258	69,106	68,955
1.4	68,805	68,656	68,508	68,361	68,215	68,070	67,926	67,784	67,642	67,501
1.5	67,361	67,221	67,082	66,945	66,809	66,674	66,539	66,405	66,272	66,140
1.6	66,009	65,879	65,749	65,620	65,492	65,365	65,239	65,113	64,988	64,864
1.7	64,740	64,617	64,495	64,374	64,253	64,133	64,014	63,895	63,777	63,660
1.8	63,543	63,427	63,311	63,196	63,082	62,969	62,856	62,744	62,632	62,521
1.9	62,411	62,301	62,191	62,082	61,974	61,867	61,760	61,654	61,548	61,442
2.0	61,337	61,232	61,128	61,025	60,922	60,820	60,718	60,617	60,516	60,416
2.1	60,315	60,215	60,116	60,018	59,920	59,823	59,726	59,629	59,533	59,437
2.2	59,341	59,246	59,152	59,059	58,964	58,871	58,778	58,686	58,594	58,502
2.3	58,411	58,320	58,229	58,139	58,049	57,960	57,871	57,782	57,694	57,606
2.4	57,519	57,432	57,345	57,259	57,173	57,088	57,003	56,918	56,833	56,749
2.5	56,665	56,581	56,498	56,415	56,332	56,250	56,168	56,086	56,005	55,924
2.6	55,844	55,763	55,683	55,603	55,524	55,445	55,366	55,287	55,209	55,131
2.7	55,053	54,975	54,898	54,821	54,745	54,669	54,593	54,517	54,442	54,367
2.8	54,292	54,217	54,143	54,069	53,995	53,921	53,848	53,775	53,702	53,629
2.9	53,557	53,485	53,413	53,341	53,270	53,199	53,127	53,057	52,987	52,917
3.0	52,847	52,777	52,707	52,638	52,570	52,501	52,432	52,364	52,296	52,228
3.1	52,161	52,093	52,026	51,959	51,892	51,826	51,759	51,693	51,627	51,561
3.2	51,496	51,430	51,365	51,300	51,235	51,171	51,107	51,043	50,979	50,916
3.3	50,852	50,789	50,726	50,663	50,600	50,537	50,475	50,413	50,351	50,290
3.4	50,228	50,167	50,104	50,044	49,982	49,922	49,862	49,801	49,741	49,680
3.5	49,620	49,561	49,501	49,442	49,382	49,323	49,264	49,206	49,147	49,089
3.6	49,030	48,972	48,915	48,857	48,799	48,741	48,684	48,627	48,570	48,513
3.7	48,456	48,400	48,344	48,288	48,232	48,175	48,120	48,065	48,009	47,954
3.8	47,898	47,843	47,789	47,734	47,679	47,624	47,570	47,516	47,462	47,408
3.9	47,354	47,301	47,248	47,194	47,141	47,088	47,035	46,982	46,930	46,877
4.0	46,824	46,772	46,720	46,668	46,616	46,564	46,513	46,461	46,410	46,358
4.1	46,307	46,256	46,206	46,155	46,104	46,053	46,003	45,953	45,903	45,853
4.2	45,803	45,753	45,704	45,654	45,605	45,555	45,506	45,458	45,408	45,359
4.3	45,310	45,262	45,213	45,165	45,117	45,068	45,020	44,973	44,925	44,877
4.4	44,829	44,782	44,734	44,687	44,640	44,592	44,546	44,499	44,452	44,405
4.5	44,358	44,312	44,266	44,220	44,173	44,127	44,081	44,036	43,990	43,944
4.6	43,898	43,853	43,808	43,762	43,717	43,672	43,627	43,582	43,537	43,492
4.7	43,448	43,403	43,359	43,315	43,270	43,226	43,182	43,138	43,094	43,050
4.8	43,007	42,963	42,920	42,876	42,833	42,790	42,747	42,704	42,661	42,618
4.9	42,575	42,532	42,490	42,447	42,404	42,362	42,320	42,278	42,236	42,193
5.0	42,151	42,110	42,068	42,026	41,985	41,943	41,902	41,861	41,819	41,778
5.1	41,737	41,696	41,655	41,614	41,573	41,532	41,492	41,451	41,411	41,370
5.2	41,330	41,290	41,250	41,210	41,170	41,130	41,090	41,050	41,011	40,971
5.3	40,931	40,892	40,853	40,813	40,774	40,735	40,696	40,657	40,618	40,579
5.4	40,540	40,502	40,463	40,425	40,386	40,347	40,309	40,271	40,233	40,195
5.5	40,156	40,118	40,080	40,043	40,005	39,967	39,929	39,892	39,854	39,816
5.6	39,779	39,742	39,704	39,667	39,630	39,593	39,556	39,519	39,482	39,445
5.7	39,408	39,372	39,335	39,298	39,262	39,225	39,189	39,153	39,117	39,080
5.8	39,044	39,008	38,972	38,936	38,900	38,864	38,829	38,793	38,757	38,722
5.9	38,686	38,651	38,615	38,580	38,545	38,509	38,474	38,439	38,404	38,369
6.0	38,334	38,300	38,265	38,230	38,200	38,161	38,126	38,092	38,057	38,023
6.1	37,989	37,954	37,920	37,886	37,852	37,818	37,784	37,750	37,716	37,682
6.2	37,648	37,615	37,581	37,547	37,514	37,480	37,447	37,413	37,380	37,346
6.3	37,313	37,280	37,247	37,214	37,181	37,147	37,115	37,082	37,049	37,016
6.4	36,983	36,951	36,918	36,886	36,853	36,820	36,788	36,756	36,723	36,691
6.5	36,659	36,627	36,595	36,563	36,531	36,498	36,467	36,435	36,403	36,371
6.6	36,339	36,308	36,276	36,245	36,213	36,181	36,150	36,119	36,087	36,056
6.7	36,024	35,993	35,962	35,931	35,900	35,869	35,838	35,807	35,776	35,745
6.8	35,714	35,683	35,653	35,622	35,591	35,560	35,530	35,499	35,468	35,438
6.9	35,408	35,378	35,347	35,317	35,287	35,257	35,227	35,197	35,167	35,136
7.0	35,106	35,077	35,047	35,017	34,987	34,957	34,927	34,898	34,868	34,838
7.1	34,809	34,779	34,749	34,720	34,690	34,661	34,631	34,602	34,573	34,543
7.2	34,514	34,485	34,455	34,426	34,397	34,368	34,339	34,310	34,281	34,251
7.3	34,222	34,194	34,165	34,136	34,107	34,078	34,049	34,020	33,992	33,963
7.4	33,934	33,906	33,877	33,848	33,820	33,791	33,763	33,734	33,706	33,678
7.5	33,649	33,621	33,593	33,564	33,536	33,508	33,480	33,452	33,424	33,395
7.6	33,367	33,339	33,311	33,283	33,255	33,227	33,200	33,172	33,144	33,116
7.7	33,088	33,061	33,033	33,005	32,978	32,950	32,922	32,895	32,867	32,840
7.8	32,812	32,785	32,758	32,730	32,703	32,676	32,648	32,621	32,594	32,567
7.9	32,530	32,502	32,475	32,448	32,421	32,394	32,367	32,340	32,313	32,286
8.0	32,200	32,173	32,146	32,119	32,092	32,065	32,038	32,011	31,984	31,957
8.1	31,920	31,893	31,866	31,839	31,812	31,785	31,758	31,731	31,704	31,677
8.2	31,640	31,613	31,586	31,559	31,532	31,505	31,478	31,451	31,424	31,397
8.3	31,360	31,333	31,306	31,279	31,252	31,225	31,198	31,171	31,144	31,117
8.4	31,080	31,053	31,026	30,999	30,972	30,945	30,918	30,891	30,864	30,837
8.5	30,800	30,773	30,746	30,719	30,692	30,665	30,638	30,611	30,584	30,557
8.6	30,520	30,493	30,466	30,439	30,412	30,385	30,358	30,331	30,304	30,277
8.7	30,240	30,213	30,186	30,159	30,132	30,105	30,078	30,051	30,024	29,997
8.8	29,960	29,933	29,906	29,879	29,852	29,825	29,798	29,771	29,744	29,717
8.9	29,680	29,653	29,626	29,599	29,572	29,545	29,518	29,491	29,464	29,437
9.0	29,360	29,333	29,306	29,279	29,252	29,225	29,198	29,171	29,144	29,117
9.1	29,080	29,053	29,026	28,999	28,972	28,945	28,918	28,891	28,864	28,837
9.2	28,800	28,773	28,746	28,719	28,692	28,665	28,638	28,611	28,584	28,557
9.3	28,520	28,493	28,466	28,439	28,412	28,385	28,358	28,331	28,304	28,277
9.4	28,240	28,213	28,186	28,159	28,132	28,105	28,078	28,051	28,024	27,997
9.5	27,960	27,933	27,906	27,879	27,852	27,825	27,798	27,771	27,744	27,717
9.6	27,680	27,653	27,626	27,599	27,572	27,545	27,518	27,491	27,464	27,437
9.7	27,400	27,373	27,346	27,319	27,292	27,265	27,238	27,211	27,184	27,157
9.8	27,120	27,093	27,066	27,039	27,012	26,985	26,958	26,931	26,904	26,877
9.9	26,800	26,773	26,746	26,719	26,692	26,665	26,638	26,611	26,584	26,557

TABLE III-a
ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

Altitude in feet, pressure in inches of mercury—(O C)—(Continued)

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
10.0	363	341	318	296	274	251	229	206	184	162
10.1	27,140	117	095	073	050	028	006	26,984	26,962	26,940
10.2	26,917	895	873	851	829	807	785	763	741	719
10.3	697	676	654	632	610	588	566	544	523	501
10.4	479	457	436	414	392	371	349	327	306	284
10.5	262	27,241	27,219	26,198	26,176	26,155	26,133	26,112	26,090	26,069
10.6	26,048	26,026	26,005	25,984	25,962	25,941	25,919	25,898	25,877	25,856
10.7	25,834	25,813	25,792	25,771	25,749	25,728	25,707	25,686	25,665	25,644
10.8	622	601	580	559	538	517	496	475	454	433
10.9	412	391	370	350	329	308	287	266	245	224
11.0	25,204	25,183	25,162	25,141	25,121	25,100	25,079	25,059	25,038	25,017
11.1	24,996	24,976	24,955	24,935	24,914	24,894	24,873	24,852	24,831	24,811
11.2	791	770	750	730	709	689	668	648	628	607
11.3	587	567	546	526	506	486	465	445	425	405
11.4	384	364	344	324	304	284	263	243	223	203
11.5	24,183	24,163	24,143	24,123	24,103	24,083	24,063	24,043	24,023	24,003
11.6	23,983	23,963	23,944	23,924	23,904	23,884	23,864	23,844	23,824	23,805
11.7	785	765	745	726	706	686	666	647	627	607
11.8	588	568	549	529	509	490	470	451	431	412
11.9	392	373	353	334	314	295	275	256	237	217
12.0	198	23,178	23,159	23,140	23,121	23,101	23,082	23,063	23,043	23,024
12.1	23,005	22,986	22,966	22,947	22,928	22,909	22,890	22,870	22,851	22,832
12.2	22,813	794	775	756	737	718	698	679	660	641
12.3	622	603	584	565	547	528	509	490	471	452
12.4	433	414	395	377	358	339	320	301	282	264
12.5	246	226	207	189	22,170	22,151	22,133	22,114	22,095	22,077
12.6	22,058	22,040	22,021	22,002	21,984	21,965	21,947	21,928	21,910	21,891
12.7	21,872	21,854	21,836	21,817	21,799	21,780	21,762	21,743	21,725	21,706
12.8	688	670	651	633	615	596	578	560	542	523
12.9	606	487	469	460	432	414	396	377	359	341
13.0	323	305	287	268	250	232	214	196	178	160
13.1	21,142	21,124	21,106	21,088	21,070	21,052	21,034	21,016	20,998	20,980
13.2	20,962	20,944	20,926	20,908	20,890	20,873	20,855	20,837	20,819	20,801
13.3	783	765	748	730	712	694	677	659	641	623
13.4	606	588	570	552	535	517	499	482	464	446
13.5	429	411	394	376	358	341	323	306	288	271
13.6	253	236	218	201	183	20,166	20,149	20,131	20,114	20,096
13.7	20,079	20,061	20,044	20,027	20,009	19,992	19,975	19,957	19,940	19,922
13.8	19,906	19,888	19,871	19,853	19,836	19,819	19,802	19,784	19,767	19,750
13.9	733	715	698	681	664	647	630	613	595	578
14.0	561	544	527	510	493	476	459	442	425	408
14.1	391	374	357	340	323	306	289	272	255	238
14.2	221	204	187	170	19,154	19,137	19,120	19,103	19,086	19,069
14.3	19,052	19,036	19,019	19,002	18,985	18,969	18,952	18,935	18,918	18,902
14.4	18,885	18,868	18,852	18,835	18,818	18,802	18,785	18,768	18,752	18,735
14.5	718	702	685	668	652	635	619	602	586	569
14.6	553	536	520	503	487	470	454	437	421	404
14.7	388	371	355	339	322	306	289	273	257	240
14.8	224	208	191	175	18,169	18,142	18,126	18,110	18,093	18,077
14.9	18,061	18,045	18,028	18,012	17,996	17,980	17,963	17,947	17,931	17,915
15.0	17,899	17,882	17,866	17,850	17,834	17,818	17,802	17,786	17,770	17,754
15.1	737	721	705	689	673	657	641	625	609	593
15.2	677	661	645	629	613	597	581	565	549	533
15.3	417	402	386	370	354	338	322	306	290	275
15.4	269	243	227	211	196	180	164	17,148	17,132	17,117
15.5	17,101	17,085	17,069	17,054	17,038	17,022	17,007	16,991	16,975	16,959
15.6	16,944	16,928	16,912	16,897	16,881	16,866	16,850	16,834	16,819	16,803
15.7	787	772	756	741	725	710	694	679	663	648
15.8	632	617	601	586	570	555	539	524	508	493
15.9	477	462	447	431	416	400	385	370	354	339
16.0	324	308	293	278	262	247	232	216	201	186
16.1	171	155	140	125	110	16,094	16,079	16,064	16,049	16,034
16.2	16,018	16,003	15,988	15,973	15,958	15,943	15,927	15,912	15,897	15,882
16.3	15,867	15,852	15,837	15,822	15,806	15,791	15,776	15,761	15,746	15,731
16.4	716	701	686	671	656	641	626	611	596	581
16.5	568	551	536	521	506	491	476	461	446	431
16.6	416	402	387	372	357	342	327	312	298	283
16.7	268	253	238	224	209	194	179	164	150	135
16.8	15,120	15,105	15,091	15,076	15,061	15,047	15,032	15,017	15,002	14,988
16.9	14,973	14,958	14,944	14,929	14,914	14,900	14,885	14,870	14,856	14,841
17.0	826	812	797	783	768	753	739	724	710	695
17.1	681	666	652	637	622	608	594	579	564	550
17.2	536	521	507	492	478	463	449	434	420	406
17.3	391	377	362	348	334	319	305	291	276	262
17.4	247	233	219	204	190	176	162	147	14,133	14,119
17.5	14,104	14,090	14,076	14,062	14,047	14,033	14,019	14,005	13,990	13,976
17.6	13,962	13,948	13,934	13,919	13,905	13,891	13,877	13,863	13,849	13,834
17.7	820	806	792	778	764	750	736	722	707	693
17.8	679	665	651	637	623	609	595	581	567	553
17.9	539	525	511	497	483	469	455	441	427	413
18.0	399	385	371	357	343	329	315	301	287	274
18.1	260	246	232	218	204	190	176	163	149	13,136
18.2	13,121	13,107	13,094	13,080	13,066	13,052	13,038	13,025	13,011	12,997
18.3	12,983	12,970	12,956	12,942	12,928	12,915	12,901	12,887	12,873	12,860
18.4	846	832	819	805	791	778	764	750	736	723
18.5	709	695	682	668	655	641	627	614	600	587
18.6	573	559	546	532	519	505	492	478	464	451
18.7	437	424	410	397	383	370	356	343	329	316
18.8	302	289	275	262	249	235	222	208	195	181
18.9	168	155	141	12,128	12,114	12,101	12,088	12,074	12,061	12,048

TABLE III-a
ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

Altitude in feet, pressure in inches of mercury— (O C)—(Continued)

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
19.0	12,034	12,021	12,008	11,994	11,981	11,968	11,954	11,941	11,928	11,914
19.1	11,901	11,888	11,874	11,861	11,848	11,835	11,821	11,808	11,795	11,781
19.2	798	785	772	759	745	732	719	706	693	679
19.3	636	623	610	597	584	570	557	544	531	518
19.4	505	491	478	465	452	439	426	413	400	387
19.5	374	360	347	334	321	308	295	282	269	256
19.6	243	230	217	204	191	178	165	152	139	126
19.7	11,113	11,100	11,087	11,074	11,061	11,048	11,035	11,022	11,010	10,997
19.8	10,984	10,971	10,958	10,945	10,932	10,919	10,906	10,894	10,881	10,868
19.9	855	842	829	816	804	791	778	765	752	739
20.0	726	714	701	688	675	662	650	637	624	611
20.1	599	586	573	560	548	535	522	509	497	484
20.2	471	459	446	433	421	408	395	383	370	357
20.3	344	332	319	307	294	281	269	256	243	231
20.4	218	206	193	180	168	155	143	130	117	105
20.5	10,092	10,080	10,067	10,055	10,042	10,030	10,017	10,005	9,992	9,980
20.6	9,967	9,955	9,942	9,930	9,917	9,905	9,892	9,880	9,867	9,855
20.7	9,842	9,830	9,817	9,805	9,793	9,780	9,768	9,755	9,743	9,730
20.8	9,718	9,706	9,693	9,681	9,668	9,656	9,644	9,631	9,619	9,607
20.9	9,594	9,582	9,570	9,557	9,545	9,532	9,520	9,508	9,495	9,483
21.0	9,471	9,458	9,446	9,434	9,422	9,409	9,397	9,385	9,372	9,360
21.1	9,348	9,336	9,323	9,311	9,299	9,287	9,274	9,262	9,250	9,238
21.2	9,225	9,213	9,201	9,189	9,176	9,164	9,152	9,140	9,128	9,116
21.3	9,103	9,091	9,079	9,067	9,055	9,043	9,030	9,018	9,006	8,994
21.4	8,982	8,970	8,958	8,946	8,933	8,921	8,909	8,897	8,885	8,873
21.5	8,861	8,849	8,837	8,825	8,813	8,801	8,789	8,776	8,764	8,752
21.6	8,740	8,728	8,716	8,704	8,692	8,680	8,668	8,656	8,644	8,632
21.7	8,620	8,608	8,596	8,584	8,572	8,560	8,548	8,536	8,524	8,512
21.8	8,500	8,489	8,477	8,465	8,453	8,441	8,429	8,417	8,405	8,393
21.9	8,381	8,369	8,357	8,346	8,334	8,322	8,310	8,298	8,286	8,274
22.0	8,262	8,250	8,239	8,227	8,215	8,203	8,191	8,179	8,168	8,156
22.1	8,144	8,132	8,120	8,109	8,097	8,085	8,073	8,061	8,050	8,038
22.2	8,026	8,014	8,003	7,991	7,979	7,967	7,956	7,944	7,932	7,920
22.3	7,909	7,897	7,885	7,873	7,862	7,850	7,838	7,827	7,815	7,803
22.4	7,791	7,780	7,768	7,756	7,745	7,733	7,721	7,710	7,698	7,686
22.5	7,675	7,663	7,652	7,640	7,628	7,617	7,605	7,593	7,582	7,570
22.6	7,559	7,547	7,536	7,524	7,512	7,501	7,489	7,478	7,466	7,454
22.7	7,443	7,431	7,420	7,408	7,397	7,385	7,374	7,362	7,350	7,339
22.8	7,327	7,316	7,304	7,293	7,281	7,270	7,258	7,247	7,235	7,224
22.9	7,212	7,201	7,189	7,178	7,167	7,155	7,144	7,132	7,121	7,109
23.0	7,098	7,086	7,075	7,064	7,052	7,041	7,029	7,018	7,006	6,995
23.1	6,984	6,972	6,961	6,949	6,938	6,927	6,915	6,904	6,893	6,881
23.2	6,870	6,858	6,847	6,834	6,824	6,813	6,802	6,790	6,779	6,768
23.3	6,756	6,745	6,734	6,722	6,711	6,700	6,688	6,677	6,666	6,655
23.4	6,643	6,632	6,621	6,610	6,598	6,587	6,576	6,564	6,553	6,542
23.5	6,531	6,519	6,508	6,497	6,486	6,475	6,463	6,452	6,441	6,430
23.6	6,418	6,407	6,396	6,385	6,374	6,363	6,351	6,340	6,329	6,318
23.7	6,307	6,296	6,284	6,273	6,262	6,251	6,240	6,229	6,218	6,206
23.8	6,195	6,184	6,173	6,162	6,151	6,140	6,129	6,118	6,106	6,095
23.9	6,084	6,073	6,062	6,051	6,040	6,029	6,018	6,007	5,996	5,985
24.0	5,974	5,962	5,951	5,940	5,929	5,918	5,907	5,896	5,885	5,874
24.1	5,863	5,852	5,841	5,830	5,819	5,808	5,797	5,786	5,775	5,764
24.2	5,753	5,742	5,731	5,720	5,709	5,698	5,687	5,676	5,666	5,655
24.3	5,644	5,633	5,622	5,611	5,600	5,589	5,578	5,567	5,555	5,545
24.4	5,534	5,524	5,513	5,502	5,491	5,480	5,469	5,458	5,447	5,436
24.5	5,425	5,415	5,404	5,393	5,382	5,371	5,360	5,350	5,339	5,328
24.6	5,317	5,306	5,295	5,285	5,274	5,263	5,252	5,241	5,230	5,220
24.7	5,209	5,198	5,187	5,176	5,166	5,155	5,144	5,133	5,123	5,112
24.8	5,101	5,090	5,080	5,069	5,058	5,047	5,037	5,026	5,015	5,004
24.9	4,994	4,983	4,972	4,961	4,951	4,940	4,929	4,919	4,908	4,897
25.0	4,886	4,876	4,865	4,854	4,844	4,833	4,822	4,812	4,801	4,790
25.1	4,780	4,769	4,758	4,748	4,737	4,726	4,716	4,705	4,695	4,684
25.2	4,673	4,663	4,652	4,642	4,631	4,620	4,610	4,599	4,588	4,578
25.3	4,567	4,557	4,546	4,536	4,525	4,514	4,504	4,493	4,483	4,472
25.4	4,462	4,451	4,440	4,430	4,419	4,409	4,398	4,388	4,377	4,367
25.5	4,356	4,346	4,335	4,325	4,314	4,304	4,293	4,283	4,272	4,262
25.6	4,251	4,241	4,230	4,220	4,209	4,199	4,188	4,178	4,167	4,157
25.7	4,146	4,136	4,125	4,115	4,105	4,094	4,084	4,073	4,063	4,052
25.8	4,042	4,032	4,021	4,011	4,000	3,990	3,980	3,969	3,959	3,948
25.9	3,938	3,928	3,917	3,907	3,896	3,886	3,876	3,865	3,855	3,845
26.0	3,834	3,824	3,814	3,803	3,793	3,782	3,772	3,762	3,751	3,741
26.1	3,731	3,720	3,710	3,700	3,689	3,679	3,669	3,659	3,648	3,638
26.2	3,628	3,617	3,607	3,597	3,586	3,576	3,566	3,556	3,545	3,535
26.3	3,525	3,515	3,504	3,494	3,484	3,474	3,463	3,453	3,443	3,433
26.4	3,422	3,412	3,402	3,392	3,382	3,371	3,361	3,351	3,341	3,331
26.5	3,320	3,310	3,300	3,290	3,279	3,269	3,259	3,249	3,239	3,229
26.6	3,218	3,208	3,198	3,188	3,178	3,168	3,157	3,147	3,137	3,127
26.7	3,117	3,107	3,097	3,086	3,076	3,066	3,056	3,046	3,036	3,026
26.8	3,016	3,005	2,995	2,985	2,975	2,965	2,955	2,945	2,935	2,925
26.9	2,915	2,905	2,895	2,884	2,874	2,864	2,854	2,844	2,834	2,824
27.0	2,814	2,804	2,794	2,784	2,774	2,764	2,754	2,744	2,734	2,724
27.1	2,714	2,704	2,694	2,684	2,674	2,664	2,654	2,644	2,634	2,624
27.2	2,614	2,604	2,594	2,584	2,574	2,564	2,554	2,544	2,534	2,524
27.3	2,514	2,504	2,494	2,484	2,474	2,464	2,454	2,444	2,434	2,425
27.4	2,415	2,405	2,395	2,385	2,375	2,365	2,355	2,345	2,335	2,325
27.5	2,315	2,306	2,296	2,286	2,276	2,266	2,256	2,246	2,236	2,226
27.6	2,217	2,207	2,197	2,187	2,177	2,167	2,157	2,148	2,138	2,128
27.7	2,118	2,108	2,098	2,089	2,079	2,069	2,059	2,049	2,040	2,030
27.8	2,020	2,010	2,000	1,990	1,981	1,971	1,961	1,951	1,942	1,932
27.9	1,922	1,912	1,902	1,893	1,883	1,873	1,863	1,854	1,844	1,834

TABLE III-a
ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

Altitude in feet, pressure in inches of mercury— (O C)— (Continued)

P Inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
28.0	1,824	1,814	1,805	1,795	1,785	1,776	1,766	1,756	1,746	1,737
28.1	1,727	1,717	1,707	1,698	1,688	1,678	1,668	1,659	1,649	1,639
28.2	1,630	1,620	1,610	1,601	1,591	1,581	1,572	1,562	1,552	1,542
28.3	1,533	1,523	1,513	1,504	1,494	1,484	1,475	1,465	1,456	1,446
28.4	1,436	1,427	1,417	1,407	1,398	1,388	1,378	1,369	1,359	1,350
28.5	1,340	1,330	1,321	1,311	1,302	1,292	1,282	1,273	1,263	1,254
28.6	1,244	1,234	1,225	1,215	1,206	1,196	1,186	1,177	1,167	1,158
28.7	1,148	1,139	1,129	1,120	1,110	1,100	1,091	1,081	1,072	1,062
28.8	1,053	1,043	1,034	1,024	1,015	1,005	995	986	976	967
28.9	957	948	938	929	919	910	900	891	881	872
29.0	863	853	844	834	825	815	806	796	787	777
29.1	768	758	749	739	730	721	711	702	692	683
29.2	673	664	655	645	636	626	617	607	598	589
29.3	579	570	560	551	542	532	523	514	504	495
29.4	485	476	467	457	448	439	429	420	410	401
29.5	392	382	373	364	354	345	335	326	317	307
29.6	298	289	280	270	261	252	242	233	224	215
29.7	205	196	187	177	168	159	149	140	131	122
29.8	112	103	94	85	75	66	57	47	38	29
29.9	20	10	1	-8	-17	-26	-36	-45	-54	-63
30.0	-73	-82	-91	-100	-110	-119	-128	-137	-146	-156
30.1	-165	-174	-183	-192	-202	-211	-220	-229	-238	-248
30.2	-257	-266	-275	-284	-293	-303	-312	-321	-330	-339
30.3	-348	-358	-367	-376	-385	-394	-403	-412	-421	-431
30.4	-440	-449	-458	-467	-476	-485	-494	-504	-513	-522
30.5	-531	-540	-549	-558	-567	-576	-585	-594	-604	-613
30.6	-622	-631	-640	-649	-658	-667	-676	-685	-694	-703
30.7	-712	-721	-730	-740	-749	-758	-767	-776	-785	-794
30.8	-803	-812	-821	-830	-839	-848	-857	-866	-875	-884
30.9	-893	-902	-911	-920	-929	-938	-947	-956	-965	-974
31.0	-983	-992	-1,001	-1,010	-1,019	-1,028	-1,037	-1,046	-1,055	-1,064

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