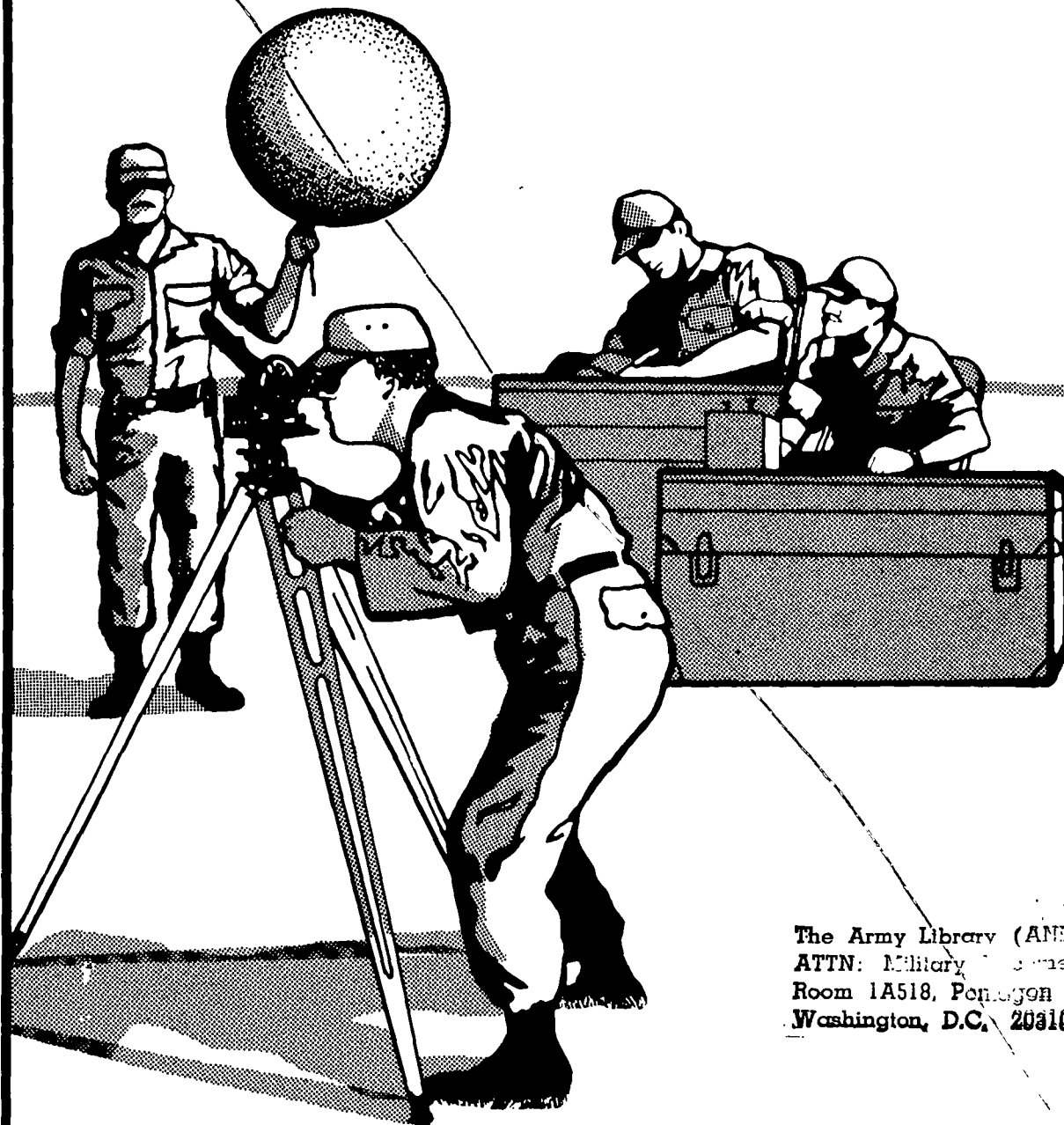
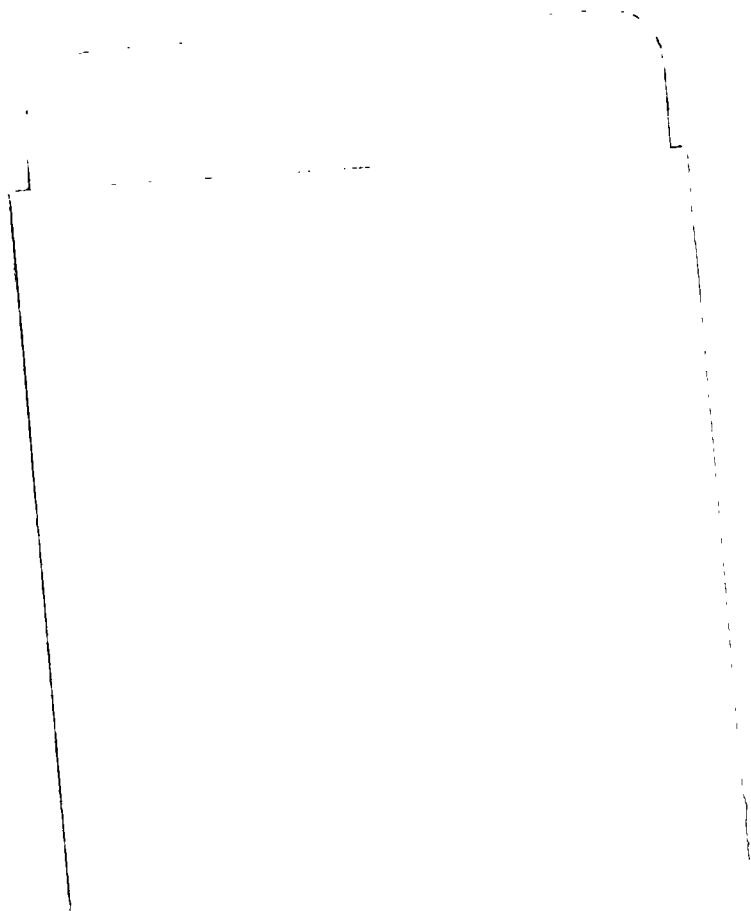


TABLES FOR ARTILLERY METEOROLOGY (SOUND RANGING) MESSAGES



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FIELD MANUAL

No. 6-16-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 10 May 1979

TABLES FOR ARTILLERY METEOROLOGY (SOUND RANGING) MESSAGES

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*This publication together with FM 6-16 supersedes FM 6-16, 12 May 1961, including all changes.



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CHAPTER 1

INTRODUCTION

1-1. PURPOSE AND SCOPE

a. This manual is a compilation of tables and charts used by the sound/flash ranging crewman and/or field artillery meteorological crewman to compute sound ranging messages for field artillery. These tables and charts apply to both visual and electronic sound ranging messages. Use of this manual in the computation of the sound ranging message is described in FM 6-15, *Artillery Meteorology*.

b. FM 6-16, *Tables for Artillery Meteorology*, has been revised into a set of two field manuals. The set includes:

FM 6-16, *Tables for Artillery Meteorology (Electronic) Ballistic Type 3 and Computer Messages*

FM 6-16-1, *Tables for Artillery Meteorology (Sound Ranging) Messages*

1-2. RECOMMENDED CHANGES

a. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commandant, United States Army Field Artillery School. ATTN: ATSF-CF-R, Fort Sill, Oklahoma 73503.



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CHAPTER 2

WIND TABLES FOR SOUND RANGING MESSAGES

Tables 2-1 through 2-6 are used for obtaining the effective sound ranging wind.

Table 2-1. Horizontal Distance (Meters), Layer 1, 54-Seconds Reading, 30-Gram Balloon (200 Meters)

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
6	1,900	1,870	1,840	1,810	1,780	1,750	1,730	1,700	1,680	1,650
7	1,630	1,600	1,580	1,560	1,540	1,520	1,500	1,480	1,460	1,440
8	1,420	1,400	1,390	1,370	1,350	1,340	1,320	1,310	1,290	1,280
9	1,260	1,250	1,230	1,220	1,210	1,200	1,180	1,170	1,160	1,140
10	1,130	1,120	1,110	1,100	1,090	1,080	1,070	1,060	1,050	1,040
11	1,030	1,020	1,010	1,000	990	980	970	960	960	950
12	940	930	920	920	910	900	890	890	880	870
13	870	860	850	850	840	830	830	820	810	810
14	800	800	790	780	780	770	770	760	760	750
15	750	740	740	730	730	720	720	710	710	700
16	700	690	690	680	680	680	670	670	660	660
17	650	650	650	640	640	630	630	630	620	620
18	620	610	610	600	600	600	590	590	590	580
19	580	580	570	570	570	560	560	560	560	550
20	550	550	540	540	540	540	530	530	530	520
21	520	520	520	510	510	510	500	500	500	500
22	500	490	490	490	480	480	480	480	480	470
23	470	470	470	460	460	460	460	460	450	450
24	450	450	440	440	440	440	440	440	430	430
25	430	430	420	420	420	420	420	420	410	410
26	410	410	410	400	400	400	400	400	400	390
27	390	390	390	390	390	380	380	380	380	380
28	380	380	370	370	370	370	370	360	360	360
29	360	360	360	360	360	350	350	350	350	350
30	350	340	340	340	340	340	340	340	340	330
31	330	330	330	330	330	330	320	320	320	320
32	320	320	320	320	320	310	310	310	310	310
33	310	310	310	300	300	300	300	300	300	300
34	300	300	290	290	290	290	290	290	290	290
35	290	280	280	280	280	280	280	280	280	280
36	280	270	270	270	270	270	270	270	270	270
37	260	260	260	260	260	260	260	260	260	260
38	260	260	250	250	250	250	250	250	250	250
39	250	250	240	240	240	240	240	240	240	240
40	240	240	240	240	240	230	230	230	230	230
41	230	230	230	230	230	230	220	220	220	220
42	220	220	220	220	220	220	220	220	220	220
43	210	210	210	210	210	210	210	210	210	210
44	210	210	210	200	200	200	200	200	200	200
45	200	200	200	200	200	200	200	200	190	190
46	190	190	190	190	190	190	190	190	190	190
47	190	190	180	180	180	180	180	180	180	180

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

FM 6-16-1

Table 2-1. Horizontal Distance (Meters), Layer 1, 54-Seconds Reading, 30-Gram Balloon (200 Meters)—Continued

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
48	180	180	180	180	180	180	180	180	180	170
49	170	170	170	170	170	170	170	170	170	170
50	170	170	170	170	160	160	160	160	160	160
51	160	160	160	160	160	160	160	160	160	160
52	160	160	160	160	150	150	150	150	150	150
53	150	150	150	150	150	150	150	150	150	150
54	140	140	140	140	140	140	140	140	140	140
55	140	140	140	140	140	140	140	140	140	140
56	140	130	130	130	130	130	130	130	130	130
57	130	130	130	130	130	130	130	130	130	120
58	120	120	120	120	120	120	120	120	120	120
59	120	120	120	120	120	120	120	120	120	120
60	120	120	120	110	110	110	110	110	110	110
61	110	110	110	110	110	110	110	110	110	110
62	110	110	100	100	100	100	100	100	100	100
63	100	100	100	100	100	100	100	100	100	100
64	100	100	100	100	100	100	100	90	90	90
65	90	90	90	90	90	90	90	90	90	90
66	90	90	90	90	90	90	90	90	90	80
67	80	80	80	80	80	80	80	80	80	80
68	80	80	80	80	80	80	80	80	80	80
69	80	80	80	80	80	80	70	70	70	70
70	70	70	70	70	70	70	70	70	70	70
71	70	70	70	70	70	70	70	70	70	60
72	70	60	60	60	60	60	60	60	60	60
73	60	60	60	60	60	60	60	60	60	60
74	60	60	60	60	60	60	60	60	50	50
75	50	50	50	50	50	50	50	50	50	50
76	50	50	50	50	50	50	50	50	50	50
77	50	50	50	50	40	40	40	40	40	40
78	40	40	40	40	40	40	40	40	40	40
79	40	40	40	40	40	40	40	40	40	40
80	40	40	30	30	30	30	30	30	30	30
81	30	30	30	30	30	30	30	30	30	30
82	30	30	30	30	30	30	30	30	30	20
83	20	20	20	20	20	20	20	20	20	20
84	20	20	20	20	20	20	20	20	20	20
85	20	20	20	20	20	20	20	20	20	10
86	10	10	10	10	10	10	10	10	10	10
87	10	10	10	10	10	10	10	10	10	10
88	10	10	10	10	10	0	0	0	0	0

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 2, 1-Minute 54-Seconds Reading, 30-Gram Balloon (400 Meters)

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
6	3,800	3,740	3,680	3,620	3,560	3,510	3,450	3,400	3,350	3,300
7	3,250	3,210	3,160	3,120	3,080	3,040	3,000	2,960	2,920	2,880
8	2,840	2,810	2,780	2,740	2,710	2,680	2,640	2,610	2,580	2,550
9	2,520	2,500	2,470	2,440	2,420	2,390	2,360	2,340	2,320	2,290
10	2,270	2,250	2,220	2,200	2,180	2,160	2,140	2,120	2,100	2,080
11	2,060	2,040	2,020	2,000	1,980	1,970	1,950	1,930	1,920	1,900
12	1,880	1,870	1,850	1,840	1,820	1,800	1,790	1,780	1,760	1,750
13	1,730	1,720	1,700	1,690	1,680	1,670	1,650	1,640	1,630	1,620
14	1,600	1,590	1,580	1,570	1,560	1,550	1,540	1,520	1,510	1,500
15	1,490	1,480	1,470	1,460	1,450	1,440	1,430	1,420	1,410	1,400
16	1,400	1,390	1,380	1,370	1,360	1,350	1,340	1,330	1,320	1,320
17	1,310	1,300	1,290	1,280	1,280	1,270	1,260	1,250	1,250	1,240
18	1,230	1,220	1,220	1,210	1,200	1,200	1,190	1,180	1,180	1,170
19	1,160	1,160	1,150	1,140	1,140	1,130	1,120	1,120	1,110	1,100
20	1,100	1,090	1,090	1,080	1,080	1,070	1,060	1,060	1,050	1,050
21	1,040	1,040	1,030	1,030	1,020	1,020	1,010	1,000	1,000	1,000
22	990	980	980	980	970	970	960	960	950	950
23	940	940	930	930	920	920	920	910	910	900
24	900	890	890	890	880	880	870	870	870	860
25	860	850	850	850	840	840	840	830	830	820
26	820	820	810	810	810	800	800	800	790	790
27	790	780	780	780	770	770	760	760	760	760
28	750	750	750	740	740	740	730	730	730	720
29	720	720	720	710	710	710	700	700	700	700
30	690	690	690	680	680	680	680	670	670	670
31	670	670	660	660	660	650	650	650	640	640
32	640	640	640	630	630	630	620	620	620	620
33	620	620	610	610	610	600	600	600	600	600
34	590	590	590	590	580	580	580	580	580	570
35	570	570	570	560	560	560	560	560	560	550
36	550	550	550	540	540	540	540	540	540	530
37	530	530	530	520	520	520	520	520	520	510
38	510	510	510	510	500	500	500	500	500	500
39	490	490	490	490	490	480	480	480	480	480
40	480	470	470	470	470	470	470	460	460	460
41	460	460	460	460	450	450	450	450	450	450
42	440	440	440	440	440	440	440	430	430	430
43	430	430	430	420	420	420	420	420	420	420
44	410	410	410	410	410	410	410	400	400	400
45	400	400	400	400	390	390	390	390	390	390
46	390	380	380	380	380	380	380	380	380	370
47	370	370	370	370	370	370	360	360	360	360

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 2, 1-Minute 54-Seconds Reading, 30-Gram Balloon (400 Meters)—

Continued

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
48	360	360	360	360	360	350	350	350	350	350
49	350	350	340	340	340	340	340	340	340	340
50	340	330	330	330	330	330	330	330	330	320
51	320	320	320	320	320	320	320	320	320	310
52	310	310	310	310	310	310	310	310	300	300
53	300	300	300	300	300	300	300	290	290	290
54	290	290	290	290	290	280	280	280	280	280
55	280	280	280	280	280	280	270	270	270	270
56	270	270	270	270	270	260	260	260	260	260
57	260	260	260	260	260	260	250	250	250	250
58	250	250	250	250	250	240	240	240	240	240
59	240	240	240	240	240	240	240	230	230	230
60	230	230	230	230	230	230	220	220	220	220
61	220	220	220	220	220	220	220	220	210	210
62	210	210	210	210	210	210	210	210	210	200
63	200	200	200	200	200	200	200	200	200	200
64	200	190	190	190	190	190	190	190	190	190
65	190	190	180	180	180	180	180	180	180	180
66	180	180	180	180	170	170	170	170	170	170
67	170	170	170	170	170	170	160	160	160	160
68	160	160	160	160	160	160	160	160	160	150
69	150	150	150	150	150	150	150	150	150	150
70	150	140	140	140	140	140	140	140	140	140
71	140	140	140	130	130	130	130	130	130	130
72	130	130	130	130	130	130	120	120	120	120
73	120	120	120	120	120	120	120	120	120	120
74	120	110	110	110	110	110	110	110	110	110
75	110	110	110	100	100	100	100	100	100	100
76	100	100	100	100	100	100	100	90	90	90
77	90	90	90	90	90	90	90	90	90	90
78	80	80	80	80	80	80	80	80	80	80
79	80	80	80	80	80	70	70	70	70	70
80	70	70	70	70	70	70	70	70	60	60
81	60	60	60	60	60	60	60	60	60	60
82	60	60	60	50	50	50	50	50	50	50
83	50	50	50	50	50	50	40	40	40	40
84	40	40	40	40	40	40	40	40	40	40
85	40	30	30	30	30	30	30	30	30	30
86	30	30	30	30	30	20	20	20	20	20
87	20	20	20	20	20	20	20	20	20	20
88	10	10	10	10	10	10	10	10	10	10
89	10	10	10	10	0	0	0	0	0	0

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 3, 2-Minutes 54-Seconds Reading, 30-Gram Balloon (600 Meters)

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
6	5,700	5,610	5,520	5,430	5,340	5,260	5,180	5,100	5,020	4,950
7	4,880	4,810	4,750	4,680	4,610	4,550	4,490	4,430	4,380	4,320
8	4,270	4,220	4,160	4,110	4,060	4,010	3,970	3,920	3,880	3,830
9	3,790	3,750	3,710	3,660	3,620	3,590	3,550	3,510	3,470	3,440
10	3,400	3,370	3,340	3,300	3,270	3,240	3,210	3,180	3,140	3,120
11	3,090	3,060	3,030	3,000	2,980	2,950	2,920	2,900	2,870	2,850
12	2,820	2,800	2,780	2,750	2,730	2,710	2,680	2,660	2,640	2,620
13	2,600	2,580	2,560	2,540	2,520	2,500	2,480	2,460	2,440	2,420
14	2,410	2,390	2,370	2,350	2,340	2,320	2,300	2,290	2,270	2,260
15	2,240	2,220	2,210	2,190	2,180	2,160	2,150	2,130	2,120	2,110
16	2,090	2,080	2,060	2,050	2,040	2,030	2,010	2,000	1,990	1,980
17	1,960	1,950	1,940	1,930	1,920	1,900	1,890	1,880	1,870	1,860
18	1,850	1,840	1,820	1,810	1,800	1,790	1,780	1,770	1,760	1,750
19	1,740	1,730	1,720	1,710	1,700	1,690	1,680	1,680	1,670	1,660
20	1,650	1,640	1,630	1,620	1,610	1,600	1,600	1,590	1,580	1,570
21	1,560	1,550	1,550	1,540	1,530	1,520	1,520	1,510	1,500	1,490
22	1,480	1,480	1,470	1,460	1,460	1,450	1,440	1,430	1,430	1,420
23	1,410	1,410	1,400	1,390	1,390	1,380	1,370	1,370	1,360	1,350
24	1,350	1,340	1,340	1,330	1,320	1,320	1,310	1,300	1,300	1,290
25	1,290	1,280	1,280	1,270	1,260	1,260	1,250	1,250	1,240	1,240
26	1,230	1,220	1,220	1,210	1,210	1,200	1,200	1,190	1,190	1,180
27	1,180	1,170	1,170	1,160	1,160	1,150	1,150	1,140	1,140	1,130
28	1,130	1,120	1,120	1,110	1,110	1,100	1,100	1,100	1,090	1,090
29	1,080	1,080	1,070	1,070	1,060	1,060	1,060	1,050	1,050	1,040
30	1,040	1,040	1,030	1,030	1,020	1,020	1,010	1,010	1,010	1,000
31	1,000	1,000	990	990	980	980	980	970	970	960
32	960	960	950	950	940	940	940	940	930	930
33	920	920	920	910	910	910	900	900	900	890
34	890	890	880	880	880	870	870	870	860	860
35	860	850	850	850	840	840	840	840	830	830
36	830	820	820	820	810	810	810	810	800	800
37	800	790	790	790	780	780	780	780	770	770
38	770	760	760	760	760	750	750	750	750	740
39	740	740	740	730	730	730	720	720	720	720
40	720	710	710	710	700	700	700	700	700	690
41	690	690	680	680	680	680	680	670	670	670
42	670	660	660	660	660	660	650	650	650	650
43	640	640	640	640	630	630	630	630	630	620
44	620	620	620	620	610	610	610	610	600	600
45	600	600	600	590	590	590	590	590	580	580
46	580	580	580	570	570	570	570	560	560	560
47	560	560	560	550	550	550	550	550	540	540
48	540	540	540	540	530	530	530	530	520	520

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 3, 2-Minutes 54-Seconds Reading, 30-Gram Balloon (600 Meters)—
Continued

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
49	520	520	520	520	510	510	510	510	510	510
50	500	500	500	500	500	500	490	490	490	490
51	490	480	480	480	480	480	480	470	470	470
52	470	470	460	460	460	460	460	460	460	450
53	450	450	450	450	450	440	440	440	440	440
54	440	430	430	430	430	430	430	420	420	420
55	420	420	420	420	410	410	410	410	410	410
56	400	400	400	400	400	400	400	390	390	390
57	390	390	390	380	380	380	380	380	380	380
58	380	370	370	370	370	370	370	360	360	360
59	360	360	360	360	360	350	350	350	350	350
60	350	340	340	340	340	340	340	340	340	330
61	330	330	330	330	330	330	320	320	320	320
62	320	320	320	320	310	310	310	310	310	310
63	310	300	300	300	300	300	300	300	300	290
64	290	290	290	290	290	290	280	280	280	280
65	280	280	280	280	280	270	270	270	270	270
66	270	270	260	260	260	260	260	260	260	260
67	260	250	250	250	250	250	250	250	240	240
68	240	240	240	240	240	240	240	230	230	230
69	230	230	230	230	230	220	220	220	220	220
70	220	220	220	220	210	210	210	210	210	210
71	210	200	200	200	200	200	200	200	200	200
72	200	190	190	190	190	190	190	190	190	180
73	180	180	180	180	180	180	180	180	170	170
74	170	170	170	170	170	170	160	160	160	160
75	160	160	160	160	160	160	150	150	150	150
76	150	150	150	150	140	140	140	140	140	140
77	140	140	140	140	130	130	130	130	130	130
78	130	130	120	120	120	120	120	120	120	120
79	120	120	110	110	110	110	110	110	110	110
80	110	100	100	100	100	100	100	100	100	100
81	100	90	90	90	90	90	90	90	90	80
82	80	80	80	80	80	80	80	80	80	80
83	70	70	70	70	70	70	70	70	60	60
84	60	60	60	60	60	60	60	60	60	50
85	50	50	50	50	50	50	50	40	40	40
86	40	40	40	40	40	40	40	40	30	30
87	30	30	30	30	30	30	20	20	20	20
88	20	20	20	20	20	20	20	10	10	10
89	10	10	10	10	10	0	0	0	0	0

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 4, 3-Minutes 54-Seconds Reading, 30-Gram Balloon (800 Meters)

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
6	7,600	7,480	7,360	7,240	7,120	7,010	6,900	6,800	6,700	6,600
7	6,510	6,420	6,330	6,240	6,160	6,080	6,000	5,920	5,840	5,760
8	5,690	5,620	5,550	5,480	5,420	5,350	5,290	5,230	5,170	5,110
9	5,050	4,990	4,940	4,880	4,830	4,780	4,730	4,680	4,630	4,580
10	4,540	4,490	4,450	4,400	4,360	4,320	4,280	4,230	4,190	4,150
11	4,120	4,080	4,040	4,000	3,970	3,930	3,900	3,860	3,830	3,800
12	3,760	3,730	3,700	3,670	3,640	3,610	3,580	3,550	3,520	3,490
13	3,460	3,440	3,410	3,380	3,360	3,330	3,310	3,280	3,260	3,230
14	3,210	3,180	3,160	3,140	3,120	3,090	3,070	3,050	3,030	3,010
15	2,990	2,960	2,940	2,920	2,900	2,880	2,860	2,850	2,830	2,810
16	2,790	2,770	2,750	2,740	2,720	2,700	2,680	2,670	2,650	2,630
17	2,620	2,600	2,580	2,570	2,550	2,540	2,520	2,510	2,490	2,480
18	2,460	2,450	2,430	2,420	2,410	2,390	2,380	2,360	2,350	2,340
19	2,320	2,310	2,300	2,280	2,270	2,260	2,250	2,230	2,220	2,210
20	2,200	2,190	2,170	2,160	2,150	2,140	2,130	2,120	2,110	2,100
21	2,080	2,070	2,060	2,050	2,040	2,030	2,020	2,010	2,000	1,990
22	1,980	1,970	1,960	1,950	1,940	1,930	1,920	1,910	1,900	1,890
23	1,880	1,880	1,870	1,860	1,850	1,840	1,830	1,820	1,810	1,810
24	1,800	1,790	1,780	1,770	1,760	1,760	1,750	1,740	1,730	1,720
25	1,720	1,710	1,700	1,690	1,680	1,680	1,670	1,660	1,660	1,650
26	1,640	1,630	1,630	1,620	1,610	1,610	1,600	1,590	1,580	1,580
27	1,570	1,560	1,560	1,550	1,540	1,540	1,530	1,520	1,520	1,510
28	1,510	1,500	1,490	1,490	1,480	1,470	1,470	1,460	1,460	1,450
29	1,440	1,440	1,430	1,430	1,420	1,410	1,410	1,400	1,400	1,390
30	1,390	1,380	1,380	1,370	1,360	1,360	1,350	1,350	1,340	1,340
31	1,330	1,330	1,320	1,320	1,310	1,310	1,300	1,300	1,290	1,280
32	1,280	1,280	1,270	1,260	1,260	1,260	1,250	1,250	1,240	1,240
33	1,230	1,230	1,220	1,220	1,210	1,210	1,200	1,200	1,200	1,190
34	1,190	1,180	1,180	1,170	1,170	1,160	1,160	1,160	1,150	1,150
35	1,140	1,140	1,130	1,130	1,120	1,120	1,110	1,110	1,100	1,100
36	1,100	1,100	1,090	1,090	1,080	1,080	1,080	1,070	1,070	1,070
37	1,060	1,060	1,050	1,050	1,050	1,040	1,040	1,040	1,030	1,030
38	1,020	1,020	1,020	1,010	1,010	1,010	1,000	1,000	1,000	990
39	990	980	980	980	970	970	970	960	960	960
40	950	950	950	940	940	940	930	930	930	920
41	920	920	910	910	910	900	900	900	900	890
42	890	880	880	880	880	870	870	870	860	860
43	860	860	850	850	850	840	840	840	830	830
44	830	830	820	820	820	810	810	810	810	800
45	800	800	790	790	790	790	780	780	780	780
46	770	770	770	760	760	760	760	750	750	750
47	750	740	740	740	740	730	730	730	720	720

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-1. Horizontal Distance (Meters), Layer 4, 3-Minutes 54-Seconds Reading, 30-Gram Balloon (800 Meters)—
Continued

Degrees	Elevation angle, tenths of a degree									
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
48	720	720	720	710	710	710	710	700	700	700
49	700	690	690	690	690	680	680	680	680	670
50	670	670	670	660	660	660	660	660	650	650
51	650	650	640	640	640	640	630	630	630	630
52	620	620	620	620	620	610	610	610	610	610
53	600	600	600	600	590	590	590	590	590	580
54	580	580	580	580	570	570	570	570	560	560
55	560	560	560	550	550	550	550	550	540	540
56	540	540	540	530	530	530	530	530	520	520
57	520	520	520	510	510	510	510	510	500	500
58	500	500	500	490	490	490	490	490	480	480
59	480	480	480	480	470	470	470	470	470	460
60	460	460	460	460	450	450	450	450	450	440
61	440	440	440	440	440	430	430	430	430	430
62	420	420	420	420	420	420	420	410	410	410
63	410	410	400	400	400	400	400	400	390	390
64	390	390	390	380	380	380	380	380	380	380
65	370	370	370	370	370	360	360	360	360	360
66	360	350	350	350	350	350	350	340	340	340
67	340	340	340	340	330	330	330	330	330	320
68	320	320	320	320	320	320	310	310	310	310
69	310	300	300	300	300	300	300	300	290	290
70	290	290	290	290	280	280	280	280	280	280
71	280	270	270	270	270	270	270	260	260	260
72	260	260	260	260	250	250	250	250	250	250
73	240	240	240	240	240	240	240	230	230	230
74	230	230	230	220	220	220	220	220	220	220
75	210	210	210	210	210	210	210	200	200	200
76	200	200	200	200	190	190	190	190	190	190
77	180	180	180	180	180	180	180	170	170	170
78	170	170	170	170	160	160	160	160	160	160
79	160	150	150	150	150	150	150	140	140	140
80	140	140	140	140	140	130	130	130	130	130
81	130	120	120	120	120	120	120	120	120	110
82	110	110	110	110	110	110	100	100	100	100
83	100	100	100	90	90	90	90	90	90	90
84	80	80	80	80	80	80	80	70	70	70
85	70	70	70	70	60	60	60	60	60	60
86	60	60	50	50	50	50	50	50	40	40
87	40	40	40	40	40	40	30	30	30	30
88	30	30	20	20	20	20	20	20	20	20
89	10	10	10	10	10	10	10	0	0	0

Enter table with elevation angle to nearest tenth of a degree. Obtain horizontal distance to the nearest 10 meters. Do not interpolate.

Table 2-2. Surface Wind Speed Tables for Sound Ranging. Observation to 30-Gram Balloon

This table was computed for a 30-gram balloon with a constant rate of rise of 220 meters per minute. This table may be used to determine surface wind speed, 15-second reading, to a 30-gram balloon.

Elevation angle, degrees	Speed, knots	Elevation angle, degrees	Speed, knots	Elevation angle, degrees	Speed, knots
8.1-8.2	50	12.1-12.4	33	23.8-24.7	16
8.3-8.4	49	12.5-12.8	32	24.8-26.2	15
8.5-8.6	48	12.9-13.3	31	26.3-28.1	14
8.7-8.7	47	13.4-13.7	30	28.2-30.0	13
8.8-8.9	46	13.8-14.1	29	30.1-32.4	12
9.0-9.1	45	14.2-14.6	28	32.5-34.1	11
9.2-9.4	44	14.7-15.2	27	34.2-36.9	10
9.5-9.5	43	15.3-15.8	26	37.0-40.4	9
9.6-9.8	42	15.9-16.2	25	40.5-44.2	8
9.9-10.0	41	16.3-16.9	24	44.3-47.1	7
10.1-10.3	40	17.0-17.7	23	47.2-52.3	6
10.4-10.6	39	17.8-18.5	22	52.4-57.8	5
10.7-10.8	38	18.6-19.4	21	57.9-64.7	4
10.9-11.1	37	19.5-20.1	20	64.8-71.8	3
11.2-11.4	36	20.2-21.2	19	71.9-77.1	2
11.5-11.8	35	21.3-22.3	18	77.2-82.7	1
11.9-12.0	34	22.4-23.7	17	82.8-90.0	0

Enter table with elevation angle to the nearest tenth of a degree. Obtain wind speed to nearest knot. Do not interpolate. Do not use when offset is more than forty-nine (49) meters.

Table 2-3. Wind Direction (Mils), Surface

Azimuth to balloon, degrees	Wind direction, mils	Azimuth to balloon, degrees	Wind direction, mils
0-2.8	3,200	177.2-182.8	6,400
2.9-8.4	3,300	182.9-188.4	100
8.5-14.0	3,400	188.5-194.0	200
14.1-19.6	3,500	194.1-199.6	300
19.7-25.3	3,600	199.7-205.3	400
25.4-30.9	3,700	205.4-210.9	500
31.0-36.5	3,800	211.0-216.5	600
36.6-42.1	3,900	216.6-222.1	700
42.2-47.8	4,000	222.2-227.8	800
47.9-53.4	4,100	227.9-233.4	900
53.5-59.0	4,200	233.5-239.0	1,000
59.1-64.6	4,300	239.1-244.6	1,100
64.7-70.3	4,400	244.7-250.3	1,200
70.4-75.9	4,500	250.4-255.9	1,300
76.0-81.5	4,600	256.0-261.5	1,400
81.6-87.1	4,700	261.6-267.1	1,500
87.2-92.8	4,800	267.2-272.8	1,600
92.9-98.4	4,900	272.9-278.4	1,700

Enter table with azimuth to the nearest tenth of a degree. Obtain wind direction to the nearest 100 mils. Do not interpolate.

Table 2-3. Wind Direction (Mils), Surface—Continued

Azimuth to balloon, degrees	Wind direction, mils	Azimuth to balloon, degrees	Wind direction, mils
98.5-104.0	5,000	278.5-284.0	1,800
104.1-109.6	5,100	284.1-289.6	1,900
109.7-115.3	5,200	289.7-295.3	2,000
115.4-120.9	5,300	295.4-300.9	2,100
121.0-126.5	5,400	301.0-306.5	2,200
126.6-132.1	5,500	306.6-312.1	2,300
132.2-137.8	5,600	312.2-317.8	2,400
137.9-143.4	5,700	317.9-323.4	2,500
143.5-149.0	5,800	323.5-329.0	2,600
149.1-154.6	5,900	329.1-334.6	2,700
154.7-160.3	6,000	334.7-340.3	2,800
160.4-165.9	6,100	340.4-345.9	2,900
166.0-171.5	6,200	346.0-351.5	3,000
171.6-177.1	6,300	351.6-357.1	3,100
177.2-182.8	6,400	357.2-360.0	3,200

Enter table with azimuth to the nearest tenth of a degree. Obtain wind direction to the nearest 100 mils. Do not interpolate.

Table 2-4. Wind Speed Tables for Sound Ranging

Sound ranging layer number 1 (surface to 200 meters) (54 seconds)					
Meters traveled in 54 seconds	Knots	Meters traveled in 54 seconds	Knots	Meters traveled in 54 seconds	Knots
0-13	0	404-430	15	821-847	30
14-41	1	431-458	16	848-875	31
42-69	2	459-486	17	876-903	32
70-97	3	487-514	18	904-931	33
98-125	4	515-542	19	932-959	34
126-152	5	543-569	20	960-986	35
153-180	6	570-597	21	987-1,014	36
181-208	7	598-625	22	1,015-1,042	37
209-236	8	626-653	23	1,043-1,070	38
237-264	9	654-681	24	1,071-1,098	39
265-291	10	682-708	25	1,099-1,125	40
292-319	11	709-736	26	1,126-1,153	41
320-347	12	737-764	27	1,154-1,181	42
348-375	13	765-792	28	1,182-1,209	43
376-403	14	793-820	29	1,210-1,237	44

Sound ranging layer 2, 3, and 4 (60 seconds)					
Meters traveled in 60 seconds	Knots	Meters traveled in 60 seconds	Knots	Meters traveled in 60 seconds	Knots
0-15	0	448-478	15	912-942	30
16-46	1	479-509	16	943-972	31
47-77	2	510-540	17	973-1,003	32
78-108	3	541-571	18	1,004-1,034	33
109-139	4	572-602	19	1,035-1,065	34
140-169	5	603-633	20	1,066-1,096	35
170-200	6	634-664	21	1,097-1,127	36
201-231	7	665-694	22	1,128-1,158	37
232-262	8	695-725	23	1,159-1,189	38
263-293	9	726-756	24	1,190-1,220	39
294-324	10	757-787	25	1,221-1,250	40
325-355	11	788-818	26	1,251-1,281	41
356-386	12	819-849	27	1,282-1,312	42
387-416	13	850-880	28	1,313-1,343	43
417-447	14	881-911	29	1,344-1,374	44

Enter table with horizontal travel to the nearest meter. Obtain wind speed to the nearest knot. Do not interpolate. 0.514791 meter per second = 1 knot.

Table 2-5. Weighted Wind Speed (Normal Wind Structure)

	0	1	2	3	4	5	6	7	8	9
0.....	.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
10.....	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
20.....	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8
30.....	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8
40.....	8.0	8.2	8.4	8.6	8.8	9.0	9.2	9.4	9.6	9.8
50.....	10.0	10.2	10.4	10.6	10.8	11.0	11.2	11.4	11.6	11.8
60.....	12.0	12.2	12.4	12.6	12.8	13.0	13.2	13.4	13.6	13.8
70.....	14.0	14.2	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.8

First layer wind speed, knots

	0	1	2	3	4	5	6	7	8	9
0.....	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
10.....	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
20.....	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5
30.....	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5
40.....	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5
50.....	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5
60.....	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5
70.....	35.0	35.5	36.0	36.5	37.0	37.5	38.0	38.5	39.0	39.5

Second layer wind speed, knots

	0	1	2	3	4	5	6	7	8	9
0.....	.0	0.2	0.3	0.4	0.6	0.8	0.9	1.0	1.2	1.4
10.....	1.5	1.6	1.8	2.0	2.1	2.2	2.4	2.6	2.7	2.8
20.....	3.0	3.2	3.3	3.4	3.6	3.8	3.9	4.0	4.2	4.4
30.....	4.5	4.6	4.8	5.0	5.1	5.2	5.4	5.6	5.7	5.8
40.....	6.0	6.2	6.3	6.4	6.6	6.8	6.9	7.0	7.2	7.4
50.....	7.5	7.6	7.8	8.0	8.1	8.2	8.4	8.6	8.7	8.8
60.....	9.0	9.2	9.3	9.4	9.6	9.8	9.9	10.0	10.2	10.4
70.....	10.5	10.6	10.8	11.0	11.1	11.2	11.4	11.6	11.7	11.8

Third or fourth layer wind speed, knots

	0	1	2	3	4	5	6	7	8	9
0.....		0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7
10.....	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4
20.....	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.2
30.....	2.2	2.2	2.4	2.5	2.6	2.6	2.7	2.8	2.8	2.9
40.....	3.0	3.1	3.2	3.2	3.3	3.4	3.4	3.5	3.6	3.7
50.....	3.8	3.8	3.9	4.0	4.0	4.1	4.2	4.3	4.4	4.4
60.....	4.5	4.6	4.6	4.7	4.8	4.9	5.0	5.0	5.1	5.2
70.....	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.9

Enter table with wind speed to the nearest knot. Obtain weighted wind speed to the nearest tenth of a knot. Do not interpolate.

Table 2-6. Weighted Wind Speed (Wind Structure 2)

Surface wind speed, knots										
	0	1	2	3	4	5	6	7	8	9
0.....		0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6
10.....	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6
20.....	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.6
30.....	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2	15.6
40.....	16.0	16.4	16.8	17.2	17.6	18.0	18.4	18.8	19.2	19.6
50.....	20.0	20.4	20.8	21.2	21.6	22.0	22.4	22.8	23.2	23.6
60.....	24.0	24.4	24.8	25.2	25.6	26.0	26.4	26.8	27.2	27.6
70.....	28.0	28.4	28.8	29.2	29.6	30.0	30.4	30.8	31.2	31.6

Second layer wind speed, knots										
	0	1	2	3	4	5	6	7	8	9
0.....		.3	.6	.9	1.2	1.5	1.8	2.1	2.4	2.7
10.....	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7
20.....	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7
30.....	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7
40.....	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.4	14.7
50.....	15.0	15.3	15.6	15.9	16.2	16.5	16.8	17.1	17.4	17.7
60.....	18.0	18.3	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7
70.....	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4	23.7

Third or fourth layer wind speed, knots										
	0	1	2	3	4	5	6	7	8	9
0.....		.2	.3	.4	.6	.8	.9	1.0	1.2	1.4
10.....	1.5	1.6	1.8	2.0	2.1	2.2	2.4	2.6	2.7	2.8
20.....	3.0	3.2	3.3	3.4	3.6	3.8	3.9	4.0	4.2	4.4
30.....	4.5	4.6	4.8	5.0	5.1	5.2	5.4	5.6	5.7	5.8
40.....	6.0	6.2	6.3	6.4	6.6	6.8	6.9	7.0	7.2	7.4
50.....	7.5	7.6	7.8	8.0	8.1	8.2	8.4	8.6	8.7	8.8
60.....	9.0	9.2	9.3	9.4	9.6	9.8	9.9	10.0	10.2	10.4
70.....	10.5	10.6	10.8	11.0	11.1	11.2	11.4	11.6	11.7	11.8

Enter table with wind speed to the nearest knot. Obtain weighted wind speed to the nearest tenth of a knot. Do not interpolate.

CHAPTER 3

VIRTUAL TEMPERATURE TABLES FOR SOUND RANGING MESSAGES

The tables and diagram included in this chapter are used for computing the effective sound ranging temperature. Included is an example of the computation procedures.

Table 3-1. Virtual Temperature (Degrees Celsius)

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
*-5	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.7	-4.7	-4.7	-4.7	-4.7	-4.7	-4.7	-4.7	-4.7	-4.8	-4.8
-4	-3.5	-3.5	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7
-3	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.7	-2.7	-2.7	-2.7
-2	-1.4	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
-1	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
1	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5
3	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
4	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.6	4.6
5	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7
6	7.0	7.0	7.0	7.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7
7	8.1	8.1	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8
8	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	8.9	8.9	8.9	8.9	8.9	8.9
9	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
10	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.1	11.0	11.0
11	12.4	12.4	12.4	12.4	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.1
12	13.5	13.5	13.5	13.5	13.5	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.3	13.3	13.3	13.2	13.2	13.2
13	14.6	14.6	14.6	14.6	14.6	14.6	14.5	14.5	14.5	14.5	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.3	14.3
14	15.8	15.8	15.7	15.7	15.7	15.7	15.7	15.6	15.6	15.6	15.6	15.6	15.5	15.5	15.5	15.5	15.5	15.4	15.4	15.4
15	16.9	16.9	16.8	16.8	16.8	16.8	16.8	16.8	16.7	16.7	16.7	16.7	16.6	16.6	16.6	16.6	16.6	16.5	16.5	16.5
16	18.0	18.0	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.8	17.8	17.8	17.8	17.7	17.7	17.7	17.7	17.7	17.7	17.7
17	19.2	19.2	19.1	19.1	19.1	19.1	19.0	19.0	19.0	19.0	18.9	18.9	18.9	18.9	18.9	18.8	18.8	18.8	18.8	18.8
18	20.3	20.3	20.3	20.2	20.2	20.2	20.2	20.1	20.1	20.1	20.1	20.1	20.0	20.0	20.0	20.0	20.0	19.9	19.9	19.9
19	21.5	21.5	21.4	21.4	21.4	21.4	21.4	21.3	21.3	21.3	21.3	21.2	21.2	21.2	21.2	21.1	21.1	21.1	21.1	21.1
20	22.6	22.6	22.6	22.6	22.5	22.5	22.5	22.5	22.4	22.4	22.4	22.4	22.4	22.3	22.3	22.3	22.3	22.2	22.2	22.2
21	23.8	23.8	23.8	23.8	23.8	23.7	23.7	23.7	23.6	23.6	23.6	23.6	23.5	23.5	23.5	23.4	23.4	23.4	23.4	23.4
22	25.0	25.0	25.0	24.9	24.9	24.9	24.9	24.8	24.8	24.8	24.8	24.7	24.7	24.7	24.6	24.6	24.6	24.6	24.5	24.5
23	26.2	26.2	26.2	26.1	26.1	26.1	26.1	26.0	26.0	26.0	26.0	25.9	25.9	25.9	25.8	25.8	25.8	25.7	25.7	25.7
24	27.4	27.4	27.4	27.3	27.3	27.3	27.2	27.2	27.2	27.2	27.1	27.1	27.1	27.1	27.0	27.0	27.0	27.0	26.9	26.9
25	28.7	28.6	28.6	28.6	28.6	28.5	28.5	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.2	28.2	28.2	28.2	28.1	28.1
26	29.9	29.9	29.8	29.8	29.8	29.7	29.7	29.7	29.7	29.6	29.6	29.6	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.4
27	31.2	31.1	31.1	31.1	31.0	31.0	30.9	30.9	30.9	30.9	30.8	30.8	30.7	30.7	30.7	30.6	30.6	30.6	30.6	30.6
28	32.4	32.4	32.4	32.3	32.3	32.2	32.2	32.2	32.2	32.1	32.1	32.1	32.0	32.0	32.0	31.9	31.9	31.9	31.8	31.8
29	33.7	33.7	33.7	33.6	33.6	33.5	33.5	33.5	33.4	33.4	33.4	33.3	33.3	33.2	33.2	33.2	33.2	33.1	33.1	33.1
30	35.0	35.0	35.0	34.9	34.9	34.8	34.8	34.8	34.7	34.7	34.7	34.6	34.6	34.6	34.5	34.5	34.4	34.4	34.4	34.4

31	36.3	36.3	36.3	36.2	36.2	36.1	36.1	36.1	36.0	36.0	36.0	35.9	35.9	35.9	35.8	35.8	35.8	35.7	35.6	35.6
32	37.7	37.6	37.6	37.6	37.5	37.4	37.4	37.4	37.3	37.3	37.3	37.2	37.2	37.2	37.1	37.1	37.0	37.0	37.0	36.9
33	39.0	39.0	39.0	38.9	38.8	38.8	38.8	38.7	38.7	38.7	38.6	38.5	38.5	38.5	38.4	38.4	38.4	38.4	38.3	38.2
34	40.4	40.3	40.3	40.3	40.2	40.2	40.1	40.1	40.1	40.0	40.0	40.0	39.9	39.8	39.8	39.8	39.7	39.7	39.6	39.6
35	41.8	41.7	41.7	41.7	41.6	41.6	41.5	41.5	41.5	41.4	41.4	41.3	41.3	41.2	41.2	41.1	41.1	41.0	41.0	41.0
36	43.2	43.2	43.2	43.1	43.0	43.0	42.9	42.9	42.9	4.28	42.8	42.7	42.6	42.6	42.6	42.5	42.5	42.4	42.4	42.4
37	44.6	44.6	44.6	44.5	44.4	44.4	44.3	44.3	44.3	44.2	44.2	44.1	44.0	44.0	44.0	44.0	43.9	43.8	43.8	43.7
38	46.1	46.0	46.0	46.0	45.9	45.9	45.8	45.8	45.7	45.6	45.6	45.6	45.5	45.5	45.4	45.4	45.3	45.2	45.2	45.2
39	47.6	47.5	47.5	47.4	47.4	47.4	47.3	47.3	47.2	47.1	47.0	47.0	47.0	46.9	46.8	46.8	46.8	46.8	46.7	46.6
40	49.1	49.0	49.0	49.0	49.0	48.9	48.8	48.8	48.7	48.6	48.6	48.5	48.5	48.4	48.3	48.3	48.2	48.2	48.1	48.1
41	50.7	50.6	50.6	50.5	50.5	50.4	50.3	50.3	50.2	50.2	50.1	50.0	50.0	49.9	49.9	49.8	49.8	49.7	49.6	49.6
42	52.2	52.2	52.2	52.0	52.0	51.9	51.8	51.8	51.7	51.7	51.6	51.5	51.5	51.4	51.4	51.3	51.3	51.2	51.1	51.1
43	53.8	53.7	53.7	53.6	53.6	53.5	53.4	53.4	53.3	53.3	53.2	53.2	53.1	53.0	53.0	52.9	52.9	52.8	52.8	52.7
44	55.5	55.4	55.4	55.2	55.2	55.1	55.1	55.0	54.9	54.9	54.8	54.8	54.7	54.7	54.6	54.4	54.4	54.3	54.3	54.2

*For temperatures below -5° Celsius, use air temperature as virtual temperature, regardless of wet-bulb depression.

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
*-5	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-5.0	-5.0
-4	-3.7	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
-3	-2.7	-2.7	-2.7	-2.7	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9	-2.9	-2.9	-2.9	-2.9
-2	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.9	-1.9
-1	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8
0	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
1	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2
2	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3
3	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3
4	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4
5	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4
6	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5
7	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
8	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.6
9	9.9	9.9	9.9	9.9	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7
10	11.0	11.0	11.0	11.0	11.0	11.0	10.9	10.9	10.9	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
11	12.1	12.1	12.1	12.1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.9	11.9	11.9	11.8	11.8	11.8	11.8
12	13.2	13.2	13.2	13.2	13.1	13.1	13.1	13.1	13.1	13.1	13.0	13.0	13.0	13.0	13.0	13.0	12.9	12.9	12.9	12.9
13	14.3	14.3	14.3	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.1	14.1	14.1	14.1	14.1	14.1	14.0	14.0	14.0	14.0
14	15.4	15.4	15.4	15.4	15.3	15.3	15.3	15.3	15.3	15.2	15.2	15.2	15.2	15.2	15.2	15.1	15.1	15.1	15.1	15.1
15	16.5	16.5	16.5	16.4	16.4	16.4	16.4	16.4	16.4	16.3	16.3	16.3	16.3	16.3	16.2	16.2	16.2	16.2	16.2	16.2
16	17.6	17.6	17.6	17.6	17.6	17.5	17.5	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.3	17.3	17.3	17.3	17.3	17.3
17	18.8	18.7	18.7	18.7	18.7	18.6	18.6	18.6	18.6	18.6	18.6	18.5	18.5	18.5	18.5	18.4	18.4	18.4	18.4	18.4
18	19.9	19.9	19.9	19.8	19.8	19.8	19.8	19.8	19.7	19.7	19.7	19.7	19.6	19.6	19.6	19.6	19.6	19.5	19.5	19.5
19	21.0	21.0	21.0	21.0	21.0	21.0	20.9	20.9	20.9	20.9	20.8	20.8	20.8	20.8	20.7	20.7	20.7	20.7	20.7	20.6
20	22.2	22.2	22.2	22.1	22.1	22.1	22.1	22.0	22.0	22.0	22.0	22.0	21.9	21.9	21.9	21.9	21.8	21.8	21.8	21.8
21	23.4	23.3	23.3	23.3	23.3	23.2	23.2	23.2	23.2	23.2	23.1	23.1	23.1	23.1	23.0	23.0	23.0	23.0	23.0	22.9
22	24.5	24.5	24.5	24.4	24.4	24.4	24.4	24.4	24.3	24.3	24.3	24.3	24.2	24.2	24.2	24.1	24.1	24.1	24.1	24.1
23	25.7	25.7	25.6	25.6	25.6	25.6	25.5	25.5	25.5	25.5	25.4	25.4	25.4	25.4	25.3	25.3	25.3	25.2	25.2	25.2
24	26.9	26.9	26.9	26.8	26.8	26.8	26.8	26.7	26.7	26.6	26.6	26.6	26.6	26.6	26.5	26.5	26.5	26.4	26.4	26.4
25	28.1	28.1	28.0	28.0	28.0	28.0	27.9	27.9	27.9	27.8	27.8	27.8	27.7	27.7	27.7	27.6	27.6	27.6	27.6	27.6
26	29.3	29.3	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8
27	30.5	30.5	30.5	30.4	30.4	30.4	30.4	30.3	30.3	30.2	30.2	30.2	30.2	30.1	30.1	30.1	30.0	30.0	30.0	30.0
28	31.8	31.8	31.7	31.7	31.7	31.6	31.6	31.6	31.5	31.5	31.5	31.5	31.4	31.4	31.3	31.3	31.3	31.2	31.2	31.2
29	33.1	33.0	33.0	33.0	32.9	32.9	32.9	32.8	32.8	32.8	32.7	32.7	32.7	32.6	32.6	32.6	32.5	32.5	32.5	32.4
30	34.3	34.3	34.3	34.2	34.2	34.2	34.1	34.1	34.1	34.0	34.0	34.0	33.9	33.9	33.9	33.8	33.8	33.7	33.7	33.7

31	35.6	35.6	35.5	35.5	35.4	35.4	35.4	35.4	35.4	35.3	35.3	35.2	35.2	35.2	35.1	35.1	35.1	35.0	35.0	35.0
32	36.9	36.9	36.8	36.8	36.8	36.7	36.7	36.6	36.6	36.6	36.5	36.5	36.5	36.4	36.4	36.4	36.3	36.3	36.2	36.2
33	38.2	38.2	38.1	38.1	38.1	38.0	38.0	37.9	37.9	37.9	37.8	37.8	37.8	37.7	37.7	37.6	37.6	37.6	37.6	37.5
34	39.6	39.5	39.5	39.4	39.4	39.4	39.3	39.2	39.2	39.2	39.2	39.1	39.1	39.1	39.0	39.0	38.9	38.9	38.9	38.8
35	40.9	40.8	40.8	40.8	40.8	40.7	40.6	40.6	40.6	40.6	40.5	40.4	40.4	40.4	40.4	40.3	40.2	40.2	40.2	40.2
36	42.3	42.3	42.2	42.1	42.1	42.1	42.1	42.0	41.9	41.9	41.8	41.8	41.8	41.7	41.7	41.6	41.6	41.6	41.6	41.5
37	43.7	43.7	43.6	43.6	43.5	43.4	43.4	43.4	43.4	43.3	43.3	43.2	43.1	43.1	43.0	43.0	43.0	43.0	42.9	42.8
38	45.2	45.1	45.0	45.0	44.9	44.8	44.8	44.8	44.7	44.7	44.7	44.6	44.6	44.5	44.5	44.4	44.3	44.3	44.2	44.2
39	46.6	46.5	46.5	46.4	46.4	46.3	46.2	46.2	46.2	46.2	46.1	46.1	46.0	45.9	45.9	45.8	45.8	45.7	45.6	45.6
40	48.0	47.9	47.9	47.8	47.8	47.8	47.8	47.7	47.7	47.6	47.5	47.5	47.4	47.4	47.3	47.3	47.2	47.2	47.1	47.0
41	49.5	49.5	49.4	49.4	49.3	49.2	49.2	49.1	49.1	49.0	49.0	48.9	48.9	48.8	48.7	48.7	48.6	48.6	48.5	48.5
42	51.0	51.0	50.9	50.9	50.8	50.8	50.7	50.6	50.6	50.5	50.5	50.4	50.4	50.3	50.3	50.2	50.2	50.1	50.1	50.0
43	52.6	52.6	52.4	52.4	52.3	52.3	52.2	52.2	52.1	52.1	52.0	51.9	51.9	51.8	51.8	51.7	51.7	51.6	51.6	51.5
44	54.2	54.1	54.1	54.0	53.9	53.9	53.8	53.8	53.6	53.6	53.5	53.5	53.4	53.4	53.3	53.3	53.2	53.2	53.1	53.1

*For temperatures below -5° Celsius, use air temperature as virtual temperature, regardless of wet-bulb depression.
Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C	Wet-bulb depression, degrees Celsius																			
	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
-5	-5.0	-5.0																		
-4	-3.9	-4.0	-4.0	-4.0																
-3	-2.9	-2.9	-2.9	-2.9	-2.9	-3.0	-3.0													
-2	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-2.0	-2.0	-2.0										
-1	-0.8	-0.8	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-1.0									
0	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0				
1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0			
2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
3	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1
4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1
5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.2
6	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2
7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3
8	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3
9	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4
10	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5
11	11.8	11.8	11.8	11.8	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.5
12	12.9	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7	12.7	12.7	12.7	12.7	12.7	12.6	12.6	12.6	12.6
13	14.0	14.0	13.9	13.9	13.9	13.9	13.9	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.7	13.7	13.7	13.7	13.7	13.7
14	15.1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.9	14.9	14.9	14.9	14.8	14.8	14.8	14.8	14.8	14.8	14.8
15	16.2	16.2	16.1	16.1	16.1	16.1	16.1	16.0	16.0	16.0	16.0	16.0	16.0	16.0	15.9	15.9	15.9	15.9	15.9	15.8
16	17.3	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.1	17.1	17.1	17.1	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
17	18.4	18.4	18.3	18.3	18.3	18.3	18.3	18.3	18.2	18.2	18.2	18.2	18.2	18.2	18.1	18.1	18.1	18.1	18.1	18.0
18	19.5	19.5	19.5	19.4	19.4	19.4	19.4	19.4	19.4	19.3	19.3	19.3	19.3	19.2	19.2	19.2	19.2	19.2	19.2	19.1
19	20.6	20.6	20.6	20.6	20.5	20.5	20.5	20.5	20.5	20.4	20.4	20.4	20.4	20.4	20.4	20.3	20.3	20.3	20.3	20.3
20	21.8	21.8	21.7	21.7	21.7	21.7	21.6	21.6	21.6	21.6	21.6	21.5	21.5	21.5	21.5	21.5	21.4	21.4	21.4	21.4
21	22.9	22.9	22.9	22.8	22.8	22.8	22.8	22.8	22.7	22.7	22.7	22.7	22.6	22.6	22.6	22.6	22.6	22.6	22.5	22.5
22	24.0	24.0	24.0	24.0	24.0	23.9	23.9	23.9	23.9	23.8	23.8	23.8	23.8	23.8	23.8	23.7	23.7	23.7	23.7	23.6
23	25.2	25.2	25.2	25.2	25.1	25.1	25.1	25.1	25.0	25.0	25.0	25.0	24.9	24.9	24.9	24.9	24.9	24.8	24.8	24.8
24	26.4	26.4	26.3	26.3	26.3	26.3	26.2	26.2	26.2	26.2	26.1	26.1	26.1	26.1	26.1	26.0	26.0	26.0	26.0	25.9
25	27.6	27.5	27.5	27.5	27.4	27.4	27.4	27.4	27.3	27.3	27.3	27.3	27.2	27.2	27.2	27.2	27.2	27.2	27.1	27.1
26	28.8	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.3
27	29.9	29.9	29.9	29.9	29.9	29.8	29.8	29.8	29.7	29.7	29.7	29.7	29.6	29.6	29.6	29.6	29.5	29.5	29.5	29.4
28	31.2	31.2	31.1	31.1	31.1	31.1	31.0	31.0	31.0	30.9	30.9	30.9	30.8	30.8	30.8	30.8	30.7	30.7	30.7	30.7
29	32.4	32.4	32.4	32.4	32.3	32.3	32.3	32.2	32.2	32.2	32.1	32.1	32.1	32.0	32.0	32.0	31.9	31.9	31.9	31.9
30	33.7	33.6	33.6	33.6	33.5	33.5	33.5	33.5	33.4	33.4	33.4	33.3	33.3	33.3	33.2	33.2	33.2	33.1	33.1	33.1

31	34.9	34.9	34.8	34.8	34.8	34.7	34.7	34.7	34.7	34.6	34.6	34.6	34.5	34.5	34.5	34.4	34.4	34.4	34.4	34.3
32	36.2	36.1	36.1	36.1	36.1	36.0	36.0	36.0	35.9	35.9	35.9	35.8	35.8	35.7	35.7	35.7	35.6	35.6	35.6	35.6
33	37.4	37.4	37.4	37.4	37.3	37.3	37.3	37.2	37.2	37.2	37.1	37.1	37.0	37.0	37.0	37.0	36.9	36.9	36.8	36.8
34	38.8	38.7	38.7	38.7	38.6	38.6	38.5	38.5	38.5	38.5	38.4	38.4	38.4	38.3	38.3	38.2	38.2	38.2	38.2	38.1
35	40.1	40.1	40.0	40.0	40.0	39.9	39.9	39.8	39.8	39.8	39.7	39.7	39.6	39.6	39.6	39.6	39.5	39.5	39.4	39.4
36	41.4	41.4	41.3	41.3	41.3	41.3	41.2	41.2	41.1	41.0	41.0	41.0	41.0	40.9	40.9	40.8	4.08	40.8	40.7	40.7
37	42.8	42.7	42.7	42.7	42.7	42.6	42.6	42.5	42.5	42.4	42.4	42.4	42.3	42.3	42.2	42.2	42.1	42.1	42.0	42.0
38	44.2	44.2	44.1	44.1	44.0	44.0	43.9	43.8	43.8	43.8	43.8	43.7	43.7	43.6	43.6	43.5	43.5	43.4	43.4	43.4
39	45.6	45.5	45.5	45.5	45.4	45.4	45.3	45.3	45.2	45.2	45.1	45.1	45.0	45.0	44.9	44.9	44.8	44.8	44.8	44.8
40	47.0	46.9	46.9	46.8	46.8	46.8	46.8	46.7	46.7	46.6	46.6	46.5	46.5	46.4	46.4	46.3	46.3	46.2	46.2	46.1
41	48.4	48.4	48.3	48.3	48.2	48.2	48.2	48.2	48.1	48.1	48.0	48.0	47.9	47.9	47.8	47.8	47.7	47.7	47.6	47.6
42	50.0	49.9	49.8	49.8	49.7	49.7	49.6	49.6	49.5	49.5	49.4	49.4	49.3	49.3	49.2	49.2	49.1	49.1	49.0	49.0
43	51.5	51.4	51.4	51.2	51.2	51.1	51.1	51.0	51.0	50.9	50.9	50.8	50.8	50.7	50.7	50.6	50.6	50.5	50.5	50.4
44	53.0	53.0	52.8	52.8	52.7	52.7	52.6	52.6	52.5	52.5	52.4	52.4	52.3	52.3	52.2	52.2	52.0	52.0	51.9	51.9

*For temperatures below -5° Celsius, use air temperature as virtual temperature, regardless of wet-bulb depression.
Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
2	2.0	2.0																		
3	3.1	3.1	3.1	3.1	3.0	3.0														
4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.0											
5	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0	5.0							
6	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.0					
7	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.0	
8	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
9	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
10	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.2	10.2	10.2	10.2
11	11.5	11.5	11.5	11.5	11.5	11.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.3	11.3
12	12.6	12.6	12.6	12.6	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.3	12.3
13	13.7	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.4	13.4	13.4	13.4
14	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.5	14.5	14.5	14.5	14.5
15	15.8	15.8	15.8	15.8	15.8	15.8	15.7	15.7	15.7	15.7	15.7	15.7	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.5
16	16.9	16.9	16.9	16.9	16.9	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.7	16.7	16.7	16.7	16.7	16.6	16.6	16.6
17	18.0	18.0	18.0	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.8	17.8	17.8	17.8	17.8	17.8	17.7	17.7	17.7
18	19.1	19.1	19.1	19.1	19.1	19.0	19.0	19.0	19.0	19.0	19.0	18.9	18.9	18.9	18.9	18.9	18.9	18.8	18.8	18.8
19	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.1	20.1	20.1	20.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.9
20	21.4	21.4	21.3	21.3	21.3	21.3	21.2	21.2	21.2	21.2	21.2	21.2	21.1	21.1	21.1	21.1	21.1	21.0	21.0	21.0
21	22.5	22.5	22.4	22.4	22.4	22.4	22.4	22.4	22.3	22.3	22.3	22.3	22.2	22.2	22.2	22.2	22.2	22.2	22.1	22.1
22	23.6	23.6	23.6	23.6	23.5	23.5	23.5	23.5	23.4	23.4	23.4	23.4	23.4	23.4	23.3	23.3	23.3	23.3	23.3	23.2
23	24.8	24.7	24.7	24.7	24.7	24.7	24.6	24.6	24.6	24.6	24.6	24.6	24.5	24.5	24.5	24.4	24.4	24.4	24.4	24.4
24	25.9	25.9	25.9	25.9	25.8	25.8	25.8	25.8	25.7	25.7	25.7	25.7	25.6	25.6	25.6	25.6	25.6	25.6	25.5	25.5
25	27.1	27.0	27.0	27.0	27.0	27.0	26.9	26.9	26.9	26.9	26.8	26.8	26.8	26.8	26.8	26.7	26.7	26.7	26.7	26.6
26	28.3	28.2	28.2	28.2	28.2	28.1	28.1	28.1	28.1	28.0	28.0	28.0	28.0	28.0	27.9	27.9	27.9	27.8	27.8	27.8
27	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0
28	30.6	30.6	30.6	30.6	30.5	30.5	30.5	30.4	30.4	30.4	30.4	30.4	30.3	30.3	30.3	30.3	30.2	30.2	30.2	30.1
29	31.8	31.8	31.8	31.7	31.7	31.7	31.7	31.6	31.6	31.6	31.6	31.6	31.5	31.5	31.4	31.4	31.4	31.4	31.4	31.3
30	33.1	33.0	33.0	33.0	33.0	32.9	32.9	32.9	32.8	32.8	32.8	32.8	32.7	32.7	32.7	32.6	32.6	32.6	32.6	32.5

31	34.3	34.3	34.2	34.2	34.2	34.2	34.1	34.1	34.0	34.0	34.0	33.9	33.9	33.9	33.9	33.8	33.8	33.8	33.8	33.7
32	35.5	35.5	35.5	35.5	35.4	35.4	35.4	35.3	35.3	35.2	35.2	35.2	35.2	35.1	35.1	35.1	35.1	35.0	35.0	35.0
33	36.8	36.7	36.7	36.7	36.7	36.6	36.6	36.6	36.6	36.5	36.4	36.4	36.4	36.4	36.3	36.3	36.2	36.2	36.2	36.2
34	38.0	38.0	38.0	38.0	37.9	37.9	37.8	37.8	37.8	37.8	37.7	37.7	37.6	37.6	37.6	37.6	37.5	37.5	37.5	37.5
35	39.4	39.4	39.3	39.3	39.2	39.1	39.1	39.1	39.1	39.0	39.0	38.9	38.9	38.9	38.9	38.8	38.8	38.7	38.7	38.7
36	40.6	40.6	40.6	40.6	40.5	40.5	40.4	40.4	40.3	40.3	40.3	40.3	40.2	40.2	40.1	40.1	40.0	40.0	40.0	40.0
37	42.0	42.0	41.9	41.9	41.8	41.8	41.7	41.7	41.7	41.7	41.6	41.6	41.5	41.5	41.4	41.4	41.4	41.4	41.3	41.3
38	43.4	43.3	43.3	43.2	43.2	43.1	43.1	43.0	43.0	43.0	43.0	42.9	42.9	42.8	42.8	42.7	42.7	42.6	42.6	42.6
39	44.7	44.7	44.6	44.6	44.5	44.5	44.4	44.4	44.3	44.3	44.2	44.2	44.2	44.2	44.1	44.1	44.0	44.0	43.9	43.9
40	46.1	46.0	46.0	45.9	45.9	45.8	45.8	45.8	45.8	45.7	45.7	45.6	45.6	45.5	45.5	45.4	45.4	45.4	45.3	45.3
41	47.5	47.5	47.4	47.4	47.3	47.3	47.2	47.2	47.1	47.1	47.0	47.0	46.9	46.9	46.8	46.8	46.8	46.7	46.7	46.6
42	48.9	48.9	48.9	48.8	48.8	48.7	48.7	48.6	48.6	48.5	48.5	48.4	48.4	48.2	48.2	48.2	48.2	48.2	48.0	48.0
43	50.4	50.3	50.3	50.2	50.2	50.2	50.0	50.0	49.9	49.9	49.8	49.8	49.7	49.7	49.6	49.6	49.6	49.5	49.5	49.4
44	51.8	51.8	51.7	51.7	51.6	51.6	51.6	51.5	51.5	51.4	51.4	51.2	51.2	51.1	51.1	51.1	51.0	51.0	50.9	50.9

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
8	8.1	8.1	8.1	8.0																
9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.0											
10	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.0							
11	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.0		
12	12.3	12.3	12.3	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.0
13	13.4	13.4	13.4	13.3	13.3	13.3	13.3	13.3	13.3	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.1
14	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.2	14.2	14.2	14.2	14.2
15	15.5	15.5	15.5	15.5	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.3	15.3	15.3	15.3	15.3	15.3	15.2
16	16.6	16.6	16.6	16.6	16.6	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.4	16.4	16.4	16.4	16.4	16.3	16.3	16.3
17	17.7	17.7	17.7	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.4	17.4	17.4
18	18.8	18.8	18.8	18.7	18.7	18.7	18.7	18.7	18.6	18.6	18.6	18.6	18.6	18.6	18.5	18.5	18.5	18.5	18.5	18.5
19	19.9	19.9	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.7	19.7	19.7	19.7	19.7	19.6	19.6	19.6	19.6	19.6
20	21.0	21.0	21.0	20.9	20.9	20.9	20.9	20.9	20.8	20.8	20.8	20.8	20.8	20.8	20.7	20.7	20.7	20.7	20.7	20.7
21	22.1	22.1	22.1	22.0	22.0	22.0	22.0	22.0	22.0	21.9	21.9	21.9	21.9	21.9	21.8	21.8	21.8	21.8	21.8	21.8
22	23.2	23.2	23.2	23.2	23.2	23.1	23.1	23.1	23.1	23.0	23.0	23.0	23.0	23.0	23.0	22.9	22.9	22.9	22.9	22.9
23	24.4	24.3	24.3	24.3	24.3	24.3	24.2	24.2	24.2	24.2	24.2	24.1	24.1	24.1	24.1	24.0	24.0	24.0	24.0	24.0
24	25.5	25.5	25.4	25.4	25.4	25.4	25.4	25.3	25.3	25.3	25.3	25.3	25.2	25.2	25.2	25.2	25.2	25.1	25.1	25.1
25	26.6	26.6	26.6	26.6	26.5	26.5	26.5	26.5	26.5	26.4	26.4	26.4	26.4	26.3	26.3	26.3	26.3	26.2	26.2	26.2
26	27.8	27.8	27.7	27.7	27.7	27.7	27.6	27.6	27.6	27.6	27.6	27.5	27.5	27.5	27.4	27.4	27.4	27.4	27.4	27.4
27	29.0	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5
28	30.1	30.1	30.1	30.0	30.0	30.0	30.0	30.0	29.9	29.9	29.9	29.9	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7
29	31.3	31.3	31.3	31.2	31.2	31.2	31.2	31.1	31.1	31.1	31.0	31.0	31.0	31.0	30.9	30.9	30.9	30.8	30.8	30.8
30	32.5	32.5	32.5	32.4	32.4	32.4	32.4	32.3	32.3	32.3	32.2	32.2	32.2	32.2	32.1	32.1	32.1	32.0	32.0	32.0
31	33.7	33.7	33.7	33.6	33.6	33.6	33.6	33.5	33.5	33.5	33.4	33.4	33.4	33.4	33.3	33.3	33.2	33.2	33.2	33.2
32	34.9	34.9	34.8	34.8	34.8	34.8	34.7	34.7	34.7	34.7	34.6	34.6	34.6	34.6	34.5	34.5	34.4	34.4	34.4	34.4
33	36.1	36.1	36.1	36.1	36.0	36.0	36.0	36.0	35.9	35.9	35.8	35.8	35.8	35.7	35.7	35.6	35.6	35.6	35.6	35.6
34	37.4	37.4	37.3	37.3	37.3	37.3	37.2	37.2	37.1	37.1	37.1	37.1	37.0	37.0	36.9	36.9	36.9	36.8	36.8	36.8
35	38.7	38.6	38.6	38.5	38.5	38.5	38.5	38.4	38.4	38.3	38.3	38.3	38.3	38.2	38.2	38.1	38.1	38.1	38.1	38.1
36	39.9	39.9	39.8	39.8	39.8	39.8	39.8	39.7	39.7	39.6	39.6	39.5	39.5	39.5	39.5	39.4	39.4	39.3	39.3	39.3
37	41.2	41.2	41.1	41.1	41.0	41.0	41.0	41.0	40.9	40.9	40.9	40.8	40.8	40.8	40.7	40.7	40.6	40.6	40.6	40.6
38	42.6	42.5	42.5	42.5	42.4	42.4	42.3	42.3	42.2	42.2	42.1	42.1	42.1	42.1	42.0	42.0	41.9	41.9	41.8	41.8
39	43.9	43.8	43.8	43.7	43.7	43.6	43.6	43.6	43.5	43.5	43.5	43.4	43.4	43.3	43.3	43.2	43.2	43.1	43.1	43.1
40	45.2	45.2	45.1	45.1	45.0	44.9	44.9	44.9	44.8	44.8	44.8	44.8	44.7	44.7	44.6	44.6	44.5	44.5	44.5	44.5
41	46.6	46.5	46.5	46.4	46.4	46.4	46.3	46.3	46.2	46.2	46.1	46.1	46.0	46.0	45.9	45.9	45.8	45.8	45.8	45.8
42	47.9	47.9	47.8	47.8	47.8	47.7	47.7	47.6	47.5	47.5	47.5	47.4	47.4	47.4	47.3	47.2	47.2	47.2	47.1	47.1
43	49.4	49.3	49.3	49.3	49.2	49.2	49.1	49.1	49.0	49.0	49.0	48.9	48.9	48.8	48.8	48.6	48.6	48.5	48.5	48.5
44	50.8	50.8	50.7	50.7	50.7	50.5	50.5	50.4	50.4	50.4	50.3	50.3	50.2	50.2	50.1	50.1	50.0	50.0	49.8	49.8

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C	Wet-bulb depression, degrees Celsius																			
	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9
13	13.1	13.1	13.1	13.1	13.1	13.0														
14	14.2	14.2	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.0										
15	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.1	15.1	15.1	15.1	15.0							
16	16.3	16.3	16.3	16.3	16.3	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.1	16.1	16.1	16.1	16.0			
17	17.4	17.4	17.4	17.4	17.3	17.3	17.3	17.3	17.3	17.3	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.1	17.1	17.1
18	18.5	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.3	18.3	18.3	18.3	18.3	18.3	18.2	18.2	18.2	18.2	18.2
19	19.6	19.6	19.5	19.5	19.5	19.5	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.3	19.3	19.3	19.3	19.3	19.2
20	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.5	20.5	20.5	20.5	20.5	20.4	20.4	20.4	20.4	20.4	20.4	20.3	20.3
21	21.7	21.7	21.7	21.7	21.7	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.5	21.5	21.5	21.5	21.5	21.4	21.4	21.4
22	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.7	22.7	22.7	22.7	22.7	22.6	22.6	22.6	22.6	22.6	22.5	22.5	22.5
23	24.0	23.9	23.9	23.9	23.9	23.9	23.8	23.8	23.8	23.8	23.8	23.8	23.7	23.7	23.7	23.7	23.7	23.6	23.6	23.6
24	25.1	25.1	25.0	25.0	25.0	25.0	24.9	24.9	24.9	24.9	24.9	24.9	24.8	24.8	24.8	24.8	24.8	24.8	24.7	24.7
25	26.2	26.2	26.2	26.1	26.1	26.1	26.1	26.1	26.1	26.0	26.0	26.0	26.0	26.0	25.9	25.9	25.9	25.9	25.8	25.8
26	27.4	27.3	27.3	27.3	27.2	27.2	27.2	27.2	27.2	27.2	27.1	27.1	27.1	27.0	27.0	27.0	27.0	27.0	27.0	26.9
27	28.5	28.4	28.4	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.3	28.2	28.2	28.2	28.2	28.2	28.2	28.1	28.1	28.1
28	29.6	29.6	29.6	29.6	29.6	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.2	29.2	29.2
29	30.8	30.8	30.8	30.8	30.7	30.7	30.6	30.6	30.6	30.6	30.6	30.6	30.5	30.5	30.5	30.5	30.4	30.4	30.4	30.4
30	32.0	32.0	31.9	31.9	31.9	31.9	31.8	31.8	31.8	31.8	31.8	31.7	31.7	31.7	31.7	31.6	31.6	31.6	31.6	31.5
31	33.1	33.1	33.1	33.1	33.1	33.0	33.0	33.0	33.0	32.9	32.9	32.9	32.9	32.8	32.8	32.8	32.8	32.7	32.7	32.7
32	34.4	34.3	34.3	34.3	34.3	34.2	34.2	34.2	34.2	34.1	34.1	34.1	34.1	34.0	34.0	34.0	34.0	33.9	33.9	33.9
33	35.5	35.5	35.5	35.5	35.5	35.4	35.4	35.4	35.4	35.3	35.3	35.2	35.2	35.2	35.2	35.1	35.1	35.1	35.0	35.0
34	36.8	36.8	36.8	36.7	36.7	36.6	36.6	36.6	36.6	36.5	36.5	36.5	36.4	36.4	36.4	36.3	36.3	36.2	36.2	36.2
35	38.0	38.0	38.0	37.9	37.9	37.9	37.9	37.8	37.8	37.7	37.7	37.6	37.6	37.6	37.6	37.5	37.5	37.5	37.4	37.4
36	39.2	39.2	39.2	39.2	39.2	39.1	39.1	39.0	39.0	39.0	39.0	38.9	38.9	38.9	38.8	38.8	38.7	38.7	38.7	38.7
37	40.5	40.5	40.4	40.4	40.4	40.4	40.4	40.3	40.3	40.2	40.2	40.1	40.1	40.1	40.1	40.0	40.0	39.9	39.9	39.9
38	41.8	41.7	41.7	41.7	41.6	41.6	41.6	41.6	41.6	41.5	41.5	41.4	41.4	41.3	41.3	41.3	41.2	41.2	41.2	41.2
39	43.1	43.0	43.0	43.0	43.0	43.0	42.9	42.9	42.8	42.8	42.7	42.7	42.7	42.6	42.6	42.6	42.5	42.5	42.5	42.4
40	44.4	44.4	44.4	44.3	44.3	44.2	44.2	44.1	44.1	44.0	44.0	44.0	43.9	43.9	43.9	43.8	43.8	43.7	43.7	43.6
41	45.7	45.7	45.6	45.6	45.5	45.5	45.5	45.4	45.4	45.4	45.4	45.3	45.3	45.3	45.2	45.2	45.1	45.1	45.1	45.0
42	47.1	47.0	47.0	46.9	46.9	46.9	46.8	46.8	46.7	46.7	46.7	46.6	46.6	46.6	46.5	46.5	46.4	46.4	46.4	46.3
43	48.4	48.4	48.4	48.3	48.3	48.2	48.2	48.2	48.1	48.1	48.0	48.0	48.0	47.9	47.9	47.8	47.8	47.7	47.7	47.7
44	49.8	49.8	49.7	49.7	49.6	49.6	49.6	49.5	49.5	49.4	49.4	49.3	49.3	49.3	49.2	49.2	49.0	49.0	49.0	49.0

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C	Wet-bulb depression, degrees Celsius																			
	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9
18	18.2	18.2	18.1	18.1	18.1															
19	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.1											
20	20.3	20.3	20.3	20.3	20.3	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.1	20.1						
21	21.4	21.4	21.4	21.4	21.3	21.3	21.3	21.3	21.3	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.1	21.1		
22	22.5	22.5	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.3	22.3	22.3	22.3	22.3	22.2	22.2	22.2	22.2	22.2
23	23.6	23.6	23.6	23.6	23.5	23.5	23.5	23.5	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.3	23.3	23.3	23.3
24	24.7	24.7	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.5	24.5	24.5	24.5	24.4	24.4	24.4	24.4	24.4	24.4
25	25.8	25.8	25.8	25.8	25.7	25.7	25.7	25.7	25.7	25.7	25.6	25.6	25.6	25.6	25.6	25.6	25.5	25.5	25.5	25.5
26	26.9	26.9	26.8	26.8	26.8	26.8	26.7	26.7	26.7	26.7	26.7	26.7	26.6	26.6	26.6	26.6	26.6	26.6	26.5	26.5
27	28.1	28.0	28.0	28.0	28.0	28.0	28.0	27.9	27.9	27.9	27.9	27.8	27.8	27.8	27.8	27.8	27.8	27.7	27.7	27.7
28	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8
29	30.3	30.3	30.3	30.3	30.3	30.2	30.2	30.2	30.2	30.1	30.1	30.1	30.1	30.0	30.0	30.0	30.0	30.0	29.9	29.9
30	31.5	31.5	31.5	31.4	31.4	31.4	31.4	31.4	31.3	31.3	31.3	31.3	31.2	31.2	31.2	31.2	31.1	31.1	31.0	31.0
31	32.7	32.7	32.6	32.6	32.6	32.6	32.5	32.5	32.5	32.4	32.4	32.4	32.4	32.3	32.3	32.3	32.3	32.3	32.2	32.2
32	33.8	33.8	33.8	33.8	33.8	33.7	33.7	33.6	33.6	33.6	33.6	33.6	33.5	33.5	33.5	33.5	33.4	33.4	33.4	33.4
33	35.0	35.0	34.9	34.9	34.9	34.9	34.9	34.8	34.8	34.8	34.8	34.8	34.7	34.7	34.7	34.6	34.6	34.6	34.6	34.6
34	36.2	36.2	36.2	36.1	36.1	36.0	36.0	36.0	36.0	36.0	35.9	35.9	35.9	35.9	35.9	35.8	35.8	35.8	35.7	35.7
35	37.4	37.4	37.4	37.3	37.3	37.3	37.2	37.2	37.2	37.2	37.2	37.1	37.1	37.0	37.0	37.0	37.0	37.0	36.9	36.9
36	38.7	38.6	38.6	38.5	38.5	38.5	38.4	38.4	38.4	38.4	38.4	38.3	38.3	38.2	38.2	38.2	38.2	38.2	38.1	38.1
37	39.9	39.8	39.8	39.8	39.8	39.8	39.7	39.7	39.6	39.6	39.6	39.5	39.5	39.5	39.4	39.4	39.4	39.4	39.4	39.3
38	41.2	41.1	41.1	41.0	41.0	41.0	40.9	40.9	40.8	40.8	40.8	40.8	40.8	40.7	40.7	40.7	40.6	40.6	40.5	40.5
39	42.4	42.4	42.4	42.4	42.3	42.3	42.2	42.2	42.1	42.1	42.1	42.0	42.0	41.9	41.9	41.9	41.8	41.8	41.8	41.8
40	43.6	43.6	43.6	43.6	43.6	43.6	43.5	43.5	43.4	43.4	43.3	43.3	43.3	43.2	43.2	43.2	43.1	43.1	43.1	43.0
41	45.0	45.0	44.9	44.9	44.9	44.8	44.8	44.8	44.7	44.7	44.6	44.6	44.6	44.5	44.5	44.5	44.4	44.4	44.4	44.3
42	46.3	46.3	46.2	46.2	46.1	46.1	46.1	46.0	46.0	46.0	45.9	45.9	45.8	45.8	45.7	45.7	45.7	45.7	45.6	45.6
43	47.7	47.6	47.6	47.6	47.4	47.4	47.3	47.3	47.3	47.2	47.2	47.2	47.1	47.1	47.1	47.0	47.0	47.0	46.9	46.9
44	48.9	48.9	48.9	48.8	48.8	48.8	48.7	48.7	48.6	48.6	48.6	48.5	48.5	48.5	48.4	48.4	48.4	48.2	48.2	48.2

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9
22	22.2	22.2	22.2																	
23	23.3	23.3	23.2	23.2	23.2	23.2	23.2	23.2												
24	24.3	24.3	24.3	24.3	24.3	24.3	24.2	24.2	24.2	24.2										
25	25.4	25.4	25.4	25.4	25.4	25.4	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.2	25.2	25.2	25.2			
26	26.5	26.5	26.5	26.5	26.5	26.5	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.3	26.3	26.3	26.3	26.3	26.2	26.2
27	27.7	27.7	27.6	27.6	27.6	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.4	27.4	27.4	27.4	27.3	27.3
28	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.4	28.4	28.4
29	29.9	29.9	29.9	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7	29.6	29.6	29.6	29.6	29.5	29.5
30	31.0	31.0	31.0	31.0	31.0	31.0	30.9	30.9	30.9	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.7	30.7	30.7	30.6
31	32.2	32.2	32.2	32.1	32.1	32.1	32.1	32.1	32.0	32.0	32.0	32.0	32.0	31.9	31.9	31.8	31.8	31.8	31.8	31.8
32	33.4	33.3	33.3	33.3	33.2	33.2	33.2	33.2	33.2	33.1	33.1	33.1	33.1	33.0	33.0	33.0	33.0	33.0	33.0	32.9
33	34.5	34.5	34.4	34.4	34.4	34.4	34.4	34.3	34.3	34.3	34.3	34.3	34.2	34.2	34.2	34.1	34.1	34.1	34.1	34.1
34	35.7	35.7	35.7	35.6	35.6	35.5	35.5	35.5	35.5	35.5	35.5	35.4	35.4	35.3	35.3	35.3	35.3	35.3	35.3	35.2
35	36.9	36.8	36.8	36.8	36.8	36.8	36.7	36.7	36.7	36.6	36.6	36.6	36.6	36.5	36.5	36.5	36.5	36.4	36.4	36.4
36	38.1	38.0	38.0	38.0	38.0	38.0	37.9	37.9	37.9	37.8	37.8	37.8	37.7	37.7	37.7	37.7	37.7	37.6	37.6	37.6
37	39.3	39.3	39.2	39.2	39.1	39.1	39.1	39.1	39.1	39.1	39.0	39.0	38.9	38.9	38.9	38.8	38.8	38.8	38.8	38.8
38	40.5	40.5	40.4	40.4	40.4	40.4	40.4	40.3	40.3	40.3	40.2	40.2	40.2	40.1	40.1	40.1	40.0	40.0	40.0	40.0
39	41.8	41.8	41.7	41.7	41.6	41.6	41.6	41.5	41.5	41.5	41.4	41.4	41.4	41.3	41.3	41.3	41.2	41.2	41.2	41.2
40	43.0	42.9	42.9	42.9	42.8	42.8	42.8	42.7	42.7	42.7	42.6	42.6	42.6	42.6	42.6	42.6	42.5	42.5	42.5	42.4
41	44.3	44.2	44.2	44.2	44.1	44.1	44.1	44.0	44.0	44.0	43.9	43.9	43.9	43.8	43.8	43.8	43.7	43.7	43.7	43.6
42	45.6	45.5	45.5	45.5	45.4	45.4	45.4	45.3	45.3	45.3	45.2	45.2	45.2	45.1	45.1	45.1	45.0	45.0	45.0	44.9
43	46.8	46.8	46.8	46.7	46.7	46.7	46.6	46.6	46.6	46.5	46.5	46.5	46.4	46.4	46.4	46.3	46.3	46.3	46.2	46.2
44	48.1	48.1	48.1	48.0	48.0	48.0	47.9	47.9	47.9	47.8	47.8	47.8	47.7	47.7	47.7	47.6	47.6	47.6	47.4	47.4

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9
26	26.2	26.2																		
27	27.3	27.3	27.2	27.2	27.2	27.2	27.2													
28	28.4	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.3	28.3	28.2	28.2	28.2							
29	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2			
30	30.6	30.6	30.6	30.6	30.6	30.6	30.5	30.5	30.5	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.3	30.3	30.2
31	31.8	31.8	31.8	31.7	31.7	31.6	31.6	31.6	31.6	31.6	31.6	31.5	31.5	31.5	31.5	31.5	31.4	31.4	31.4	31.4
32	32.9	32.8	32.8	32.8	32.8	32.8	32.8	32.7	32.7	32.7	32.7	32.7	32.6	32.6	32.6	32.6	32.6	32.6	32.5	32.5
33	34.0	34.0	34.0	34.0	34.0	34.0	33.9	33.9	33.9	33.8	33.8	33.8	33.8	33.8	33.7	33.7	33.7	33.7	33.7	33.7
34	35.2	35.2	35.2	35.2	35.1	35.1	35.1	35.0	35.0	35.0	35.0	35.0	34.9	34.9	34.9	34.8	34.8	34.8	34.8	34.8
35	36.4	36.4	36.3	36.3	36.3	36.2	36.2	36.2	36.2	36.2	36.2	36.1	36.1	36.1	36.0	36.0	36.0	36.0	36.0	36.0
36	37.5	37.5	37.5	37.4	37.4	37.4	37.4	37.4	37.4	37.3	37.3	37.3	37.2	37.2	37.2	37.2	37.2	37.2	37.1	37.1
37	38.8	38.7	38.7	38.7	38.6	38.6	38.6	38.5	38.5	38.5	38.4	38.4	38.4	38.4	38.4	38.4	38.3	38.3	38.3	38.2
38	40.0	39.9	39.9	39.9	39.8	39.8	39.8	39.7	39.7	39.7	39.6	39.6	39.6	39.5	39.5	39.5	39.5	39.5	39.5	39.5
39	41.2	41.2	41.1	41.1	41.1	41.0	41.0	41.0	40.9	40.9	40.9	40.8	40.8	40.8	40.7	40.7	40.7	40.6	40.6	40.6
40	42.4	42.4	42.3	42.3	42.3	42.2	42.2	42.2	42.1	42.1	42.1	42.0	42.0	42.0	41.9	41.9	41.9	41.8	41.8	41.8
41	43.6	43.6	43.5	43.5	43.4	43.4	43.4	43.4	43.3	43.3	43.3	43.2	43.2	43.2	43.2	43.1	43.1	43.1	43.0	43.0
42	44.9	44.9	44.8	44.8	44.8	44.7	44.7	44.7	44.6	44.6	44.6	44.5	44.5	44.5	44.5	44.4	44.4	44.4	44.3	44.3
43	46.2	46.0	46.0	46.0	46.0	45.9	45.9	45.9	45.8	45.8	45.8	45.7	45.7	45.7	45.6	45.6	45.6	45.6	45.5	45.5
44	47.4	47.3	47.3	47.3	47.2	47.2	47.2	47.2	47.1	47.1	47.1	47.0	47.0	47.0	46.9	46.9	46.9	46.8	46.8	46.8

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9
30	30.2	30.2																		
31	31.4	31.4	31.3	31.3	31.3	31.3	31.3													
32	32.5	32.4	32.4	32.4	32.4	32.4	32.4	32.3	32.3	32.3	32.3	32.3	32.3							
33	33.6	33.6	33.6	33.5	33.5	33.5	33.5	33.5	33.4	33.4	33.4	33.4	33.4	33.4	33.3	33.3	33.3			
34	34.8	34.7	34.7	34.7	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.5	34.5	34.5	34.5	34.4	34.4	34.4	34.4
35	35.9	35.9	35.9	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.7	35.7	35.7	35.6	35.6	35.6	35.5	35.5	35.5	35.5
36	37.1	37.0	37.0	37.0	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.8	36.8	36.8	36.7	36.7	36.7	36.7	36.6	36.6
37	38.2	38.2	38.2	38.2	38.2	38.1	38.1	38.1	38.0	38.0	38.0	37.9	37.9	37.9	37.9	37.8	37.8	37.8	37.8	37.8
38	39.4	39.4	39.4	39.3	39.3	39.3	39.2	39.2	39.2	39.1	39.1	39.1	39.1	39.1	39.1	39.1	39.0	39.0	39.0	38.9
39	40.6	40.6	40.6	40.5	40.5	40.5	40.5	40.4	40.4	40.4	40.4	40.3	40.3	40.3	40.2	40.2	40.2	40.2	40.1	40.1
40	41.8	41.7	41.7	41.7	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.5	41.5	41.5	41.5	41.4	41.4	41.4	41.3	41.3
41	43.0	42.9	42.9	42.9	42.8	42.8	42.8	42.7	42.7	42.7	42.7	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.4
42	44.3	44.2	44.2	44.2	44.2	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	43.8	43.8	43.8	43.7	43.7	43.7	43.6
43	45.5	45.4	45.4	45.4	45.4	45.3	45.3	45.3	45.2	45.2	45.2	45.2	45.2	45.1	45.1	45.1	45.0	45.0	45.0	44.8
44	46.8	46.6	46.6	46.6	46.5	46.5	46.5	46.5	46.4	46.4	46.4	46.4	46.4	46.3	46.3	46.3	46.2	46.2	46.2	46.1

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C.	Wet-bulb depression, degrees Celsius																			
	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9
34	34.3	34.3	34.3																	
35	35.5	35.4	35.4	35.4	35.4	35.3	35.3	35.3												
36	36.6	36.6	36.6	36.5	36.5	36.5	36.4	36.4	36.4	36.4										
37	37.8	37.7	37.7	37.7	37.7	37.6	37.6	37.6	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.4	37.4	37.4	37.4	37.4
38	38.9	38.9	38.9	38.8	38.8	38.8	38.7	38.7	38.7	38.7	38.6	38.6	38.6	38.6	38.6	38.6	38.6	38.5	38.5	38.5
39	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.9	39.9	39.9	39.9	39.8	39.8	39.8	39.7	39.7	39.7	39.7	39.6	39.6
40	41.3	41.2	41.2	41.2	41.1	41.1	41.1	41.1	41.0	41.0	41.0	41.0	40.9	40.9	40.9	40.9	40.8	40.8	40.8	40.7
41	42.4	42.4	42.4	42.4	42.4	42.3	42.3	42.3	42.3	42.2	42.2	42.2	42.2	42.1	42.1	42.1	42.0	42.0	42.0	42.0
42	43.6	43.6	43.5	43.5	43.5	43.5	43.4	43.4	43.4	43.4	43.3	43.3	43.3	43.3	43.2	43.2	43.2	43.1	43.1	43.1
43	44.8	44.8	44.7	44.7	44.7	44.7	44.6	44.6	44.6	44.6	44.5	44.5	44.5	44.5	44.4	44.4	44.4	44.4	44.3	44.3
44	46.1	46.1	46.1	46.0	46.0	46.0	46.0	45.8	45.8	45.8	45.8	45.7	45.7	45.7	45.7	45.6	45.6	45.6	45.5	45.5

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

Table 3-1. Virtual Temperature (Degrees Celsius)—Continued

Air temp °C	Wet-bulb depression, degrees Celsius																			
	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9
38	38.4	38.4	38.4	38.4																
39	39.6	39.6	39.5	39.5	39.5	39.5	39.4	39.4	39.4											
40	40.7	40.7	40.7	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.5	40.5	40.5	40.5					
41	41.9	41.9	41.9	41.9	41.8	41.8	41.8	41.8	41.7	41.7	41.7	41.7	41.6	41.6	41.6	41.6	41.5	41.5	41.5	41.5
42	43.1	43.0	43.0	43.0	43.0	42.9	42.9	42.9	42.9	42.8	42.8	42.8	42.8	42.7	42.7	42.7	42.7	42.6	42.6	42.6
43	44.3	44.2	44.2	44.2	44.2	44.2	44.1	44.1	44.1	44.1	44.0	44.0	44.0	44.0	43.9	43.9	43.9	43.9	43.8	43.8
44	45.5	45.5	45.4	45.4	45.4	45.4	45.3	45.3	45.3	45.3	45.2	45.2	45.2	45.2	45.2	45.0	45.0	45.0	45.0	44.9

Air temp °C	Wet-bulb depression, degrees Celsius																			
	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9
42	42.6	42.5	42.5	42.5	42.5	42.5														
43	43.8	43.8	43.8	43.6	43.6	43.6	43.6	43.5	43.5	43.5	43.5									
44	44.9	44.9	44.9	44.8	44.8	44.8	44.8	44.8	44.7	44.7	44.7									

Enter table with air temperature to nearest tenth of a degree and wet-bulb depression to nearest tenth of a degree. Interpolate as necessary.

COMPUTATIONS FOR SOUND RANGING EFFECTIVE TEMPERATURE USING THE PILOT BALLOON METHOD

EFFECTIVE TEMPERATURE: $T_S = (3T_V + T) / 4$

T_S = SOUND RANGING EFFECTIVE TEMPERATURE

T_V = SURFACE VIRTUAL TEMPERATURE

T = SURFACE DRY-BULB TEMPERATURE

1. SUBTRACT WET-BULB READING FROM DRY-BULB READING TO OBTAIN WET-BULB DEPRESSION.
2. OBTAIN SURFACE VIRTUAL TEMPERATURE (T_V) FROM TABLE 3-1 FM6-16-1 USING DRY-BULB READING AND WET-BULB DEPRESSION AS ARGUMENTS.

EXAMPLE: DRY-BULB	28.0°C	28.0°C
WET-BULB	<u>25.2°C</u>	
DEPRESSION	2.8°C	
VIRTUAL TEMPERATURE	32°C X 3 = 96.0°C	
		124.0°C / 4 = 31.0°C
TIME OF DAY CORRECTION (NIGHT FOR THIS EXAMPLE)		<u>+1.3°C</u>
EFFECTIVE TEMPERATURE		32.3°C

Figure 3-1. Example of effective temperature computation procedures.

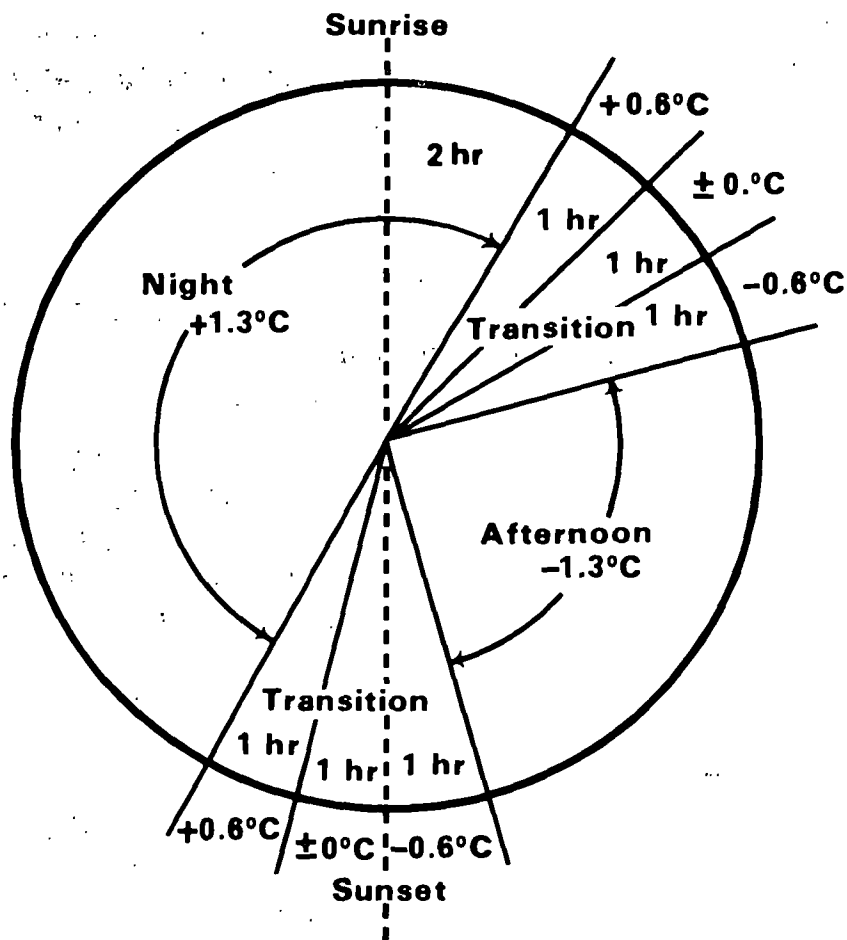


Figure 3-2. Meteorological day (sound ranging messages) correction diagram.

NOTE!

1. When surface wind exceeds 15 knots, use Afternoon (-1.3°C).
2. In rain, drizzle, and fog, use no correction.
3. When surface wind is 5-15 knots and sky is half to total overcast, use Afternoon (-1.3°C).
4. Otherwise, use Meteorological day correction.



10 MAY 1979

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

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