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AIR WEATHER SERVICE

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# FORECASTER MEMO

MAY 1983

Single Station Analysis and Forecasting

CONVERSION TABLES, MISCELLANEOUS CHARTS

The purpose of this forecaster memo series is to provide information to aid the forecaster in development of single station analyses and forecasts. This forecaster memo provides a handy reference of regularly used tables and charts. Page ii is table of contents for the AWS/FM-300/XXX series; page iii is the table of contents for this forecaster memo, AWS/FM-300/005. This series of forecaster memos is dynamic; if you have comments or techniques that should be included, submit them to AWS/DNTS.

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# 1. CONVERSION FACTORS AND TABLES

## CONVERSIONS/CONSTANTS

### LENGTH

1 Millimeter (mm)	= 0.039 in.
1 Centimeter (cm)	= 0.394 in.
	= 0.033 ft.
1 meter (m)	= 39.37 in.
	= 3.281 ft.
1 kilometer (km)	= 3280.84 ft.
	= 0.621 mi
	= 0.540 nm
1 inch (in)	= 25.4 mm
	= 2.54 cm
1 foot (ft)	= 30.48 cm
	= 0.305 m
1 statute mile (mi)	= 0.868 nm
	= 1609.344 m
	= 1.609 km
1 U.S. nautical mile (nm)	= 6080.21 ft
	= 1.152 mi
	= 1853.248 m
	= 1.853 km

### VELOCITY

1 meter per second (mps)	= 3.6 km hr <sup>-1</sup>
	= 1.943 kts
	= 2,237 mph
1 kilometer per hour (km hr <sup>-1</sup> )	= 0.278 mps
	= 0.534 kts
	= 0.621 mph
1 knot (kts)	= 1.152 mph
	= 0.515 mps
	= 1.85 km hr <sup>-1</sup>
1 mile per hour (mph)	= 0.868 kts
	= 0.447 mph
	= 1.609 km hr <sup>-1</sup>

### PRESSURE

1 millibar (mb)	= 0.750 mm Hg
	= 0.0295 in Hg
1 standard millimeter of Mercury (mm Hg)	= 1.333 mb
1 standard inch of Mercury (in Hg)	= 0.0394 in Hg
	= 33.864 mb
1 standard atmosphere (atmos)	= 25.4 mm Hg
	= 1013.250 mb
	= 760 mm Hg
	= 29.921 in Hg

### TEMPERATURE

	SYMBOL	FREEZING*	BOILING*	CONVERSION FORMULAE
Celsius	C	0	100	$C = 5/9 (F - 32) = K - 273.16$
Fahrenheit	F	32	212	$F = 9/5C + 32 = 9/5 (K - 273.16) + 32$
Kelvin	K	273.16	373.16	$K = C + 273.6 = 5/9 (F - 32) + 273.16$

\* Of water at 1 atmosphere.

### THERMODYNAMIC CONVERSIONS/CONSTANTS

Dry Adiabatic Lapse Rate	5.5°F per 1000 ft 1°C per 100 meters (513)
Moist Adiabatic Lapse Rate	3°F per 1000 ft 0.55°C per 100 meters (513)
Standard Lapse Rate	3.6°F per 1000 ft (513) 0.65°C per 100 meters

## INCHES TO MILLIBARS (507)

Inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
	Millibars									
28.0	948.2	948.5	948.9	949.2	949.5	949.9	950.2	950.6	950.9	951.2
28.1	951.6	951.9	952.3	952.6	952.9	953.3	953.6	953.9	954.3	954.6
28.2	955.0	955.3	955.6	956.0	956.3	956.7	957.0	957.3	957.7	958.0
28.3	958.3	958.7	959.0	959.4	959.7	960.0	960.4	960.7	961.1	961.4
28.4	961.7	962.1	962.4	962.7	963.1	963.4	963.8	964.1	964.4	964.8
28.5	965.1	965.6	965.8	966.1	966.5	966.8	967.2	967.5	967.8	968.2
28.6	968.5	968.8	969.2	969.5	969.9	970.2	970.5	970.9	971.2	971.6
28.7	971.9	972.2	972.6	972.9	973.2	973.6	973.9	974.3	974.6	974.9
28.8	975.3	975.6	976.0	976.3	976.6	977.0	977.3	977.6	978.0	978.3
28.9	978.7	979.0	979.3	979.7	980.0	980.4	980.7	981.0	981.4	981.7
29.0	982.1	982.4	982.7	983.1	983.4	983.7	984.1	984.4	984.8	985.1
29.1	985.4	985.8	986.1	986.5	986.8	987.1	987.5	987.8	988.1	988.5
29.2	988.8	989.2	989.5	989.8	990.2	990.5	990.9	991.2	991.5	991.9
29.3	992.2	992.5	992.9	993.2	993.6	993.9	994.2	994.6	994.9	995.3
29.4	995.6	995.9	996.3	996.6	997.0	997.3	997.6	998.0	998.3	998.6
29.5	999.0	999.3	999.7	1000.0	1000.3	1000.7	1001.0	1001.4	1001.7	1002.0
29.6	1002.4	1002.7	1003.0	1003.4	1003.7	1004.1	1004.4	1004.7	1005.1	1005.4
29.7	1005.8	1006.1	1006.4	1006.8	1007.1	1007.4	1007.8	1008.1	1008.5	1008.8
29.8	1009.1	1009.5	1009.8	1010.2	1010.5	1010.8	1011.2	1011.5	1011.9	1012.2
29.9	1012.5	1012.9	1013.2	1013.5	1013.9	1014.2	1014.6	1014.9	1015.2	1015.6
30.0	1015.9	1016.3	1016.6	1016.9	1017.3	1017.4	1017.9	1018.3	1018.6	1019.0
30.1	1019.3	1019.6	1020.0	1020.3	1020.7	1021.0	1021.3	1021.7	1022.0	1022.3
30.2	1022.7	1023.0	1023.4	1023.7	1024.0	1024.4	1024.7	1025.1	1025.4	1025.7
30.3	1026.1	1026.4	1026.8	1027.1	1027.4	1027.8	1028.1	1028.4	1028.8	1029.1
30.4	1029.5	1029.8	1030.1	1030.5	1030.8	1031.2	1031.5	1031.8	1032.2	1032.5
30.5	1032.8	1033.2	1033.5	1033.9	1034.2	1034.5	1034.9	1035.2	1035.6	1035.9
30.6	1036.2	1036.6	1036.9	1037.2	1037.6	1037.9	1038.3	1038.6	1038.9	1039.3
30.7	1039.6	1040.0	1040.3	1040.6	1041.0	1041.3	1041.7	1042.0	1042.3	1042.7
30.8	1043.0	1043.3	1043.7	1044.0	1044.4	1044.7	1045.0	1045.4	1045.7	1046.1
30.9	1046.4	1046.7	1047.1	1047.4	1047.7	1048.1	1048.4	1048.8	1049.1	1049.4

## MILLIBARS TO INCHES (507)

Millibars	0	1	2	3	4	5	6	7	8	9
	Inches									
940	27.76	27.79	27.82	27.84	27.88	27.91	27.94	27.96	27.99	28.02
950	28.05	28.08	28.11	28.14	28.17	28.20	28.23	28.26	28.29	28.32
960	28.35	28.38	28.41	28.44	28.47	28.50	28.53	28.56	28.59	28.61
970	28.64	28.67	28.70	28.73	28.76	28.79	28.82	28.85	28.88	28.91
980	28.94	28.97	29.00	29.03	29.06	29.09	29.12	29.15	29.18	29.21
990	29.23	29.26	29.29	29.32	29.35	29.38	29.41	29.44	29.47	29.50
1000	29.53	29.56	29.59	29.62	29.65	29.68	29.71	29.74	29.77	29.80
1010	29.83	29.85	29.88	29.91	29.94	29.97	30.00	30.03	30.06	30.09
1020	30.12	30.15	30.18	30.21	30.24	30.27	30.30	30.33	30.36	30.39
1030	30.42	30.45	30.47	30.50	30.53	30.56	30.59	30.62	30.65	30.68
1040	30.71	30.74	30.77	30.80	30.83	30.86	30.89	30.92	30.95	30.98
1050	31.01	31.04	31.07	31.10	31.12	31.15	31.18	31.21	31.24	31.27

Proportional Parts	Inches	.001	.002	.003	.004	.005	.006	.007	.008	.009
	Milli-bars	00	.1	.1	.1	.2	.2	.2	.3	.3



## Fahrenheit to Celsius (502)

°F		°C	°F		°C	°F		°C	°F		°C
From	To		From	To		From	To		From	To	
128.3	130.0	54	83.3	85.0	29	38.3	40.0	04	-4.8	-3.1	M20
126.5	128.2	53	81.5	83.2	28	36.3	38.2	03	-6.6	-4.9	M21
124.7	126.4	52	79.7	81.4	27	34.7	36.4	02	-8.4	-6.7	M22
122.9	124.6	51	77.9	79.6	26	32.9	34.6	01	-10.2	-8.5	M23
121.1	122.8	50	76.1	77.8	25	32.0	32.8	00	-12.0	-10.3	M24
119.3	121.0	49	74.3	76.0	24	31.2	31.9	M00	-13.8	-12.1	M25
117.5	119.2	48	72.5	74.2	23	29.4	31.9	M01	-15.6	-13.9	M26
115.7	117.4	47	70.7	72.4	22	27.6	29.3	M02	-17.4	-15.7	M27
113.9	115.6	46	68.9	70.6	21	25.8	27.5	M03	-19.2	-17.5	M28
112.1	113.8	45	67.1	68.8	20	24.0	25.7	M04	-21.0	-19.3	M29
110.3	112.0	44	65.3	67.0	19	22.2	23.9	M05	-22.8	-21.1	M30
108.5	110.2	43	63.5	65.2	18	20.4	22.1	M06	-24.6	-22.9	M31
106.7	108.4	42	61.7	63.4	17	18.6	20.3	M07	-26.4	-24.7	M32
104.9	106.6	41	59.9	61.6	16	16.8	18.5	M08	-28.2	-26.5	M33
103.1	104.8	40	58.1	59.8	15	15.0	16.7	M09	-30.0	-28.3	M34
101.3	103.0	39	56.3	58.0	14	13.2	14.9	M10	-31.8	-30.1	M35
99.5	101.2	38	54.5	56.2	13	11.4	13.1	M11	-33.6	-31.9	M36
97.7	99.4	37	52.7	54.4	12	9.6	11.3	M12	-35.4	-33.7	M37
95.9	97.6	36	50.9	52.6	11	7.8	9.5	M13	-37.2	-35.5	M38
94.1	95.8	35	49.1	50.8	10	6.0	7.7	M14	-39.0	-37.3	M39
92.3	94.0	34	47.3	49.0	09	4.2	5.9	M15	-40.8	-39.1	M40
90.5	92.2	33	45.5	47.2	08	2.4	4.1	M16	-42.6	-40.9	M41
88.7	90.4	32	43.7	45.4	07	0.6	2.3	M17	-44.4	-42.7	M42
86.9	88.6	31	41.9	43.6	06	-1.2	+0.5	M18	-46.2	-44.5	M43
85.1	86.8	30	40.1	41.8	05	-3.0	-1.3	M19	-48.0	-46.3	M44

ACTUAL CONVERSION (508)			REPORTABLE VISIBILITY VALUES (502)		
KILOMETERS	NAUTICAL MILES	FEET	STATUTE MILES	NAUTICAL MILES	METERS
0.11	0.05	330	1/16	0.05	0100
0.20	0.11	660	1/8	0.1	0200
0.30	0.16	990	3/16	0.15	0300
0.40	0.22	1320	1/4	0.2	0400
0.50	0.27	1650	5/16	0.25	0500
0.57	0.33	1980	3/8	0.3	0600
--	--	--	--	0.4	0700
0.80	0.44	2640	1/2	0.45	0800
--	--	--	--	0.5	0900
1.01	0.54	3300	5/8	0.55	1000
--	--	--	--	0.6	1100
1.21	0.65	3960	3/4	--	1200
--	--	--	--	0.7	1300
1.41	0.74	4620	7/8	--	1400
--	--	--	--	0.8	1500
1.61	0.87	5280	1	--	1600
--	--	--	--	0.9	1700
1.81	0.98	5940	1 1/8	1.0	1800
2.01	1.09	6600	1 1/4	1.1	2000
2.21	1.20	7260	1 3/8	1.2	2200
2.41	1.31	7920	1 1/2	1.3	2400
2.62	1.41	8580	1 5/8	1.4	2600
2.82	1.52	9240	1 3/4	1.5	2800
3.02	1.63	9900	1 7/8	1.6	3000
3.22	1.74	10560	2	1.7	3200
--	--	--	--	1.8	3400
3.62	1.96	11800	2 1/4	1.9	3600
--	--	--	--	2.0	3700
4.02	2.18	13200	2 1/2	2.2	4000
--	--	--	--	2.4	4500
--	--	--	--	2.5	4700
4.83	2.60	15840	3	2.6	4800
--	--	--	--	2.7	5000
6.44	3.47	21120	4	3.0	6000
--	--	--	--	4.0	7000
8.05	4.34	26400	5	4.3	8000
9.66	5.21	31680	6	5.0	9000
11.27	6.08	36960	7	6.0	9999
12.87	6.95	42240	8	7.0	9999
14.48	7.82	47520	9	8.0	9999
16.09	8.68	52800	10	9.0	9999
17.70	9.55	58080	11	10.0	9999
19.31	10.42	63360	12	10.0	9999
20.92	11.29	68640	13	11.0	9999
22.53	12.15	73920	14	12.0	9999
24.14	13.03	79200	15	13.0	9999
32.19	17.37	105600	20	15.0	9999
40.23	21.71	132000	25	20.0	9999
48.28	26.05	158400	30	25.0	9999
56.33	30.39	184800	35	30.0	9999
64.37	34.74	211200	40	35.0	9999
73.42	39.08	237600	45	40.0	9999
80.47	43.42	264000	50	45.0	9999



## MILES PER HOUR TO KNOTS (502)

Miles Per Hour	0	1	2	3	4	5	6	7	8	9
	Knots									
0	0	1	2	3	3	4	5	6	7	8
10	9	10	10	11	12	13	14	15	16	17
20	17	18	19	20	21	22	23	23	24	25
30	26	27	28	29	30	30	31	32	33	34
40	35	36	36	37	38	39	40	41	42	43
50	43	44	45	46	47	48	49	50	50	51
60	52	53	54	55	56	56	57	58	59	60
70	61	62	63	63	64	65	66	67	68	69
80	70	70	71	72	73	74	75	76	76	77
90	78	79	80	81	82	83	83	84	85	86
100	87	88	89	89	90	91	92	93	94	95
110	96	96	97	98	99	100	101	102	103	103

## KNOTS TO MILES PER HOUR (502)

Knots	0	1	2	3	4	5	6	7	8	9
	Miles Per Hour									
0	0	1	2	3	5	6	7	8	9	10
10	12	13	14	15	16	17	18	20	21	22
20	23	24	25	26	28	29	30	31	32	33
30	35	36	37	38	39	40	41	43	44	45
40	46	47	48	49	51	52	53	54	55	56
50	58	59	60	61	62	63	64	66	67	68
60	69	70	71	72	74	75	76	77	78	79
70	81	82	83	84	85	86	87	89	90	91
80	92	93	94	96	97	98	99	100	101	102
90	104	105	106	107	108	109	110	112	113	114
100	115	116	118	119	120	121	122	123	124	126
110	127	128	129	130	131	132	134	135	136	137

## KNOTS TO METERS PER SECOND (502)

Knots	0	1	2	3	4	5	6	7	8	9
	Meters Per Second									
0	0	1	1	2	2	3	3	4	4	5
10	5	6	6	7	7	8	8	9	9	10
20	10	11	11	12	12	13	13	14	14	15
30	15	16	17	17	18	18	19	19	20	20
40	21	21	22	22	23	23	24	24	25	25
50	26	26	27	27	28	28	29	29	30	30
60	31	31	32	32	33	34	34	35	35	36
70	36	37	37	38	38	39	39	40	40	41
80	41	42	42	43	43	44	44	45	45	46
90	46	47	47	48	48	49	49	50	50	51
100	52	52	53	53	54	54	55	55	56	56
110	57	57	58	58	59	59	60	60	61	61

KNOTS TO KILOMETERS PER HOUR (502)										
Knots	0	1	2	3	4	5	6	7	8	9
	Kilometer Per Hour									
0	0	2	4	6	7	9	11	13	15	17
10	19	20	22	24	26	28	30	32	33	35
20	37	39	41	43	45	46	48	50	52	54
30	56	58	59	61	63	65	67	69	70	72
40	74	76	78	80	82	83	85	87	89	91
50	93	95	96	98	100	102	104	106	108	109
60	110	113	115	117	119	121	122	124	126	128
70	130	132	133	135	137	139	141	143	145	146
80	148	150	152	154	156	158	159	161	163	165
90	167	169	171	172	174	176	178	180	182	184
100	184	187	189	191	193	195	196	198	200	202
110	204	206	208	209	211	213	215	217	219	221

MILES PER HOUR TO METERS PER SECOND (502)										
Miles Per Hour	0	1	2	3	4	5	6	7	8	9
	Meters Per Second									
0	0	0	1	1	2	2	3	3	4	4
10	4	5	5	6	6	7	7	8	8	9
20	9	9	10	10	11	11	12	12	12	13
30	13	14	14	15	15	16	16	17	17	17
40	18	18	19	19	20	20	21	21	21	22
50	22	23	23	24	24	25	25	25	26	26
60	27	27	28	28	29	29	30	30	30	31
70	31	32	32	32	33	34	34	34	35	35
80	36	36	37	37	38	38	38	39	39	40
90	40	41	41	42	42	42	43	43	44	44
100	45	45	46	46	46	47	47	48	48	49
110	49	50	50	51	51	51	52	52	53	53

MILES PER HOUR TO KILOMETERS PER HOUR (502)										
Miles Per Hour	0	1	2	3	4	5	6	7	8	9
	Kilometers Per Hour									
0	0	2	3	5	6	8	10	11	13	15
10	16	18	19	21	23	24	26	27	29	31
20	32	34	35	37	39	40	42	44	45	47
30	48	50	52	53	55	56	58	60	61	63
40	64	66	68	69	71	72	74	76	77	79
50	81	82	84	85	87	89	90	92	93	95
60	97	98	100	101	103	105	106	108	109	111
70	113	114	116	118	119	121	122	124	126	127
80	129	130	132	134	135	137	138	140	142	143
90	145	147	148	150	151	153	155	156	158	159
100	161	163	164	166	167	169	171	172	174	175
110	177	179	180	182	184	185	187	188	190	192

INCHES TO-MILLIMETERS (508)

Inches	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	Millimeters									
0.0	0.0	2.5	5.1	7.6	10.2	12.7	15.2	17.8	20.3	22.9
1.0	25.4	27.9	30.5	33.0	35.6	38.1	40.6	43.2	45.7	48.3
2.0	50.8	53.3	55.9	58.4	61.0	63.5	66.0	68.6	71.1	73.7
3.0	76.2	78.7	81.3	83.8	86.4	88.9	91.4	94.0	96.5	99.1
4.0	101.6	104.1	106.7	109.2	111.8	114.3	116.8	119.4	121.9	124.5
5.0	127.0	129.4	132.1	134.6	137.2	139.7	142.2	144.8	147.3	149.9
6.0	152.4	154.9	157.5	160.0	162.6	165.1	167.6	170.2	172.7	175.3
7.0	177.8	180.3	182.9	185.4	188.0	190.5	193.0	195.6	198.1	200.7
8.0	203.2	205.7	208.3	210.8	213.4	215.9	218.4	221.0	223.5	226.1
9.0	228.6	231.1	233.7	236.2	238.8	241.3	243.8	246.4	248.9	251.5
10.0	254.0	256.5	259.1	261.6	264.2	266.7	269.2	271.8	274.3	276.9
11.0	279.4	281.9	284.5	287.0	289.6	292.1	294.6	297.2	299.7	302.3
12.0	304.8	307.3	309.9	312.4	315.0	317.5	320.0	322.6	325.1	327.7

Proportional Parts	In	.01	.02	.03	.04	.05	.06	.07	.08	.09
	mm	.3	.5	.8	1.0	1.3	1.5	1.8	2.0	2.3



FEET TO METERS (508)

Feet	Meters									
	0	10	20	30	40	50	60	70	80	90
0	0.00	3.06	6.10	9.14	12.19	15.24	18.29	21.34	24.38	27.43
100	30.48	33.53	36.58	39.62	42.67	45.72	48.77	51.82	54.86	57.91
200	60.96	64.01	67.06	70.10	73.15	76.20	79.25	82.30	85.34	88.39
300	91.44	94.49	97.54	100.58	103.63	106.68	109.73	112.78	115.82	118.87
400	121.92	124.97	128.02	131.06	134.11	137.16	140.21	143.26	146.30	149.35
500	152.40	155.45	158.50	161.54	164.59	167.64	170.69	173.74	176.78	179.83
600	182.88	185.93	188.98	192.02	195.07	198.12	201.17	204.22	207.26	210.31
700	213.36	216.41	219.46	222.50	225.55	228.60	231.65	234.70	237.74	240.79
800	243.84	246.89	249.94	252.98	256.03	259.08	262.13	265.18	268.22	271.27
900	274.32	277.37	280.42	283.46	286.51	289.56	292.61	295.66	298.70	301.75
1000	304.80	307.85	310.90	313.94	316.99	320.04	323.09	326.14	329.18	332.23
1100	335.28	338.33	341.38	344.42	347.47	350.52	353.57	356.62	359.66	362.71
1200	365.76	368.81	371.86	374.90	377.95	381.00	384.05	387.10	390.14	393.19
1300	396.24	399.29	402.34	405.38	408.43	411.48	414.53	417.58	420.62	423.67
1400	426.72	429.77	432.82	435.86	438.91	441.96	445.01	448.06	451.10	454.15
1500	457.20	460.25	463.30	466.34	469.39	472.44	475.49	478.54	481.58	484.63
1600	487.68	490.73	493.78	496.82	499.87	502.92	505.97	509.02	512.06	515.11
1700	518.16	521.21	524.26	527.30	530.35	533.40	536.45	539.50	542.54	545.59
1800	548.64	551.69	554.74	557.78	560.83	563.88	566.93	569.98	573.02	576.07
1900	579.12	582.17	585.22	588.26	591.31	594.36	597.41	600.46	603.50	606.55
2000	609.60	612.65	615.70	618.74	621.79	624.84	627.89	630.94	633.98	637.03
2100	640.08	643.13	646.18	649.22	652.27	655.32	658.37	661.42	664.46	667.51
2200	670.56	673.61	676.66	679.70	682.75	685.80	688.85	691.90	694.94	697.99
2300	701.04	704.09	707.14	710.18	713.23	716.28	719.33	722.38	725.42	728.47
2400	731.52	734.57	737.62	740.66	743.71	746.76	749.81	752.86	755.90	758.94
2500	762.00	765.05	768.10	771.14	774.19	777.24	780.29	783.34	786.38	789.43
2600	792.48	795.53	798.58	801.62	804.67	807.72	810.77	813.82	816.86	819.91
2700	822.96	826.01	829.06	832.10	835.15	838.20	841.25	844.30	847.34	850.39
2800	853.44	856.49	859.54	862.58	865.63	868.68	871.73	874.78	877.82	880.87
2900	883.92	886.97	890.02	893.06	896.11	899.16	902.21	905.26	908.30	911.35
3000	914.40	917.45	920.50	923.54	926.59	929.64	932.69	935.74	938.78	941.83
3100	944.88	947.93	950.98	954.02	957.07	960.12	963.17	966.22	969.26	972.31
3200	975.36	978.41	981.46	984.50	987.55	990.60	993.65	996.70	999.74	1002.79
3300	1005.84	1008.89	1011.94	1014.98	1018.03	1021.08	1024.13	1027.18	1030.22	1033.27
3400	1036.32	1039.37	1042.42	1045.46	1048.51	1051.56	1054.61	1057.66	1060.70	1063.75
3500	1066.80	1069.85	1072.90	1075.94	1078.99	1082.04	1085.09	1088.14	1091.18	1094.23
3600	1097.28	1100.33	1103.38	1106.42	1109.47	1112.52	1115.57	1118.62	1121.66	1124.71
3700	1127.76	1130.81	1133.86	1136.90	1139.95	1143.00	1146.05	1149.10	1152.14	1155.19
3800	1158.24	1161.29	1164.34	1167.38	1170.43	1173.48	1176.53	1179.58	1182.62	1185.67
3900	1188.72	1191.77	1194.82	1197.86	1200.91	1203.96	1207.01	1210.06	1213.10	1216.15
4000	1219.20	1222.25	1225.30	1228.34	1231.39	1234.44	1237.49	1240.54	1243.58	1246.63
4100	1249.68	1252.73	1255.78	1258.82	1261.87	1264.92	1267.97	1271.02	1274.06	1277.11
4200	1280.16	1283.21	1286.26	1289.30	1292.35	1295.40	1298.45	1301.50	1304.54	1307.59
4300	1310.64	1313.69	1316.74	1319.78	1322.83	1325.88	1328.93	1331.98	1335.02	1338.07
4400	1341.12	1344.17	1347.22	1350.26	1353.31	1356.36	1359.41	1362.46	1365.50	1368.55
4500	1371.60	1374.65	1377.70	1380.74	1383.79	1386.84	1389.89	1392.94	1395.98	1399.03
4600	1402.08	1405.13	1408.18	1411.22	1414.27	1417.32	1420.37	1423.42	1426.46	1429.51
4700	1432.56	1435.61	1438.66	1441.70	1444.75	1447.80	1450.85	1453.90	1456.94	1459.99
4800	1463.04	1466.09	1469.14	1472.18	1475.23	1478.28	1481.33	1484.38	1487.42	1490.47
4900	1493.52	1496.57	1499.62	1502.66	1505.71	1508.76	1511.81	1514.86	1517.90	1520.95
5000	1524.00	1527.05	1530.10	1533.14	1536.19	1539.24	1542.29	1545.34	1548.38	1551.43
Proportional parts	ft	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
	m.	.30	.61	.91	1.22	1.52	1.83	2.13	2.44	2.74

## 2. PRESSURE TABLES

### MANUAL METHODS FOR COMPUTING PRESSURE AND DENSITY ALTITUDE (515)

#### 1. Pressure Altitude.

$$PA = H_a + PAV$$

Where: PA = pressure altitude

$H_a$  = field elevation

PAV = pressure altitude variation or (29.92 minus the current altimeter setting) x 1,000

EXAMPLE: The field elevation is 1,500 feet with a current altimeter setting of 29.41 Ins.

$$PA = 1,500 + 1,000 (29.92 - 29.41)$$

$$PA = 2,010 \text{ feet}$$

#### 2. Density Altitude.

$$DA = PA + (120 V_t)$$

Where: DA = density altitude

PA = pressure altitude

120 = temperature constant (120 feet per  $1^{\circ}\text{C}$ )

$V_t$  = actual temperature minus the standard temperature at the pressure altitude

EXAMPLE: The surface temperature is  $30^{\circ}\text{C}$ . The standard temperature for a pressure altitude of 2,010 feet is  $11^{\circ}\text{C}$ . (See pages 2 - 4 for standard temperatures.)

$$DA = 2,010 \text{ feet} + [120 (30^{\circ}\text{C} - 11^{\circ}\text{C})]$$

$$= 2,010 + 120 (19)$$

$$DA = 4,290 \text{ feet}$$

#### 3. Rule of thumb for estimating standard temperatures up to altitudes of 35,000 feet.

a. Double the altitude (in thousands of feet)

b. Subtract 15

c. Change the sign

EXAMPLE: Altitude is 7,000 feet.

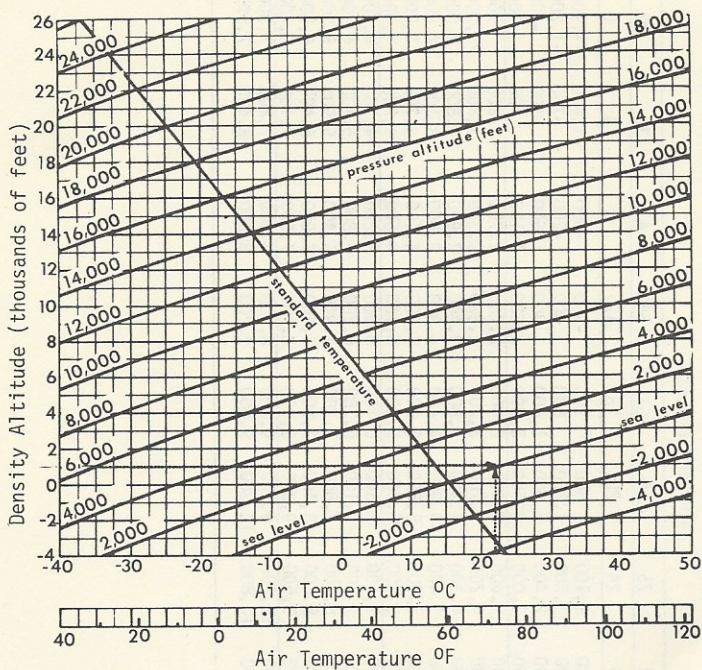
a.  $7 \times 2 = 14$

b.  $14 - 15 = -1$ , then change sign

c. Standard temperature at 7,000 feet is approximately  $+1^{\circ}\text{C}$ . (Actual temperature is  $+1.1^{\circ}\text{C}$ .)



### DENSITY ALTITUDE DIAGRAM



With a temperature of 22 $^{\circ}\text{C}$ , pressure altitude of 10 feet, the density altitude is 1000 feet.

APPROXIMATE DENSITY ALTITUDE COMPUTATIONS TO THE NEAREST 100 FEET (506)

AIR TEMPERATURE

Pressure Altitude (feet)	AIR TEMPERATURE													
	97 °F	90	82	75	68	61	54	47	39	32	25	18	11	4
	36	32	29	24	20	16	12	8	4	0	-4	-10	-16	-22
Sea level.....	2,500	2,100	1,600	1,100	600	100	-400	-900	-1,400	-1,900	-2,300	-2,700	-3,100	-3,500
500.....	3,100	2,700	2,200	1,800	1,300	800	300	-200	-700	-1,200	-1,600	-2,000	-2,400	-2,800
1,000.....	3,700	3,200	2,800	2,400	1,900	1,400	900	500	-100	-600	-1,100	-1,500	-1,900	-2,300
1,500.....	4,300	3,900	3,400	3,000	2,500	2,000	1,500	1,100	600	100	-500	-900	-1,300	-1,700
2,000.....	4,900	4,500	4,000	3,600	3,100	2,600	2,200	1,700	1,200	700	200	-300	-700	-1,100
2,500.....	5,500	5,100	4,600	4,200	3,700	3,200	2,800	2,300	1,800	1,300	800	300	-200	-600
3,000.....	6,300	5,700	5,200	4,800	4,300	3,800	3,400	2,900	2,500	2,000	1,500	1,000	500	0
3,500.....	6,800	6,300	5,900	5,400	4,900	4,400	4,000	3,500	3,100	2,600	2,100	1,600	1,100	600
4,000.....	7,500	7,000	6,600	5,900	5,500	5,000	4,600	4,100	3,700	3,200	2,700	2,200	1,700	1,200
4,500.....	8,000	7,500	7,100	6,500	6,000	5,500	5,100	4,600	4,200	3,600	3,200	2,700	2,200	1,700
5,000.....	8,500	8,000	7,600	7,100	6,500	6,100	5,600	5,200	4,700	4,200	3,700	3,200	2,700	2,200
5,500.....	9,100	8,600	8,200	7,700	7,100	6,700	6,200	5,800	5,300	4,700	4,300	3,800	3,300	2,800
6,000.....	9,700	9,200	8,800	8,300	7,800	7,300	6,900	6,400	5,900	5,300	4,900	4,400	3,900	3,400
6,500.....	10,300	9,800	9,400	8,800	8,400	7,800	7,400	7,000	6,400	6,000	5,600	5,100	4,600	4,100
7,000.....	10,800	10,400	10,000	9,500	9,000	8,500	8,100	7,600	7,100	6,700	6,200	5,700	5,200	4,700
7,500.....	11,400	11,000	10,600	10,200	9,700	9,200	8,700	8,300	7,800	7,300	6,800	6,300	5,800	5,300
8,000.....	12,100	11,600	11,200	10,800	10,300	9,800	9,200	8,800	8,400	7,900	7,300	6,800	6,300	5,800



PRESSURE ALTITUDE TABLE - INCHES TO FEET (507)

Inches	Feet										
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	
28.0	1824	1814	1805	1795	1785	1776	1766	1756	1746	1737	
28.1	1727	1717	1707	1698	1688	1678	1668	1659	1649	1639	
28.2	1630	1620	1610	1601	1591	1581	1572	1562	1552	1542	
28.3	1533	1523	1513	1504	1494	1484	1475	1465	1456	1446	
28.4	1436	1427	1417	1407	1398	1388	1378	1369	1359	1350	
28.5	1340	1330	1321	1311	1302	1292	1282	1273	1263	1254	
28.6	1244	1234	1225	1215	1206	1196	1186	1177	1167	1158	
28.7	1148	1139	1130	1120	1110	1100	1091	1081	1072	1062	
28.8	1053	1043	1034	1024	1015	1005	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	336	326	318	308	
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	+	-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	-1001	-1010	-1019	-1028	-1037	-1046	-1055	-1064	

U.S. STANDARD ATMOSPHERE

Altitude (feet)	(505)	Pressure	Temperature	
	Milli- bars (mb)	Inches of Hg	Degs C	Degs F
0	1013.2	29.92	15.0	59.0
1,000	977.2	28.86	13.0	55.4
2,000	942.1	27.82	11.0	51.9
3,000	908.1	26.82	9.0	48.3
4,000	875.1	25.84	7.1	44.7
5,000	843.1	24.90	5.1	41.2
6,000	812.0	23.98	3.1	37.6
7,000	781.8	23.09	1.1	34.0
8,000	752.6	22.22	-0.8	30.5
9,000	724.3	21.39	-2.8	26.9
10,000	696.8	20.58	-4.8	23.3
11,000	670.2	19.79	-6.8	19.8
12,000	644.4	19.03	-8.8	16.2
13,000	619.4	18.29	-10.8	12.6
14,000	595.2	17.58	-12.7	9.1
15,000	571.8	16.89	-14.7	5.5
16,000	549.2	16.22	-16.7	1.9
17,000	427.2	15.57	-18.7	-1.6
18,000	506.0	14.94	-29.7	-5.2
19,000	485.5	14.34	-22.6	-8.8
20,000	465.6	13.75	-24.6	-12.3
21,000	446.4	13.18	-26.6	-15.9
22,000	427.9	12.64	-28.6	-19.5
23,000	410.0	12.11	-30.6	-23.9
24,000	392.7	11.60	-32.5	-26.6
25,000	376.0	11.10	-34.5	-30.2
26,000	359.9	10.63	-36.5	-33.7
27,000	344.3	10.17	-38.5	-37.3
28,000	329.3	9.72	-40.5	-40.9
29,000	314.8	9.30	-42.5	-44.4
30,000	300.9	8.89	-44.4	-48.0
31,000	287.4	8.49	-46.4	-51.6
32,000	274.5	8.11	-48.4	-55.1
33,000	262.0	7.74	-50.4	-58.7
34,000	250.0	7.38	-52.4	-62.2
35,000	238.4	7.04	-54.3	-65.8
36,000	227.3	6.71	-56.3	-69.4
37,000	216.6	6.40	-56.5	-69.7
38,000	206.5	6.10	Constant to	
39,000	196.8	5.81	65,600 feet	
40,000	187.5	5.54		
41,000	178.7	5.28		
42,000	170.4	5.04		
43,000	162.4	4.79		
44,000	154.7	4.57		
45,000	147.5	4.35		
46,000	140.6	4.15		
47,000	134.0	3.96		
48,000	127.7	3.77		
49,000	121.7	3.59		
50,000	116.0	3.42		

Standard Pressure Surface	Approximate Height Above Means Sea Level	
Millibars	Meters	Feet
1,000	120	400
850	1,500	5,000
700	3,000	10,000
500	5,500	18,000
400	7,200	23,500
300	9,000	30,000
250	10,000	34,000
200	12,000	39,000
100	16,000	53,000
50	20,500	67,500

### 3. WINDS

#### Definitions (514)

1. Tropical Cyclone - A non-frontal low pressure system of synoptic scale developing over tropical or subtropical waters having a definitely closed wind circulation.
2. Tropical Depression - A tropical cyclone in which the maximum sustained wind (one-minute mean) is 33 knots or less.
3. Tropical Disturbance - A distinct system of apparently organized convection, originating in the tropics or subtropics, having non-frontal character, and maintaining its identity for 24 hours or more. In successive stages, it may later be classified as a tropical depression, tropical storm, or hurricane.
4. Tropical Storm - A warm-core tropical cyclone in which the maximum sustained surface wind (one-minute mean) ranges from 34 to 63 knots.
5. Typhoon or Hurricane - A warm-core tropical cyclone with maximum sustained one-minute mean surface winds of 64 knots or more.
6. Super Typhoon or Hurricane - A typhoon/hurricane in which the maximum sustained wind (one-minute mean) is 130 knots or greater.



WIND COMPONENT TABLE

Wind Speed	ANGLE BETWEEN WIND DIRECTION AND HEADING (LEFT OR RIGHT)																	Wind Speed							
	HEAD WIND COMPONENT								TAIL WIND COMPONENT								CROSS WIND COMPONENT								
	10	20	30	40	50	60	70	80	100	110	120	130	140	150	160	170	10		20	30	40	50	60	70	80
5	-5	-5	-4	-3	-2	-2	-1	+1	+2	+3	+3	+4	+4	+5	+5	1	2	3	3	4	4	5	5		
10	-10	-9	-9	-8	-6	-5	-3	+2	+3	+5	+6	+8	+9	+9	+10	2	3	5	6	8	9	9	10	10	
15	-15	-14	-13	-11	-10	-8	-5	+3	+5	+8	+10	+11	+13	+14	+15	3	5	8	10	11	13	14	15	15	
20	-20	-19	-17	-15	-13	-10	-7	+3	+7	+10	+13	+15	+17	+19	+20	3	7	10	13	15	17	19	20	20	
25	-25	-23	-22	-19	-16	-13	-9	+4	+9	+13	+16	+19	+22	+23	+25	4	9	13	16	19	22	23	25	25	
30	-29	-28	-26	-23	-19	-15	-10	+5	+10	+15	+19	+23	+26	+28	+29	5	10	15	19	23	26	28	29	30	
35	-34	-33	-30	-27	-22	-18	-12	+6	+12	+18	+22	+27	+30	+33	+34	6	12	18	22	27	30	33	34	35	
40	-39	-38	-35	-31	-26	-20	-14	+7	+14	+20	+25	+31	+35	+38	+39	7	14	20	26	31	35	38	39	40	
45	-44	-42	-39	-34	-29	-23	-15	+8	+15	+23	+29	+34	+39	+42	+44	8	15	23	29	34	39	42	44	45	
50	-49	-47	-43	-38	-32	-25	-17	+9	+17	+25	+32	+38	+43	+47	+49	9	17	25	32	38	43	47	49	45	
55	-54	-52	-48	-42	-35	-28	-19	+9	+19	+28	+35	+42	+48	+52	+54	9	19	28	35	42	48	52	54	44	
60	-59	-56	-52	-46	-39	-30	-21	+10	+21	+30	+39	+46	+52	+56	+59	10	21	30	39	46	52	56	59	60	
65	-64	-61	-56	-50	-42	-33	-22	+11	+22	+33	+42	+50	+56	+61	+64	11	22	33	42	50	56	61	64	65	
70	-69	-66	-61	-54	-45	-35	-24	+12	+24	+35	+45	+54	+61	+66	+69	12	24	35	45	54	61	66	69	70	

e.g. (1) flight heading of  $150^{\circ}$  with winds  $170^{\circ}$  at 45 knots would have a head wind component of  $-42$ .

(2) on runway 03 with surface winds of  $070^{\circ}$  at 25 knots, the cross wind component would be 16 knots.

Beaufort Scale of Winds (502)

Beaufort Number	Description	Knots	Kilometers Per Hour	Meters Per Second	Specifications for Estimating Wind Speed
0	Calm	Less than 1	Less than 1	0- 0.2	Calm; smoke rises vertically.
1	Light air	1- 3	1- 5	0.3- 1.5	Direction of wind shown by smoke drift but not by wind vanes.
2	Light breeze	4- 6	6- 11	1.6- 3.3	Wind felt on face; leaves rustle; vanes moved by wind.
3	Gentle breeze	7- 10	12- 19	3.4- 5.4	Leaves and small twigs in constant motion; wind extends light flag.
4	Moderate breeze	11- 16	20- 28	5.5- 7.9	Raises dust and loose paper; small branches are moved.
5	Fresh breeze	17- 21	29- 38	8.9-10.7	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	Strong breeze	22- 27	39- 49	10.8-13.8	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	Near gale	28- 33	50- 61	13.9-17.1	Whole trees in motion; inconvenience felt when walking against the wind.
8	Gale	34- 40	62- 74	17.2-20.7	Breaks twigs off trees; generally impedes progress.
9	Strong gale	41- 47	75- 88	20.8-24.4	Slight structural damage occurs.
10	Storm	48- 55	89-102	24.5-28.4	Trees uprooted; considerable structural damage occurs.
11	Violent	56- 63	103-117	28.5-32.6	Accompanied by widespread damage.
12	Hurricane/ Typhoon	64- 71	118-133	32.7-36.9	

True Wind Speed From Sea Conditions (502)

Knots	Sea Conditions	Probable wave height in feet
0-1	Sea smooth and mirrorlike-----	-----
1-3	Scalelike ripples without foam crests-----	1/4
4-6	Small, short wavelets; crests have a glassy appearance and do not break-----	1/2
7-10	Large wavelets; some crests begin to break; foam of glassy appearance. Occasional white foam crests-----	2
11-16	Small waves, becoming longer; fairly frequent white foam crests-----	4
17-21	Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray-----	6
22-27	Large waves begin to form; white foam crests are more extensive everywhere; there may be some spray-----	10
28-33	Sea heaps up and white foam from breaking waves begin to be blown in streaks along the direction of the wind; spindrift begins-----	14
34-40	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind-----	18
41-47	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble, and roll over; spray may reduce visibility-----	23
48-55	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea is white in appearance. The tumbling of the sea becomes heavy and shocklike. Visibility is reduced-----	29
56-63	Exceptionally high waves that may obscure small and medium-sized ships. The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility reduced-----	37
64 and over	The air is filled with foam and spray. Sea completely white with driving spray; visibility very much reduced-----	45

WIND SPEED FROM WAVE CONDITIONS (504)

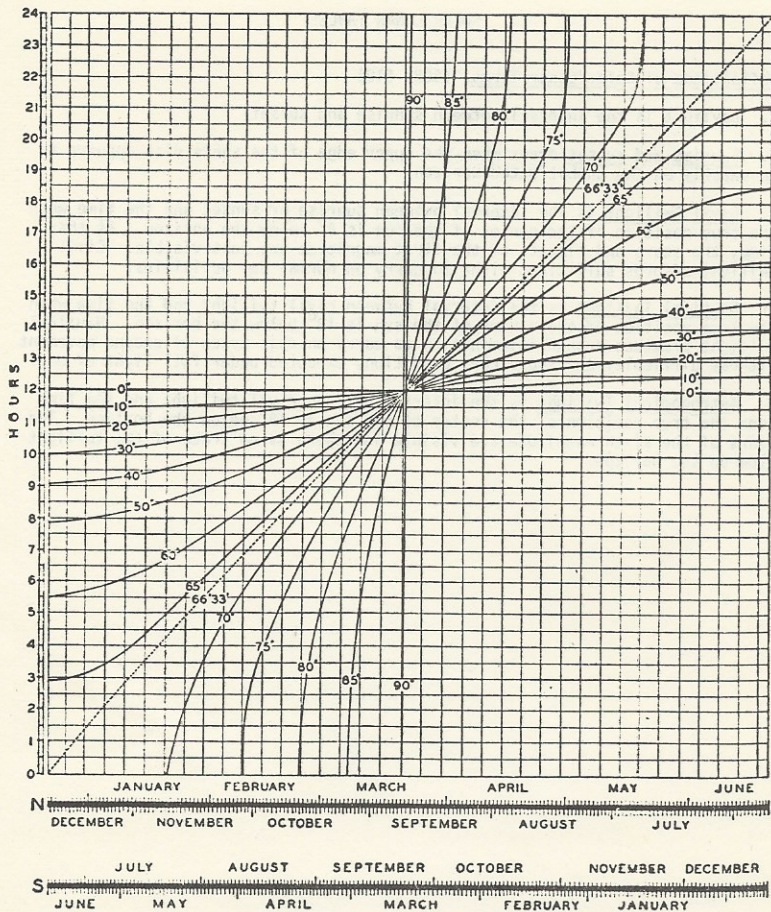
Wave height vs wind velocity	$H = 0.026 v^2$ H - Height in feet of greatest waves v - wind velocity in knots
Wave velocity vs wind velocity	Approximately equal when winds are 25 knots.
	If wind greater than 25 knots, wave velocity slightly less than wind speed.
	If wind less than 25 knots, wave velocity slightly exceeds wind speed.



#### 4. SOLAR/LUNAR TABLES

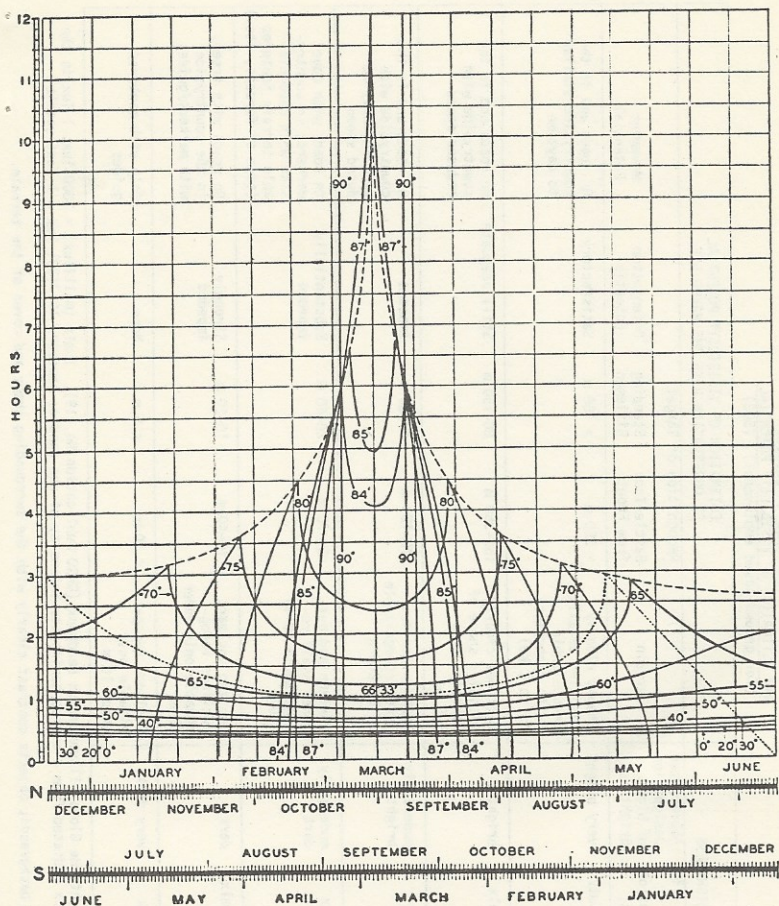
##### Definitions of Solar/Lunar Terms. (508, 518)

1. Daylight is the interval between sunrise and sunset.
2. Sunrise and sunset occur when the upper edge of the sun's disk appears to be exactly on the unobstructed horizon.
3. Civil Twilight is the interval between sunrise or sunset and the time when the true position of the center of the sun is  $6^{\circ}$  below the horizon. At that time, the stars and planets of the first magnitude are just visible. Civil Twilight affords sufficient light to carry on normal day activities.
4. Nautical Twilight is the interval between civil twilight and the time when the true position of the center of the sun is  $12^{\circ}$  below the horizon. Nautical Twilight provides enough illumination to carry on most types of ground movement without difficulty and approaches conditions expected under full light of day.
5. Astronomical Twilight is the interval between civil twilight and the time when the true position of the center of the sun is  $18^{\circ}$  below the horizon. The stars of the sixth magnitude are visible and there is no trace of the twilight glow on the horizon.



Duration of day (sunrise to sunset) in various latitudes. Use scale of dates marked "N" for Northern Hemisphere, scale "S" for Southern Hemisphere. Select date on horizontal scale reading upper portion on either "N" or "S" scale from left to right, lower portion from right to left. Place ruler vertically to scale through date. Obtain intersection with appropriate latitude. Follow horizontally across to ordinate scale of hours on left of diagram and read time interval, in hours, between sunrise and sunset. Time of sunrise or sunset can be approximately obtained by dividing this interval by 2 and subtracting it from or adding it to time of local noon. (504)





Duration of civil twilight in various latitudes. Use scale of date marked "N" for Northern Hemisphere, scale "S" for Southern Hemisphere, reading upper portion of either "N" or "S" scale from left to right, lower portion from right to left. Place ruler vertically to scale through date. Obtain intersection with appropriate latitude line. Follow horizontally across to ordinate scale of hours and read duration of civil twilight at either end of day. To obtain time of beginning or end of civil twilight subtract interval from time of sunrise or add to time of sunset. (504)

**NIGHT BRIGHTNESS CATEGORIES  
AND ESTIMATION OF VISIBILITY POTENTIAL  
(for ground-based employment) (503)**

NIGHT BRIGHTNESS		ESTIMATION OF VISIBILITY POTENTIAL BY OBSERVATION WITH THE NAKED EYE					
(1) Category	(1) Illumination Range	(1) Abbreviated Designation of Night Brightness	(2) Terrain	(2) Recognition of Targets		(2) Orientation Potential	
				Battle Tank from Front	Standing Rifleman	Movement Potential	
1	300-140 mlx	very bright	Shapes clearly visible; details recognizable (with binoculars up to 2 km)	> 350 m	> 150 m	Satisfactory	On roads and in the countryside similar to daytime
2	139-40 mlx	bright	Outlines clearly visible; shape of terrain up to 500 m	150-350 m	80-150 m	Still adequate	On roads and in the countryside with reduced speed
3	39-5 mlx	moderately bright	Horizon and outlines recognizable up to 200 m	70-150 m	40-80 m	Impeded	On roads and in the countryside with substantially reduced speed
4	4.9-2 mlx	moderately dark	Horizon and outlines still recognizable up to 100 m	30-70 m	20-40 m	Substantially impeded	On roads with edge markers; in countryside with recognizable terrain features (edge of forests, etc.)
5	1.9-1.0 mlx	dark	Horizon unclear; outlines recognizable only under 50 m	10-40 m	10-20 m	Strongly impeded	On roads with trees; in the countryside with markers/guides
6	< 1.0 mlx	very dark	Outlines recognizable only under 10 m	< 10 m	< 5 m	None	Only with markers/guides

(1) See GM60 Nighttime Global Illumination Handbook (GM60 Publication No. 19). 1 mlx (millilux) = 1000 lux; 1 lux is the luminous flux radiated from a source having the intensity of one candle; however, 10.76391 lux = 1 foot candle.

(2) Contrasting background; objects contrast clearly with the surrounding shape and cover of the terrain.

## 5. COMFORT INDICES

Apparent temperature, humiture, and humidex are indices that attempt to relate how hot the temperature "feels" to the average person. (509)

Humidex does not appear to be designed for low humidities and seems to be higher than apparent temperature. Humiture tends to read lower than apparent temperature in the lower humidity and temperature ranges.

The temperature-humidity index (THI) is always lower than the apparent temperature. The wet-bulb globe temperature (WBGT) index does not relate to how the air "feels" but is used like a stability index. Wind effect is not considered in THI but is considered in the WBGT index.

<u>THI</u>	70 <sup>0</sup> F	10% of the people feel uncomfortable.
	75 <sup>0</sup> F	50% of the people feel uncomfortable.
	80 <sup>0</sup> F	100% of the people feel uncomfortable.
	85 <sup>0</sup> F	Danger zone

WBGT. When the WBGT Index reaches 82<sup>0</sup>, discretion should be used in planning heavy exercise for unseasoned personnel.

When the WBGT reaches 85<sup>0</sup>, strenuous exercises such as marching at standard cadence should be suspended in unseasoned personnel during their first three weeks of training. At this temperature training activities may be continued on a reduced scale after the second week of training.

Outdoor classes in the sun should be avoided with the WBGT exceeds 85<sup>0</sup>.

When the WBGT reaches 88<sup>0</sup>, strenuous exercise should be curtailed for all recruits and other trainees with less than 12 weeks training in hot weather. Hardened personnel, after having been acclimatized each season, can carry on limited activity at WBGT of 88<sup>0</sup> to 90<sup>0</sup> for periods not exceeding 6 hours a day.



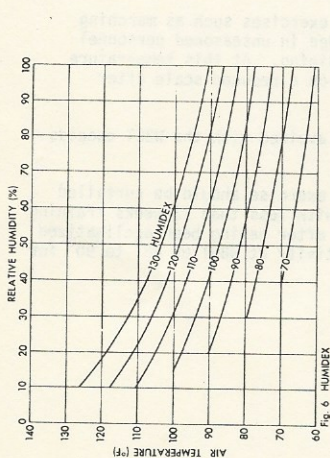


Fig 6 HUMIDEX

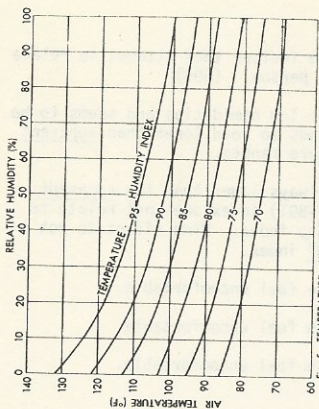
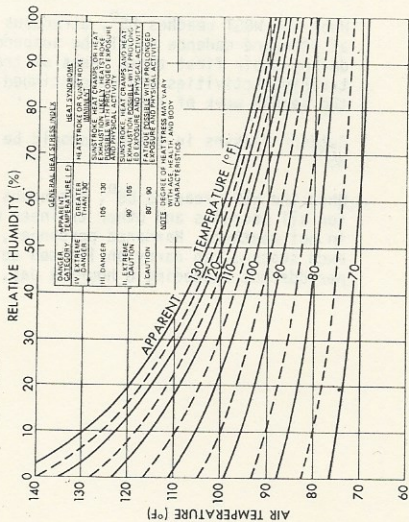


Fig 5 TEMPERATURE - HUMIDITY INDEX

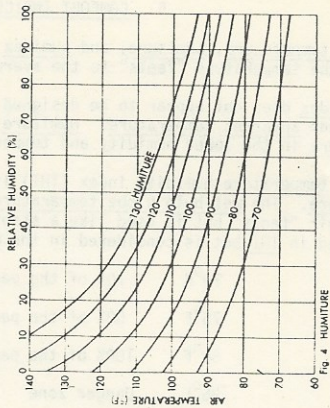
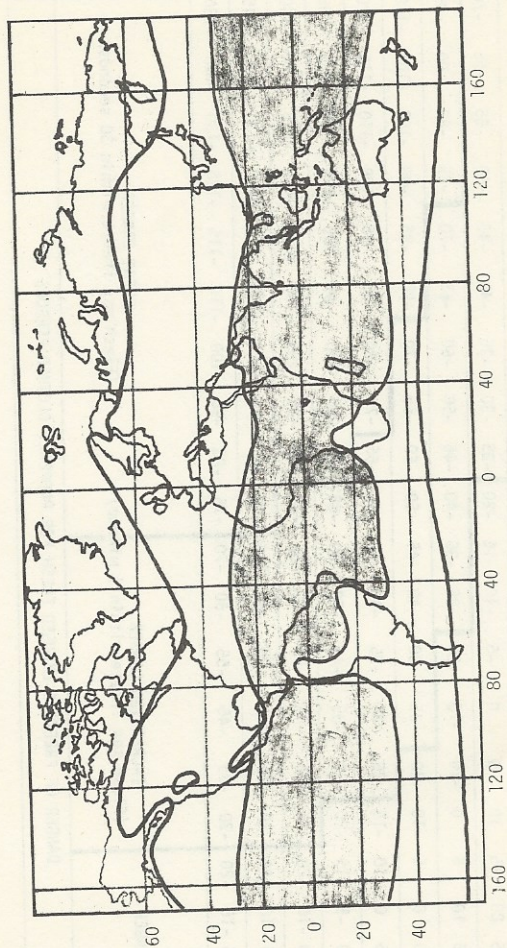


Fig 4 HUMITURE

MAJOR CLOTHING ZONES OF THE EARTH



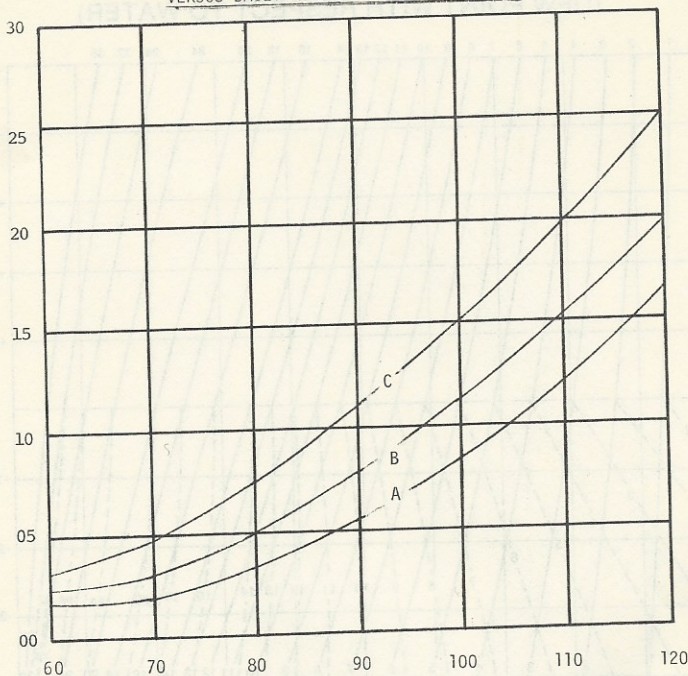
Dark shaded area: tropical zone, warm throughout year. Blank area: moderate zone, regular change between warm and cold season. Light shaded area: polar zone, cold throughout the year. After Berry et. al. (504)

COOLING POWER OF WIND EXPRESSED AS "EQUIVALENT CHILL TEMPERATURE" (505)

WIND SPEED		TEMPERATURE (°F)																						
CALM CALM		40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-60		
KNOTS MPH		EQUIVALENT CHILL TEMPERATURE																						
3-6	5	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-65	-70		
7-10	10	30	20	15	10	5	0	-10	-15	-20	-25	-35	-40	-45	-50	-60	-65	-70	-75	-80	-90	-95		
11-15	15	25	15	10	0	-5	-10	-20	-25	-30	-40	-45	-50	-60	-65	-70	-80	-85	-90	-100	-105	-110		
16-19	20	20	10	5	0	-10	-15	-25	-30	-35	-45	-50	-60	-65	-75	-80	-85	-95	-100	-110	-115	-120		
20-23	25	15	10	0	-5	-15	-20	-30	-35	-45	-50	-60	-65	-75	-80	-90	-95	-105	-110	-120	-125	-135		
24-28	30	10	5	0	-10	-20	-25	-30	-40	-50	-55	-65	-70	-80	-85	-95	-100	-110	-115	-125	-130	-140		
29-32	35	10	5	-5	-10	-20	-30	-35	-40	-50	-60	-65	-75	-80	-90	-100	-105	-115	-120	-130	-135	-145		
33-36	40	10	0	-5	-15	-20	-30	-35	-45	-55	-60	-70	-75	-85	-95	-100	-110	-115	-125	-130	-140	-150		
WINDS ABOVE 40 HAVE LITTLE ADDITIONAL EFFECT.		LITTLE DANGER											INCREASING DANGER (Flesh may freeze within 1 minute)						GREAT DANGER (Flesh may freeze within 30 seconds)					
		DANGER OF FREEZING EXPOSED FLESH FOR PROPERLY CLOTHED PERSONS																						



DAILY WATER REQUIREMENTS FOR THREE LEVELS OF ACTIVITY  
VERSUS DAILY MEAN AIR TEMPERATURE, °F



This graph shows water needs, in quarts per day, for men at three activity levels in relation to the daily mean air temperature.

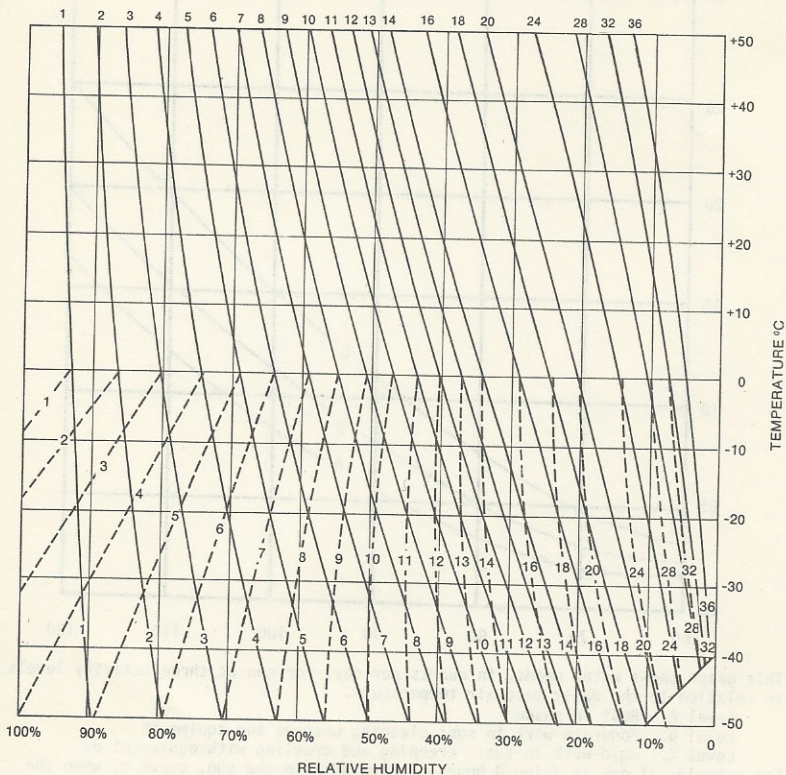
Level A. Rest in shade

Level B. Moderate work in sun: cleaning weapons and equipment

Level C. Hard work in sun: creeping and crawling with equipment on

For example, if one is doing 8 hours of hard work in the sun, curve c, when the average temperature for the day is 100°F, his water requirements for the day will be approximately 15 quarts. (511)

# DEW POINT DEPRESSION IN °C (DEW POINT WITH RESPECT TO WATER)



(SOLID LINES - WITH RESPECT TO WATER  
DASH LINES WITH RESPECT TO ICE)

## 6. WEATHER AND CLOUDS

Balloon Ascension Rates (502) (in feet)				
Time in Minutes and Seconds	10-gram Spherical		30-gram Pibal	
	Day <sup>1</sup>		Day <sup>1,4</sup>	Night <sup>4,5</sup>
	Nozzle lift <sup>2</sup> 40-gr. H or 43-gr. He	Nozzle lift <sup>3</sup> 45-gr. He	Nozzle lift 125-gr. H or 139-gr. He	Nozzle lift 170-gr. H or 192-gr. He
0:10	80	80		120
0:20	170	170		240
0:30	250	250		350
0:40	330	330		470
0:50	400	420		590
1:00	480	500		710
1:10	540	580		820
1:20	610	650		930
1:30	670	730		1,030
1:40	730	810		1,140
1:50	790	880		1,250
2:00	850	960		1,360
2:30	1,030	1,190		1,680
3:00	1,210	1,420		2,010
3:30	1,390	1,650		2,320
4:00	1,570	1,880		2,630
4:30	1,750	2,090		2,940
5:00	1,930	2,300		3,250
5:30	2,110	2,510		3,540
6:00	2,290	2,720		3,840
6:30	2,470	2,930		4,130
7:00	2,650	3,140		4,430
7:30	2,830	3,350		4,720
8:00	3,010	3,560		5,020

NOTES:

- The daytime table for 10- and 30- gram balloons may be used at night when the ML-608 lighting unit is used and attached prior to inflation.
- Add 180 feet for each additional one-half minute after 8 minutes.
- Add 210 feet for each additional one-half minute after 8 minutes.
- Add 295 feet for each additional one-half minute after 8 minutes.
- Attached lighting unit after inflation.

He = helium, H = hydrogen



Estimating Intensity of Precipitation (Other than Drizzle) on Rate-of-Fall Basis (502)

Light	A trace thru 0.10 inch per hour;
Moderate	0.11 inch thru 0.30 inch per hour;
Heavy	More than 0.30 inch per hour;

Estimating the Intensity of Rain

	<u>INDIVIDUAL DROPS</u>	<u>SPRAY OVER HARD SURFACES</u>	<u>PUDDLES</u>
Light	Easily seen.	Hardly any.	Form slowly.
Moderate	Not easily seen.	Noticeable.	Form rapidly.
Heavy	Not identifiable. Rain in sheets.	Heavy, to a height of several inches.	Form very rapidly.

NOTE: The following guide provides a simplified outline of the above descriptions as an aid in readily estimating intensity. (502)

Intensity of Drizzle, Snow Grains, Snow Pellets, or Snow with Visibility as Criteria (502)

Light	Visibility equal to or greater than 5/8 statute mile, 0.55 nautical mile, or 1,000 meters.
Moderate	Visibility 5/16 thru 1/2 statute mile, 0.25 thru 0.5 nautical mile, or 500 thru 900 meters.
Heavy	Visibility equal to or less than 1/4 statute mile, 0.2 nautical mile, or 400 meters.

NOTE: Use this table to determine intensity when the respective type of precipitation (drizzle, snow, etc.) is occurring alone. When occurring with other precipitation or an obstruction to vision, estimate intensity on a rate-of-fall basis.

Estimating the Intensity of Ice Pellets (502)

Light	Few pellets falling with little, if any, accumulation.
Moderate	Slow accumulation.
Heavy	Rapid accumulation.

CLOUD CODES (502)

Low

- 1 Cumulus with little vertical extent and seemingly flattened and/or ragged cumulus other than of bad weather.
- 2 Towering cumulus or cumulus of moderate or strong vertical extent.
- 3 Cumulonimbus where the cloud top is not fibrous, striated nor in the form of an anvil.
- 4 Stratocumulus formed by the spreading out of cumulus.
- 5 Stratocumulus other than that formed from the spreading or flattening of cumulus.
- 6 Stratus in a relatively continuous layer and/or ragged shreds.
- 7 Stratus-fractus and/or cumulus fractus of bad weather; usually below altostratus or nimbostratus.
- 8 Cumulus and stratocumulus (not formed by the spreading out of cumulus) with bases at different levels are present.
- 9 Cumulonimbus where the top is striated or fibrous; including cumulonimbus mammatus, lightning, thunder, or hail where the top is hidden by other clouds.

Middle

- 1 Altostratus, semitransparent or transparent.
- 2 Nimbostratus or opaque altostratus.
- 3 Semitransparent or transparent altocumulus at one level, not progressively invading the sky.
- 4 Altocumulus in semitransparent patches continuously changing in appearance and occurring at one or more levels; include lenticular clouds.
- 5 Altocumulus progressively invading the sky.
- 6 Altocumulus formed by the spreading or flattening of cumulus or cumulonimbus.
- 7 Altocumulus with altostratus or nimbostratus.
- 8 Altocumulus with sprouting in the form of turrets or battlements or in the form of small tufts with or without altostratus or nimbostratus present.
- 9 Altocumulus of a chaotic sky, generally at several levels, with or without altostratus or nimbostratus.

High

- 1 Cirrus in thin filaments, strands, or hooks, not progressively invading the sky.
- 2 Cirrus in dense patches or with sproutings in the form of small tufts or battlements.
- 3 Cirrus, often in the form of an anvil, originating from cumulonimbus.
- 4 Cirrus in hooks, filaments, or strands progressively invading the sky.
- 5 Cirrostratus with or without cirrus progressively invading the sky and the continuous veil extends more than  $45^{\circ}$  above the local horizon.
- 6 Cirrostratus with or without cirrus progressively invading the sky and the continuous veil extends more than  $45^{\circ}$  above the local horizon but does not cover the entire sky.
- 7 Cirrostratus without or without cirrus or cirrocumulus which covers the entire sky.
- 8 Cirrostratus with or without cirrus or cirrocumulus which does not cover the whole sky and is not invading the celestial dome.
- 9 Cirrocumulus, alone or predominant.



APPROXIMATE HEIGHT OF NEW FORMING CUMULUS (501)

$T - T_d$ (°F)	Estimated Cumulus Height (ft)	$T - T_d$ (°C)	Estimated Cumulus Height (ft)
1	200	0.5	200
2	500	1	400
3	700	1.5	600
4	900	2	800
5	1,100	2.5	1,000
6	1,400	3	1,200
7	1,600	3.5	1,400
8	1,800	4	1,600
9	2,000	4.5	1,800
10	2,300	5	2,000
11	2,500	5.5	2,300
12	2,700	6	2,500
13	3,000	6.5	2,700
14	3,200	7	2,900
15	3,400	7.5	3,100
16	3,600	8	3,300
17	3,900	8.5	3,500
18	4,100	9	3,700
19	4,300	9.5	3,900
20	4,500	10	4,100
21	4,800	10.5	4,300
22	5,000	11	4,500
		11.5	4,700
		12	4,900
		12.5	5,000

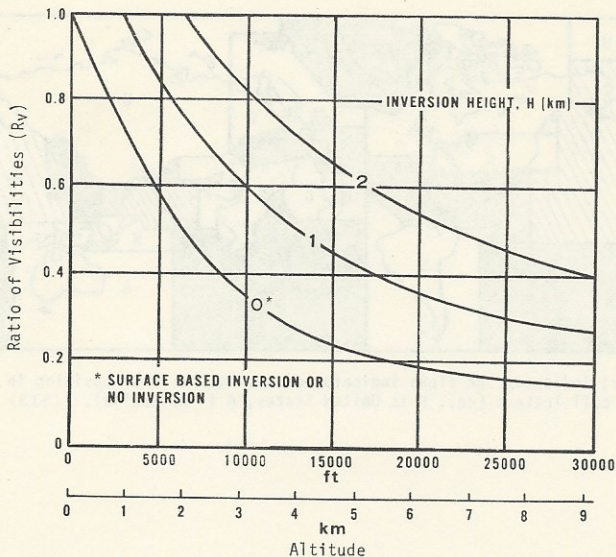
NOTES: This table is not suitable for use at stations situated in mountainous or hilly terrain, and it should be used only when the clouds present are formed by active surface convection in the vicinity of the station. Also, it should be used with caution when the surface temperature is below freezing (due to the difficulties inherent in the accurate determination of the dew point at low temperatures). The temperature factor is based on the difference between the air and dew point temperature. Reportable height values between those in the table may be obtained by means of interpolation, using the difference to the nearest tenth of a degree.

Probabilities of Cloud-Free Line-of-Sight (CFLOS) as a Function of Look Angle and Total Sky Cover Below Sensor Altitude (501)

Look Angle (deg)	Tenths										
	0	1	2	3	4	5	6	7	8	9	10
90	1.00	0.97	0.92	0.87	0.81	0.77	0.70	0.62	0.48	0.31	0.08
80	0.99	0.97	0.92	0.87	0.81	0.77	0.69	0.61	0.47	0.31	0.08
70	0.99	0.97	0.91	0.86	0.80	0.76	0.68	0.61	0.47	0.30	0.08
60	0.99	0.96	0.90	0.85	0.80	0.75	0.66	0.60	0.46	0.29	0.08
50	0.99	0.96	0.90	0.85	0.78	0.73	0.64	0.58	0.45	0.29	0.08
40	0.99	0.95	0.88	0.83	0.76	0.71	0.62	0.55	0.42	0.27	0.07
30	0.98	0.93	0.86	0.80	0.73	0.66	0.57	0.50	0.38	0.24	0.06
20	0.98	0.90	0.83	0.75	0.67	0.59	0.50	0.42	0.33	0.21	0.05
10	0.97	0.86	0.76	0.65	0.55	0.47	0.39	0.32	0.24	0.16	0.03
8*	0.96	0.84	0.74	0.60	0.51	0.42	0.35	0.28	0.22	0.13	0.02
5*	0.93	0.80	0.66	0.50	0.42	0.35	0.26	0.22	0.17	0.10	0.01
2*	0.85	0.65	0.45	0.39	0.33	0.21	0.11	0.10	0.09	0.05	0.00

\*Values based on extrapolation of data.

## SLANT RANGE VISIBILITY



To determine slant range visibility:

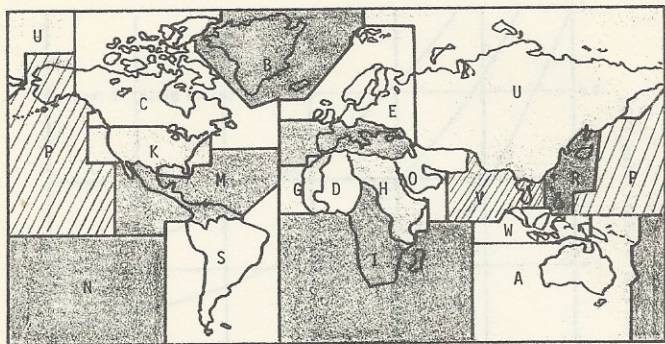
1. Enter the table with the inversion height and desired altitude to find the ratio of visibilities ( $R_v$ ).

2. Use  $R_v$  in the formula:  $V_s = V/R_v$ , where  $V_s$  is the slant range visibility,  $V$  is the surface visibility, and  $R_v$  is the ratio of visibilities.

3. eg., the inversion height is 1 km, aircraft altitude is 10,000 feet, and the surface visibility is 3 nautical miles. Substituting into the formula,  $V_s = 3/0.6$ .  $V_s = 5$  nautical miles. (501)



ENCODE/DECODE STATION CALL LETTERS



The chart indicates the alpha indicator occupying the first position in the station call letters (eq., K is United States, A is Australia). (512)

AH	Afghanistan	UB	Egypt
AB	Albania	EG	Equatorial Guinea
AL	Algeria	ET	Ethiopia
AN	Angola		
AA	Antarctica	FA	Faeroes
AT	Antigua, St. Kitts, and British Islands Vicinty	FK	Falkland Islands (Malvinas)
AG	Argentina	FI	Finland
NU	Aruba	FR	France
AT	Ascension Island	FG	French Guiana
AU	Australia	OF	French Polynesia
OS	Austria		
AZ	Azores	GO	Gabon
		GB	Gambia
BA	Bahamas	DD	Germany, Democratic Republic of
BN	Bahrain	DL	Germany (Federal Republic)
BW	Bangladesh	GH	Ghana
BR	Barbados	GI	Gibraltar
BH	Belize	GT	Kiribati (Gilbert Islands)
BX	Belgium and Luxembourg	GR	Greece
BJ	Benin	GL	Greenland
BE	Bermuda	MF	Guadeloupe
BO	Bolivia	GM	Guam
NU	Bonaire	GU	Guatemala
BC	Botswana	GN	Guinea
BC	Bouvet Islands	PG	Guinea/Bissau
BZ	Brazil	GY	Guyana
BF	Brunei		
BU	Bulgaria	HQ	Haiti
BM	Burma	HO	Honduras
BI	Burundi	HK	Hong Kong
		HU	Hungary
CM	Cameroon	IL	Iceland
CN	Canada	IN	India
CR	Canary Islands, (Spain)	ID	Indonesia
CT	Canton Island	IR	Iran
CV	Cape Verde Island	IQ	Iraq
CA	Caribbean	IE	Ireland
KA	Caroline Islands	IS	Israel
GC	Caymen Islands	IW	Israel-Jordon DMS
CE	Central African Empire	IY	Italy
CB	Chad	IV	Ivory Coast
CH	Chile		
CI	China, Peoples Republic of	JM	Jamaica
KI	Christmas Islands	JP	Japan
CO	Colombia	TJ	Jordan
KM	Comoro Islanda		
CS	Costa Rica	CD	Kampuchea, (Democratic)
CU	Cuba	KS	Kashmir
NU	Curacao	KN	Kenya
CY	Cyprus	KO	Korea, Repbulic of
CZ	Czechoslovakia	KW	Kuwait
DN	Denmark	LA	Lao Peoples Democratic Republic
DJ	Djibouti	LB	Lebanon
DO	Dominica	LS	Lesotho
DR	Dominican Republic	LI	Liberia
		LY	Libya
EQ	Equador	LT	Lichtenstein
EL	El Salvador	BX	Luxembourg and Belgium

MU	Macao	SD	Saudi Arabia
MG	Madagascar	SG	Senegal
MD	Maderia	SC	Seychelles Islands
MW	Malawi	SL	Sierra Leone
MS	Malaysia	SR	Singapore
MV	Maldive Islands	SO	Solomon Islands
FS	Malt	SI	Somalia
ML	Malta	ZA	South Africa
MY	Mariana Islands	PS	South Pacific
MH	Marshall Islands	SP	Spain
MR	Martinique	CL	Sri Lanka
MT	Mauritania	MF	St. Bartholomew
MA	Mauritius	MN	St. Eustatius
MX	Mexico	HE	St. Helena
MO	Mongolia	AT	St. Kitts
MC	Morocco	LC	St. Lucia
MZ	Mozambique	MN	St. Maarten
OM	Muscat and Oman	MF	St. Martin
		SU	Sudan
NM	Namibia	SM	Suriname
NR	Nauru	SV	Swaziland
NP	Nepal	SN	Sweden
NL	Netherlands	SW	Switzerland
NU	Netherlands Antilles (Aruba, Bonaire, Curacao)	SY	Syrian Arab Republic
NC	New Caledonia and Loyalty Is.	TW	Taiwan
NG	New Guinea	TN	Tanzania, United Republic of
NY	New Hebrides	TH	Thailand
NZ	New Zealand	TD	Tabago and Trinidad
NK	Nicaragua	TG	Togo
FN	Niger	TK	Tokelau Islands
NI	Nigeria	TO	Tonga
UK	Northern Ireland and United Kingdom	TD	Trinidad and Tobago
PN	North Pacific	TS	Tunisia
NO	Norway	TU	Turkey
		TI	Turks Island
OM	Oman and Muscat	UG	Uganda
		ER	United Arab Emirates
PK	Pakistan	UK	United Kingdom and Northern Ireland
PM	Panama	US	United States of America
PY	Paraguay	HV	Upper Volta
PR	Peru	UY	Uruguay
PH	Philippines	RA	U.S.S.R. Asia
PI	Phoenix Islands	RS	U.S.S.R. Europe
PT	Pitcairn Islands		
PL	Poland	YS	Viet Nam (Socialist Republic of)
PO	Portugal	VN	Venezuela
PP	Portuguese Timor	VI	Virgin Islands
PU	Puerto Rico		
		WK	Wake Island
QT	Qatar	ZM	Western Samoa
RE	Reunion and Associated Islands	YE	Yemen
RI	Rio De Oro	AD	Yemen, (Democratic)
RO	Romania	YG	Yugoslavia
RW	Rwanda		
		ZR	Zaire
MN	Saba	ZB	Zambia
TP	Sao Tome and Principe Islands	RH	Zimbabwe (Rhodesia)
SK	Sarawak		



AA	Antarctica	ES	El Salvador
AB	Albania	ET	Ethiopia
AD	Yemen, (Democratic)		
AG	Argentina	FA	Faeroes
AH	Afghanistan	FG	French Guiana
AI	Ascension Island	FI	Finland
AL	Algeria	FJ	Fiji Islands
AN	Angola	FK	Falkland Island (Malvins)
AT	Antigua, St. Kitts, and British Islands Vicinty	FN	Niger
AU	Australia	FR	France
AZ	Azores	FS	Mali
BA	Bahamas	GB	Gambia
BC	Botswana	GC	Caymen Island
BE	Bermuda	GH	Ghana
BF	Brunei	GI	Gibraltar
BH	Belize	GL	Greenland
BI	Burundi	GM	Guam
BJ	Benin	GN	Guinea
BM	Burma	GO	Gabon
BN	Bahrain	GR	Greece
BO	Bolivia	GT	Kiribati (Gilbert Islands)
BR	Barbados	GU	Guatemala
BU	Bulgaria	GY	Guyana
BV	Bouvet Islands		
BW	Bangladesh	HA	Haiti
BX	Belgium and Luxembourg	HE	St. Helena
BZ	Brazil	HK	Hong Kong
		HO	Honduras
		HU	Hungary
		HV	Upper Volta
CA	Caribbean		
CB	Chad	ID	Indonesia
CD	Kampuchea, (Democratic)	IE	Ireland
CE	Central Africa	IL	Iceland
CG	Congo	IN	India
CH	Chile	IQ	Iraq
CI	China, Peoples Republic of	IR	Iran
CL	Sri Lanka	IS	Israel
CM	Cameroon	IV	Ivory Coast
CN	Canada	IW	Israel-Jordan DMS
CO	Colombia	IY	Italy
CR	Canary Islands, (Spain)		
CS	Costa Rica	JM	Jamaica
CT	Canton Island	JP	Japan
CU	Cuba		
CV	Cape Verde Island	KA	Caroline Islands
CY	Cyprus	KI	Christmas Islands
CZ	Czechoslovakia	KM	Comoro Islands
		KN	Kenya
DD	Germany, Democratic Republic of	KO	Korea, Republic of
DJ	Djibouti	KS	Kashmir
DL	Germany (Federal Republic)	KU	Cook Islands
DN	Denmark	KW	Kuwait
DO	Dominica		
DR	Dominican Republic	LA	Lao Peoples Democratic Republic
		LB	Lebanon
EG	Equatorial Guinea	LC	St. Lucia
EL	Tuvalu (Ellice Islands)	LI	Liberia
EQ	Equador	LS	Lesotho
ER	United Arab Emirates		

LT	Liechtenstein	RA	U.S.S.R. Asia
LY	Libya	RE	Reunion and Associated Islands
		RH	Zimbabwe (Rhodesia)
MA	Mauritius	RI	Rio De Oro
MC	Morocco	RO	Romania
MD	Maderia	RS	U.S.S.R. Europe
MF	St. Martin, St. Batholomew, Guadeloupe, & French Islands Vcnty	RW	Rwanda
		SC	Seychelles Islands
MG	Madagascar	SD	Saudi Arabia
MH	Marshall Islands	SF	Djibouti
ML	Malta	SG	Senegal
MN	St. Maarten, St. Eustatius, Saba	SI	Somalia
MO	Mongolia	SK	Sarawak
MR	Martinique	SL	Sierra Leone
MS	Malaysia	SM	Suriname
MT	Mauritania	SN	Sweden
MU	Macao	SO	Solomon Islands
MV	Maldive Islands	SP	Spain
MW	Malawi	SR	Singapore
MX	Mexico	SU	Sudan
MY	Marianna Islands	SV	Swaziland
MZ	Mozambique	SW	Switzerland
		SY	Syrian Arab Republic
NC	New Caledonia and Loyalty Is.		
NG	New Guinea	TD	Trinidad and Tobago
NH	New Hebrides	TG	Togo
NI	Nigeria	TH	Thailand
NK	Nicaragua	TI	Turks Islands
NL	Netherlands	TJ	Jordon
NM	Namibia	TK	Tokelau Islands
NO	Norway	TN	Tanzania, United Republic of
NP	Nepal	TO	Tonga
NR	Nauru	TP	Sao Tome and Principe Islands
NU	Netherland Antilles (Aruba, Bonaire, Curacao)	TS	Tunisia
NZ	New Zealand	TU	Turkey
		TW	Taiwan
OF	French Polynesia	UR	Egypt
OM	Muscat and Oman	UG	Uganda
OS	Austria	UK	United Kingdom and Northern Ireland
		US	United States of America
PG	Guinea/Bissau	UY	Uruguay
PH	Phillipines		
PI	Phoenix Islands	VI	Virgin Islands
PK	Pakistan	VN	Venezuela
PL	Poland	VS	Socialist Republic of Viet Nam
PM	Panama		
PN	North Pacific	WK	Wake Island
PO	Portugal		
PP	Portuguese Timor	YE	Yemen
PR	Peru	YG	Yugoslavia
PS	South Pacific		
PT	Pitcairn Islands		
PU	Puerto Rico	ZA	South Africa
PY	Paraguay	ZB	Zambia
		ZM	Western Samoa
QT	Qatar	ZR	Zaire

Distance to Objects on the Horizon at Sea (Nautical Miles) (502)

Height of observer's eyes above sea level (feet)	Height of object above sea level (feet)														
	0	10	20	30	40	60	80	100	150	200	300	400	600	800	1,000
10.....	3.8	7.2	8.7	9.9	10.8	12.5	13.9	15.1	17.7	19.8	23.5	26.5	31.6	36.0	39.8
15.....	4.6	8.0	9.5	10.7	11.6	13.3	14.7	15.9	18.5	20.6	24.3	27.3	32.4	36.8	40.6
20.....	5.4	8.7	10.2	11.4	12.3	14.0	15.4	16.6	19.2	21.3	25.0	28.0	33.1	37.5	41.3
25.....	6.0	9.3	10.8	12.0	12.9	14.6	16.0	17.2	19.8	21.9	25.6	28.6	33.7	38.1	41.9
30.....	6.6	9.9	11.4	12.6	13.5	15.2	16.6	17.8	20.4	22.5	26.2	29.2	34.3	38.7	42.5
35.....	7.1	10.4	11.9	13.1	14.0	15.7	17.1	18.3	20.9	23.0	26.7	29.7	34.8	39.2	43.0
40.....	7.6	10.8	12.3	13.5	14.4	16.1	17.5	18.7	21.3	23.4	27.1	30.1	35.2	39.6	43.4
45.....	8.0	11.3	12.8	14.0	14.9	16.6	18.0	19.2	21.8	23.9	27.6	30.6	35.7	40.1	43.9
50.....	8.5	11.7	13.2	14.4	15.3	17.0	18.4	19.6	22.2	24.3	28.0	31.0	36.1	40.5	44.3
60.....	9.3	12.5	14.0	15.2	16.1	17.8	19.2	20.4	23.0	25.1	28.8	31.8	36.9	41.3	45.1
70.....	10.0	13.2	14.7	15.9	16.8	18.5	19.9	21.1	23.7	25.8	29.5	32.5	37.6	42.0	45.8
80.....	10.7	13.9	15.4	16.6	17.5	19.2	20.6	21.8	24.4	26.5	30.2	33.2	38.3	42.7	46.5
90.....	11.4	14.5	16.0	17.2	18.1	19.8	21.2	22.4	25.0	27.1	30.8	33.8	38.9	43.3	47.1
100.....	12.0	15.1	16.6	17.8	18.7	20.4	21.8	23.0	25.6	27.7	31.4	34.4	39.5	43.9	47.7

Horizon



PHONETIC ALPHABET

A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Joliet	W	Whisky
K	Kilo	X	Xray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

EXCULPATIONS

GROUP A	GROUP B	GROUP C
0 INTEGRATED	0 THERMAL	0 EQUILIBRIUM
1 PSUEDO	1 VORTICITY	1 TRANSFER
2 DYNAMIC	2 SOLENOIDAL	2 STRATIFICATION
3 POTENTIAL	3 MOLECULAR	3 BALANCE
4 DIURNAL	4 OROGRAPHIC	4 FIELD
5 STRATOSPHERIC	5 TURBULENT	5 CORRELATION
6 CUMULATIVE	6 SOLAR	6 DISCONTINUITY
7 ABSOLUTE	7 INERTIAL	7 ADVECTION
8 KINEMATIC	8 ROTATIONAL	8 TRAJECTORY
9 CONDITIONAL	9 VAPOR	9 FUNCTION

The above table provides one thousand technical terms which can be used for all of the above purposes.

For example ... The local pilot wants to know why yesterday's forecast went to pot. First, think of a three digit number such as 208. Use the above table. . . . Number 2 in Group A . . . 0 in Group B . . . and 8 in Group C. Then immediately state that the dynamic thermal trajectory was in error so you had 6 inches of rain instead of sunny skies. Who would want to question that . . .

These phrases are also handy for use in forecasts when in doubt of what will happen.

