

APPENDIX A

THE METRIC SYSTEM AND METRIC UNIT CONVERSION CHARTS

The Metric System simply and logically coordinates the measurements of length, area, volume, and mass into one decimalized system. United States currency, with its unexcelled convenience, was the first large scale national use of a decimal system. The ratio between the units of the series - dollars, dimes, cents, and mills - is ten. Additions and other numerical operations are simple. Calculations with metric units require no conversion from unit to unit, as for example between inches and feet or ounces and pounds.

In the Metric System there is one series of units for length, one for area, one for volume or capacity, one for mass, and one for temperature.

LENGTH - The common metric units of length are the millimeter (mm) for small dimensions, the centimeter (cm) for daily practical use, the meter (m) for expressing dimensions of larger objects and short distances and the kilometer (km) for longer distances. The centimeter is about four-tenths of an inch. The meter is about forty inches and the kilometer about six-tenths of a mile ([figure A-1](#)). When drawing to metric scale, engineering and product dimensions are in millimeters. Architectural drawings can be in millimeters or centimeters. On land surveys the unit is the meter. On maps the kilometer is the unit of measurement.

AREA - Small areas are usually measured in square centimeters (cm²). In building and construction the square meter (m²) is used and is about 20 percent larger than a square yard. The hectare (ha) is used for land surveys and is about 2.5 acres.

VOLUME - For volume the most convenient unit is the cubic decimeter (dm³), referred to as the liter (l). The liter is slightly larger than the U.S. liquid quart but smaller than the U.S. dry quart and the British Imperial quart. The preferred unit for dispensing unit for dispensing drugs and for scientific work is the cubic centimeter (cm³) or milliliter (ml) as it is also called. For measuring amounts of concrete and excavations the cubic meter (m³) is used.

MASS - In pharmaceutical and scientific work the gram (g) is the most convenient unit. There are slightly less than 30 grams in one avoirdupois ounce. For most other uses the kilogram (kg) is convenient and is approximately 2.2 pounds. The metric ton (t), 1000 kg, is used for farm commodities, minerals, and large shipments. It is convenient that a liter of pure water at standard temperature and pressure has a mass of one kilogram (discrepancy less than one part in 10,000). This relationship makes it easy to determine the mass of any known volume of water, or of any other liquid if its specific gravity is known.

TEMPERATURE - All countries using the Metric System of weights and measures also use the Celsius (C) scale (formerly called centigrade) for ordinary measurement of temperature. On the Celsius scale pure water at standard atmospheric pressure freezes at 0 and boils at 100. Normal human body temperature is 37°, while a comfortable room temperature is about 22°. The preferred temperature scale for engineering and physics is the kelvin (K) which has the same units as the Celsius and where the freezing point of pure water is 273.15 K.

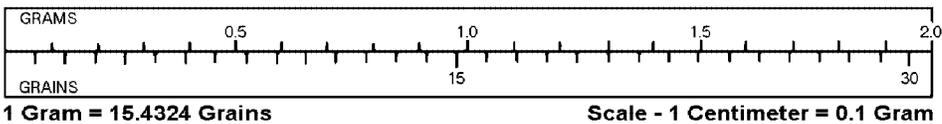
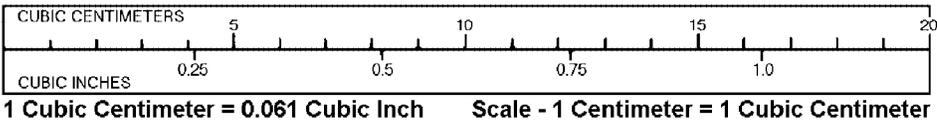
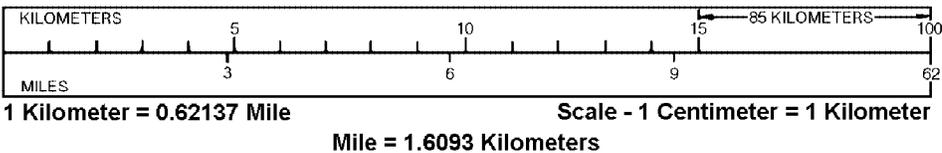
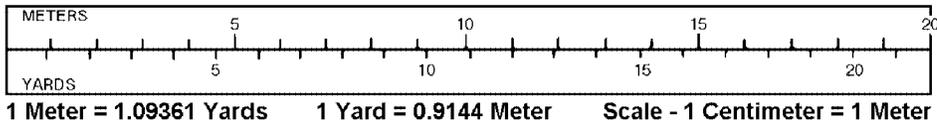
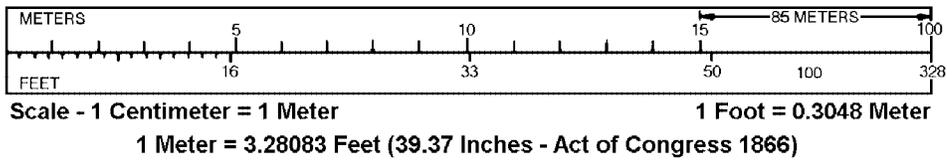
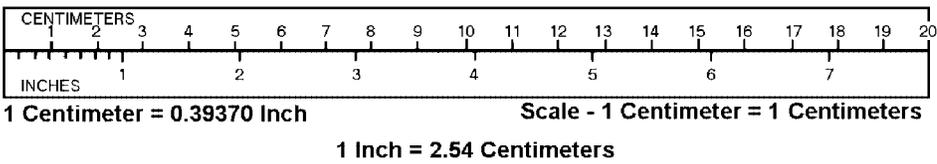
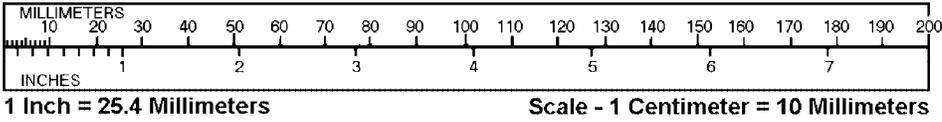
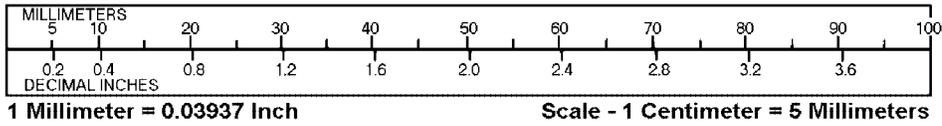
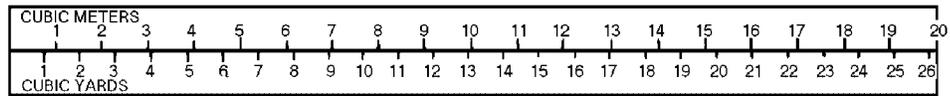
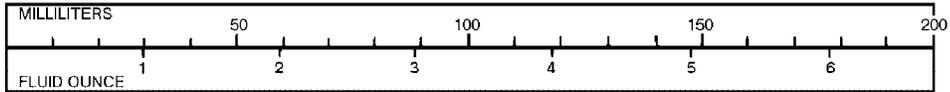


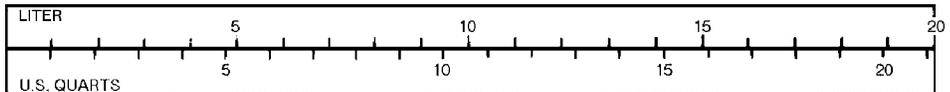
Figure A-1. Reference Conversion Charts (Sheet 1 of 2)



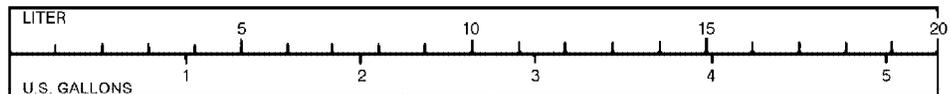
1 Cubic Meter = 1.30795 Cubic meter **Scale - 1 Centimeter = 1 Cubic Meter**
1 Cubic Yard = 0.76455 Cubic meter



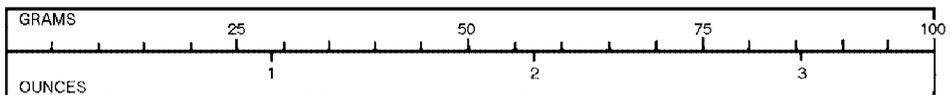
1 Milliliter = 0.03381 Fluid Ounce **Scale - 1 Centimeter = 10 Milliliter**
1 Fluid Ounce = 29.57 Milliliters



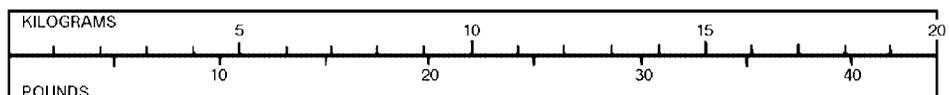
1 Liter = 1.0567 U.S. Quarts **1 U.S. Quart = 0.9463 Liter** **Scale - 1 Centimeter = 1 Liter**



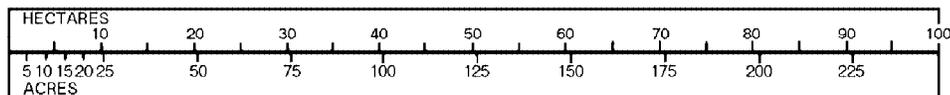
1 Liter = 0.26418 U.S. Gallon **Scale - 1 Centimeter = 1 Liter**
1 U.S. Gallon = 3.7853 Liters



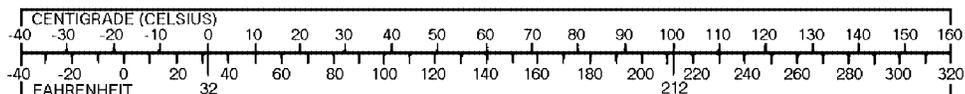
1 Avoirdupois ounce = 28.3495 Grams **Scale - 1 Centimeter = 5 Grams**



1 Kilogram = 2.2045 Pounds **Scale - 1 Centimeter = 1 Kilogram**
1 Pound = 0.45359 Kilogram



1 Hectare = 2.47105 Acres **Scale - 1 Centimeter = 5 Hectares**
1 Acres = 0.40489 Hectares **40 Acres = 16.19 Hectares**



Fahrenheit = 9/5 Centigrade plus 32 **Scale - 1 Centigrade = 10° Centigrade**
Centigrade = Fahrenheit minus 32 x 5/9

Figure A-1. Reference Conversion Charts (Sheet 2 of 2)

Table A-1. Symbols and Relationships of Metric Units

Quantity	Unit (Note 1)	Symbol	Relationship of Units
Length	millimeter	mm	1 mm = 0.001 m
	centimeter	cm	1 cm = 10 mm
	decimeter	dm	1 dm = 10 cm
	<u>meter (Note 2)</u>	m	1 m = 100 cm
	kilometer	km	1 km = 1000 m
Area	square centimeter	cm ²	1 cm ² = 100 mm ²
	square decimeter	dm ²	1 dm ² = 100 cm ²
	<u>square meter (Note 2)</u>	m ²	1 m ² = 100 dm ²
	are	a	1 a = 100 m ²
	hectare	ha	1 ha = 100 a
square kilometer	km ²	1 km ² = 100 ha	
Volume	{ cubic centimeter	cm ³	1 cm ³ } = 0.001 l
	{ millimeter		
	{ cubic decimeter	dm ³	1 dm ³ } = 1000 ml
	{ liter		
	<u>cubic meter (Note 2)</u>	m ³	1 m ³ = 1000 l
Mass*	milligram	mg	1 mg = 0.001 g
	gram	g	1 g = 1000 mg
	<u>kilogram (Note 2)</u>	kg	1 kg = 1000 g
	metric ton	t	1 t = 1000 kg

*Mass is the quantity of matter. Weight is a force Earth's attraction for a given mass. Generally the term mass is meant when we use weight.

- Notes:
1. The three main units; meter liter and gram can be changed to more convenient sized units for specific purposes by means of several well known prefixes. Milli means 1/1000. Centi means 1/100. Deci means 1/10. Kilo means 1000. One merely learns the main units and the value of the most commonly used prefixes. The symbols for metric units are the same for single and plural amounts and are not followed by a period. Rates are usually shown by use of the slash as in m/s.
 2. The underlined units in this table are basic or derived units of the International System of Units (SI).

Table A-2. Inches to Millimeters Conversion Chart

Inch	mm								
.001	0.0254	.051	1.2954	.101	2.5654	.151	3.8354	.201	5.1054
.002	0.0508	.052	1.3208	.102	2.5908	.152	3.8608	.202	5.1308
.003	0.0762	.053	1.3462	.103	2.6162	.153	3.8862	.203	5.1562
.004	0.1016	.054	1.3716	.104	2.6416	.154	3.9116	.204	5.1816
.005	0.1270	.055	1.3970	.105	2.6670	.155	3.9370	.205	5.2070
.006	0.1524	.056	1.4224	.106	2.6924	.156	3.9624	.206	5.2324
.007	0.1778	.057	1.4478	.107	2.7178	.157	3.9878	.207	5.2578
.008	0.2032	.058	1.4732	.108	2.7432	.158	4.0132	.208	5.2832
.009	0.2286	.059	1.4986	.109	2.7686	.159	4.0386	.209	5.3086
.010	0.2540	.060	1.5240	.110	2.7940	.160	4.0640	.210	5.3340
.011	0.2794	.061	1.5494	.111	2.8194	.161	4.0894	.211	5.3594
.012	0.3048	.062	1.5748	.112	2.8448	.162	4.1148	.212	5.3848
.013	0.3302	.063	1.6002	.113	2.8702	.163	4.1402	.213	5.4102
.014	0.3556	.064	1.6256	.114	2.8956	.164	4.1656	.214	5.4356
.015	0.3810	.065	1.6510	.115	2.9210	.165	4.1910	.215	5.4610
.016	0.4064	.066	1.6764	.116	2.9464	.166	4.2164	.216	5.4864
.017	0.4318	.067	1.7018	.117	2.9718	.167	4.2418	.217	5.5118
.018	0.4572	.068	1.7272	.118	2.9972	.168	4.2672	.218	5.5372
.019	0.4826	.069	1.7526	.119	3.0226	.169	4.2926	.219	5.5626
.020	0.5080	.070	1.7780	.120	3.0480	.170	4.3180	.220	5.5880
.021	0.5334	.071	1.8034	.121	3.0734	.171	4.3434	.221	5.6134
.022	0.5588	.072	1.8288	.122	3.0988	.172	4.3688	.222	5.6388
.023	0.5842	.073	1.8542	.123	3.1242	.173	4.3942	.223	5.6642
.024	0.6096	.074	1.8796	.124	3.1496	.174	4.4196	.224	5.6896
.025	0.6350	.075	1.9050	.125	3.1750	.175	4.4450	.225	5.7150
.026	0.6604	.076	1.9304	.126	3.2004	.176	4.4704	.226	5.7404
.027	0.6858	.077	1.9558	.127	3.2258	.177	4.4958	.227	5.7658
.028	0.7112	.078	1.9812	.128	3.2512	.178	4.5212	.228	5.7912
.029	0.7366	.079	2.0066	.129	3.2766	.179	4.5466	.229	5.8166
.030	0.7620	.080	2.0320	.130	3.3020	.180	4.5720	.230	5.8420
.031	0.7874	.081	2.0574	.131	3.3274	.181	4.5974	.231	5.8674
.032	0.8128	.082	2.0828	.132	3.3528	.182	4.6228	.232	5.8928
.033	0.8382	.083	2.1082	.133	3.3782	.183	4.6482	.233	5.9182
.034	0.8636	.084	2.1336	.134	3.4036	.184	4.6736	.234	5.9436
.035	0.8890	.085	2.1590	.135	3.4290	.185	4.6990	.235	5.9690
.036	0.9144	.086	2.1844	.136	3.4544	.186	4.7244	.236	5.9944
.037	0.9398	.087	2.2098	.137	3.4798	.187	4.7498	.237	6.0198
.038	0.9652	.088	2.2352	.138	3.5052	.188	4.7752	.238	6.0452
.039	0.9906	.089	2.2606	.139	3.5306	.189	4.8006	.239	6.0706
.040	1.0160	.090	2.2860	.140	3.5560	.190	4.8260	.240	6.0960
.041	1.0414	.091	2.3114	.141	3.5814	.191	4.8514	.241	6.1214
.042	1.0668	.092	2.3368	.142	3.6068	.192	4.8768	.242	6.1468
.043	1.0922	.093	2.3622	.143	3.6322	.193	4.9022	.243	6.1722
.044	1.1176	.094	2.3876	.144	3.6576	.194	4.9276	.244	6.1976
.045	1.1430	.095	2.4130	.145	3.6830	.195	4.9530	.245	6.2230
.046	1.1684	.096	2.4384	.146	3.7084	.196	4.9784	.246	6.2484
.047	1.1938	.097	2.4638	.147	3.7338	.197	5.0038	.247	6.2738
.048	1.2192	.098	2.4892	.148	3.7592	.198	5.0292	.248	6.2992
.049	1.2446	.099	2.5146	.149	3.7846	.199	5.0546	.249	6.3246
.050	1.2700	.100	2.5400	.150	3.8100	.200	5.0800	.250	6.3500

Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
.251	6.3754	.301	7.6454	.351	8.9154	.401	10.1854	.451	11.4554
.252	6.4008	.302	7.6708	.352	8.9408	.402	10.2108	.452	11.4808
.253	6.4262	.303	7.6962	.353	8.9662	.403	10.2362	.453	11.5062
.254	6.4516	.304	7.7216	.354	8.9916	.404	10.2616	.454	11.5316
.255	6.4770	.305	7.7470	.355	9.0170	.405	10.2870	.455	11.5570
.256	6.5024	.306	7.7724	.356	9.0424	.406	10.3124	.456	11.5824
.257	6.5278	.307	7.7978	.357	9.0678	.407	10.3378	.457	11.6078
.258	6.5532	.308	7.8232	.358	9.0932	.408	10.3632	.458	11.6332
.259	6.5786	.309	7.8486	.359	9.1186	.409	10.3886	.459	11.6586
.260	6.6040	.310	7.8740	.360	9.1440	.410	10.4140	.460	11.6840
.261	6.6294	.311	7.8994	.361	9.1694	.411	10.4394	.461	11.7094
.262	6.6548	.312	7.9248	.362	9.1948	.412	10.4648	.462	11.7348
.263	6.6802	.313	7.9502	.363	9.2202	.413	10.4902	.463	11.7602
.264	6.7056	.314	7.9756	.364	9.2456	.414	10.5156	.464	11.7856
.265	6.7310	.315	8.0010	.365	9.2710	.415	10.5410	.465	11.8110
.266	6.7564	.316	8.0264	.366	9.2964	.416	10.5664	.466	11.8364
.267	6.7818	.317	8.0518	.367	9.3218	.417	10.5918	.467	11.8618
.268	6.8072	.318	8.0772	.368	9.3472	.418	10.6172	.468	11.8872
.269	6.8326	.319	8.1026	.369	9.3726	.419	10.6426	.469	11.9126
.270	6.8580	.320	8.1280	.370	9.3980	.420	10.6680	.470	11.9380
.271	6.8834	.321	8.1534	.371	9.4234	.421	10.6934	.471	11.9634
.272	6.9088	.322	8.1788	.372	9.4488	.422	10.7188	.472	11.9888
.273	6.9342	.323	8.2042	.373	9.4742	.423	10.7442	.473	12.0142
.274	6.9596	.324	8.2296	.374	9.4996	.424	10.7696	.474	12.0396
.275	6.9850	.325	8.2550	.375	9.5250	.425	10.7950	.475	12.0650
.276	7.0104	.326	8.2804	.376	9.5504	.426	10.8204	.476	12.0904
.277	7.0358	.327	8.3058	.377	9.5758	.427	10.8458	.477	12.1158
.278	7.0612	.328	8.3312	.378	9.6012	.428	10.8712	.478	12.1412
.279	7.0866	.329	8.3566	.379	9.6266	.429	10.8966	.479	12.1666
.280	7.1120	.330	8.3820	.380	9.6520	.430	10.9220	.480	12.1920
.281	7.1374	.331	8.4074	.381	9.6774	.431	10.9474	.481	12.2174
.282	7.1628	.332	8.4328	.382	9.7028	.432	10.9728	.482	12.2428
.283	7.1882	.333	8.4582	.383	9.7282	.433	10.9982	.483	12.2682
.284	7.2136	.334	8.4836	.384	9.7536	.434	11.0236	.484	12.2936
.285	7.2390	.335	8.5090	.385	9.7790	.435	11.0490	.485	12.3190
.286	7.2644	.336	8.5344	.386	9.8044	.436	11.0744	.486	12.3444
.287	7.2898	.337	8.5598	.387	9.8298	.437	11.0998	.487	12.3698
.288	7.3152	.338	8.5852	.388	9.8552	.438	11.1252	.488	12.3952
.289	7.3406	.339	8.6106	.389	9.8806	.439	11.1506	.489	12.4206
.290	7.3660	.340	8.6360	.390	9.9060	.440	11.1760	.490	12.4460
.291	7.3914	.341	8.6614	.391	9.9314	.441	11.2014	.491	12.4714
.292	7.4168	.342	8.6868	.392	9.9568	.442	11.2268	.492	12.4968
.293	7.4422	.343	8.7122	.393	9.9822	.443	11.2522	.493	12.5222
.294	7.4676	.344	8.7376	.394	10.0076	.444	11.2776	.494	12.5476
.295	7.4930	.345	8.7630	.395	10.0330	.445	11.3030	.495	12.5730
.296	7.5184	.346	8.7884	.396	10.0584	.446	11.3284	.496	12.5984
.297	7.5438	.347	8.8138	.397	10.0838	.447	11.3538	.497	12.6238
.298	7.5692	.348	8.8392	.398	10.1092	.448	11.3792	.498	12.6492
.299	7.5946	.349	8.8646	.399	10.1346	.449	11.4046	.499	12.6746
.300	7.6200	.350	8.8900	.400	10.1600	.450	11.4300	.500	12.7000

Table A-3. International System of Units (SI)

Quantity	Unit	Symbol
Elemental units		
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	degree Kelvin	°K
Luminous intensity	candela	cd
Supplementary units		
Plane angle	radian	rad
Solid angle	steradian	sr
Derived units		
Area	square meter	m ²
Volume	cubic meter	m ³
Frequency	hertz	Hz (s ⁻¹)
Density	kilogram per cubic meter	kg/m ³
Velocity	meter per second	m/s
Angular velocity	radian per second	rad/s
Acceleration	meter per second squared	m/s ²
Angular acceleration	radian per second squared	rad/s ²
Force	newton	N (kg m/s ²)
Pressure	newton per square meter	N/m ²
Kinematic viscosity	square meter per second	m ² /s
Dynamic viscosity	newton-second per square meter	N s/m ²
Work, energy, quantity of heat	joule	J (N m)
Power	watt	W (J/s)
Electric charge	coulomb	C (A s)
Voltage, potential difference, electromotive force	volt	V (W/A)
Electric field strength	volt per meter	V/m
Electric resistance	ohm	Ω (V/A)
Electric capacitance	farad	F (A s/V)
Magnetic flux	weber	Wb (V s)
Inductance	henry	H (V s/A)
Magnetic flux density	tesla	T (Wb/m ²)
Magnetic field strength	ampere per meter	A/m
Magnetomotive force	ampere	A
Luminous flux	lumen	lm (cd sr)
Luminance	candela per square meter	cd/m ²
Illumination	lux	lx (lm/m ²)

USE OF TABLES

Following are step by step directions for the solution to an example conversion problem. The example is: Convert 12 3/4 inches to centimeters.

- Convert all fractions to decimals. (Refer to [table A-3](#).)

$$12 \frac{3}{4} = 12.75$$

- Refer to [table A-4](#) and find the column for the unit which you have. This would be the column labeled "INCHES" in the "Length" table.

- Locate the numeral 1 in the column labeled "INCHES."

- Locate the column labeled "CENTIMETERS."

- Read the number in the CENTIMETERS column that is in direct line with the numeral 1 located in the INCHES column.

Read 2.540

- Multiply the number of inches of this example by the conversion factor to obtain the number of centimeters.

$$2.540 \text{ times } 12.75 \text{ equals } 32.385$$

- Round off the answer to not over four significant figures (four numbers counting from the first non-zero number on the left. Fewer significant figures may be used depending on the accuracy of measurement and the tolerances allowed. For most work in this manual, centimeters would be expressed as three significant figures.

$$12 \frac{3}{4} \text{ inches} = 32.4 \text{ centimeters}$$

Table A-4. Fraction/Decimal/Millimeter Conversion Chart

Fractions	Dec Equiv	MM Equiv	Fractions	Dec Equiv	MM Equiv
1/64	0.01562	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.04688	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.125	3.175	5/8	0.625	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.25	6.350	3/4	0.75	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.375	9.525	7/8	0.875	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5	12.700	1	1.0	25.400

Table A-5. Metric Unit Conversions

<u>Length</u>								
Millimeters	Centimeters	Inches	Feet	Yards	Meters			
1.0	0.1000	0.03937	0.003281	0.001094	0.001000			
10.0	1.0	0.3937	0.03281	0.01094	0.01000			
25.40	2.540	1.0	0.08333	0.02778	0.0254			
304.8	30.48	12.0	1.0	0.3333	0.3048			
914.4	91.44	36.0	3.000	1.0	0.9144			
1000.0	100.0	39.37	3.281	1.094	1.0			
<u>Weight</u>								
Grams	Kilograms	Grains	Ounces	Pounds				
1000.0	1.0	15,432.0	35.27	2.205				
1.0	0.0010	15,432	0.03527	0.002205				
0.06480	0.00006480	1.0	0.002286	0.0001429				
28.35	0.02835	437.5	1.0	0.0625				
453.6	0.4536	7,000.0	16.0	1.0				
<u>Velocity</u>								
Meters/Sec	Kilometers/Hr	Feet/Sec	Miles/Hr	Knots				
1.0	3.600	3.281	2.237	1.944				
0.2778	1.0	0.9113	0.6214	0.5400				
0.3048	1.097	1.0	0.6818	0.5925				
0.4470	1.609	1.467	1.0	0.8690				
0.5144	1.852	1.688	1.1511	1.0				
<u>Pressure</u>								
Bars	Kilograms/	Pounds/	Atmos-	Columns of Mercury (0°C)	Columns of Water (15°C)			
(Mega-	square	square	pheres	Meters	Inches	Meters	Inches	Feet
baryes)	cm	inch						
1.0	1.0197	14.50	0.9869	0.7501	29.53	10.21	401.8	33.49
0.9807	1.0	14.22	0.9678	0.7356	28.96	10.01	394.1	32.84
0.06895	0.07031	1.0	0.06805	0.05171	2.036	0.7037	27.70	2.309
1.0133	1.0332	14.70	1.0	0.7600	29.92	10.34	407.1	33.93
1.3332	1.3595	19.34	1.316	1.0	39.37	13.61	535.7	44.64
0.03386	0.03453	0.4912	0.03342	0.02540	1.0	0.3456	13.61	1.134
0.09798	0.09991	1.421	0.09670	0.07349	2.893	1.0	39.37	3.281
0.002489	0.002538	0.03609	0.002456	0.001867	0.0739	0.02540	1.0	0.08333
0.02986	0.03045	0.4331	0.02947	0.02240	0.8819	0.3048	12.0	1.0
<u>Area</u>								
Square	Square	Square	Square	Square	Square			
Meters	Centimeters	Inches	Feet	Yards				
1.0	10,000.0	1,550.0	10.76	1.196				
0.0001	1.0	0.1550	0.001076	0.0001196				
0.0006452	6,452.0	1.0	0.006944	0.0007716				
0.9290	929.0	144.0	1.0	0.1111				
0.8361	8,361.0	1,296.0	9.0000	1.0				
<u>Volume</u>								
Cubic	Cubic	Cubic	Gallons	Quarts	Liters	Cubic	Milliliters	
Inches	Feet	Yards	(U.S.)	(U.S.)	(Cubic	Meters	(Cubic	
					Decimeters)		Centimeters)	
1.0	0.0005787	0.00002143	0.004329	0.01732	0.01639	0.00001639	16.39	
1,728.0	1.0	0.03704	7.481	29.92	28.32	0.02832	28,320	
46,656.0	27.0	1.0	202.2	807.9	764.6	0.7646	764,600	
231.0	0.1337	0.004951	1.0	4.000	3.785	0.003785	3,785	
57.75	0.03342	0.001238	0.2500	1.0	0.9464	0.0009464	946.4	
61.02	0.03531	0.001308	0.2642	1.057	1.0	0.001	1,000	
61020	353.1	1.308	264.2	1057	1000.0	1	1,000,000	
0.06102	0.00003531	0.000001308	0.0002642	0.001057	0.001	0.000001	1	

Table A-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
C (Cont)			C (Cont)		
centimeters of mercury	pounds/sq ft	27.85	cubic inches	gallons	4.329 X 10 ⁻³
centimeters of mercury	pounds/sq in.	0.1934	cubic inches	liters	0.01639
centimeters/sec	feet/min	1.1969	cubic inches	mil-feet	1.061 X 10 ⁵
centimeters/sec	feet/sec	0.03281	cubic inches	pints(U.S. liq.)	0.03463
centimeters/sec	kilometers/hr	0.036	cubic inches	quarts(U.S. liq.)	0.01732
centimeters/sec	knots	0.1943	cubic meters	bushels (dry)	28.38
centimeters/sec	miles/hr	0.02237	cubic inches	cu yards	2.143 X 10 ⁻⁵
centimeters/sec	miles/min	3.728 X 10 ⁻⁴	cubic meters	cu cms	10 ⁴
centimeters/sec/sec	feet/sec/sec	0.03281	cubic meters	cu feet	35.31
centimeters/sec/sec	kms/hr/sec	0.036	cubic meters	cu inches	61,023.0
centimeters/sec/sec	meters/sec/sec	0.01	cubic meters	cu yards	1.308
centimeters/sec/sec	miles/hr/sec	0.02237	cubic meters	gallons (U.S. liq.)	264.2
Chain	Inches	792.00	cubic meters	liters	1,000.0
Chain	meters	20.12	cubic meters	pints(U.S. liq.)	2,113.0
Chains (surveyors' or Gunter's)	yards	22.00	cubic meters	quarts (U.S. liq.)	1,057.0
circular mils	sq cms	5.067 X 10 ⁻⁶	cubic yards	cu cms	7.646 X 10 ⁵
circular mils	sq mils	0.7854	cubic yards	cu feet	27.0
Circumference	Radians	6.283	cubic yards	cu inches	46,656.0
circular mils	sq inches	7.854 X 10 ⁻⁷	cubic yards	cu meters	0.7646
Cords	cord feet	8	cubic yards	gallons (U.S. liq.)	202.0
Cord feet	cu. feet	16	cubic yards	liters	764.6
Coulomb	Statcoulombs	2.998 X 10 ⁹	cubic yards	pints (U.S. liq.)	1,615.9
coulombs	faradays	1.036 X 10 ⁻⁵	cubic yards	quarts (U.S. liq.)	807.9
coulombs/sq cm	coulombs/sq in.	64.52	cubic yards/min	cubic ft/sec	0.45
coulombs/sq cm	coulombs/sq meter	10 ⁴	cubic yards/min	gallons/sec	3.367
coulombs/sq in.	coulombs/sq cm	0.1550	cubic yards/min	liters/sec	12.74
coulombs/sq in.	coulombs/sq meter	1,550.0		D	
coulombs/sq meter	coulombs/sq cm	10	Dalton	Gram	1.650 X 10 ⁻²⁴
coulombs/sq meter	coulombs/sq in.	6.452 X 10 ⁻⁴	days	seconds	86,400.0
cubic centimeters	cu feet	3.531 X 10 ⁻⁵	decigrams	grams	0.1
cubic centimeters	cu inches	0.06102	deciliters	liters	0.1
cubic centimeters	cu meters	10 ⁻⁶	decimeters	meters	0.1
cubic centimeters	cu yards	1.308 X 10 ⁻⁶	degrees (angle)	quadrants	0.01111
cubic centimeters	gallons (U.S. liq.)	2.642 X 10 ⁻⁴	degrees (angle)	radians	0.01745
cubic centimeters	liters	0.001	degrees (angle)	seconds	3,600.0
cubic centimeters	pints (U.S. liq.)	2.113 X 10 ⁻³	degrees/sec	radians/sec	0.01745
cubic centimeters	quarts (U.S. liq.)	1.057 X 10 ⁻³	degrees/sec	revolutions/min	0.1667
cubic foot	bushels (dry)	0.8036	degrees/sec	revolutions/sec	2.778 X 10 ⁻³
cubic foot	cu cms	28,320.0	dekagrams	grams	10.0
cubic foot	cu inches	1,728.0	dekaliters	liters	10.0
cubic foot	cu meters	0.02832	dekameters	meters	10.0
cubic foot	cu yards	0.03704	Drams (apothecaries' or troy)	ounces (avoirdupois)	0.1371429
cubic foot	gallons (U.S. liq.)	7.48052	Drams (apothecaries' or troy)	ounces (troy)	0.125
cubic foot	liters	28.32	Drams (U.S., fluid or apoth.)	cubic cm.	3.6967
cubic foot	pints (U.S. liq.)	59.84	drams	grams	1.7718
cubic foot	quarts (U.S. liq.)	29.92	drams	grains	27.3437
cubic feet/min	cu cms/sec	472.0	drams	ounces	0.0625
cubic feet/min	gallons/sec	0.1247	Dyne/cm	Erg/sq. millimeter	0.01
cubic feet/min	liters/sec	0.4720	Dyne/sq. cm.	Atmospheres	9.869 X 10 ⁻⁷
cubic feet/min	pounds of water/min	62.43	Dyne/sq. cm.	Inch of Mercury at 0°C	2.953 X 10 ⁻⁵
cubic feet/sec	million gals/day	0.646317	Dyne/sq. cm.	Inch of Water at 4°C	4.015 X 10 ⁻⁴
cubic feet/sec	gallons/min	448.831		grams	1.020 X 10 ⁻³
cubic inches	cu cms	16.39		joules/cm	10 ⁻⁷
cubic inches	cu feet	5.787 X 10 ⁻⁴		joules/meter (newtons)	10 ⁻⁵
cubic inches	cu meters	1.639 X 10 ⁻⁵			
cubic inches	cu yards	2.143 X 10 ⁻⁵			

Table A-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
D (Cont)			F (Cont)		
dynes	kilograms	1.020 X 10 ⁻⁶	feet/sec	kms/hr	1.097
dynes	poundals	7.233 X 10 ⁻⁵	feet/sec	knots	0.5921
dynes	pounds	2.248 X 10 ⁻⁶	feet/sec	meters/min	18.29
dynes/sq cm	bars	10 ⁻⁶	feet/sec	miles/hr	0.6818
E			feet/sec	miles/min	0.01136
Eil	Cm.	114.30	feet/sec	cms/sec	30.48
Eil	Inches	45	feet/sec/sec	cms/sec/sec	30.48
Em, Pica	Inch	0.167	feet/sec/sec	kms/hr/sec	1.097
Em, Pica	Cm.	0.4233	feet/sec/sec	meters/sec/sec	0.3048
Erg/sec	Dyne - cm/sec	1.000	feet/sec/sec	miles/hr/sec	0.6818
ergs	Btu	9.480 X 10 ⁻¹¹	feet/100 feet	per cent grade	1.0
ergs	dyne-centimeters	1.0	Foot - candle	Lumen/sq. meter	10.764
ergs	foot-pounds	7.367 X 10 ⁻⁸	foot-pounds	Btu	1.286 X 10 ⁻³
ergs	gram-calories	0.2389 X 10 ⁻⁷	foot-pounds	ergs	1.356 X 10 ⁷
ergs	gram-cms	1.020 X 10 ⁻³	foot-pounds	gram-calories	0.3238
ergs	horsepower-hrs	3.7250 X 10 ⁻¹⁴	foot-pounds	hp-hrs	5.050 X 10 ⁻⁷
E (Cont)			foot-pounds	joules	1.356
ergs	joules	10 ⁻⁷	foot-pounds	kg-calories	3.24 X 10 ⁻⁴
ergs	kg-calories	2.389 X 10 ⁻¹¹	foot-pounds	kg-meters	0.1383
ergs	kg-meters	1.020 X 10 ⁻⁸	foot-pounds/min	kilowatt-hrs	3.766 X 10 ⁻⁷
ergs	kilowatt-hrs	0.2778 X 10 ⁻¹³	foot-pounds/min	Btu/min	1.286 X 10 ⁻³
ergs	watt-hours	0.2778 X 10 ⁻¹⁸	foot-pounds/min	foot-pounds/sec	0.01667
ergs/sec	Btu/min	5.688 X 10 ⁻⁶	foot-pounds/min	horsepower	3.030 X 10 ⁻⁵
ergs/sec	ft-lbs/min	4.427 X 10 ⁻⁶	foot-pounds/min	kg-calories/min	3.24 X 10 ⁻⁴
ergs/sec	ft-lbs/sec	7.3756 X 10 ⁻⁸	foot-pounds/min	kilowatts	2.260 X 10 ⁻⁵
ergs/sec	horsepower	1.341 X 10 ⁻¹⁰	foot-pounds/sec	Btu/hr	4.6263
ergs/sec	kg-calories/min	1.433 X 10 ⁻⁹	foot-pounds/sec	Btu/min	0.07717
ergs/sec	kilowatts	10 ⁻¹⁰	foot-pounds/sec	horsepower	1.818 X 10 ⁻³
F			foot-pounds/sec	kg-calories/min	0.01945
farads	microfarads	10 ⁶	foot-pounds/sec	kilowatts	1.356 X 10 ⁻³
Faraday/sec	Ampere (absolute)	9.6500 X 10 ⁴	Furlongs	miles(U.S.)	0.125
faradays	ampere-hours	26.80	furlongs	rods	40.0
faradays	coulombs	9.649 X 10 ⁴	furlongs	feet	660.0
Fathom	Meter	1.828804	G		
fathoms	feet	6.0	gallons	cu cms	3,785.0
feet	centimeters	30.48	gallons	cu feet	0.1337
feet	kilometers	3.048 X 10 ⁻⁴	gallons	cu inches	231.0
feet	meters	0.3048	gallons	cu meters	3.785 X 10 ⁻³
feet	miles (naut.)	1.645 X 10 ⁻⁴	gallons	cu yards	4.951 X 10 ⁻³
feet	miles (stat.)	1.894 X 10 ⁻⁴	gallons	liters	3.785
feet	millimeters	304.8	gallons (liq Br. Imp.)	gallons (U.S. liq)	1.20095
feet	mils	1.2 X 10 ⁴	gallons (U.S.)	gallons (Imp.)	0.83267
feet of water	atmospheres	0.02950	gallons of water	pounds of water	8.3453
feet of water	in. of mercury	0.8826	gallons/min	cu ft/sec	2.228 X 10 ⁻³
feet of water	kgs/sq cm	0.03048	gallons/min	liters/sec	0.06308
feet of water	kgs/sq meter	304.8	gallons/min	cu ft/hr	8.0208
feet of water	pounds/sq ft	62.43	gausses	lines/sq in.	6.452
feet of water	pounds/sq in	0.4335	gausses	webers/sq cm	10 ⁻⁸
feet/min	cms/sec	0.5080	gausses	webers/sq in.	6.452 X 10 ⁻⁸
feet/min	feet/sec	0.01667	gausses	webers/sq meter	10 ⁻⁴
feet/min	kms/hr	0.01829	gilberts	ampere-turns	0.7958
feet/min	meters/min	0.3048	gilberts/cm	amp-turns/cm	0.7958
feet/min	miles/hr	0.01136	gilberts/cm	amp-turns/in	2.021
feet/sec	cms/sec	30.48	gilberts/cm	amp-turns/meter	79.58
			Gills (British)	cubic cm.	142.07
			gills	liters	0.1183
			gills	pints (liq.)	0.25

Table A-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
J (Cont)			K (Cont)		
joules/cm	joules/meter (newtons)	100.0	kilometers/hr/sec	cms/sec/sec	27.78
joules/cm	poundals	723.3	kilometers/hr/sec	ft/sec/sec	0.9113
joules/cm	pounds	22.48	kilometers/hr/sec	meters/sec/sec	0.2778
K			kilometers/hr/sec	miles/hr/sec	0.6214
kilograms	dynes	980,665.0	kilowatts	Btu/min	56.92
kilograms	grams	1,000.0	kilowatts	foot-lbs/min	4.426 X 10 ⁴
kilograms	joules/cm	0.09807	kilowatts	foot-lbs/sec	737.6
kilograms	joules/meter (newtons)	9.807	kilowatts	horsepower	1.341
kilograms	poundals	70.93	kilowatts	kg-calories/min	14.34
kilograms	pounds	2.205	kilowatts	watts	1,000.0
kilograms	tons (long)	9.842 X 10 ⁻⁴	kilowatt-hrs	Btu	3,413.0
kilograms	tons (short)	1.102 X 10 ⁻³	kilowatt-hrs	ergs	3.600 X 10 ¹³
kilograms/cu meter	grams/cu cm	0.001	kilowatt-hrs	foot-lbs	2.655 X 10 ⁴
kilograms/cu meter	pounds/cu ft	0.06243	kilowatt-hrs	gram-calories	859,850.0
kilograms/cu meter	pounds/cu in.	3.613 X 10 ⁻⁵	kilowatt-hrs	horsepower-hrs	1.341
kilograms/cu meter	pounds/mil-foot	3.405 X 10 ⁻¹⁰	kilowatt-hrs	joules	3.6 X 10 ⁴
kilograms/meter	pounds/ft	0.6720	kilowatt-hrs	kg-calories	860.5
Kilogram/sq. cm.	Dynes	980,665	kilowatt-hrs	kg-meters	3.671 X 10 ⁵
kilograms/sq cm	atmospheres	0.9678	kilowatt-hrs	pounds of water evaporated from and at 212°F	3.53
kilograms/sq cm	feet of water	32.81	kilowatt-hrs	pounds of water raised from 62° to 212°F	22.75
kilograms/sq cm	inches of mercury	28.96	knots	feet/hr	6,080.0
kilograms/sq cm	pounds/sq ft	2,048.0	knots	kilometers/hr	1.8532
kilograms/sq cm	pounds/sq in.	14.22	knots	nautical miles/hr	1.0
kilograms/sq meter	atmospheres	9.678 X 10 ⁻⁵	knots	statute miles/hr	1.151
kilograms/sq meter	bars	98.07 X 10 ⁻⁶	knots	yards/hr	2,027.0
kilograms/sq meter	feet of water	3.281 X 10 ⁻³	knots	feet/sec	1.689
kilograms/sq meter	inches of mercury	2.896 X 10 ⁻³	L		
kilograms/sq meter	pounds/sq ft	0.2048	league	miles(approx.)	3.0
kilograms/sq meter	pounds/sq in.	1.422 X 10 ⁻³	Light year	Miles	5.9 X 10 ¹²
kilograms/sq mm	kgs/sq meter	10 ⁶	Light year	Kilometers	9.46091 X 10 ¹²
kilogram-calories	Btu	3.968	lines/sq cm	gausses	1.0
kilogram-calories	foot-pounds	3,088	lines/sq in.	gausses	0.1550
kilogram-calories	hp-hrs	1.560 X 10 ⁻³	lines/sq in.	webers/sq cm	1.550 X 10 ⁻⁹
kilogram-calories	joules	4,186	lines/sq in.	webers/sq in.	10 ⁻⁸
kilogram-calories	kg-meters	426.9	links (engineer's)	webers/sq meter	1.550 X 10 ⁻⁵
kilogram-calories	kilojoules	4.186	links (surveyor's)	inches	12.0
kilogram-calories	kilowatt-hrs	1.163 X 10 ⁻³	liters	inches	7.92
kilogram meters	Btu	9.294 X 10 ⁻³	liters	bushels (U.S. dry)	0.02838
kilogram meters	ergs	9.804 X 10 ⁷	liters	cu cm	1,000.0
kilogram meters	foot-pounds	7.233	liters	cu inches	61.02
kilogram meters	joules	9.804	liters	cu meters	0.001
kilogram meters	kg-calories	2.342 X 10 ⁻³	liters	cu yards	1.308 X 10 ⁻³
kilogram meters	kilowatt-hrs	2.723 X 10 ⁻⁶	liters	gallons (U.S. liq.)	0.2642
kilolines	maxwells	1,000.0	liters	pints (U.S. liq.)	2.113
kiloliters	liters	1,000.0	liters	quarts (U.S. liq.)	1.057
kilometers	centimeters	10 ⁵	liters/min	cu ft/sec	5.886 X 10 ⁻⁴
kilometers	feet	3,281.0	liters/min	gals/sec	4.403 X 10 ⁻³
kilometers	inches	3.937 X 10 ⁴	lumens/sq ft	foot-candles	1.0
kilometers	meters	1,000.0	Lumen	Spherical candle power	0.07958
kilometers	miles	0.6214	Lumen	Watt	0.001496
kilometers	millimeters	10 ⁶	Lumen	Lumen/sq. meter	10.76
kilometers	yards	1,094.0	lux	foot-candles	0.0929
kilometers/hr	cms/sec	27.78			
kilometers/hr	feet/min	54.68			
kilometers/hr	feet/sec	0.9113			
kilometers/hr	knots	0.5396			
kilometers/hr	meters/min	16.67			
kilometers/hr	miles/hr	0.6214			

Table A-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
R (Cont)			S (Cont)		
radians/sec	revolutions/sec	0.1592	square kilometers	sq meters	10 ⁶
radians/sec/sec	revs/min/min	573.0	square kilometers	sq miles	0.3861
radians/sec/sec	revs/min/sec	9.549	square kilometers	sq yards	1.196 X 10 ⁶
radians/sec/sec	revs/sec/sec	0.1592	square meters	acres	2.471 X 10 ⁻⁴
revolutions	degrees	360.0	square meters	sq cms	10 ⁴
revolutions	quadrants	4.0	square meters	sq feet	10.76
revolutions	radians	6.283	square meters	sq inches	1,550.0
revolutions/min	degrees/sec	6.0	square meters	sq miles	3.861 X 10 ⁻⁷
revolutions/min	radians/sec	0.1047	square meters	sq millimeters	10 ⁶
revolutions/min	revs/sec	0.01667	square meters	sq yards	1.196
revolutions/miri/min	radians/sec/sec	1.745 X 10 ⁻³	square miles	acres	640.0
revolutions/min/min	revs/min/sec	0.01667	square miles	sq feet	27.88 X 10 ⁶
revolutions/min/min	revs/sec/sec	2.778 X 10 ⁻⁴	square miles	sq kms	2.590
revolutions/sec	degrees/sec	360.0	square miles	sq meters	2.590 X 10 ⁶
revolutions/sec	radians/sec	6.283	square miles	sq yards	3.098 X 10 ⁶
revolutions/sec	revs/min	60.0	square millimeters	circular mils	1,973.0
revolutions/sec/sec	radians/sec/sec	6.283	square millimeters	sq cms	0.01
revolutions/sec/sec	revs/min/min	3,600.0	square millimeters	sq feet	1.076 X 10 ⁻⁵
revolutions/sec/sec	revs/min/sec	60.0	square millimeters	sq inches	1.550 X 10 ⁻³
Rod	Chain (Gunters)	0.25	square mils	circular mils	1.273
Rod	Meters	5.029	square mils	sq cms	6.452 X 10 ⁶
Rods (Surveyors' meas.)	yards	5.5	square mils	sq inches	10 ⁻⁶
rods	feet	16.5	square yards	acres	2.066 X 10 ⁻⁴
S			T		
Scruples	grains	20	temperature (°C) +273	absolute	1.0
seconds (angle)	degrees	2.778 X 10 ⁻⁴	temperature (°C) +17.78	temperature (°C)	1.8
seconds (angle)	minutes	0.01667	temperature (°F) +460	temperature (°F)	1.0
seconds (angle)	quadrants	3.087 X 10 ⁻⁶	temperature (°F)32	temperature (°C)	5/9
seconds (angle)	radians	4.848 X 10 ⁻⁶	tons (long)	kilograms	1,016.0
Slug	Kilogram	14.59	tons (long)	pounds	2,240.0
Slug	Pounds	32.17	tons (long)	tons (short)	1.120
Sphere	Steradians	12.57	tons (metric)	kilograms	1,000.0
square centimeters	circular mils	1.973 X 10 ⁵	tons (metric)	pounds	2,205.0
square centimeters	sq feet	1.076 X 10 ⁻³	tons (short)	kilograms	907.1848
square centimeters	sq inches	0.1550	tons (short)	ounces	32,000.0
square centimeters	sq meters	0.0001	tons (short)	ounces (troy)	29,166.66
square centimeters	sq miles	3.861 X 10 ⁻¹¹	tons (short)	pounds	2,000.0
square centimeters	sq millimeters	100.0	tons (short)	pounds (troy)	2,430.56
square centimeters	sq yards	1.196 X 10 ⁻⁴	tons (short)	tons (long)	0.89287
square feet	acres	2.296 X 10 ⁻⁵	tons (short)	tons (metric)	0.9078
square feet	sq cms	929.0	tons (short)/sq ft	kgs/sq meter	9,765.0
square feet	sq inches	144.0	tons (short)/sq ft	pounds/sq in.	2,000.0
square feet	sq meters	0.09290	tons of water/24 hrs	pounds of water/hr	83.333
square feet	sq miles	3.587 X 10 ⁻⁶	tons of water/24 hrs	gallons/min	0.16643
square feet	sq millimeters	9.290 X 10 ⁴	tons of water/24 hrs	cu ft/hr	1.3349
square feet	sq yards	0.1111			
square inches	circular mils	1.273 X 10 ⁶			
square inches	sq cms	6.452			
square inches	sq feet	6.944 X 10 ⁻³			
square inches	sq millimeters	645.2			
square inches	sq mils	10.6			
square inches	sq yards	7.716 X 10 ⁻⁴			
square kilometers	acres	247.1			
square kilometers	sq cms	10.10			
square kilometers	sq ft	10.76 X 10 ⁶			
square kilometers	sq inches	1.550 X 10 ⁹			

Table A-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
	V			W (Cont)	
Volt/inch	Volt/cm.	0.39370	watt-hours	kilogram-meters	367.2
Volt (absolute)	Statvolts	0.003336	watt-hours	kilowatt-hrs	0.001
	W		Watt (International)	Watt (absolute)	1.0002
watts	Btu/hr	3.4129	webers	maxwells	10 ⁸
watts	Btu/min	0.05688	webers	kilolines	10 ⁵
Watts	ergs/sec	107.0	webers/sq in.	gausses	1.550 X 10 ⁷
watts	foot-lbs/min	44.27	webers/sq in.	lines/sq in.	10 ⁸
watts	foot-lbs/sec	0.7378	webers/sq in.	webers/sq cm	0.1550
watts	horsepower	1.341 X 10 ⁻³	webers/sq meter	webers/sq meter	1,550.0
watts	horsepower (metric)	1.360 X 10 ⁻³	webers/sq meter	gausses	10 ⁴
watts	kg-calories/min	0.01433	webers/sq meter	lines/sq in.	6.452 X 10 ⁴
watts	kilowatts	0.001	webers/sq meter	webers/sq cm	10 ⁻⁴
Watts (Abs.)	B.T.U. (mean)/min.	0.056884	webers/sq meter	webers/sq in.	6.452 X 10 ⁻⁴
Watts (Abs.)	joules/sec.	1		Y	
watt-hours	Btu	3.413	yards	centimeters	91.44
watt-hours	ergs	3.60 X 10 ¹⁰	yards	kilometers	9.144 X 10 ⁻⁴
watt-hours	foot-pounds	2,656.0	yards	meters	0.9144 X 10 ⁻⁴
watt-hours	gram-calories	859.85	yards	miles (naut.)	4.934 X 10 ⁻⁴
watt-hours	horsepower-hrs	1.341 X 10 ⁻³	yards	miles (stat.)	5.682 X 10 ⁻⁴
watt-hours	kilogram-calories	0.8605	yards	millimeters	914.4

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GLOSSARY

ACID. A fundamental chemical class distinguished by having reactive hydrogen radicals (pH below 7.0). Acids can be extremely corrosive to metal and damaging to fabric.

ACM. Abbreviation for Aircraft Combat Maneuvers.

AIRCREWMEMBER. An aircraft crewmember. Passengers are not considered aircrewmembers.

ALKALINE. A substance which is opposite to an acid, a base (pH above 7.0). Also, any substance which has the properties of an alkali (metallic hydroxide).

ALPACA. The woolly hair from the alpaca. Alpaca wool is used in making linings and thin cloth.

APPROX. Abbreviation for approximately.

AQUEOUS. Made with, or from water.

A/R. Abbreviation for as required.

ARAMID. A heat-resistant, low flammability rate knitted material with excellent stability to 700° F. Its inherent properties allow the material to last 6-10 times longer than other materials and does not lose these properties with washing or drying. (Replaces polyamide material.)

ASSEMBLY. A grouping of parts fitted together to form a complete unit.

ATTENUATION. Reduction or lessening. For example, sound attenuation is the reduction of ambient noise in an aircraft by use of a helmet equipped with sound attenuating earphones; sonic earcup.

BACKSTITCH. A stitch made by inserting the needle a stitch length behind and bringing it up a stitch length ahead of the last stitch. Also, sewing back over a row of stitches.

BARTACK. A concentrated series of zig-zag like stitches used to reinforce points of stress.

BEESWAX. A wax that is applied cold or melted to thread to prevent raveling or cloth unknotting and to make thread easier to sew.

BIAS. A line or fold or cut diagonal to the grain of a fabric.

BINDING. A piece of tape or fabric folded over and stitched to a raw edge of cloth to prevent raveling or fraying.

BOXSTITCH. Rectangular stitch used to attach or reinforce.

BREADTH. The measure of an object from side to side (width).

C. Abbreviation for Celsius. A thermometric scale of which the interval between the freezing point and boiling point of water is divided into 100 degrees. 0 degrees C represents the freezing point and 100 degrees C represents the boiling point of water.

CAUTION. Indicates danger to the equipment. The caution precedes the step or item to which it refers.

CDI. Abbreviation for Collateral Duty Inspector. A CDI is permanently assigned to a production division with secondary quality assurance assignments to inspect work accomplished within his production division.

 Symbol for centerline.

COMPONENT. An item of equipment making up part of an assembly.

CONFIGURATION. The make-up, size, shape and relative location of parts in an item of equipment and its accessories. This includes the composition of the materials as well as marking details. The configuration of each equipment is specified by government drawings, military specifications and modification instructions.

COVERALL, ANTI-EXPOSURE. A one-piece outer garment worn to provide protection in adverse, low temperature conditions.

COVERALL, ANTI-g CUTAWAY. A garment worn by the aircrewmembers of high performance aircraft to counteract the gravity forces caused by accelerations of aircraft maneuvers.

CROSS BOXSTITCH. A boxstitch with an X pattern stitch inside. Sometimes called BOX-X STITCH.

D-RING. A metal fitting shaped in the form of the letter "D".

DART. A stitched, tapering fold in a section of fabric. Used for shaping the fabric by gathering material to conform with a predetermined contour.

NAVAIR 13-1-6.7-3

DIA. Abbreviation for diameter.

DISPOSITION. Instructions on what is to be done with items which are obsolete, worn out or beyond repair.

DOFF. To remove or take off an item of clothing or equipment.

DON. To put on an item of clothing or equipment.

EDGEROLL. A beading around the border of a helmet shell, protecting the wearer from sharp edges and adds to energy absorption.

EGRESS. Outlet or means of getting out.

EJECTION SEAT. An emergency escape seat for propelling an occupant out and away from the aircraft by means of an explosive charge or rocket motor.

ELASTOMER. Any of various elastic substances resembling rubber.

EXTRUSION. A raised or grooved surface or edge.

F. Abbreviation for Fahrenheit. Pertaining to the thermometric scale where 32 degrees represents the freezing point of water and 212 degrees the boiling point.

FABRICATE. To make up or construct an item of equipment, accessory or material.

FOLDER. A device used as an attachment to a sewing machine to guide and fold cloth.

FAKE. To fold a line or lanyard in a back and forth fashion.

FASTENER, SLIDE. A type of fastener made of two lengths of tape with a series of metal or plastic scoops fastened to one side of each. A metal slide is provided which causes the scoops to mesh or lock in place as the fastener is closed, or to separate as the fastener is opened. Colloquial: **ZIPPER.**

FASTENER, SNAP. A metal fastener containing essentially a ball and a socket attached to opposed parts of a material and used to hold mating surfaces together.

FIBER. A natural or synthetic filament (as of wool, cotton, rayon, etc.) capable of being spun into yarn.

FID. A small, flat, hand tool of metal or wood used during the packing procedure to straighten and insert flaps into the container.

FITTING, QUICK-RELEASE. A device used to connect and release on instant response.

GAGE. An instrument for measuring pressure.

GAUGE. A measurement of size or thickness.

GFE. Abbreviation for Government Furnished Equipment.

GROMMET. A metal eye and washer used to reinforce a hole in material.

HEM. A border or reinforced edge formed by folding cloth back and securing it, usually by sewing.

HOOK TAPE. A strip of fabric tape with miniature hooks on one side. Hook tape is used together with pile tape as a fastener.

IN. Abbreviation for inches.

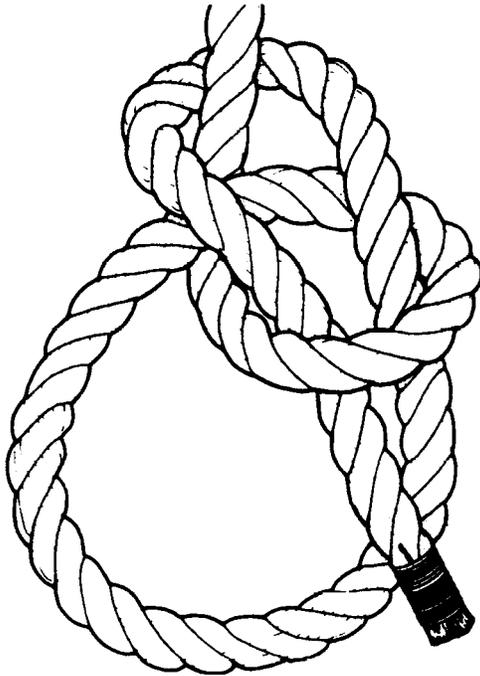
INFLATION ASSEMBLY. Inflation valve and carbon dioxide cylinder as a unit.

IN.H₂O. Abbreviation for inches of water column (27.68 IN.H₂O equals 1 PSI equals 2.036 IN.Hg).

IN.Hg. Abbreviation for inches of mercury column (0.07349 IN.Hg equals 1.0 IN.H₂O).

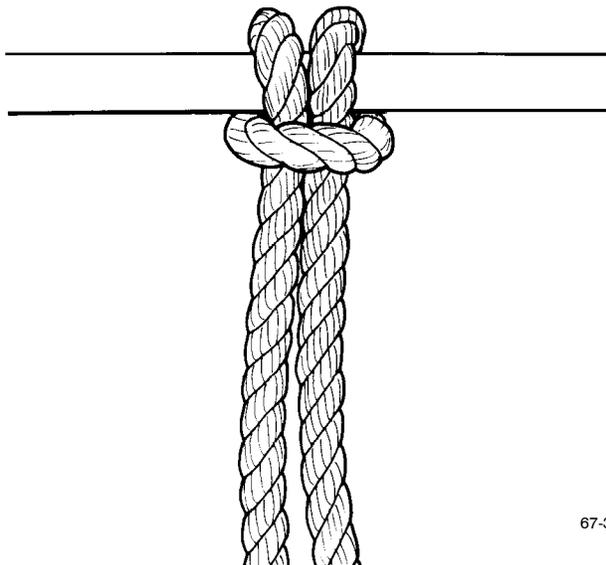
INSPECTION. A close examination for damage, wear and dirt. Also, a regularly scheduled examination of oxygen equipment and accessories.

KNOT, BOWLINE. A knot formed by making a small overhand loop a desired distance from the end of the line. The end of the line is then passed through the loop from the underside of the main part of the line and around behind standing line then back through the small loop. When this knot is drawn tight, it will not slip but can be easily untied.



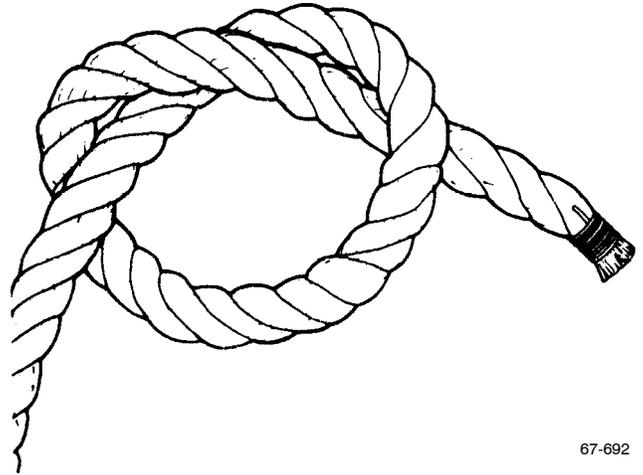
67-691

KNOT, LARK'S HEAD. A knot formed around an attachment ring or bar by passing the free ends of the line around the bar or through the ring and then through a loop or bight in the line.



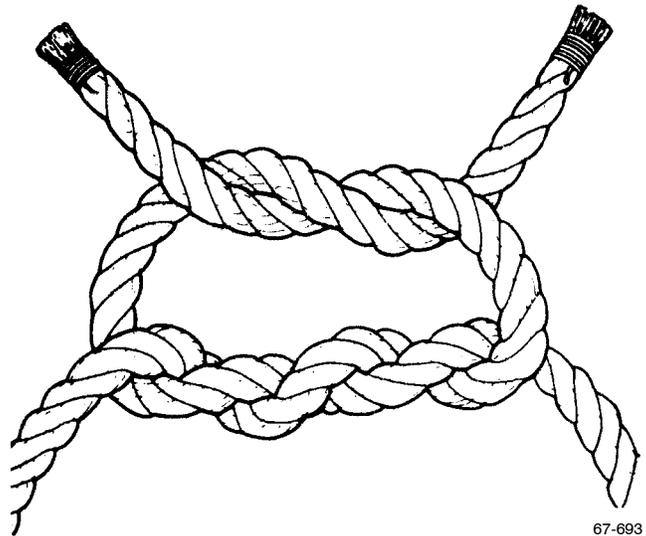
67-358

KNOT, OVERHAND. A simple knot tied in the end of a line by forming a loop and passing the end over and down through the loop.



67-692

KNOT, SURGEON'S. The surgeon's knot is similar to the square knot, except that the first overhand tie is wrapped twice around the cord or line.



67-693

LBS. Abbreviation for pounds.

LOCKWIRE. A wire that prevents loosening of a securing device.

LPM. Abbreviation for liters per minute.

MANUFACTURER'S CODES. Identification codes for every manufacturer listed as a procurement source in accordance with cataloging handbooks H4/H8, Commercial and Government Entity Codes.

NAVAIR 13-1-6.7-3

METHYL ETHYL KETONE (MEK). A colorless, flammable alcohol used in lacquers, paint removers, cements and adhesives, celluloid and cleaning fluids.

MILDEW. A damaging fungus or mold which forms on cloth or leather. It is caused by dampness and the absence of fresh air and sunlight.

MOUTON. A processed sheepskin that has been sheared and dyed to resemble beaver or seal.

NAMEPLATE. A label attached to equipment, giving data as to type, model number, date of manufacture, part number, serial number, etc.

NHA. Abbreviation for next higher assembly.

NO. Abbreviation for number.

NOTE. An information item. A note may precede or follow the item or step to which it refers.

PACK. To put together compactly; to store neatly, for example, packing a survival kit consists of stowing the survival equipment in a container, folding and covering the raft, and inserting both into the kit container.

PARAFFIN. Wax generally used with 50 percent beeswax as a hot dip to prevent the fraying of cut ends of webbing, cord, thread or tape. See also [BEESWAX](#).

pH VALUE. A numerical scale of measuring the acidity or alkalinity of a solution. A pH reading can be made using litmus paper and comparison chart. A reading of 7.0 indicates a neutral solution; below 7.0 indicates acid and above 7.0 indicates alkaline (base).

PHOSPHORESCENT MATERIAL. A material that glows in the dark without producing any noticeable heat.

PILE TAPE. Strip of fabric tape with small nylon loops on one side. Used with hook tape as a fastener.

POLYAMIDE CLOTH. A fire-resistant synthetic cloth; also called "Nomex."

PSI. Abbreviation for pounds per square inch. See also: [PSIA](#) and [PSIG](#).

PSIA. Abbreviation for pounds per square inch, absolute. Absolute pressure is measured from absolute zero (100% vacuum), rather than from normal, or atmospheric pressure. It equals gage pressure plus 14.696 pounds per square inch. See also: [PSI](#) and [PSIG](#).

PSIG. Abbreviation for pounds per square inch, gage. Indicates pressure above ambient pressure, as indicated on a pressure gage vented to the atmosphere. See also: [PSI](#) and [PSIA](#).

QUALIFIED PERSONNEL. Graduates of the Aircrew Survival Equipment School.

QUALITY ASSURANCE INSPECTION. An inspection of work by someone other than the person performing the work. Quality assurance inspections ensure that critical procedures in a job and the job as a whole are performed correctly and are not a threat to safety or function.

R. Abbreviation for radius.

RAVEL (UNRAVEL). To separate, untwist or unwind, leaving a frayed or ragged edge. RAVEL is the preferred work to describe such a condition.

REF. Abbreviation for reference.

REFURBISH. To restore to original condition.

REPAIRS, MAJOR. Repairs requiring special equipment, personnel or materials not normally available at intermediate level of maintenance.

REPAIRS, MINOR. Repairs that can be performed at organizational or intermediate levels of maintenance.

RIG. To assemble and adjust; to equip.

SAFETY TIE. Low strength thread which serves to inhibit accidental opening, discharge or separation.

SAFETY WIRE. Low strength wire which serves to inhibit premature opening, discharge or separation.

SCRAP. To discard, with proper authorization, items, parts or materials which are obsolete or no longer useable.

SEAM. A series of stitches joining two or more pieces of cloth.

SEAR. To melt or seal with heat, for example, to sear the end of nylon webbing one heats the end until the nylon melts and fuses. This prevents raveling.

SM&R CODES. Abbreviation for source, maintenance and recoverability codes. Comprised of three parts; a two-position source code, a three position maintenance code, and a one-position recoverability code. Refer to NAVSUPINST 4423.29 for further details.

STIRRUP. A cloth or leather strip sewn across the cuff of a pant leg to form a loop. When the pants are put on, the stirrup, which is worn under the foot, prevents the pant leg from riding up.

STITCHES PER INCH. The number of needle penetrations where threads are interlaced, per linear inch.

STOWING. The act of putting away in a neat, orderly fashion.

SURVIVAL VEST. A vest constructed of nylon cloth and equipped with pockets and attachments for stowage of survival items.

SUIT, ANTI-EXPOSURE. A garment worn to provide protection in adverse, low temperature conditions.

TACK. To attach temporarily prior to final sewing. Also, to tie temporarily as an aid in positioning. Also, to permanently secure portions of a seat survival kit assembly together.

TAPE. A narrow, woven ribbon of cotton, linen, nylon or other material.

TEMPLATE. A pattern or gage commonly in the form of a thin plate of cardboard, wood or metal. It is used as a guide in the layout or cutting of flat work.

TYP. Abbreviation for typical.

UNRAVEL. See **RAVEL**.

V-RING. A metal fitting shaped in the form of a closed letter “V”.

VRHMU. Abbreviation for visor reticle helmet mounted unit. A one-piece visor housing that contains a parabolic visor and four electronic sensor assemblies which are mounted, two per side.

VTAS. Abbreviation for visual target acquisition system. A helmet sight system which allows the pilot to direct his fire control system by viewing a prospective target.

WAFFLE WEAVE. A type of weave used in making cloth. It has a pattern of small raised squares. The squares provide dead-air space for improved insulation.

WARNING. Indicates danger to personnel. A warning precedes the item or step to which it refers.

WARP. The threads that run parallel to the selvage edge of cloth; those that are crossed by the filling threads.

WEBBING. A strong, narrow closely-woven tape of synthetic cotton or linen fiber designed for bearing weight.

WEBBING, TUBULAR. Strong synthetic or natural fiber webbing woven in the form of a tube.

WOLVERINE FUR. A long, straight light-weight fur from the wolverine; usually dark brown and black in color. Wolverine fur does not collect moisture and frost in cold weather and is, therefore, used to trim collars and hoods on winter clothing.

X. Abbreviation for times or by; sign for multiplication.

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