APPENDIX

C

Symbols, Units, and Conversion Factors

Table C.1 Symbols and Units

Parameter or Variable Name	Symbol	SI	English
Acceleration, angular	$\alpha(t)$	rad/s^2	rad/s^2
Acceleration, translational	$a(t)$	m/s^2	ft/s^2
Friction, rotational	b	$\frac{Nm}{rad/s}$	$\frac{ft\text{-}lb}{rad/s}$
Friction, translational	b	$\frac{N}{m/s}$	$\frac{lb}{ft/s}$
Inertia, rotational	J	$\frac{Nm}{rad/s^2}$	$\frac{ft\text{-}lb}{rad/s^2}$
Mass	M	kg	slugs
Position, rotational	$\theta(t)$	rad	rad
Position, translational	$x(t)$	m	ft
Speed, rotational	$\omega(t)$	rad/s	rad/s
Speed, translational	$v(t)$	m/s	ft/s
Torque	$T(t)$	Nm	ft-lb

Table C.2 Conversion Factors

To Convert	Into	Multiply by
Btu	ft-lb	778.3
Btu	J	1054.8
Btu/hr	ft-lb/s	0.2162
Btu/hr	W	0.2931
Btu/min	hp	0.02356
Btu/min	kW	0.01757
Btu/min	W	17.57
cal	J	4.182
cm	ft	3.281×10^{-2}
cm	in.	0.3937
cm^3	ft^3	3.531×10^{-5}
deg (angle)	rad	0.01745
deg/s	rpm	0.1667
dynes	g	1.020×10^{-3}
dynes	lb	2.248×10^{-6}
dynes	N	10^{-5}
ft/s	miles/hr	0.6818
ft/s	miles/min	0.01136
ft-lb	g-cm	1.383×10^{4}
ft-lb	oz-in.	192
ft-lb/min	Btu/min	1.286×10^{-3}
ft-lb/s	hp	1.818×10^{-3}
ft-lb/s	kW	1.356×10^{-3}
$\frac{\text{ft-lb}}{\text{rad/s}}$	$\frac{\text{oz-in.}}{\text{rpm}}$	20.11
g	dynes	980.7
g	lb	2.205×10^{-3}
$g\text{-}cm^2$	$oz\text{-}in^2$	5.468×10^{-3}
g-cm	oz-in.	1.389×10^{-2}
g-cm	ft-lb	1.235×10^{-5}
hp	Btu/min	42.44
hp	ft-lb/min	33,000
hp	ft-lb/s	550.0
hp	W	745.7
in.	meters	2.540×10^{-2}
in.	cm	2.540
J	Btu	9.480×10^{-4}
J	ergs	10^{7}
J	ft-lb	0.7376
J	W-hr	2.778×10^{-4}
kg	lb	2.205
kg	slugs	6.852×10^{-2}
To Convert	**Into**	**Multiply by**
kW	Btu/min	56.92
kW	ft-lb/min	4.462×10^{4}
kW	hp	1.341
miles (statute)	ft	5280
mph	ft/min	88
mph	ft/s	1.467
mph	m/s	0.44704
mils	cm	2.540×10^{-3}
mils	in.	0.001
min (angles)	deg	0.01667
min (angles)	rad	2.909×10^{-4}
Nm	ft-lb	0.73756
Nm	dyne-cm	10^{7}
Nms	W	1.0
oz	g	28.349527
oz-in.	dyne-cm	70,615.7
$oz\text{-}in^2$	$g\text{-}cm^2$	1.829×10^{2}
oz-in.	ft-lb	5.208×10^{-3}
oz-in.	g-cm	72.01
lb(force)	N	4.4482
lb/ft^3	g/cm^3	0.01602
$lb\text{-}ft\text{-}s^2$	$oz\text{-}in^2$	7.419×10^{4}
rad	deg	57.30
rad	min	3438
rad	s	2.063×10^{5}
rad/s	deg/s	57.30
rad/s	rpm	9.549
rad/s	rps	0.1592
rpm	deg/s	6.0
rpm	rad/s	0.1047
s (angle)	deg	2.778×10^{-4}
s (angle)	rad	4.848×10^{-6}
slugs (mass)	kg	14.594
$slug\text{-}ft^2$	km^2	1.3558
W	Btu/hr	3.413
W	Btu/min	0.05688
W	ft-lb/min	44.27
W	hp	1.341×10^{-3}
W	Nm/s	1.0
Wh	Btu	3.413

gram (g), joule (J), watt (W), newton (N), watt-hour (Wh)