

Lawrence Berkeley National Laboratory

Recent Work

Title

BASE UNITS AND DERIVED UNITS

Permalink

<https://escholarship.org/uc/item/2591h5rm>

Author

Davey, J.

Publication Date

1985-02-01

~~SECRET~~

LBID-1003
c.1

BASE UNITS AND DERIVED UNITS

FEB 1985

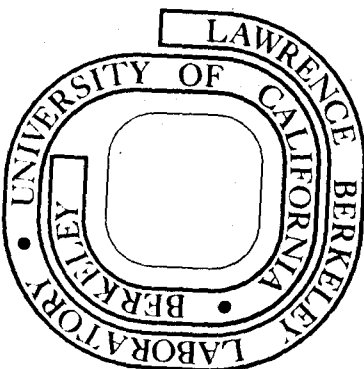
RECEIVED
LAWRENCE
BERKELEY LABORATORY

APR 2 1986

LIBRARY AND
DOCUMENTS SECTION

For Reference

Not to be taken from this room



LBID-1003
c.1

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.

LAWRENCE BERKELEY LABORATORY - UNIVERSITY OF CALIFORNIA		CODE	SERIAL	PAGE
ENGINEERING NOTE		AA0139	M6338	1 of 2
AUTHOR	DEPARTMENT	LOCATION	DATE	
J. Davey	Mechanical	Berkeley	February 1, 1985	
PROGRAM - PROJECT - JOB				
MECHANICAL DEPARTMENT METRICATION				
DEPARTMENTAL METRICATION				
TITLE				
BASE UNITS AND DERIVED UNITS				

The following information is given in continuation of the Mechanical Department metric policy to keep abreast of and report on the national metric conversion effort, and offer metrication information selected for its educational merit. This issue will give some basic units and prefixes, and is intended to help prepare the reader for future total conversion when it occurs.

THE INTERNATIONAL SYSTEM OF UNITS

The International System of Units (SI) includes seven basic physical quantities: length, mass, time, electric current, temperature, luminous intensity, and amount of substance.

Each physical quantity is represented by a "base" unit included in the following chart:

Base Units

Length	meter (m)
Mass	kilogram (kg)
Time	second (s)
Electric Current	ampere (A)
Temperature	kelvin (K)
Luminous Intensity	candela (cd)
Amount of Substance	mole (mol)

Other units can be derived mathematically from these base units as illustrated in the following charts:

Derived Units

(expressed in terms of base units from which they are derived)

area	square meter - m^2
volume	cubic meter - m^3
density	kilogram per cubic meter - kg/m^3
velocity	meter per second - m/s
acceleration	meter per second squared - m/s^2
luminance	candela per square meter - cd/m^2

*This work was supported by the U.S. Department of Energy, Office of Basic Energy Science, under Contract No. DE-AC03-76SF00098.

ENGINEERING NOTE

AA0139

M6338

2 of 2

AUTHOR

DEPARTMENT

LOCATION

DATE

J. Davey

Mechanical

Berkeley

February 1, 1985

Derived Units
(expressed by special names)

force	newton - N	$\text{kg} \cdot \text{m}/\text{s}^2$
pressure	pascal - Pa	N/m^2
work	joule - J	$\text{N} \cdot \text{m}$
power	watt - W	J/s
electric charge	coulomb - C	$\text{A} \cdot \text{s}$
electrical potential	volt - V	W/A
frequency	hertz - Hz	1/s
electric capacitance	farad - F	$\text{A} \cdot \text{s}/\text{V}$
electric resistance	ohm - Ω	V/A
magnetic flux	weber - Wb	$\text{V} \cdot \text{s}$
inductance	henry - H	$\text{V} \cdot \text{s}/\text{A}$
luminous flux	lumen - lm	$\text{cd} \cdot \text{sr}^*$
illuminance	lux - lx	lm/m^2

*Certain units of the SI are assigned to a third class called "supplementary." These units are used to form derived units. This class currently contains two purely geometrical units: the radian (rad), which is a plane angle unit; and the steradian (sr), which is a solid angle unit.

In the metric system, prefixes are used to indicate units larger and smaller than a given base unit. The prefixes tell what the value of the new unit is. Each prefix represents a different power of 10, and it can be added to any of the basic or derived units. The following is a list of metric prefixes, along with their symbol, factor, and decimal meanings.

Prefix	Pronunciation (USA)	Sym	Factor	Decimal
exa	ex'a (<u>a</u> as in <u>about</u>)	E	10^{18}	1 000 000 000 000 000 000
peta	as in <u>petal</u>	P	10^{15}	1 000 000 000 000 000
tera	as in <u>terrace</u>	T	10^{12}	1 000 000 000 000
giga	jig'a (<u>a</u> as in <u>about</u>)	G	10^9	1 000 000 000
mega	as in <u>megaphone</u>	M	10^6	1 000 000
kilo	as in <u>kilowatt</u>	K	10^3	1 000
hecto	hect'toe	h	10^2	100
deka	deck'a (<u>a</u> as in <u>about</u>)	da	10	10
deci	as in <u>decimal</u>	cd	10^{-1}	0.1
centi	as in <u>sentiment</u>	c	10^{-2}	0.01
milli	as in <u>military</u>	m	10^{-3}	0.001
micro	as in <u>microphone</u>	μ	10^{-6}	0.000 001
nano	nan'oh (<u>an</u> as in <u>ant</u>)	n	10^{-9}	0.000 000 001
pico	peek'oh	p	10^{-12}	0.000 000 000 001
femto	fem'toe (fem as in feminine)	f	10^{-15}	0.000 000 000 000 001
atto	as in <u>anatomy</u>	a	10^{-18}	0.000 000 000 000 000 001

Some future issues will cover "Metric in Everyday Use and Basic Rules for Use and writing of SI Symbols and Units."

JD:er

This report was done with support from the Department of Energy. Any conclusions or opinions expressed in this report represent solely those of the author(s) and not necessarily those of The Regents of the University of California, the Lawrence Berkeley Laboratory or the Department of Energy.

TECHNICAL INFORMATION DEPARTMENT
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA 94720