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On Symbols for Units of Measurement

VARIOUS standardizing and publication agencies in the sciences and engineering have recommended or adopted lists of "abbreviations" for the names of units of measurement. None of the lists, even the most recent ones, seem to have been compiled with much regard for the view that these "abbreviations" may be usefully employed as *physical symbols*, in the sense that they may be incorporated in physical equations in exactly the same manner as are the letter symbols for physical quantities and the numerical symbols; moreover, that these symbols (abbreviations) are then subject to the same conventions and rules of operation as are the other mathematical symbols of physical science. For this view to hold, a letter symbol for a physical quantity must be interpreted as representing both the magnitude and unit of the quantity; for example, $V = 4$ ft³. It is true that the letter symbols may be regarded alternatively as representing magnitudes alone; thus, V (in cubic feet) $= 4$. Either one of the interpretations may be adopted so long as one uses it exclusively throughout a particular physical description.

No single list of unit-symbols will be generally useful, however, unless it is devised mainly in the light of the first interpretation and its implications; for this interpretation, unlike the second one, suggests that considerable economy of thought can be effected if the rules for selecting and using unit-symbols are formulated, not mainly arbitrarily, but in the light of already established mathematical procedures. As an analogy, consider an earlier time when negative exponents had not yet been defined and there were no rules for operating on quantities such as x^{-n}. If standardization had been the only issue, any one of several definitions agreed upon by a majority might conceivably have served. However, a definition and rules of operation for positive exponents were already available, and so the sensible step was to adopt $x^{-n} \equiv 1/x^n$ as the definition, thus making factors involving negative exponents subject to the same rules of operation as those with positive exponents. Integrative steps of this kind, which effect economy of thought and effort, and simplify learning, are of course a main objective of any science.

In line with these ideas, we prepared a 35-page mimeographed document on unit-symbols and sent it to a number of physicists in various types of educational institutions and industrial and Government laboratories. Included in the document was a proposed set of rules applying to such symbols and a list of approximately 500 primary and secondary units, together with the various "abbreviations" for each of them that are in more or less common use. In the light of the various comments and criticisms received, the statement and list were prepared that appear on page 1078 of this issue. Many of the units listed in the original document have been eliminated, the present Table 1 being confined to those basic units and combining forms that are believed to be in most common use.—D. R.

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