

## METROLOGY

# Pounds or Grams?

**Ninety percent of the world has changed to the metric system of weights and measures. The United States and the British Commonwealth still cling to the complex English system.**

By RALPH SEGMAN

NEWBORNS in this country are weighed in pounds or grams, or, often, in both. Each hospital's peculiar custom determines the scale used. From the moment of birth, Americans are caught up in a confusion of weights and measures that makes life more complicated and expensive than it need be.

This problem is confined to the English-speaking world: the United States, Eire and the British Commonwealth. Ninety percent of the earth's population is on the more efficient metric system, almost exclusively.

Ever since George Washington and Thomas Jefferson unsuccessfully urged the Congress to adopt the metric system, advocates have launched sporadic, and losing, campaigns for the cause. A metric bill, the first in nearly 30 years, has recently been introduced in the House by Rep. Overton Brooks (D-La.). Passage of this bill would require the National Bureau of Standards to investigate and report within a year on the practicability of U. S. adoption of the metric system.

## Eliminate Fractions

Embraced first by the French in 1799, the metric system eliminates fractions. It is a decimal system based on the meter (little more than a yard), liter (just over a quart), and kilogram (2.2 pounds). To change an amount, say 3.5 kilograms, to a smaller unit, grams, the decimal point is moved three places to the right. The result is 3,500 grams. This is typical of metric conversions, a simple shifting of decimal points. However, to convert  $3\frac{1}{2}$  pounds to ounces, it is necessary to multiply the fraction by 16 (or 12, depending on the pound you use).

Adoption of the metric system seems as imperative for the U. S. as a haircut seems to be for a good, sociable human being.

One of the more important reasons for going metric is that virtually every other country in the world operates under that system. As stubborn holdouts, with huge export-import businesses, the U. S. and the British Commonwealth are perpetuating burdens on world commerce as well as on their own. Weights and measures have to be converted from system to system. It is a situation that breeds errors, costs time and money, and sometimes results in hard feelings.

Also, as Lewis L. Strauss pointed out when he was Secretary of Commerce: "It must be apparent to all that the uniformity of measurement systems between Russia and most of the world . . . is an enormous

advantage to the Soviets and a handicap to us."

Although we use what is loosely called the English system, we and the British have not cooperated in eliminating all of its exasperating ambiguities.

This past July, however, the U. S. and five other English-speaking countries did agree on the dimensions of the pound and inch. Still unclarified is the ton, 240 pounds heavier in Britain than in the U. S. The American fluid ounce equals 1.0408 British fluid ounces. The British have not yet abandoned the old stone (14 pounds). And the British pharmacist deals with such a conglomerate of weights and measures that he must close shop for three days every month to straighten his accounts.

Within the U. S., confusion is no less prevalent. Not satisfied with one simple, or even complicated, system, Americans have squeezed themselves into a tangled spaghetti of systems. We use the metric, avoirdupois, troy, apothecaries', and various "splinter" systems. Even scientists, who

would rather use the metric system alone, are forced onto double, triple and quadruple standards.

Why is the metric the preferred system in the world today? One must first look back to the serio-comic standards of the past to appreciate its simplicity. One of the earliest standards was the foot. Called by many names and coming in many sizes, it was "rigidly" controlled by the length of the feet of whomever happened to be chief or king. In intertribal barter, perhaps, the subjects of the king with the smallest feet might have had quite an advantage.

Many of the ancients measured in cubits, the distance from the point of the elbow to the tip of the middle finger. The Romans defined the mile as 1,000 paces. Edward II of England decreed that the inch was the length of three barley corns end-to-end. And one yard lay between the end of Henry I's nose and the tip of his thumb.

## 85 Weights and Measures

Some of these units have been discarded and others more precisely defined. The Bureau of Standards three years ago published a list of some 85 different weights and measures in general current use in the U. S. Along with feet, pounds, and meters,



**SIXTEEN GOOD MEN**—This German woodcut from a book on surveying published in 1575 illustrates the preferred method of standardizing the rute (equivalent to the English rod). Sixteen men were selected at random as they came from church and were lined up foot-to-foot. The result was one rute, or the length of 16 average feet.

there are angstroms, chains, furlongs, leagues, links, points, perches, hectares, barrels, bushels, cords, gills, pecks, teaspoons, drams, and scruples. There are at least three different tons, two pounds, three ounces, three quarts and three miles.

Despite the unwieldiness of this melange of weights and measures, some Americans might rebel against adoption of a "foreign" system. The metric system is not new in this country, however. Like the Old World immigrants, it crossed the Atlantic during Colonial days, and in 1866 was legalized for optional use in the U. S.

### France Was First

The French were the first to adopt the metric system, in 1799, because they considered it superior to the farrago of inaccuracies they had been using. Most of the rest of the world came to agree. Now, all U. S. weights and measures are based on metric standards. The U. S. standards are a meter bar and a kilogram mass both made of platinum-iridium, preserved in an air-conditioned vault at the National Bureau of Standards in Washington.

The French originally defined the meter as one ten-millionth of one quarter of the distance around the earth. They later discovered that the earth measurement was not precise (the same is true today). Finally, it was decided the meter was equal to that distance between two lines cut on a special platinum-iridium bar. This bar is kept, together with a mass arbitrarily defined as a kilogram, at the International Bureau of Weights and Measures at Sevres, France. The metric standards of every nation, including the U. S., are periodically checked against these two.

### AGU Questionnaire

A large number of individuals and some organizations (among them the American Association for the Advancement of Science and the American Geophysical Union) are eager to help the U. S. go metric. An AGU questionnaire, carrying a recommendation for a 33-year period of transition to the metric system, has been distributed to scientists and other professionals. The response to date has been 94% favorable. A full report will be published in AGU Proceedings. Some completed questionnaires were accompanied by personal comments, a few of which were:

A consulting engineer: "I wish somebody would figure out how many hours are wasted daily in this cumbersome foot-inch conversion . . ."

An accountant: "You will be surprised at the number of people and firms that will automatically pick up the metric system . . . without diddling around over the long pull."

A geohydrologist: ". . . every time I convert from gallons per minute to cubic feet per second or to acre feet per year, I curse the English system of units."

Among the antimetric replies was a radio engineer who complained that time and angle conversions are just as difficult. He could see no justification in replacing "one obsolete system (English) with a second obsolete system (metric)."

It does appear, however, that the U. S. will sooner or later adopt the metric sys-

tem. For example, although there is no uniformity of weights and measures in maternity hospitals, and pounds and inches are used only out of deference to parents, the metric system is used to scientifically determine whether the newborn is premature or normal. Most scientists and engineers prefer metrics. The system is taught in a number of schools.

### Changeover Praised

In a pioneering move, which may well set a precedent for American industry, the Indianapolis drug firm Eli Lilly and Company in 1955 began a complete conversion to the metric system that has taken just four years to institute. Some 2,500 manufacturing formulas had to be changed, machinery and instruments recalibrated, and 10,000 employees taught to think in metric terms.

Lilly's Ralph W. Ernsberger asserts that it is "increasingly apparent that the economical advantages far outweigh the difficulty encountered along the way in making the change-over." Several other drug and chemical manufacturers have since followed suit.

Science News Letter, August 15, 1959

### ARCHAEOLOGY

## 1,000-Year-Old Pre-Aztec Collection Under Study

THE REMAINS of a previously unknown pre-Aztec culture which flourished 1,000 years ago on Mexico's west coast is under study at the University of California, Los Angeles.

It is said to be one of the largest and best-preserved archaeological collections from a single Indian site.

Ranging from copper tweezers, needles and "money" to an exquisitely decorated variety of pottery, the collection is remarkably well preserved. Many of the pottery vessels are completely intact and decorated with a style of art not previously discovered. There are more than 700 pottery vessels, including incense burners, a variety of jars, vases and dishes.

A rare item is a fired clay detailed model of a temple. A variety of whistles, which still whistle, some in the shape of birds, is included in the collection. These may have served as toys, or some may have been used by the officials of games played on a "ball" court uncovered at the site.

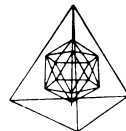
Other copper objects are bells and a finger ring with a face modelled on it. The ring is only the second finger ring found in a Mexican site. A large stone tablet with a carved figure of a man holding a snake, pottery stamps apparently used to stamp elaborate designs on cloth and skin, and obsidian arrow heads and knives are other items in the collection.

Evidence suggests that these prehistoric people, fore-runners of the Aztecs, were headhunters. A number of bodyless heads were found in the site.

The collection comes from the Amapa site (named for a nearby Mexican village) 700 miles below the Arizona-Mexico border at the mouth of the Santiago river in the state of Nayarit. The collection was excavated last spring with the permission of the Mexican Government by a UCLA expedition headed by Dr. Clement Meighan.

Science News Letter, August 15, 1959

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