

REPORT OF THE

**12d NATIONAL CONFERENCE ON
WEIGHTS AND MEASURES 1967**

**U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
SPECIAL PUBLICATION 297**

THE NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards¹ provides measurement and technical information services essential to the efficiency and effectiveness of the work of the Nation's scientists and engineers. The Bureau serves also as a focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. To accomplish this mission, the Bureau is organized into three institutes covering broad program areas of research and services:

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—Building Research—Electronic Instrumentation—Technical Analysis—Center for Computer Sciences and Technology—Textile and Apparel Technology Center—Office of Weights and Measures—Office of Engineering Standards Services—Office of Invention and Innovation—Office of Vehicle Systems Research—Clearinghouse for Federal Scientific and Technical Information³—Materials Evaluation Laboratory—NBS/GSA Testing Laboratory.

¹ Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C., 20234.

² Located at Boulder, Colorado, 80302.

³ Located at 5285 Port Royal Road, Springfield, Virginia 22151.

Report of the 52d National Conference on Weights and Measures 1967

*Sponsored by the National Bureau of Standards
Attended by Officials From the Various
States, Counties, and Cities, and
Representatives From U.S. Government,
Industry, and Consumer Organizations
Washington, D.C., June 26, 27, 28, 29, 30, 1967*

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C. R. Smith, Secretary*

*National Bureau of Standards
A. V. Astin, Director*

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OFFICERS AND COMMITTEES

OFFICERS

(As elected by the Fifty-first National Conference to serve during the Fifty-second)

President: A. V. ASTIN, Director, National Bureau of Standards. }
Executive Secretary: M. W. JENSEN, Chief, Office of Weights and Measures, National Bureau of Standards. } *Ex officio*

Chairman: J. E. BOWEN, City Sealer of Weights and Measures, Newton, Massachusetts.

Vice Chairmen:

C. O. COTTOM, Supervising Inspector, Food Inspection Division, Michigan Department of Agriculture, Lansing, Michigan.

R. H. FERNSTEN, County Sealer of Weights and Measures, Alameda County, California.

F. M. GERSZ, Deputy Commissioner, Department of Consumer Protection, Hartford, Connecticut.

J. G. GUSTAFSON, Chief Inspector, Department of Licenses, Weights and Measures, Minneapolis, Minnesota.

Treasurer: C. C. MORGAN, City Sealer of Weights and Measures, Gary, Indiana.

Chaplain: R. W. SEARLES, County Inspector of Weights and Measures, Medina County, Ohio.

OFFICERS

(As elected by the Fifty-second National Conference to serve during the Fifty-third)

A. V. ASTIN, *President* }
M. W. JENSEN, *Executive Secretary* } *Ex officio*

C. C. MORGAN, *Chairman*

N. BERRYMAN of Florida, *Vice Chairman*

R. T. WILLIAMS of Texas, *Vice Chairman*

J. T. DANIELL of Michigan, *Vice Chairman*

D. E. KONSOR of Wisconsin, *Vice Chairman*

J. F. TRUE of Kansas, *Treasurer*

R. W. SEARLES of Ohio, *Chaplain*

EXECUTIVE COMMITTEE

(As elected by the Fifty-second National Conference)

A. V. ASTIN
M. W. JENSEN
C. C. MORGAN
N. BERRYMAN
J. T. DANIELL
D. E. KONSOR
R. T. WILLIAMS
J. F. TRUE
R. W. SEARLES

Ex officio

L. H. DEGRANGE
G. L. DELANO
M. R. DETTLER
K. G. HAYDEN
N. KALECHMAN
J. B. MCGEE
G. E. MATTIMOE
J. C. MAYS
D. I. OFFNER
A. W. WEIDNER, JR.

STANDING COMMITTEES

(As constituted at the conclusion of the Fifty-second National Conference, the personnel of each of the standing committees are as listed. The remaining term of office for each committee member, in years, is shown in parentheses following each entry.)

EDUCATION*

- W. I. THOMPSON of New Jersey, Chairman (3).
- L. A. GREY of Indiana (1)
- A. D. ROSE of California (2)
- J. I. MOORE of North Carolina (4)
- B. A. PETTIT of District of Columbia (5)

LAWS AND REGULATIONS*

- W. A. KERLIN of California, Chairman (4)
- L. BARKER of West Virginia (1)
- H. L. GOFORTH of Illinois (2)
- J. F. LYLES of Virginia (3)
- G. L. DELANO of Montana (5)

SPECIFICATIONS AND TOLERANCES*

- H. D. ROBINSON of Maine, Chairman (2)
- J. F. MCCARTHY of Massachusetts (1)
- C. H. STENDER of South Carolina (3)
- R. REBUFFO of Nevada (4)
- D. E. KONSOR of Wisconsin (5)

COMMITTEE ON LIAISON WITH THE NATIONAL GOVERNMENT*

- J. H. LEWIS of Washington, Chairman (3)
- R. J. FAHEY of Illinois (1)
- K. C. ALLEN of Ohio (2)
- R. C. PRIMLEY of Michigan (4)
- E. E. WOLSKI of New York (5)

ANNUAL COMMITTEES ACTING ONLY DURING THE FIFTY-SECOND CONFERENCE

Nominations: H. E. CRAWFORD of Florida, *Chairman*; V. D. CAMPBELL of Ohio; J. E. MAHONEY of Maryland; R. E. MEEK of Indiana; C. H. STENDER of South Carolina; J. F. TRUE of Kansas; D. M. TURNBULL of Washington.

Resolutions: R. H. FERNSTEN of California, *Chairman*; J. C. BOYD of Iowa; P. W. GAITHER of Mississippi; H. P. HUTCHINSON of District of Columbia; W. H. NAUDAIN of Delaware; S. F. VALTRI of Pennsylvania; C. J. WILLS, JR. of Maine.

Auditing Committee: I. R. FRAZER of Indiana, *Chairman*; L. H. DEGRANGE of Maryland; G. L. DELANO of Montana.

*M. W. JENSEN, Executive Secretary of the Conference, is *ex officio* nonvoting secretary to each committee.

COMMITTEE MEETINGS, MONDAY JUNE 26, 1967

All day Monday was set aside for meetings of the Conference committees. Announcements of these meetings were carried in the National Conference Announcement and in the Conference Program.

The Conference committees that met on Monday morning were the Executive Committee, the Committee on Education, and the Committee on Specifications and Tolerances. The Committee on Liaison with the National Government and the Committee on Laws and Regulations met Monday afternoon.

All final reports of the Standing and Annual Committees can be found beginning on page 151.



REPORT OF THE FIFTY-SECOND NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

MORNING SESSION—TUESDAY, JUNE 27, 1967

(J. E. BOWEN, *Chairman*, Presiding)

The invocation was delivered and the memorial service for departed members was conducted by the Conference Chaplain, Rev. R. W. Searles of Ohio.

Rev. Searles led the delegates in the Pledge of Allegiance.

ADDRESS

by Hon. ALEXANDER B. TROWBRIDGE, *Secretary of Commerce*,
U.S. Department of Commerce



It is a pleasure to welcome you to Washington.

The National Conference on Weights and Measures has a long and distinguished tradition of achievement and service in the public interest, and I am confident that this session not only will continue, but will measurably enrich that tradition.

We all know the importance of common reference standards. They are the basic language of manufacture that makes mass production possible, and the unifying factor that both shapes and defines the limits of the mass market that is so essential to our progress and prosperity.

But if standards have been important in the past, they are infinitely more so in the complex, interrelated national and world societies of today. Indeed, there is every indication that today's vast technological, economic, and social changes have ushered in a whole new era of standards. Suddenly, we seem to have taken a quantum leap into an age in which standards hold the key, more than ever before, to our continued material progress, both domestically and in our commercial relations in the international sphere.

Many forces have combined to bring about this new era, but one word seems to characterize them all: the word is *more*, and not just *some* more. I mean more on a scale of magnitude unlike anything the world has ever experienced; I mean more on the scale of the increase of nuclear power over TNT.

I refer, of course, to such forces as:

—the vast increase in technology—and not just more technology, but even more meaningful, *more complex* technology;

—the enormous increase in the exchange of goods that is reflected in the surging economic activity on the domestic scene;

—the vaulting increase in international trade and the heightened competition for a rightful share in the opportunities offered by the one-world market;

—the vast social changes that have carried the democratization process into every thread of our national life;

—and the unprecedented urbanization of our country, with concentrations of population that have turned whole areas into a single megalopolis.

All of these things, of course, have brought untold benefits to our people—in health, education, housing, new and improved products of every description, and generally higher living standards at every level. We also know these forces impose mounting responsibilities on every individual and every institution, both public and private.

But I believe there are few individuals, few organizations, that have the responsibility, the opportunity, for playing such a constructive role in the maintenance and expansion of these benefits, as those involved in the field of standards.

I believe you are aware of this. For the fact is that you and your predecessors in this organization have helped bring this new era into being through the outstanding cooperative mechanism you have provided as a service to the marketplace for more than half a century. The man generally regarded as the greatest Secretary of Commerce ever to occupy this office, Herbert Hoover, took a personal and continuing interest in your work, and addressed this Annual Conference every year for six years, 1921–26.

In the first of those addresses, he said that the subject of standards is partly a matter of . . .

enforcing honesty and protecting the consumer with respect to a return for the money he gives. It is also a question of simplifying the process of manufacture, and in simplifying the process of manufacture you are contributing to a lower production cost and protecting both producer and consumer. We are saving something out of national energies. Fractions of pennies saved to every household and in every industry accumulate to make the wealth and strength of the American people.

Today President Johnson has responded to the demands of this new era by launching bold new programs in almost all areas requiring expanded standards operation—in both the con-

sumer and industrial field, in both domestic and international commerce.

And this Conference, both as an organization and through its individual members, will play an even greater cooperative role in this new era than it has in the past. I can assure you that we here in the Department of Commerce intend to call on your technical resources, your sense of national responsibility, and your paramount interest in human values, to help with the forward progress of the new programs that are only now getting underway.

We need this help not only because of our Department's continuing responsibility to promote both domestic and international trade, and to help provide standards to meet the needs of our burgeoning new technology. We also need it because our Department has been given new and expanded responsibilities in the consumer field, particularly in packaging and labeling.

I can assure you that we are approaching the tasks ahead with certain well-defined principles in mind. One of these involves the voluntary standards procedures of the Department, which seek to foster consensus by the parties involved. We feel that our role is to respond to a specific request from the private segments of society, to assist in establishing a voluntary standard.

To further this principle, the Department, as you may know, issued new procedures in 1965 for the development of voluntary standards for products, processes, and materials. These procedures leave the responsibility for consenting to product standards with the various interests affected—producers, distributors, and consumers.

We know that it is the balancing of these interests, which, beyond the technical content, makes a good or bad standard. An unbalanced standard reflecting only the producer's point of view, or only the view of a small number of the producers in a given field, will soon be recognized for what it is—an inadequate and inappropriate standard.

We are especially committed to the principle of "open standards openly arrived at." The open process should be provided with the broadest participation from public, as well as private, interest groups—the participation of all those who will be affected by the standards. Experience teaches us that industry invites Government regulation when it neglects an open process for writing its voluntary standards.

A good, voluntary standard, fairly and openly arrived at, can protect *all* points of view and can serve *all* interests. It promotes informed choice by giving the consumer information about the performance or characteristics of products he buys; it facil-

itates domestic and international trade, and it stimulates innovation and competition. We *all* benefit, both as individuals and as members of the national and international community.

By and large, producers, distributors, consumers, trade associations, and others, all have shown a strong sense of responsibility in working out standards. We now have in effect about 500 voluntary product standards developed through Commerce procedures, and at least 13,000 developed through private associations. This great system of standardization operates in the best American traditions of individual freedom and national cooperation—and we intend to expand and build on it to meet the new challenges ahead.

One of our principal challenges lies in the field of international trade. The recent successful conclusion of the Kennedy Round negotiations, which liberalized world trade on some \$40 billion worth of products, underscores the need for increased attention to international standards. For standards are the international language of trade, through which buyer and seller communicate—and we obviously are going to be doing a lot more talking in this world in the years ahead.

This means that the Tower of Babel in international standards must come tumbling down. For we know that when international standards are incompatible with national standards, trade barriers are thereby created.

For example, when international standards exclude U.S.-made products, the loss of sales by U.S. manufacturers is a problem for the entire economy. A case in point is the fact that standards for television sets in Europe differ from those in the United States. They call for a different number of scanning lines on the screen. TV sets described by these standards are not inherently better or worse than American-made sets, just different. But the barrier to the sale of our sets is as real as if the sets themselves had been excluded.

We have requested legislation, which is now before the Congress, to support and stimulate U.S. participation in formulating international standards so that ours can harmonize with those of other nations selling in the international marketplace. The bill would provide grants to qualified standardization organizations for participating in the international standards process and for information activities.

I also can announce—here for the first time today—that I will shortly propose to other agencies of our Federal Government the establishment of an Interagency Committee to consist of two panels—one to work in the international standards area and the other on the domestic side.

The first would seek to coordinate the functions of all govern-

mental agencies that touch on international standards, in an effort to come to grips with these very real, non-tariff barriers to trade. The Kennedy Round did not address itself to problem of standards as one of the non-tariff barriers, and we must mount a concerted attack on them as the next order of business if we are to fulfill the full promise that freer world trade offers.

The second panel would concern itself with the Government's attitude toward developing good voluntary standards and coordinating government's cooperation with industry and other private interests. We know that there is not enough participation by unbiased experts or those affected by the standard. This panel not only would seek to arrive at a common attitude among Federal agencies, but also coordinate policy and seek to reduce overlapping work.

But it is our Department's work in the field of consumer standards that will undoubtedly attract the greatest public notice in the immediate months and years ahead.

President Johnson laid the foundation for this work in his proposals on consumer affairs to the Congress. He recently commented:

The American consumer enjoys the highest standard of living of any time in our history. But there is unfinished business needed to strengthen the efficiency and the fairness of our marketplace. We must act and I think we should act now to protect every American against unsafe products, against misleading information, against the deceitful practices of a few.

As the representative of the business agency of government, I would like to emphasize that word "few." The number *is* few. The vast majority of American businessmen conduct their affairs on an ethical plane equal to that of other men of affairs any where in our society. But it is unfortunately true that in business, as elsewhere, an unscrupulous few do take unfair advantage, both of consumers and other producers, in our free and open marketplace. And we must deal with them in a forthright manner.

Today the mood of the country demands protection for the consumer against abuses in the marketplace. This means that the age-old philosophy of *caveat emptor*—let the buyer beware—must be modified.

It must be modified not only to protect the buyer's interest, but the public interest. For the way a product performs can affect not only the health and safety of the buyer, but in our congested society also that of his fellow citizens. An unsafe automobile places in jeopardy both the life of the driver and all those in the stream of traffic. This realization has resulted in new

legislation—in the field of highway safety, and in such environmental matters as air and water pollution.

The consumer also needs new and better standards to help him choose in the marketplace—and he must participate in the process by which those standards are drawn up.

We at Commerce have special responsibilities in this area under the Fair Packaging and Labeling Act of 1966. Our duties, however, are not regulatory in nature. We do not have the responsibility or the authority under the Act to issue any regulation governing the packaging or labeling practices of private industry. We *do* have a responsibility and authority to determine whether there are problems in this area and to encourage the development, on a voluntary basis, of standards which will be in the total public interest.

We will be making every effort to assist manufacturers, no less than consumers, and to assist consumers, no less than manufacturers, in achieving the goals which the President and the Congress have set for us.

Our Department also has special interests in legislation now in various stages of consideration by Congress that will protect the American consumer against hazards in the home. The proposals include the creation of a National Commission on Product Safety (recently approved by the Senate) that would study household products that might be hazardous and make recommendations to the President and the Congress within 18 months. Another proposal would strengthen the Flammable Fabrics Act to cover additional items of clothing and other fabrics used in interior furnishings. And a third proposal would support and supplement private research on fire-fighting and fire prevention. In 1965, some 12,000 lives and \$1.75 billion worth of property were lost to fire. Our per capita death rate through fire was about four times as great as that of the United Kingdom and over six times as great as that of Japan. We must do better, and this legislation would be a beginning step.

In much of this work, we in the Department of Commerce will be calling on this Conference and its individual members for assistance that only you can provide: identifying problem areas, gathering information, and disseminating the standards which are arrived at.

I am confident that you will respond to this call to service in the same responsible, effective, selfless manner that has always characterized your professional performance. In the new era of standards we have the opportunity to take a giant's stride forward in furthering the potential of human endeavor—and I know that you will be in the vanguard of this great forward movement.

ADDRESS

by R. D. HUNTOON, *Chief, Office for Program Development and Evaluation, National Bureau of Standards*



You have heard Secretary Trowbridge emphasize the great importance of the development of international standards. I think, therefore, that you will understand why Dr. Astin could not be with us today. He is a member of the U.S. delegation to the International Standards Organization which is now meeting in Russia to undertake some of the tasks that the Secretary has been telling us about. This is the first National Conference on Weights and Measures that Dr. Astin has missed since he became Conference President. I am both pleased and honored to have the opportunity to appear in his place.

It is very seldom that an institution as large as the National Bureau of Standards has an opportunity to rebuild and to move to a completely new physical plant. This is exactly what we have done recently and, as a part of the planning for making optimum use of these facilities, Dr. Astin authorized a re-examination of the Bureau's role, to determine how it is meeting its responsibilities and how we can further improve and extend our services to meet the needs of the national economy.

Briefly stated, the role of the Bureau is to serve as the principal focal point within the Federal Government for the maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. We carry out this mission primarily by providing the central basis, and the leadership for our National Measurement System. As will soon become apparent, this is really a sobering responsibility and a fantastic challenge. Dr. Astin thought it appropriate and I share some of our self-examination with you today.

First of all, however, it is customary to inform the Conference of those items of interest that have happened at NBS since our last meeting. Of the various items I might discuss, I am sure that you will be most interested in the program to supply the States with new standards.

As most of you know, the Congress has authorized the Bureau to provide a new set of modern standards for physical measurement to each of the States. Perhaps I should pause here to make a point. The word "standards" in the English language has two different meanings. Part of the time this morning we shall be speaking of standards for physical measurement, those standards

that provide our national tie points for measurement compatibility. At other times in the discussion, as when we heard from Secretary Trowbridge, we shall be discussing standards of practice—those standards that specify the design and performance characteristics of materials and products.

Of course when we speak of the new State standards, we are speaking of measurement standards. The Congress has authorized ten complete sets of these each year. We have the funds to take care of two years now, and funds for a third year practically in hand. Each set will include both metric and U.S. customary standards. We will provide them to a State when it, in turn, provides a laboratory and technical facilities worthy of the new standards. Dr. Astin presented recently the first two sets to Ohio and Illinois. By next year, we hope to have 10 more sets in the State laboratories.

A second item of interest since the last meeting was the completion of the move into our new Gaithersburg facilities. We formally dedicated these facilities last November. Some 2500 people were present at the dedication and about 500, including 66 foreign visitors from 25 countries, attended a two-day Symposium on Technology and World Trade, which the Secretary of Commerce sponsored at Gaithersburg in conjunction with the dedication. This Symposium examined ways in which the barriers to world trade might be removed and the dissemination of technology facilitated. At the end of that week we held an open house and, to our surprise, 20,000 people attended it.

This spring the Industrial Research Institute held a meeting at NBS. Some 240 research directors and scientists from 136 of the major corporations of the country came to see what we do, how we do it, and how we can meet the needs of industry.

Coming now to our technical program, I am happy to state that the Bureau's new linear particle accelerator is operational. This \$3 million facility produces an electron beam whose energies can be varied from 10 to 150 million electron volts. The beam can have an electron power output up to 100 kilowatts, giving us 200,000 times the radiation intensity previously available at NBS. This high beam intensity is necessary in developing measurement standards needed by the radiation processing industry and by the users of such machines wherever they occur in science and industry. We look upon the new accelerator as a major national facility, not only for NBS but for people in industry and the universities.

We also have a high-flux research reactor of 10 million watts capacity which is expected to be ready to operate in about three months. This facility will be used to study the properties of materials under radiation.

Now let us return to an examination of the role of NBS in our society through a consideration of the developing concept of a National Measurement System (NMS). This System had its beginning back in the dim past when our forebears set up systems of weights and measures to provide a basis for fair exchange in the marketplace. Starting with the three quantities, length, mass, and time, it has grown to be a very extensive and sophisticated measurement system.


The NMS is built on the fundamental principle that "things equal to the same thing are equal to each other." This sets the essential role of a standard. To insure compatibility in all measurements of a quantity such as length or mass, we must have a pyramid of comparisons, or calibrations, at ever-increasing levels of accuracy, until for each quantity all measurements are ultimately referred to the same thing—the national standard or "tie point."

If we provide compatibility in this way, then measurements made throughout the country will be consistent wherever they occur and the System will operate to provide "constrained freedom." That is to say, each individual, manufacturer, or businessman within the System will have complete freedom to make his own decisions and to develop products as he wishes; but at the same time he will be constrained so that his actions and decisions will be consistent and compatible with his environment and he will thus be able to operate successfully.

Our National Measurement System is one of a number of mutually interacting systems within our technologically based society. Examples of other such systems are the transportation system, communications system, or the fiscal system. Together they make up the environment in which our citizens live and carry on their activities.

The NMS is fully as large and important as the other social systems. In fact, this simple axiom of mathematics, that things equal to the same thing are equal to each other, really leads to big business. It is roughly estimated that something more than 20 billion measurements a day are being made in this country by all our citizens—in factories, in laboratories, and in everyday life: This number is nowhere as precise as some others we shall mention later, but nonetheless it indicates the magnitude of the system.

In this country, we have some \$25 billion invested in measuring instruments alone, and this investment is growing at the rate of \$4 or \$5 billion a year. We have some \$20 billion invested in research to provide measurement data, and we are adding about \$3 billion a year to this amount. Altogether our investment in



THE NATIONAL
MEASUREMENT
SYSTEM

	FINAL DEMAND (GNP)	COST OF MEASUREMENT	MAN YRS SPENT ON MEASUREMENT
	\$ BILLIONS	BILLIONS	THOUSANDS
MANUFACTURING	225	7.8	845
CONSTRUCTION	21	1.1	120
MINING & FARMING			
TRANSPORTATION	39	0.9	98
COMMUNICATIONS & UTILITIES			
MEDICAL & EDUCATIONAL SERVICES	28	1.4	103
GOVERNMENT & OTHER SERVICES	83	2.7	139
TOTALS	396	13.9	1305

FIGURE 1

the System is in the order of \$45 billion to \$50 billion and is increasing by \$7 or \$8 billion a year.

Figure 1 shows the impact of the National Measurement System on our national economy in figures taken from the 1963 census. Here we are looking at totals for those industries and services which then accounted for two-thirds of the Gross National Product. We find them investing \$13.9 billion a year in measurement activities and expending 1.3 million man-years in the process.

In figure 2 we take a closer look at the various manufacturing industries. The ordinate shows, for a number of industries, the percentages of the total value of all shipments that were spent on measurement; the abscissa shows the growth of these industries over the 1963-65 interval. Note that the fastest growing industries are those that devote the most effort to measurement. I do not say that measurement makes them grow faster, but I do say that the fastest growing industries are those that are most closely coupled to the output of the Measurement System, and that therefore our industrial growth is in fact tightly coupled to our measurement sophistication and capability.

What is the function of the National Measurement System that has grown up in this country? Any system, of course, consists of a set of functional elements working together under some sort of central control to accomplish some function. We see the function of the NMS as one of providing a quantitative basis in measurement for interchangeability and for decisions for action

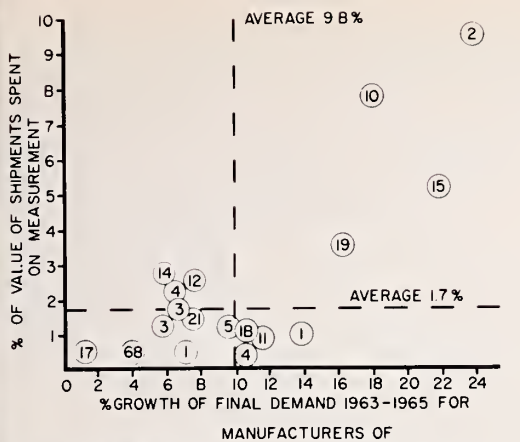


FIGURE 2

- | | |
|--------------------------|-------------------------|
| 6B FOOD & BEVERAGES | 10 AEROSPACE |
| 21 CHEMICALS & DRUGS | 5 LEATHER & PAPER |
| 19 MACHINERY | 4 OTHER TRANSPORTATION |
| 18 MOTOR VEHICLES | 4 PRINTING & PUBLISHING |
| 17 APPAREL | 3 FERROUS INDUSTRIES |
| 15 ELECTRICAL MACHINERY | 3 RUBBER & PLASTICS |
| 14 MISC DURABLES | 2 INSTRUMENTS |
| 12 FABRICATED METALS | 1 TEXTILE PRODUCTS |
| 11 FURNITURE & WOOD PROD | 1 NONFERROUS INDUSTRIES |

in all facets of our daily life—public affairs, commerce, industry, science, and engineering.

The interchangeability aspect is of fundamental importance in modern society. Once we have a measurement system with a set of agreed-upon units and standards, we have a firm basis for the interchange of goods and services in the mass markets of modern commerce, of machine parts and devices in industry, and of scientific and technical information. Such a system makes it possible for any plant to mass-produce materials, parts, and systems that are interchangeable with those made in plants in other parts of the country. Without this basis for interchangeability, our industrial economy as we know it today could not exist. Likewise, if results obtained in one laboratory are to be useful in another, they must be expressed in a measurement system common to both laboratories; otherwise, each laboratory would have to operate on its own and confusion would result when they attempted to exchange information.

Modern society requires each of us to make numerous decisions throughout the day, and many of these decisions are based on measurement. For example, we are continually making measurements of temperature, time, and speed so that we can decide what to wear, when to leave, and how fast to go. And an aircraft pilot must read a number of measurement output dials in order to make vital decisions during a flight (fig. 3).

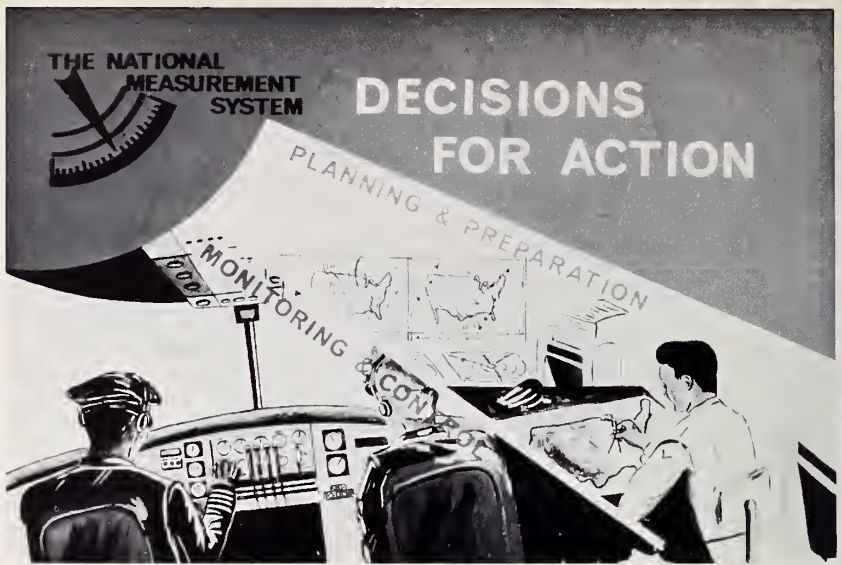


FIGURE 3

To provide a basis for decisions throughout the Nation, all measurements must be compatible with each other. For example, the airplane pilot's decisions based on measurement must be compatible with those made in the control tower and in other aircraft, as well as with measurements of the properties of the materials in the aircraft, the fuel it uses, and the atmosphere around it. Otherwise, the pilot will be unable to stay on course, avoid collisions, and arrive on time.

Like other social systems, the National Measurement Systems consists of two basically different interacting structures which we may designate as the "conceptual system" and the "operational system." The conceptual system is the logical structure that provides the fundamental basis for the operational system—a structure of functional elements each of which is an organization of people and resources to accomplish a function. The International System of Units (abbreviated SI for *Système International*) exemplifies the basic structure of the conceptual system that governs the operation of the NMS.

The anchor points for the entire structure of the conceptual system (fig. 4) are the standards for the four basic quantities: mass, length, time, and temperature. The units for all other physical quantities are linked to the units for these four quantities (the kilogram, meter, second, and degree Kelvin) through the definitions and equations of physics. This fact insures that the units of the SI will be consistent with the equations of physical science.

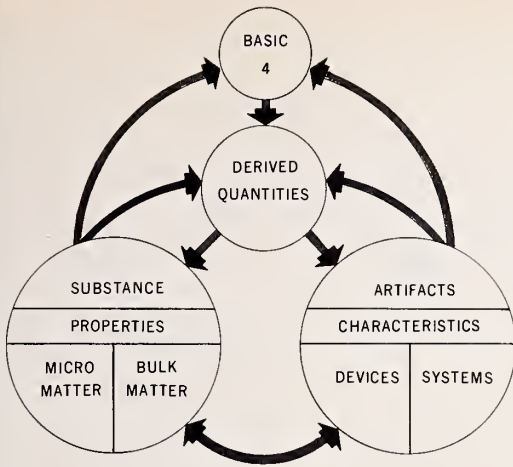


FIGURE 4

The basic and derived physical quantities form a set of some 47 general measurement quantities, in terms of which the other measurement quantities of science, industry, and commerce are developed. Those measurement quantities concerned with the properties of substances, such as density or viscosity, form one characteristic set which serves the need for a body of reliable data on the properties of matter and materials. Those that relate to manmade artifacts—devices, subsystems, and systems—rather than substances, form another characteristic set which serve the need for technological measurements and standards, i.e., design or performance standards.

Figure 4 shows upward feedback, which takes place in two ways. First, there is the feedback of information regarding the needs for refinement of the quantities at each level. Then there is the feedback of capability and knowledge developed in the various parts of the system. For instance, information on properties is essential to the definition and development of the four basic units and for standards for the derived units.

The Operational System.

We turn now to the operational system—national in scope and consisting of people and organizations. Figure 5 illustrates, in a very general way, how the NMS operates in this country. It shows the National Measurement System's relation to the international measurement system, its pool of unmet needs, and its reservoir of capability that the users draw upon. The figure also shows the three major networks which comprise the NMS. First there is the instrument network which provides calibrated traceable instrumentation, consistent and compatible with the na-

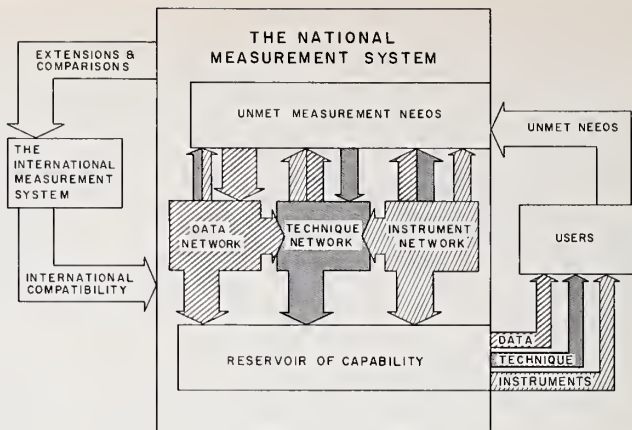


FIGURE 5

tional standards, for making measurements. This network is tied to the conceptual system through the basic core of national standards.

Then there is the data network which provides the user of the System with critically evaluated data on the intrinsic properties of materials—data that previous investigators have obtained in measurements based on the national standards. This network thus gives the user in many cases a “ready-made answer” to his measurement problem so that he does not need to make the measurement himself. The data network is related to the conceptual system through the basic core and the definitions of the properties of substances.

We may also envision a corresponding data network for data on the characteristics of devices or systems to meet the need for technological measurements and standards. This network, however, is not yet sufficiently well analyzed to permit adequate representation here.

Finally, there is the techniques network which tells the user of the NMS how to use the instrument and data networks in order to make meaningful measurements. This network disseminates knowledge to the user, through publications and other means, so that he will know, first, how to make a given measurement, and secondly, what it is meaningful for him to measure.

Now, having outlined the gross structure of the NMS, let us consider the role of NBS as a key functional element in this System (fig. 6). This role the Bureau conceives to be one of central Federal leadership—to guide the System as it continues to operate through the voluntary cooperation of American science and industry and the provision, on the part of the



CONSISTENT
INSTRUMENTATION

REFERENCE
DATA

MEANINGFUL
MEASUREMENT

NATIONAL STANDARDS

CALIBRATION
STANDARD REFERENCE MATERIALS

DATA GENERATION
DATA EVALUATION

TECHNIQUES OF MEANINGFUL
MEASUREMENT

ENGINEERING RESEARCH

FIGURE 6

Federal Government of the central basis for the system. The Bureau must maintain this leadership through general acceptance based on its capability—not by law or fiat. So it exerts its leadership through its outputs—by developing and maintaining the national standards which serve as a central core for the three networks, by providing calibration services and standard reference materials for the instrument network, by generating and evaluating data for the data network, and by developing techniques of meaningful measurement for the techniques network.

The program response of NBS to meet these needs of the NMS has followed quite naturally from the nature of the System. The Bureau's physical measurement system program is aimed primarily at basic measurements and standards. This program provides the core of central tie points around which the system functions, and from which the measurement chain extends outward to the calibrated instruments throughout the System.

A second NBS program, on matter-materials data and standards, seeks to meet the nationwide need for a systematic and readily accessible body of accurate, reliable, precise, and consistent data on the properties of materials in different environments, and for information, reference materials, and conceptual knowledge that will make possible the effective use of such data.

Finally, the Bureau has a program relating to technological measurements and standards. This program provides information on the performance characteristics and design standards of man-

made objects so that there can be meaningful exchange of products and devices in the marketplace.

Central Core.

In providing the national standards which serve as tie points for the NMS, the Bureau must develop and maintain the standards for the four basic quantities and for the set of some 50 quantities whose units are derived in accordance with the conceptual system as indicated earlier. We are also concerned with the values for about 18 physical constants.

A brief look at one of the basic units—the second—will illustrate the dynamic nature of measurement standards and the challenge we face in continually improving our standards to meet the expanding requirements of science and industry. Before 1956 the second was defined as $1/86,400$ of a mean solar day (fig. 7); thus its definition was based on the rotating earth as a clock. But by 1956 it had become sufficiently evident that the rotating earth was not a good enough clock, and the second was redefined as a fraction of the annual trip of the earth around the sun. (This redefinition did not change the *size* of the second, only the way in which it was defined.) The second thus defined is now known as the ephemeris second, and it is possible to realize this second to about 2 parts in a billion after about five years of astronomical measurements. But work with cesium-beam-controlled clocks had already surpassed this precision, so a new definition was needed. In October 1964, the 12th General Conference of Weights and Measures authorized an atomic defi-

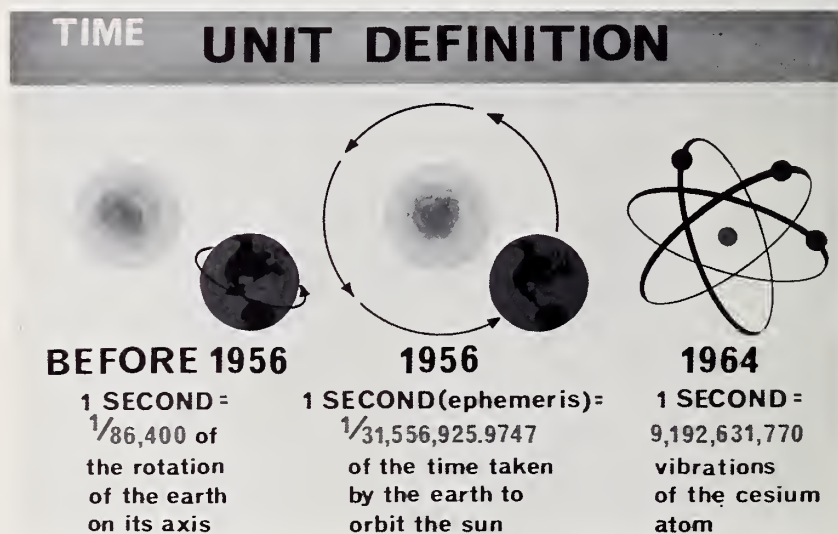


FIGURE 7

nition of the second, and the International Committee on Weights and Measures, acting for the Conference, temporarily based the definition on an invariant transition of the cesium 133 atom, in expectation of a more exact definition in the future, assigning a value of 9,192,631,770 hertz to the cesium transition selected. It now appears that we can compare the second in terms of this definition to 1 or 2 parts in 10^{13} (equivalent to about 1 sec in 30,000 years).

Why do we need to measure time to an accuracy of one second in 30,000 years? The answer is that clocks that keep in step within a few microseconds within a month are required when radio waves, which travel 1000 feet in a millionth of a second, are used to determine positions of missiles or satellites or aircraft. This requires accuracies of about a second in 30,000 years.

The progression in the development of time standards illustrates what might be called "the dynamics of a static situation." We must keep the value of the second invariant, but at the same time must continually do research to realize this unit to greater precision. This makes the field of precise measurement both complex and challenging. To obtain each advance in accuracy, increasingly complex equipment and higher degrees of skill and training are required, so that the cost of the required research spirals upward, and the necessary skills are ever changing.

I am sure that you are aware that similar progress has been made in the field of length measurement. Since 1960 the international standard meter has been defined as 1,650,763.73 wavelengths, in vacuum, of the red radiation from krypton 86, corresponding to the unperturbed transition between the energy levels $2P_{10}$ and $5d_5$. Spectral lines of this type can be compared with an overall limit of uncertainty of about 2 parts in 10^9 . Spectral lines of this type can be inter-compared to a part in 10^9 (equivalent to the diameter of a fountain pen, compared to the distance across the United States), but the translation of these measurements to material standards such as the meter cannot be accomplished so precisely, today's limit being somewhat better than 1 part in 10 million.

Figure 8 shows the progression in the development of standards for the second. We began in ages past with the hour glass which kept time to about a second in a minute and a half; it probably cost \$3 and was accurate to about a part in 100. Next we have a clock, which costs about \$30 and keeps time to a second in three hours or a part in 10^4 . Next we have a good tuning fork, accurate to a part in 10^5 and costing perhaps \$300; then the quartz frequency generator, accurate to a second in three years or a part in 10^8 ; the ammonia molecular clock, good to a

TIME

DEVELOPING THE STANDARD

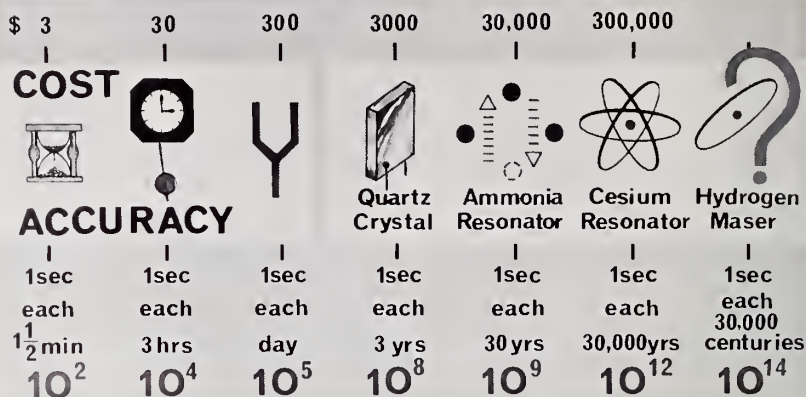


FIGURE 8

second in 30 years, or a part in 10^8 or 10^9 ; then the new cesium resonator previously mentioned, accurate to a second in 30,000 years, or a part in 10^{12} , and costing about \$300,000; and finally the hydrogen maser, now under development, which may go to a part in 10^{14} . If we get to an accuracy of a part in 10^{13} , which appears likely, it will be equivalent to an accuracy of 1 cent in the whole Federal budget.

As yet we have not found any way of tying our standard of mass to the atom which will lead to greater precision than with our present international standard, the platinum-iridium kilogram cylinder at Sèvres, France. However, the various standard kilograms in existence can be intercompared within about 2 parts in a billion. This is roughly equivalent to the weight of ink in a comma as compared with the weight of a whole book.

As I said before, from the four basic units—of length, mass, time, and temperature—we can derive the units for all other physical quantities in accordance with the definitions and equations of physics. Take the quantity current, for example, as in figure 9. We start with our old friends, length, mass, and time in the physical equation $L = ST$; distance equals speed multiplied by time. Since the units of length and time are already set, the equation sets the unit of speed for us. Now we go on to the equation $S = AT$, which defines acceleration, A. As the units of both speed and time are now set, the unit of acceleration is determined by this relationship.

Next we bring in mass, M, to set the unit of force, F, through use of Newton's law $F = MA$. The convenient way of measuring

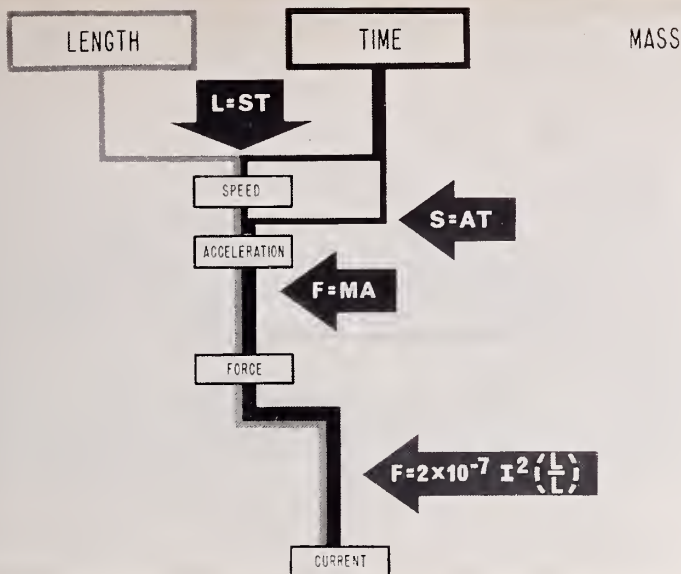


FIGURE 9

force is to weigh a mass, so for a particular weight falling freely in the earth's gravitational field, Newton's law becomes $F = MG$. Thus the measurement of the acceleration of a falling body becomes a critical experiment in setting the size of the unit of force. Once we have the unit of force, we take two parallel wires, run an electric current through them, and measure the resulting force between the parallel wires. If we set the value of the magnetic constant at 2×10^{-7} henry/meter we can now use the equation at the bottom of figure 9 to set the unit of current, I.

In similar fashion, the units for all other physical quantities can be related to the basic four in accordance with the equations of physics.

Instrumentation Network.

Once the units have been selected for the various quantities and national standards for these units have been realized, there must be a chain of measurement that will provide for measuring all the magnitudes we must deal with. In mass, for example, the range extends from the mass of the earth, or even beyond, down to the mass of the electron, neutron, or subparticle (fig. 10). So we have vast spectrum of some 50 or 60 orders of magnitude that must be connected through a measurement chain to the defined unit, the kilogram. Some of these magnitudes can be measured directly by taking multiples or submultiples of the standard,

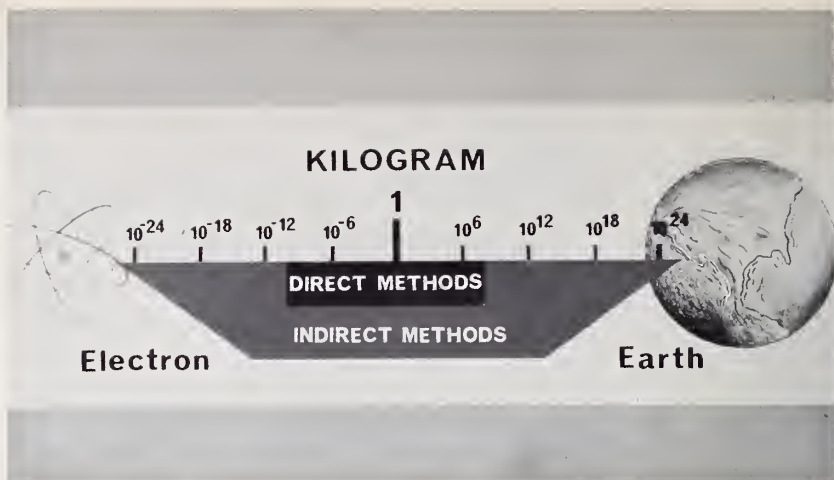


FIGURE 10

but as we leave the central part of the range we find it necessary to use indirect methods, with a corresponding reduction in accuracy.

Of course it is impossible for a single institution such as NBS to make calibrations over the complete range for length or for any other quantity. So the Bureau has to make basic decisions as to how far to go and how much to do. Its policy is to pick calibration points (or in some cases calibration regions) at intervals over the range so that the measurement activities of the country can be coupled to NBS at these points. The Bureau relies on the other measurement laboratories in industry and the defense agencies to extend the calibration to intermediate points between the NBS points so as to cover the range as needed. Thus the national standards in the central core are ultimately connected to the entire instrumentation network.

To help in making the basic decisions that are required, NBS is now using accuracy charts to assess its measurement capabilities in various areas. Figure 11 is an idealized version of such a chart. The heavy line indicates present NBS capability; the next line down, what good industrial laboratories can do; the lower line, accuracies at the ultimate user's level—at the factory bench and in the finished product. The dots indicate the accuracies our customers say they need and the dashed lines show where NBS activities now underway are going or will carry us. Finally, the stars represent the ultimate needs for capability expressed by important segments of the users.

At NBS we can use this type of chart to show graphically

GENERALIZED ACCURACY

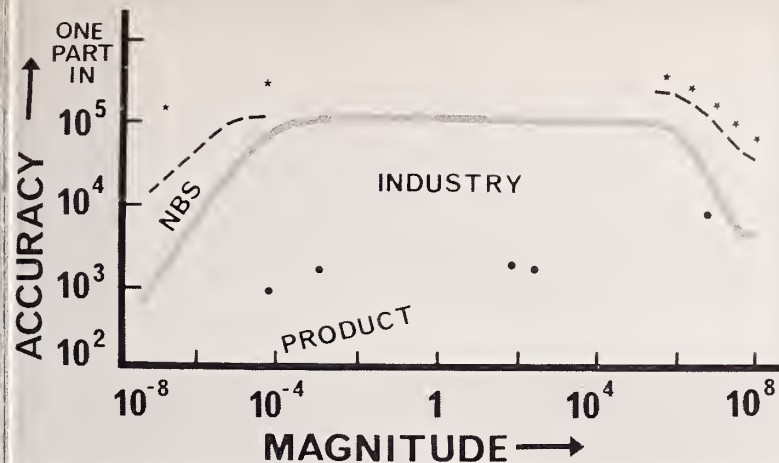


FIGURE 11

where we are putting our major efforts, to indicate our goals, to display the needs of the NMS, and to decide where to concentrate our further efforts. We need to resolve such questions as whether it is more important to raise the line representing NBS capability, and thereby bring up the line representing industrial capability, or whether to try simply to bring the industry line up closer to the NBS line by tightening up the System, perhaps by reducing the number of echelons between the standard and the ultimate user.

Figure 12 is an actual accuracy chart for length showing the different methods used in different ranges of magnitude and the accuracies achieved. As the chart indicates, the laser is emerging as a possible wavelength standard, since the krypton 86 wavelength is useful only in measuring lengths of a few inches.

In the lower left corner of figure 12 we see that frustrated reflection is being studied as a means of measuring very small lengths. You may recall that when light approaches a glass surface from within the glass, there is an angle of approach beyond which all the light will be totally reflected. Careful studies have shown that the light apparently penetrates a short distance beyond the totally reflecting surface as it changes to its reflected direction. If we frustrate that little stream of light, we frustrate the total reflection, and this gives us a means of measuring fractions of a wavelength of light down into the region of 10^{-8} inch.

As I indicated earlier, the physical constants of nature are part of the basic core of the National Measurement System. We feel that the measurement system should be coupled to nature in a

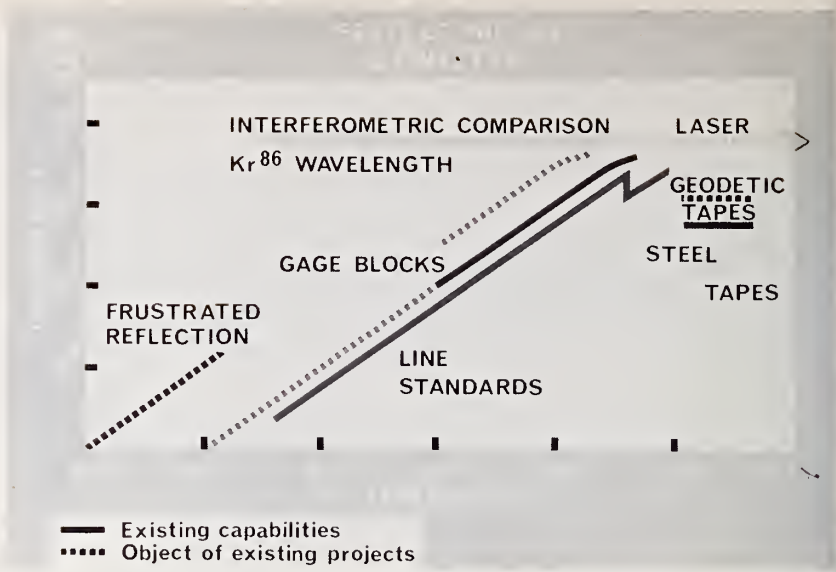


FIGURE 12

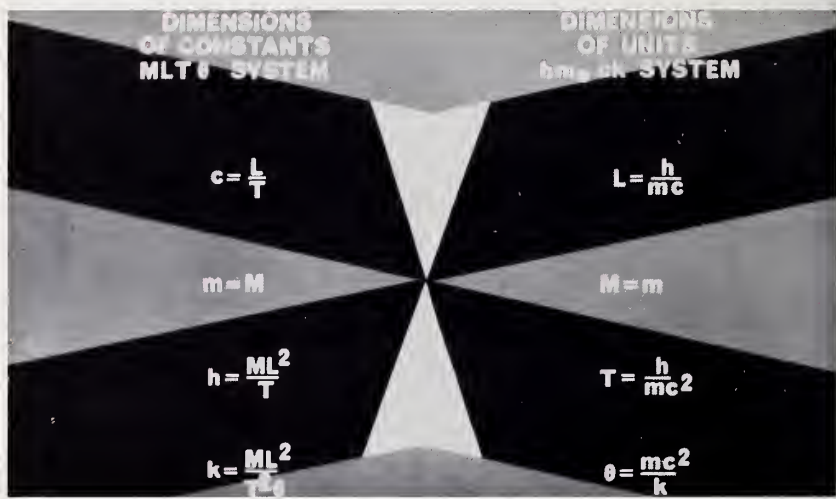


FIGURE 13

reproducible way. Although the system, as it has developed, is based on the four quantities length (L), mass (M), time (T), and temperature (θ), it might equally well have been based on the following four physical constants: the velocity of light (c), Planck's radiation constant (h), the mass of the electron (m), and the Boltzmann constant (k). In figure 13 these relationships are presented in a symmetrical way. On the left the dimensions of the four physical constants are given in terms of the four basic

quantities; on the right the dimensions of each of the four basic quantities are given in terms of the four physical constants. So we see that if we had wanted to, we could have set values for these fundamental physical constants and these would then have determined the values of our units of length, mass, time, and all other quantities. However, the length unit that we obtain as h/mc is of the order of 2×10^{-12} meter, so that a meter would have about 4×10^{11} of these units in it. As this unit is so inconvenient in size, we prefer to keep the meter as our unit of length. Nevertheless, once we have measured these four physical constants with our measuring sticks, we could in theory reproduce the entire measurement system by first arbitrarily setting the size of one unit, remeasuring the constants in terms of the other units, and adjusting their sizes accordingly. Thus these fundamental constants of nature tie the world of measurement into nature.

Data Network.

Now let us turn to the data network. An important point to consider here is that when sufficient data have been obtained to characterize a substance, then the substance can serve as a reference material for the calibration of instruments that measure the properties of substances. Thus the data network offers a means by which the user of the NMS can perform his own calibrations. The use of the freezing and boiling points of various substances—the “fixed points” of the thermometer scale—to calibrate a thermometer is an example (fig. 14). If the substance

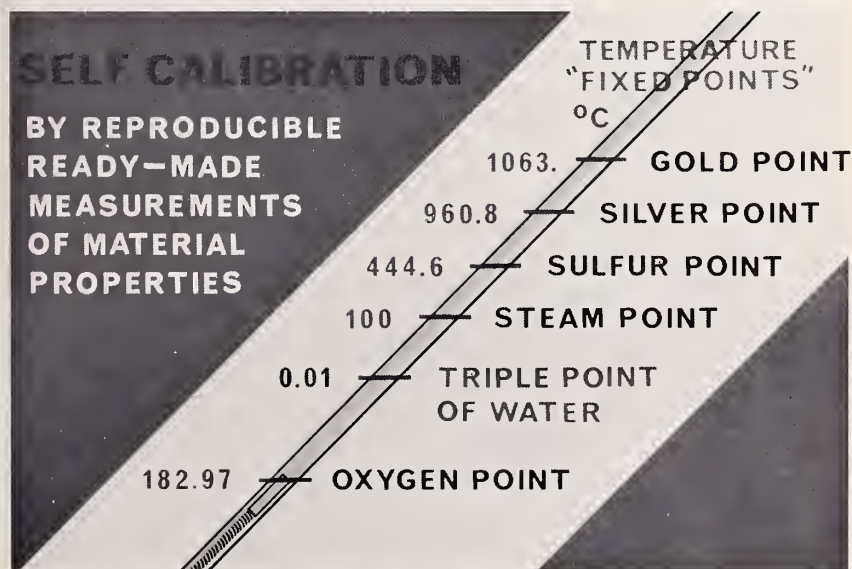


FIGURE 14

ENGINEERING DESIGN

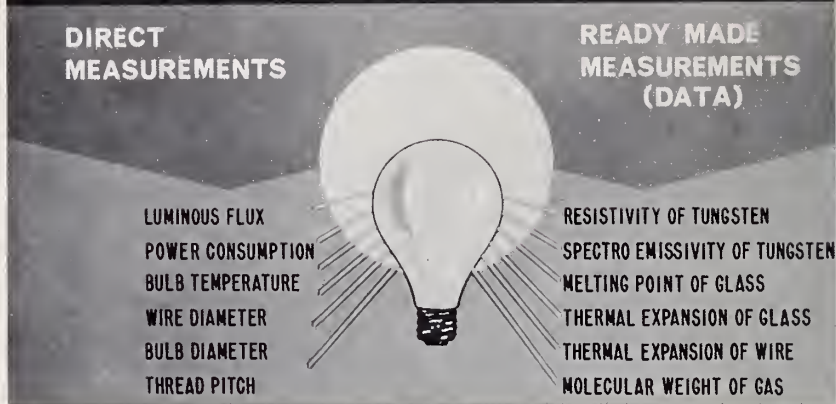


FIGURE 15

is sufficiently well characterized, the reference sample can be purchased from the usual sources of supply and certified standard samples will not be necessary.

Today the great majority of the instruments that are used to measure properties of substances are calibrated in-house by manufacturers or users by reference to standard data on the measured property. The calibrations are related to the national standards through the key data on properties which NBS provides and which people outside NBS can build around. So the existence of ready-made answers in the form of data takes a vast load off the instrument network of the Measurement System.

The data network is also of great value in providing a basis for decisions that must be based on measurement. Suppose, for example, that an engineer were setting out today to design a new competitive light bulb. Figure 15 shows some of the things he would need to know. Obviously he would need instruments to make direct measurements of the diameter of the bulb, the pitch of the thread, the weight of the materials, the diameter of the wires, and so on. But once he had the capability of making these measurements in production, he would still be a long way from the design of a light bulb. He would need a vast store of such ready reference information as the electrical resistivity and spectral emissivity of tungsten and other competitive materials, the melting point and thermal expansion of glass—in fact, a whole library of data of this kind which would also be of value to designers of vacuum tubes and other products. If he has to stop and measure all these properties, he will be investing several

NEED FOR CRITICAL DATA



FIGURE 16

million dollars in a research program before he can start his design. On the other hand, if ready-made answers are already available for the data he needs, because someone else has already measured them, then he can save this vast investment. Once he has found the numbers, he can proceed with the design, provided that he can trust the numbers to be correct.

Figure 16 illustrates, perhaps even more graphically, the need for critically evaluated data in the decision process. When an engineer goes to the literature in search of design data, he finds in some cases a wide range of values for each property he looks up. Suppose, for example, that he is designing an industrial process that involves the heat of formation of hydrogen sulfide. If he turns to the literature he will find an array of values ranging from 2.0 to 4.9 kilocalories per mole. If he accepts the value "2.0" for the heat of formation of hydrogen sulfide, he might conclude that his planned process will not work and there is no point in going further. On the other hand, if he accepts the value "4.9" he may find that his process will be highly productive and should be pushed. Which value should he accept? In the absence of critically evaluated data on the heat of formation of hydrogen sulfide, he can only do what is usually done in industry today—seek expert advice if he can find it, make an educated guess, or measure it again himself, adding another value to the list. Unless he is an expert in the measurement of heats of formation, the value he obtains will probably be no better than those already in the literature, and may be much worse.

The solution to this type of problem is to get together a group

of experts who know the field and can evaluate the various measurements from the literature so as to obtain a "best value"—the most acceptable and trustworthy value—and can make this value generally available. This, of course, is the process of critical data evaluation and compilation. In the data network the primary need is for a core of carefully measured key data that can serve as reference data for the determination of other data throughout the NMS.

Within the NMS the process of critical evaluation and compilation of data has lagged far behind the generation of data in the literature. A large backlog of unevaluated data has been built up, and as this backlog continues to grow, it has become increasingly difficult for scientists and engineers to find the data they need. Lack of critically evaluated data in conveniently available form has thus become an important and wasteful deficiency of the National Measurement System. To remedy this deficiency, the Office of Science and Technology authorized the establishment of a National Standard Reference Data System (NSRDS) and has assigned to NBS the responsibility for its administration and coordination. The NSRDS seeks to pull the best values from the literature and to get them into the hands of the users of the System through publication and other means of dissemination.

This is an enormous task. A great reservoir of unevaluated data has accumulated over the years. Data compilation and evaluation activities carried on by data centers all over the country can now take care of about 20 percent of the annual increment of 200,000 papers, but the backlog remains untouched and continues to grow. So the backlog of unevaluated data is growing, the situation is getting more confused, and it is becoming increasingly difficult for scientists and engineers to find the data they need.

There is thus a strong economic need to get all these data critically evaluated and disseminated to users. If the NSRDS can get the resources to do this job, we estimate it will pay back into the economy between \$100 and \$200 for every dollar invested.

Now, before closing, I would like to say a few words about the NBS program in the area of technological measurements and standards. These are the standards of practice that are so useful in the exchange of goods and services in the marketplace.

Here the role of NBS, as we see it, is to provide the technical basis upon which voluntary standards for sizes and designs can be based, and to encourage the development and promulgation of performance standards, as opposed to design standards, for products and devices wherever possible. In this way we hope to remove those barriers to innovation and progress that are characteristic

of some design standards. We are now developing technical information to provide a basis for technological standards in the building, computer, and automotive safety fields. The work in automotive safety includes studies of tire, seat belt, and brake systems and is supported by the Department of Transportation. You have already heard of our activities in support of "truth in packaging."

This then is a general picture of the National Measurement System, in which the weights and measures activities of the Nation, as well as the National Bureau of Standards, have key roles to play. We look upon you as members of the System and expect you to make us aware of your needs so that NBS can modify its outputs accordingly. On our part, we at NBS will continue study of the NMS as a system and will try to develop ways and means for making it more efficient and effective. The value of such an effort is well illustrated by the fact that if the NMS, through ineffective functioning, should limit the national productive capacity by only one part in a thousand then the economic loss to the Nation would be in the neighborhood of \$500 million—10 times the annual budget of the National Bureau of Standards.

Following Dr. Huntoon's address, Mr. M. W. Jensen announced the appointments to the Standing Committees of the Conference and presided during the presentation of Honor Awards.

APPOINTMENTS TO THE CONFERENCE STANDING COMMITTEE

COMMITTEE ON EDUCATION

B. A. PETTIT of the District of Columbia to replace
S. H. CHRISTIE, JR., of New Jersey (5 years)

COMMITTEE ON LAWS AND REGULATIONS

G. L. DELANO of Montana to replace
M. JENNINGS of Tennessee (5 years)

COMMITTEE ON LIAISON

WITH THE NATIONAL GOVERNMENT

J. H. LEWIS of Washington to replace
A. L. LITTLE of Arkansas (3 years)

E. E. WOLSKI of New York to replace
C. E. JOYCE of Minnesota (5 years)

COMMITTEE ON SPECIFICATIONS AND TOLERANCES

D. E. KONSOER of Wisconsin to replace
G. L. JOHNSON of Kentucky (5 years)

PRESENTATION OF HONOR AWARDS

Mr. M. W. Jensen presented Honor Awards to members of the Conference who, by attending the 51st Conference in 1966, reached one of the four attendance categories for which recognition is made—attendance at 10, 15, 20, and 25 meetings.

AWARD RECIPIENTS

20 Years

V. D. Campbell Arthur Sanders R. W. Searles

15 Years

H. J. McDade D. M. Turnbull R. W. Foster

10 Years

J. T. Daniell R. H. Tolson
W. G. Dox H. E. Siebold
Clement McBride A. W. Weidner, Jr.

ADDRESS

by J. ELLIS BOWEN, *Sealer of Weights and Measures, Newton, Massachusetts, and Chairman, National Conference on Weights and Measures*



It is a great privilege, and a profound pleasure for me, as Chairman of the National Conference on Weights and Measures, to welcome you all here today, and to extend to all of you a most cordial greeting.

I wish also to extend a sincere and warm welcome, on behalf of the Conference, to our visitors and colleagues from other nations who are honoring this Conference by their presence. We are happy to have them share with us in our deliberations.

The first annual meeting of the Sealers of Weights and Measures of the United States was held at the National Bureau of Standards on January 16 and 17, 1905. It is of interest to note that this meeting was called by Dr. S. W. Stratton, at that time Director of the National Bureau of Standards, and the invitation to the meeting stated its purpose to be, "To bring about uniformity in the State laws referring to weights and measures, and also to effect a close cooperation between the State inspection services and the National Bureau of Standards." This first meeting was attended by eleven delegates.

It seems apropos, at this time, to review the current formalized and approved statement of objectives of our National Conference:

1. To provide a national forum for the discussion of all questions related to weights and measures administration as carried on by regulatory officials of the States, Commonwealths, Territories, and possessions of the United States, their political subdivisions, and the District of Columbia.

2. To develop a concensus on model weights and measures laws and regulations, specifications, and tolerances, for commercially used weighing and measuring devices, and testing, enforcement, and administrative procedures.

3. To encourage and promote uniformity of requirements and methods among weights and measures jurisdictions.

4. To foster cooperation among weights and measures officers themselves, and between them and all of the many manufacturing, industrial, business, and consumer interests affected by their official activities.

It would be gratifying to Dr. Stratton and his colleagues to view this great assembly of men and women, dedicated to the cause of honest weights and measures; we, whose purpose it is to assure

that equity may prevail in commercial transactions.. For several years, attendance at our annual conferences has ranged from five hundred to a thousand, and certainly vindicates the foresight, judgment, and hopes of the eleven delegates who attended that first meeting in 1905.

At this point I would inject three personal opinions, as a weights and measures official, basically important to me. These are personal opinions, but I think worth your attention and consideration.

1. In my opinion, no function of government is more fundamental than weights and measures administration, and probably only the functions of the military, police, fire, and health protection are equally so.

2. In my opinion, our age appears to be an age of shifting political, economic, and moral standards. It is reassuring to know that the standards with which we deal in our professional lives, the basic standards of weights and measures, are stable. They do not, and cannot, vary.

3. In my opinion, the National Conference on Weights and Measures is one of the Nation's most successful organizations of its type in coordinating the activities of governmental enforcement agencies at all levels with relation to law and order regarding commercial transactions.

The National Conference on Weights and Measures, and the National Bureau of Standards are not, in and of themselves, law enforcement agencies, yet have demonstrated conclusively their value through coordinating the activities of enforcement agencies at all levels—Federal, State, County, and Municipal—through the promotion of uniformity of laws and regulations and procedures, and through pertinent education of weights and measures officials, users of weighing and measuring devices, and consumers.

In researching through the reports of previous conferences it has come to my attention that, at the 33rd National Conference in September of 1947, 20 years ago, E. U. Condon, then Director of the National Bureau of Standards and President of the National Conference on Weights and Measures, suggested in his address,

The most important new service which we contemplate for the National Bureau of Standards is the establishment of a school offering short courses of training for weights and measures officials of State and local governments. What we have in mind is a real training course with lessons to be studied, and supervised laboratory work to be done on topics of real practical interest in weights and measures work. We feel that if we can do a job that is proportionally as valuable as has been the police training work offered by the

Federal Bureau of Investigation, then we shall have rendered a very important service to weights and measures administration in the United States.

Since that time, numerous schools have been conducted by the National Bureau of Standards in various locations throughout the country. I think I speak without fear of contradiction in saying that such schools have contributed to weights and measures law enforcing officials a value comparable to that of the police training offered by the Federal Bureau of Investigation.

A little further researching disclosed that in 1963 your Conference Committee on Education proposed a home study self-education course for weights and measures officials. Response to questionnaires mailed widely throughout the country was unanimously favorable. Upon request of the National Conference, the Office of Weights and Measures of the National Bureau of Standards assigned Richard N. Smith, Technical Coordinator, to prepare a schedule of recommended reading and examination questions. In its report of 1964, one year later, your Committee on Education disclosed that 36, or 72 percent of our fifty States, plus two additional jurisdictions, had requested the course material, a 12-lesson outline of systematic study of standard text material, and sets of pertinent questions. At that time 826 weights and measures officials, as students, were involved in taking the course, about 20 to 25 percent of all the officials in the country. Sixteen jurisdictions were granting certificates upon completion of the course, and fourteen States favored development of additional course material, demonstrating not only a willingness, but a thirst for more professional education.

You will be interested to know that the measurement science technology course at Alfred Tech in New York, offering an Associate in Science Degree, is progressing well.

This school merits the support of all weights and measures people, both officials and industry. Numerous individuals, weights and measures associations, and those in the industry, have contributed financially toward the establishment of a scholarship fund and more such interest would certainly be worthwhile and welcome. Further, it is a school that may be well recommended to any youngster interested in a scale technology career.

I wrote to Alfred Tech for a few copies of its brochure and forwarded two copies to our local Superintendent of Public Schools. His acknowledgment says:

"Dear Mr. Bowen:

This is to acknowledge your thoughtful action in sending me the brochures relating to the measurement science technology course at Alfred. This sort of information is most useful to our guidance

people and I shall be pleased to forward it to them. I am grateful for your thoughtfulness and your interest.

Sincerely,

Charles E. Brown, Superintendent of Schools."

I would suggest that others who may be interested in this educational project write to Alfred Tech, Alfred, New York, requesting such brochures.

The scope of device-user education and consumer education has increased with the passage of time. Such projects are a continuing year 'round activity. Sealers and inspectors constantly, during their rounds, advise device users on applicable laws and regulations, and on the proper maintenance of their equipment. Many officials lecture to home town consumer groups, issue news releases through local publications, radio, and television. Each year, National Weights and Measures Week, instituted in 1958 by this Conference, has increased in scope. This is a joint public relations and educational program, directed to all consumers in every State simultaneously, and it delivers a tremendous impact. Everyone—officials, device users, and consumers—is indebted to the cooperation of our friends in industry for assistance in this annual project. Industry members furnish thousands of window stickers, posters, suggested news releases, editorial matter, etc., to assist in this educational promotion.

We who have promoted public relations programs have learned the value of such public education. We constantly inform our citizenry of the value of weights and measures protection to each person individually, and to the community at large. We must let people know what we are doing and why. We advise that careful shopping habits are in their interest, and we solicit their interest in our official functions. The establishment and maintenance of such liaison between citizen and official, though not mandated by law, is certainly a necessary ingredient of professional weights and measures administration. If you feel timid about embarking upon such a venture for a first time, contact our Committee on Education, who will spare no effort to assist you in this important activity.

Your Chairman is a staunch advocate of the professional educational value of weights and measures conferences. These can be thought of as schools that feature instructional presentations by authorities in our field on such subjects as product shrinkage, packaging problems, various aspects of marketing, and certainly we always have much to learn from the weighing and measuring device manufacturers who are there demonstrating and explaining the most recent technical advances embodied in their prod-

ucts. For a number of years this speaker has attended many such conferences in addition to those of the National and his own home State. These include weights and measures association conferences in New Hampshire, New York State, Indiana, and numerous States in the South during Southern Association Conferences. Every one, without exception, has been highly profitable professionally, as well as pleasant socially. Mrs. Bowen and I now enjoy very warm friendships with professional colleagues in every segment of this Nation.

Subsequent to our 1966 National Conference, your Chairman has not been idle. During my term as Chairman of this National Conference on Weights and Measures I have been privileged to attend several great conferences in various locations.

En route home, by automobile, from the last National Conference in Denver, during July of last year, Mrs. Bowen and I took a week's vacation and attended the 59th Annual Conference of the New York State Weights and Measures Association, held at Massena in New York State. We found the conference of excellent content. If I am not mistaken, I believe we have attended, consecutively, New York's last seven conferences. Mrs. Bowen has there delivered an address relating to the housewife consumer's point of view, and I spoke on the promotion of weights and measures education.

As you would likely presume, we attended the 71st Annual Conference of the Massachusetts Weights and Measures Association held in Boston, early in October, which included a number of outstanding presentations of professional interest.

During the latter part of October we motored to Charleston, South Carolina, to attend our sixth consecutive Southern Association Conference, which is composed of seventeen Southern States plus the District of Columbia. It was a great honor to me to have been invited by the Association President, Carl Stender, Deputy Commissioner of Agriculture for the State of South Carolina, to address this group as I had once before. The title of my address was "Building the Image," and related to public relations efforts directed to building the image of weights and measures administration. If you haven't been to a Southern Conference, I strongly recommend that you attend.

In April of this year, upon invitation of Rollin E. Meek, Director for the State of Indiana and President of the Indiana Association of Inspectors of Weights and Measures, Mrs. Bowen and I motored to Terre Haute and attended the Indiana Conference. The topic of my presentation was "Weights and Measures Administration—Now and in the Future." We were particularly pleased, and honored, that this conference bestowed upon us honorary membership in the Indiana Association of Inspectors

of Weights and Measures. The conference was distinguished by many top-notch professional presentations upon a variety of pertinent subject matters.

During January of this year, as Chairman of the National Conference, I was honored to attend an interim meeting of the National Conference Standing Committee on Laws and Regulations held in Washington. This meeting was attended by Matt Jennings, Director of the Division of Marketing of the State of Tennessee and Chairman of the Committee. Other Committee Members present were Lawrence Barker, Commissioner of Labor of West Virginia; H. L. Goforth, Superintendent of Division of Feeds, Fertilizers and Standards, State of Illinois; J. F. Lyles, Supervisor of Weights and Measures, State of Virginia; and W. A. Kerlin, Chief, Bureau of Weights and Measures, State of California. Also present were M. W. Jensen, National Conference Executive Secretary and Secretary of the Committee, ably assisted by Harold F. Wollin, Assistant Chief, and Richard N. Smith, Technical Coordinator, both of the Office of Weights and Measures of the National Bureau of Standards. In my opinion this meeting was very productive, as you will see when the Committee presents its report.

Perhaps the most dramatic phenomenon of the year 1966, described by one magazine as "Consumerism is Rampant," was the so-called housewife's revolt. The furor of the revolt, picketing, boycotting, and much resultant buck-passing, seemed to conclude in a consensus that much of price increasing is undoubtedly due to general inflation.

There are undoubtedly economies as yet not utilized in marketing. Public Law 89-755, which, prior to enactment, was popularly known as the "Truth in Packaging Bill" is now the "Fair Packaging and Labeling Act of 1966," will become effective July 1st of this year.

The February 1967 issue of *Fortune Magazine* reports that Senator Hart of Michigan, Mrs. Hart and their eight children, are breakfast devotees of Shredded Wheat, and in 1961 discovered that the box had changed in dimensions, becoming higher and narrower. It still contained twelve biscuits, but the net weight of the package had declined from 12 ounces to 10 $\frac{1}{4}$ ounces without any decline in price. This, says *Fortune*, started Senator Hart's crusade, and a series of Congressional hearings from 1961 to 1966, resulting in the "Fair Packaging and Labeling Act of 1966."

The National Conference on Weights and Measures has, over a period of time, been concerned with studies of such problems and reacted to the proposed law as follows:

1. The 51st National Conference on Weights and Measures, held in Denver, Colorado, in 1966, did adopt a strong resolution gen-

erally favoring the then so-called "Truth in Packaging Bill," but recommended some amending thereof before passage.

2. Our National Conference Secretary and Chief of the Office of Weights and Measures of the National Bureau of Standards, Malcolm Jensen, assisted in preparation of testimony to be presented to the Congressional Hearing Committee by the Secretary of Commerce, and also personally testified in behalf of his Department in support of the pending legislation. Mr. Jensen also, at the request of a large majority of the House Committee, discussed with them the technical aspects of the Bill, the role to be played by State weights and measures officials, and thoughts on implementation of responsibilities of the Department of Commerce.

3. West Virginia's Commissioner of Labor, Lawrence Barker, at that time a Vice Chairman of the National Conference and former Chairman of the Standing Committee on Laws and Regulations, at the request and authorization of our National Conference Executive Committee, twice journeyed to the House Committee on Interstate and Foreign Commerce Hearings, in Washington, where he most ably presented Conference views and answered questions relative thereto.

I will digress for a moment to say that telegraphed invitations from President Johnson to attend, on November 3, 1966, the Presidential Signing Ceremony, were received by Lawrence Barker, by Andrew L. Little, Director of Weights and Measures of the State of Arkansas and Chairman of the National Conference Committee on Liaison with the National Government; and your speaker as Chairman of the National Conference. We, together with Dr. A. V. Astin, Director of the National Bureau of Standards, and President of the National Conference; and M. W. Jensen, Chief of the Office of Weights and Measures of the Bureau, and Executive Secretary of the National Conference, were welcomed by President Johnson, who individually shook hands with us in the East Room of the White House and presented to us pens used in the signing ceremony. Also welcoming us to the ceremony with a handshake and spoken greetings were Vice President Hubert Humphrey, Secretary of Commerce John T. Connor, Special Assistant to the President for Consumer Affairs Esther Peterson, and Senator Philip Hart of Michigan, sponsor of the Law.

Briefly, and in effect, the new Law is aimed at a profusion of packages confusing to shoppers. Some big packages held less than smaller packages. Big gallons, giant pounds, king size, queen size, jumbo size, economy size, and such designations have proven vague, confusing, and meaningless. Too many packages have provided excess air space or a slack fill condition. Quantity

declarations have, in many instances, been obscure. Declarations of number of servings contained have been misleading. All this adds up to an assumption that modern merchandisers, aided by Madison Avenue, have through the complexity of packaging, really served up to consumers a big plate of scrambled eggs. It is the purpose of the Act to accomplish an unscrambling.

Exclusive of contained contents the packaging industry consumed some \$16 billion dollars worth of materials last year, and about 45 percent of that went into food packaging. Statistics demonstrate that approximately 92 percent of groceries and allied products are sold in prepackaged form.

Last year the national cost of living index rose by nearly 4 percent, and I have read that twenty-five basic food items have increased in price 16.3 percent since 1963.

Analysis of local figures, for my own city of about 92,000 population, Newton, Massachusetts, indicate that about \$366.00 per person is the annual food bill, which amounts to over \$32 million dollars in this one medium-sized city. When viewed in this light, and projected nationwide, it is obvious that we are dealing with a colossus, even if only food is considered. The provisions of the Act go much further, including many other additional commodities.

States may still enact additional statutes and promulgate additional regulations. However, it is specifically provided in Section 12 of the Act, and I quote, "It is hereby declared that it is the express intent of Congress to supersede any and all laws of the States or political subdivisions thereof insofar as they may or hereafter provide for the labeling of the net quantity of contents of the package of any consumer commodity covered by this Act which are less stringent than or require information different from the requirements of Section 4 of this Act or regulations promulgated pursuant thereto."

One of the functions of the Office of Weights and Measures of the National Bureau of Standards will be to aid the several States in uniformity of regulations as they are issued from the Food and Drug Administration, or the Federal Trade Commission.

My remarks are not intended to be a complete summary of the new "Fair Packaging and Labeling Act of 1966," but merely an outline of some of the more important aspects which will necessarily be our authority and guide, as weights and measures officials, in the future. Much more additional, and more refined, information will be presented during this Conference on Wednesday morning.

I wish to express the thanks and appreciation of this entire Conference to the other officers and to all of the members of

our Standing Committees who have labored long and well, and accomplished much. I am sure you will concur in my evaluation as you hear the presentations of their various reports later during this Conference.

The Conference too, is greatly indebted to Dr. A. V. Astin, our President and Director of the National Bureau of Standards, and to our Conference Executive Secretary M. W. Jensen, also Chief of the Office of Weights and Measures of the Bureau, and his entire staff for guidance and advice in all technical matters, as well as supplying much of the mechanics involved in the arrangements necessary for this meeting.

We who know him well have been particularly pleased to note that Mr. Jensen's distinguished career has been deemed to merit the 1966 presentation to him of the Edward B. Rosa Award. This plaque reads, "In recognition of distinguished leadership in weights and measures administration and in the development of improved techniques for product standardization." We concur with the published words of the Editor of *Scale Journal*, "Those of us who have been privileged to know and work with Mac Jensen are truly gratified at this recognition of his work and service and offer our sincere congratulations to Mr. Jensen."

It is now time to institute the formal proceedings of this 52d National Conference. The program to follow has been planned with meticulous care to allow presentation of the matters of most importance to you during our too-short stay together here.

There is one eminently important point of procedure that must be followed throughout the Conference. Anyone accorded the floor for any presentation before this Conference, even though it be a very brief question or remark, should go to the nearest microphone in the aisle, and must preface his remarks with his name and affiliation. All officers presiding at subsequent sessions will insist upon this point so important in the recording of all procedures of this Conference.

The success of the Conference is in your hands. With your full and conscientious participation success will be assured. To maintain the scheduled program each session must begin at the time assigned. I urge that you be prompt in your attendance. Our speakers have, collectively, traveled many thousands of miles in order to contribute helpful information to weights and measures administration throughout the United States. Their messages will be interesting, informative, and educational. Not only do we owe them our sincere gratitude, but we owe them also our undivided attention and our constant presence at all formal sessions of this Conference.

Your active participation in our sessions is sincerely solicited, for that is the purpose of this Conference.



At the presentation ceremony, left to right, Arthur Sanders, Executive Secretary of the Scale Manufacturers Association; Malcolm W. Jensen, Chief of the Office of Weights and Measures, National Bureau of Standards; Dr. Allen V. Astin, Director of the National Bureau of Standards and Acting Assistant Secretary of Commerce for Science and Technology; Commissioner Lawrence Barker of West Virginia's Department of Labor.

SPECIAL AWARDS CEREMONY

At the close of the Tuesday morning session, a special surprise award was presented by the conference to both Dr. A. V. Astin and Mr. M. W. Jensen.

Mr. Arthur Sanders, Scale Manufacturers Association, and Mr. Lawrence Barker and Mr. Wendell H. Holt, West Virginia Department of Labor, presented the awards signed by each of the governors of the fifty States. (The plaques, stainless-steel centered on a handsome walnut background, were formally awarded again at a subsequent date so that Dr. Astin, absent from the conference to attend an International Standards Conference in Moscow, could accept the award in person.)

The inscription on the plaque presented to Dr. Astin reads:

TO ALL WHOM THESE PRESENTS SHALL COME,
GREETINGS:

Know ye, that we, the undersigned, being the duly elected Governors of these Fifty Commonwealths and States of the Union, comprising the United States of America, in the name of and by the authority invested in us by the people of the said Commonwealths and States, in recognition of the valuable services rendered to the people thereof, do hereby issue this

Certificate of Commendation

To The Honorable

Dr. A. V. Astin, Director
of the

National Bureau of Standards

and in so doing, praise the said Dr. A. V. Astin for his service in establishing a true spirit of co-operation between Federal, State Governments and Industry Officials, in order that throughout these United States of America, in all transactions involving Weights and Measures,

EQUITY MAY PREVAIL!

In testimony whereof, we have hereunto set our hands and seals on this the 27th day of June in the year of our Lord, One Thousand Nine Hundred and Sixty Seven.

TUESDAY AFTERNOON—JUNE 27, 1967

CONFERENCE LUNCHEON

Guest Speaker: MISS BETTY FURNESS, *Special Assistant to the President for Consumer Affairs*



Two weeks ago the Washington Chapter of the National Academy of Television Arts and Sciences gave me a small memento. It was a model of a balance scale—a symbol which has universal significance, as well as particular significance to the weights and measures profession.

It is of special importance to me, as a woman. As you know, many of us try very hard to keep our own personal weights and measures down to a strict standard. We do

like to keep our figures scaled down.

I've noticed that more and more men are concerned about the very same thing!

And it's not always an easy job.

But then why should consumers find it easier to watch their weights than the practitioners of metrology?

Yours is an ancient and honorable profession, and you have kept adjusted to the needs of the times.

Once a balance scale was the official settler of complaints between the Babylonian housewife and the merchant in the bazaar. Today, nothing less than the measurement of light provides the precise standards we need.

But whether we are talking of ancient kingdoms, or medieval England, or today, weights and measures officials traditionally have worked for the consumer.

I recently read this statement:

"Experience shows that many frauds and deceits happen, which usually fall heavy upon the meanest and most indigent sort of people, who are least able to bear the same, and may be accounted little better than oppression; for remedy of which evil, let it be enacted"

That was in the year 1703, when one of the American colonies felt an urgent need to establish an office of weights and measures.

May I take this opportunity to thank you for that generation as well as for our own. You have always been guardians of the scales of justice for the consumer.

You have always believed in providing the consumer with accurate information. That was true in 1703. It is just as true now—but much more difficult. For the number of consumer goods has been infinitely increased. So, it seems, have the ways in which they are marketed and packaged.

In modern times—in 1939 to be exact—the National Conference of Weights and Measures foresaw the technical changes in the marketplace. Your predecessors could see that our wonderful economy, with its immense capacity to produce, was about to open a horn of plenty for the consumer. And you could also see that with blessings come problems.

So 38 years ago you passed a resolution asking Congress to establish an orderly approach for the packaging and sale of basic products.

Last year Congress passed a law—the Fair Packaging and Labeling Act. This law has been called "a modern day weights and measures act."

Its purpose is to put some of our common measurements in terms intelligible to consumers. For the consumer needs stand-

ards by which he can buy, just as the manufacturer needs standards when he makes the goods.

Today I should like to talk briefly about making standards useful for the consumer.

I have found that:

1. These standards often seem vague or lacking, at least as far as the consumer is concerned.

2. The Federal Government and many State governments realize that an information gap exists.

3. Industry bears a responsibility to make buying data clear.

4. Consumers have a responsibility to themselves to read up on products and to buy wisely.

The idea of standards permeates our entire life. It crops up in many figures of speech.

We say that one cannot be a well-balanced person without "standards of conduct."

We say that we bought an appliance which is "not up to usual standards."

Philosophers talk about the "measure of man."

Frequently orators use one of the 57-odd biblical phrases about weights and measures, such as:

A deceptive scale disgusts the Lord,

But he delights in an honest weight.

Despite the fact that we sprinkle our daily talk with such aphorisms, people do not know what kinds of standards exit, or what they mean.

There are performance standards—a product must meet certain service tests.

There are standards of identity, established by the Food and Drug Administration. These standards say that certain common food products, such as ice cream and applesauce, must meet minimum standards.

Another kind is safety standards. These are being introduced for our automobiles.

There are measurement and quality standards. An example in common use is for air conditioners, now rated in terms of BTU's—a method to easily compare the cooling power of different brands selling at different prices.

I wish it were as easy to rate automobiles, or fountain pens, or shoes, or thousands of other consumer products. But it is not, because the standards which could rate many products are not translated into terms meaningful to the nontechnical man and woman.

I have also discovered that many people believe that they are protected by standards sanctified by law, even when no law exists or when the law needs updating.

The Administration has been deeply concerned about this lack of standards for the consumer.

This is the case with fabrics that can burn too fast and too easily. Some of the many who wrote me after my testimony before a Senate Subcommittee on May 4 on this problem had suffered personal tragedy. They thought there was a law against fire-trap fabrics. Well, there is a law, but we know now that the law is inadequate. I sincerely hope that Congress enacts a strong bill this session that will put an end to the horror tales I have heard.

I also hope that a bill establishing a National Commission on Product Safety will pass. If it does, we will be able to investigate accidental deaths and injuries in order to establish proper mechanical safeguards.

These laws, and others, were strongly recommended by President Johnson to Congress in his Message on Consumer Protection of four months ago.

The idea of standards goes beyond safety or physical measurement.

The proposed Truth-in-Lending Bill will provide the borrower with a standard to compare loans. It will require that consumers be told the annual percentage rate plus the dollars and cents cost of a loan.

At present some people have thought, to their regret, that State small loan laws are standards protecting them against too-high interest charges.

But that is not the case. Once the signature is on the dotted line the borrower is committed. That nice man at the finance company can get very nasty after the borrower goes home and figures out the *real* interest rate. In many states it is a very legal 36 percent—not 6 percent.

There are other bills, asked by the Administration:

Because of lack of operating standards for medical clinical laboratories, we know that perhaps one quarter of all lab tests can lead to inaccurate diagnosis—and people getting treated for diseases they don't have, and not getting treated for diseases they do have. Faulty lab tests could—and have—led to unneeded operations. There is a bill being written to set minimum clinical laboratory standards.

Another bill will set manufacturing and performance standards for therapeutic devices used by surgeons such as surgical pins.

In another area, certain standards of information are needed so that lot developers will tell buyers basic facts *before* they buy. The vacation or retirement home sold by mail now may be under water—or far in the desert without any water at all.

The Interstate Land Sales Full Disclosure Act will provide that needed buying information.

I certainly think that the consumer should be assured of standards in the goods and services he buys.

That was the point of the Fair Packaging and Labeling Act of 1966. That certainly is the point of such legislation within the 50 States as the model law on weights and measures, now adopted by a majority of the States.

It is behind such ideas as the Teltag, a handy informational device originally developed in England. A Teltag is a hangtag, attached to a consumer product, which gives pertinent facts according to a standard system.

Attached to, say, a sweater, it would rate such variable characteristics as color fade and durability on a scale applicable to the products of all participating manufacturers. That way the consumer could easily compare one brand with another. He will see a clearly understood standard.

Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology, in speaking about the need of standards for the consumer said recently:

Today the consumer is tired of being a serf to an imposed system. He demands his freedom. He needs standards to help him choose in the marketplace. Even more, he insists that he should participate in the process by which these standards are issued, for in the marketplace he buys the products of our technology according to established standards. Sensible weights and measures regulations always—and especially in today's complex marketplace—try to bring producer and user together at a common meeting ground.

I second Dr. Hollomon's thoughts.

In our complicated world it is extremely important that industry, consumers, and government keep open clear lines of communication.

In doing so, we all share a responsibility.

Industry should market its products through standards of salesmanship which provide standards of information. Then the consumer can have the opportunity of full and free choice.

Governments—as rightfully interested third parties—should insure that laws and ordinances and their administration meet public needs. Consumer legislation should be advanced for the consumer interest and public benefit. And weights and measures laws *are* of benefit.

Consumers bear a major share of responsibility. By exercising their abilities to buy wisely, they can help direct the way to better products and better choices in the marketplace.

All three make a partnership. It should be a working partnership, providing all the members assume joint responsibility.

I had thought, at this point, to conclude these remarks with a little humor. But I do not think humor is appropriate because, frankly, responsibility is no joke. I hope that industry, government, and consumers will assume responsibility.

You certainly are doing it—as you always have.

I pledge that I will, too.

(J. G. Gustafson, *Vice Chairman*, Presiding)

A ROLE FOR AUTOMATIC DATA PROCESSING IN WEIGHTS AND MEASURES

by W. J. WHITTY, *Center for Computer Sciences and Technology, National Bureau of Standards, Gaithersburg, Maryland*

Introduction.



As society becomes more complex, new and more complex methods of operation are introduced. Increasing complexity usually brings an increasing volume of paperwork. The time and money spent issuing licenses, paying employees, preparing budget proposals, and preparing various standard reports are staggering.

How often has it appeared that so much more could be accomplished if so much routine paper work were not required, or if necessary information were more readily accessible? The occurrence of that very thought is often the most important step toward better management. The next is to determine what can be done about it. This paper makes a cursory attempt to describe possible approaches using automatic data processing (ADP). It will make no one an expert in automatic data processing or even provide a working knowledge of any particular application. However, it should indicate possible applications of ADP to weights and measures control and begin the realization of future plans that would not be possible without ADP.

Definitions.

Data processing usually refers to the flow of paperwork thorough an organization. Most of the work involved is clerical. ADP can be classified according to the equipment used: electronic accounting machines or electronic computer systems.

Electronic accounting machines (EAM), e.g., punched card accounting machines, have been used for years to perform various clerical tasks. The operator of such a machine must intercede in the operation at the end of each procedure and move to the next step. Electronic data processing (EDP) employs a system centered around the computer, and operator intervention in the processing is minimal.

A computer may work by any one of several physical means. Most commercially available computers are electronic devices.

There are two basic types of electronic computers, analog and digital. Analog computers simulate the problem to be solved with analogous electrical operations; digital computers solve the problem basically by arithmetic computation. Analog computers are used mainly for special types of engineering problems, while digital computers are used for most business and scientific applications. While some digital machines are designed for special purposes, discussion of computers is confined here to the more versatile, general-purpose digital machine.

Some Uses of ADP in Government and Industry.

The average citizen nowadays generally accepts the existence of ADP in his life in the form of utility bills, bank statements, credit card billings, transportation reservations, and his pay check. One of the first users of ADP was the Bureau of the Census, where data on population, housing, foreign and domestic trade, agriculture, and much more are collected and processed. The Bureau of Labor Statistics does much the same with prices, consumer spending, wages, and unemployment. The Social Security Administration uses ADP on a large scale to keep count of and regulate the flow of money in its charge; and the Internal Revenue Service now employs ADP to audit income tax returns.

State and local governments are making extensive use of ADP for traffic regulation, processing traffic violations, fingerprint identification, providing stolen vehicle information, and issuing driver's licenses and motor vehicle registrations.

The business community uses ADP for inventory management, production planning and scheduling, distribution analysis, process control, facilities location, market analysis, and quality control.

The use of ADP by research organizations to process scientific data is widespread.

Punched Card Data Processing.

The four basic procedures in data processing are classifying, sorting, calculating, and reporting. Punched card processing is performed by unit-record equipment. Briefly, the functions of such machines are: the key punch places the data onto cards; the verifier checks the cards for accuracy; the sorter puts the cards into whatever logical order is required; the collator merges two decks of cards or removes certain cards from a deck; and finally, the tabulator accumulates subtotals and totals and prints them out with suitable headings.

The detailed operation of such equipment can be largely specified by the user through plug-in units which control the operations that are to be performed and in which order.

All of the procedures performed by these machines are common and very time consuming clerical tasks when performed manually. But once the data are punched onto cards and verified, they can be sorted, extracted, merged, and otherwise manipulated with unit-record equipment to produce reports with very little effort. The data can be used over and over to produce a variety of reports and are readily available at any time.

Electronic Data Processing.

Much data processing may be effectively and efficiently accomplished with unit-record equipment. But the more complex and versatile computer may be necessary for very large or involved data processing tasks.

Computers have two major components; a storage unit and a processing unit. The instructions for performing required computations must be fed into the machine just as must the data that the computer will process. The set of instructions is called a computer program. The storage unit contains the program and the data to be transformed as well as all intermediate and final results of the operation.

The processing unit must perform two functions: control and arithmetic. Control means obtaining the instructions and data from storage and initiating the arithmetic operations. Arithmetic means the actual computations of addition, subtraction, multiplication, and division.

The machinery which serves to feed programs and data into the computer and get the results out is called input-output equipment. Data are generally fed in from punched cards, punched paper tape, or magnetic tape. For special purposes a keyboard similar to a typewriter may be used. Results can be recorded by the computer into punched cards, onto magnetic tapes, or in printed form, the last two being the most common.

Some Current ADP Applications in Weights and Measures.

Some jurisdictions are already using ADP. Hawaii has a promising computer application and several organizations are using a punched card equipment in their programs. Some of these applications will be discussed briefly in this section. In addition, a proposed program will be reviewed.

City of New York.

As might be expected in a jurisdiction the size of New York, the Department of Markets, Bureau of Consumer Law Enforcement of the City of New York has an automated system of data processing. The Department is using some punched card equipment and applying it to its program of consumer protection.

Although the New York ADP operation does not use the very latest in computer technology, it is effective. This now serves their needs very well, but the Department emphasizes that it was built up through trial and error at considerable cost in time and money.

Although the total number of inspections did not increase, the cost of tabulating the information did; this increase is now compensated for by the additional information available, as well as by the increased speed of compiling statistical data.

The system for recording and reporting inspections is now as follows:

Each time a merchant is visited, he receives a certificate showing the inspections made and the action taken. For regular inspections, the certificates are preprinted with the name and address of the establishment, its account number, class code (e.g., wholesale) and type code (e.g., bakery), and also with the location codes. On the reverse of the form are listed different items and categories to be inspected to serve as a guide for inspectors; for instance, under Weighing and Measuring Devices, the word "Condition" appears. A copy of this certificate is forwarded to the data processing center where the information is transferred to punched cards. Monthly reports which used to require three man-weeks to compile can now be produced in half an hour after the data have been punched. This information is then also available for the preparation of other reports.

Another application by the City of New York is summarizing and analyzing the inspectors' daily reports, which comprise information on the number and type of items inspected, number of violations, warnings, and condemnations, and time spent during the day engaged in various activities.

Contra Costa County, California.

Contra Costa County uses punched card equipment to process some of its records. Each merchant receives a certificate of inspection, listing all the weights and measures and/or weighing and measuring devices on the property, and any action taken. Daily reports are submitted containing the same information and from these, data cards are punched which are then used to assemble reports on the inspections conducted. The information, broken down according to type of inspection, administrative data, items checked, and such information as the number of packages weighed or the number of Off Sale Orders issued, is useful in projecting manpower requirements, justifying new equipment, and producing field and administrative cost estimates.

State of California.

In California, every retail gasoline pump must be licensed under the Weights and Measures Petroleum Program. The Data Processing Unit of the California Department of Agriculture is using punched card equipment to produce a master file of the 27,000 service stations and 126,000 pumps. Using this, renewal notices can be sent out and when an owner returns this notice with his remittance, the prepunched license is forwarded to him. The master file is also used for maintaining lists of paid-up licenses and to print delinquent notices.

Commonwealth of Virginia.

Although ADP is not being used by weights and measures officials in Virginia, they have given it considerable thought. The Weights and Measures Regulatory Section is a part of the Department of Agriculture. The Data Processing Center is operated by the Department of Agriculture as a service agency for Department components. Processing is accomplished by use of punched card machines. Plans were formulated by Weights and Measures for automating the forms processing, but existing equipment could not handle the demand.

Because of the high demand on the data processing facilities, a study was initiated by the Department to consider whether more sophisticated equipment would be beneficial. This feasibility study stated that the greatest volume of data to be processed in the Department of Agriculture originated in Weights and Measures. Furthermore, the study recommended that the Department of Agriculture install a computer system in the near future.

The proposed applications include not only preparing reports, but also aiding scheduling by indication of overdue inspections and selection of troublesome commodities and devices. Further applications include the use of ADP to help analyze where random packed items are giving trouble and to determine whether there are trouble areas in brands.

Economics.

Before an organization can rationally plan on electronic data processing or the use of electronic accounting machines, it must determine what results are required from the data processing. Once these are outlined, a formal feasibility study can make it possible for the organization to decide whether ADP will provide those results.

Cost reduction is one of the major reasons for transferring from one type of data processing to another. Any transition has its own costs, and conversion to ADP need not decrease total costs.

But ADP, properly used, can cut the cost per unit of data processed. Particularly if the volume of processing is large, the preparation of reports can be handled less expensively with the aid of automatic processing than by purely hand processing.

An investment in ADP equipment and staff can be justified only if it contributes to increased efficiency, decreased cost—preferably both—or if it provides a satisfactory incremental output for the additional capital invested. The feasibility study, which indicates appropriate equipment and its usage, should also give a good estimate of the costs involved.

Use of ADP equipment is available without the costly acquisition of the machines. Many universities possess such equipment; many state and local governments have computers; private computer centers exist which lease time on their equipment and provide professional services for computer usage; unused time can be rented from organizations having their own equipment. If ADP equipment is to be acquired it can be either purchased or leased.

Training.

Among the problems of changing to ADP are the effect of the equipment on the manpower level and the additional training required for personnel.

A change in the manpower level probably will occur and it will probably be an upward shift. Training for punched card data processing does not present much difficulty and can be completed in a few months. Average intelligence and clerical aptitude suffice.

The training required to use computers is much more extensive. Intelligent, highly skilled individuals are needed for such work, although extensive formal education is not an absolute requirement. It may be necessary to hire some already trained personnel from the outside, but such people can also be recruited from within.

Training courses are conducted by computer manufacturers, local data processing schools, and by colleges and universities. Training for programmers and systems analysts should start nine to twelve months before computer operations are to begin.

Recommendations

The first application of ADP in weights and measures control could well be to the processing of records and to the issuing of licenses.

It might be helpful to use ADP to determine categories and subdivisions of information such as the following:

1. The percentage of devices turned down by
 - a. Type
 - b. Inspector
 - c. Service organization
 - d. Area (region, etc.)
2. The number of scales over a certain classification
3. The number of scales in the different counties (regions, etc.)
4. The amount of time required to carry out various types of inspections.

This type of information might help to schedule inspections on a more rational basis; for instance, in the case of scales of the same type, some of which are involved in a much greater dollar volume than others.

With the variety of information available through ADP, sampling techniques could be used for scheduling inspections in large jurisdictions. In areas with many violations, court dates could be set by ADP to avoid crowding on some days and inactivity on others.

Summary

An office operating in the same way that it did twenty years ago should review its procedures. Improved methods may be possible, but a critical study can make sure.

ADP methods are not always the best; many offices may be able to solve their problems less expensively by some other method. Improperly utilized ADP equipment can make the same mistakes as humans, only faster.

Although ADP equipment may not be justifiable in all offices, everyone should be aware of the wideranging applications of ADP and its special features of speed and accuracy.

The field is open for imaginative and economically rewarding applications.

Acknowledgements

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The author also thanks Miss Susan Reed of the National Bureau of Standards for her many suggestions and help.

(Following Mr. Whitty's remarks an open forum was held entitled, "Cooperation—Communication—Compliance," moderated by Mr. M. W. Jensen. The floor was open to all Conference attendees to discuss any administrative or technical problem the busy Conference Program may have precluded.)

(R. H. FERNSTEN, *Vice Chairman*, Presiding)

SEMINAR ON FAIR PACKAGING AND LABELING

Moderator: M. W. JENSEN, *Chief, Office of Weights and Measures, National Bureau of Standards*



Introductory Remarks

The purpose of the session this morning is to explore in depth the Fair Packaging and Labeling Act of 1966. The objective of this new legislation is clearly set forth in Section 2:

SEC. 2. Informed consumers are essential to the fair and efficient functioning of a free market economy. Packages and their labels should enable consumers to obtain accurate information as to the quantity of the contents and should facilitate value comparisons. Therefore, it is hereby declared to be the policy of the Congress to assist consumers and manufacturers in reaching these goals in the marketing of consumer goods.

This legislation was conceived by Senator Philip Hart of Michigan who obtained authority by Resolution of the Senate to open exploratory hearings in 1961. Senator Hart introduced the first Truth-In Packaging Bill near the close of the second session of the 87th Congress in 1962.

The sponsor explained that the bill was introduced at that time specifically in order to permit him officially to receive responses from industry, from consumers, and from regulatory officials as to the appropriateness of the proposed legislation.

During the first session of the 88th Congress in 1963, S.387 was introduced. This differed from the first bill only in minor details.

Hearings were held in the Senate by a subcommittee of the committee on the Judiciary through 1965, but without actually reporting a bill to the floor. In the 89th Congress, the bill was withdrawn from the judiciary committee and introduced in the Commerce committee, chaired by Senator Magnuson of Washington. Once again hearings were started and, after hearings were completed, a bill that differed somewhat but still had definite relationship to the original bill was reported to the floor as the Fair Packaging and Labeling Act.

On June 9, 1966, this bill passed on floor vote of 72 to 9 and was referred to the Committee on Interstate and Foreign Commerce of the House of Representatives under the chairmanship of Congressman Staggers of West Virginia. He introduced a very similar

bill as H.R.15440 and open hearings on that. Congressman Staggers reported near the end of the House hearings that since that committee was established there had never been a bill that had had as many witnesses, or testimony as long as this one.

As you all know, industry generally opposed the bill. It was supported by the Administration and by relatively few consumer group. The Senate bill actually was completely rewritten in the House Committee and was reported to the floor where, on October 3, 1966, the bill passed by a vote of 300 to 8.

In Senate-House Conference, which took place very close to the end of the session, the Senate agreed to the House Bill practically without change. The Conference report came out on October 7. It was approved by the Senate on October 19, by the House on October 17. On November 9, before several hundred people, and with appropriate ceremony, the President signed into law the Fair Packaging and Labeling Act of 1966.

This statute has caused concern among industry representatives and others. Nevertheless, I believe it is the public interest, and careful administration will bring industry support.

We have with us this morning three experts—men who know the legislative history, who know what the law is intended to do and who have the job of seeing to it that the will of the Congress is implemented.

IMPLEMENTATION OF THE FAIR PACKAGING AND LABELING ACT—COOPERATION OR VEXATION?

by F. E. MCLAUGHLIN, *Assistant to the Associate Commissioner for Compliance, Food and Drug Administration*



The subject of this seminar is a piece of legislation which speaks of cooperation with the States and preemption of State authority. Section 9 of the Fair Packaging and Labeling Act, entitled *Cooperation with State Authorities*, reads:

Sec. 9(a). A copy of each regulation promulgated under this Act shall be transmitted promptly to the Secretary of Commerce, who shall

(1) transmit copies thereof to all appropriate State officers and agencies, and

(2) furnish to such State officers and agencies information and assistance to promote to the greatest practicable extent uniformity in State and Federal regulation of the labeling of consumer commodities.

(b) Nothing contained in this section shall be construed to impair or otherwise interfere with any program carried into effect by the

Secretary of Health, Education, and Welfare under other provisions of law in cooperation with State governments or agencies, instrumentalities, or political subdivisions thereof.

Congress, in the same Act (Section 12), goes on to state:

Sec. 12. It is hereby declared that it is the express intent of Congress to supersede any and all laws of the States or political subdivisions thereof insofar as they may now or hereafter provide for the labeling of the net quantity of contents of the package of any consumer commodity covered by this Act which are less stringent than or require information different from the requirements of section 4 of this Act or regulations promulgated pursuant thereto.

On the one hand, Congress admonishes agencies of the Federal Government to cooperate with their State counterparts towards the objective of promoting harmony and uniformity between Federal and State regulation of the labeling of consumer commodities, while on the other hand Congress, in clear and sweeping language, preempts the authority of the States to regulate differently from the Federal Government.

Was Congress merely paying lip service to Federal-State cooperation? The Food and Drug Administration does not think so for a number of reasons.

First, Congress recognizes, as does FDA, that without continuing, meaningful cooperation between State and Federal Government, this legislation and all similar legislation simply will not work. The basis for this conclusion is the hard fact that State legislatures show no enthusiasm for appropriating funds to enforce and State officials cannot reasonably be expected to exhibit any zeal in enforcing regulations which the majority feel are unreasonable, unrealistic, or the product of bureaucratic and administrative insularity.

This phenomenon is no less apparent at the local level. We recognize therefore, that without cooperation we can still have uniformity in regulations, but it is an impotent uniformity. We recognize, and freely admit, that Federal officials cannot begin to supplant the traditional role of the State and local officials charged with the responsibility of enforcing labeling laws.

In short, we need your good will and your regulatory muscle, and we had better pay attention to you.

There is something else we need from you, and the need is immediate and continuing.

We must have the benefit of your experience.

Over 25 years have elapsed since the issuance by FDA of general labeling regulations governing the declaration of net quantity of contents and other mandatory labeling information under the Federal Food, Drug, and Cosmetic Act. During those years State and local governing bodies have enacted countless

revisions and additions to labeling laws and ordinances. Officials like yourselves have briefed the legislators, testified on the bills being considered, frequently drafted the laws and ordinances, and eventually enforced the laws enacted.

A mechanism for tapping this resource is what is called for and Congress has pointed us in the right direction.

The procedure by which regulations must be promulgated under the Fair Packaging and Labeling Act is well adapted to the task of tapping the experience of other law enforcement agencies, be they Federal, State, or local.

The procedure found in Section 701 of the Federal Food, Drug, and Cosmetic Act provides that the issuance of any regulation shall be begun by a proposal (published in the Federal Register) affording all interested persons an opportunity to present their views and participate in the rule-making.

As you may know, the initial proposed regulations issued by FDA on March 17, 1967, under the Fair Packaging and Labeling Act, permitted 60 days within which to submit written comments. Ten States accepted the Commissioner's invitation to comment on the proposals and they submitted detailed, thoughtful, and constructive suggestions.

(I am forced to contrast these comments with many from industry evidencing a complete refusal to accept the fact that fair packaging and labeling is the law.)

While responses from 10 States cannot be shaped into a consensus of the States, the quality of the responses was gratifying and extremely helpful to FDA.

For example, one of the first comments received by the Department Hearing Clerk was from a State official, Fred Fallon of the State of New York. He pointed out an oversight in the proposals which was mentioned in only one other comment of the 315 comments received.

Several of the States submitting comments made strong presentations on the issue of the minimum weight concept advanced in the proposed regulations.

Your Committee on Liaison with the National Government made an oral presentation on this and on other issues raised in the proposed regulations.

Bill Kerlin of California, who represented the States at this meeting, submitted supplementary data at the request of FDA.

The comments received by FDA from State officials were varied, but running through the letters was a common theme which is deserving of comment here.

The fact that the initial proposals of March 17, 1967 do not adhere in several important respects to the Model Law and Regulations of the National Conference on Weights and Measures does not indicate a lack of consideration of the adoptions of the Conference by FDA, nor does it reflect a lack of representation by Mac Jensen, your Executive Secretary.

Mac, while recuperating from an illness, insisted that representatives of FTC, FDA, and the National Bureau of Standards meet in his home to consider and discuss interpretation and implementation of the Act prior to the publication of the first proposals.

I believe "intensive" is the proper term to use to describe these discussions. To the contrary, the deviation is largely a reflection of the vehement assurances on the part of representatives of industry that most of the industry was already complying with the provisions of the Model State Law and Regulation in the face of a Congressional determination that the existing labeling practices of most of the industry were in need of revision.

The problem of conveying to you in a brief paper some of the thinking that went into FDA's proposed regulations under the Fair Packaging and Labeling Act is akin to the problem facing the State or local official desiring to comment on the Federal Register issuance of such proposed regulations.

It is a poor substitute for across-the-table dialogue. The Commissioner of Food and Drugs recognizes that the opportunity to submit written comments to the Hearing Clerk, Department of Health, Education, and Welfare, does not represent the ultimate solution to the problem of involving the States in rule making that acutely affects the States. Relied upon as the sole means of contact between State and Federal opposite numbers, this process of action followed by reaction does not make for smooth articulation between State and Federal regulatory bodies.

Being a physician, Dr. Goddard is well aware that poor articulation at a necessary juncture is inevitably followed by irritation, inflammation, and malfunction. For this reason, he is anxious to explore the possibility of providing the States with another permanent vehicle for carrying to FDA their suggestions, exemption proposals, and perhaps, to other proposed regulations under the Fair Packaging and Labeling Act.

We have admitted that the good will and the experience of the States are necessary to the implementation of this legislation, but there are other benefits to be derived from the building of bridges between State and Federal regulatory bodies.

We have in mind the development of the sort of grass roots participation in rule-making that the law envisions, and the possibility that participating State officials might eventually work desirable uniformity into State and local laws in areas where the Federal law does not now impose uniformity.

While some elements of industry appear to prize the short-term objective of derailing or emasculating newly proposed regulations more highly than the long-term benefits to be derived from a uniformity of regulation across the country, I think that the majority of industry exhibits a more enlightened attitude.

For example, despite the legal opinion offered by industry counsel to the effect that no regulations could even be proposed under the Fair Packaging and Labeling Act until after July 1, 1967, individual manufacturers and associations of manufacturers began to bombard the Commissioner of Food and Drugs shortly after the law's enactment with requests for issuance as soon as possible of the mandatory requirements under Section 4 of the Act.

These requests were an important factor in the Commissioner's decision to publish the first proposed regulations in mid-March.

As expected, the decision to publish the proposed regulations was hailed by some and assailed by others, illustrating the conflicting pressures present in the contemporary decisions of the government administrator.

At present, in his decision to act upon the proposals of March 17, the Commissioner faces a conflict between the need to expand the dialogue between State and Federal enforcement bodies and the need to remove the uncertainty facing the affected industry as to what will be required by the final orders.

(I note from the booklet distributed by the National Bureau of Standards that important committee work of this Conference is also waiting on the issuance of final regulations by FDA and FTC.)

Part of my purpose in coming here today is to propose an interim solution to this conflict in the form of an invitation.

As indicated above, some discussion of the initial regulations has taken place with representatives of your Committee on Liaison with the National Government. If the remainder of this week's Conference schedule will permit, the Commissioner would like to pursue this topic further with the Governmental Officers making up the membership of your Committee on Laws and Regulations. I have discussed this matter briefly with Mac Jensen, and he indicates that such a meeting may be possible.

If the schedule will not permit of such a meeting, the Commissioner would like to have each of the Committee members contacted before FDA issues any orders acting upon the proposals.

Recognizing the differences in the governmental structure among State governments, the Commissioner has also given instructions that each of the members of the Executive Committee of the Association of Food and Drug Officials of the United States is to be contacted before issuance of the final orders. We believe that such an approach offers significant advantages to both State and Federal Governments.

I very much appreciate having had the opportunity to speak to you today.

REMARKS

by CHARLES A. SWEENEY, *Director of Deceptive Practices,
Federal Trade Commission, Washington, D.C.*



I am really very happy to be on the program today because it is so obvious that we must not only reason together but labor together to make the packaging act work.

I must compliment you on the timing of your meeting. We have more to talk about now than if you had met last week.

In a talk such as this, may I begin by explaining that I am expressing only my personal comments and opinions—not officially those of the Commission. That point must be emphasized in this case because there are so many questions left unanswered by the proposed regulations issued yesterday. These can ultimately be answered by the Commission itself, and I am speaking only as a staff member.

I am sure you are all familiar with the proposed regulations issued some time ago by the Food and Drug Administration. The Commission, as you may know, was delayed by the need for amending its rules of practice. The procedures specified for promulgating the regulations are new to the Commission—so that the rules had to be amended to provide for them.

Because the agencies have been working together on this project for some months, it should not be surprising that the two drafts are substantially similar. There are, however, some differences.

You will immediately notice that the Commission proposes to issue new regulations, whereas the Food and Drug Administration proposes to modify existing regulations.

While there are some minor variations throughout, I think the first which you will consider of any significance is with respect to the requirements regarding the name and place of business—section 505.5 The Commission would require, for ex-

ample, that "The statement of the place of business shall include an adequate and sufficient mailing address." You will recall that the Food and Drug Administration proposed that "The statement of the place of business shall include the street address, city and state; however, the street address may be omitted if it is shown in a current city directory or telephone directory."

The placement of the declaration of net quantity has been a matter of some discussion, to say the least. The Commission now proposes that "It shall be placed on the principal display panel in close proximity to the most conspicuous statement of the trade or brand name, in lines generally parallel to the base on which the package rests as it is designed to be displayed, and no label information shall appear below or to either side of the declaration of net quantity on the principal display panel."

The Commission considered it necessary, because of the nature of the commodities involved, to include provisions for expressing units of linear and area measure—sections 500.11 and 500.12. I believe that the principles of these provisions follow the spirit of those covering other forms of net content declarations.

You will certainly be interested to note that, for the purpose of this proposal at least, the Commission has tentatively adopted the attitude that net quantity of contents be expressed in terms of average, rather than minimum, amounts. You should study section 500.18 carefully for the details.

There is one question which I am sure many of you have in mind which you will not find answered in the proposed regulations.

We all know that the Food and Drug Administration administers the statute as it applies to a food, drug, device, or cosmetic as defined by section 201 of the Federal Food, Drug, and Cosmetic Act.

The scope of the Act, in terms of application to FTC is described as extending to "any consumer commodity," or to "any packaged consumer commodity." Your question: "Just what products are covered?"

By reference to the definition of "consumer commodity" in the statute, we learn that the jurisdiction of the Commission extends generally to any product or commodity, other than a food, drug, device, or cosmetic, of any kind or class which is customarily produced or distributed for sale through retail outlets for consumption by individuals, or use by individuals for purposes of personal care or in the performance of services ordinarily rendered within the household, and which usually is consumed or expended in the course of such consumption or use. While the statute clearly excludes specific products, such as tobacco, insecticides, fungicides, rodenticides, and some seeds,

which might otherwise fall within the general categories of products subject to control by FTC, I am being asked whether certain other classes of products are within the contemplation of the Act.

There are some which would appear to present no problem. Laundry detergents, and scouring powder, for example, are used by individuals in the performance of services ordinarily rendered within the household, and are expended in the course of such use.

However, I do not feel that I, as a staff member, am competent to express a view as to whether some other products are covered.

I have used paint as an example—it is as good as any. Is the painting of a wall the performance of a service ordinarily rendered within the household—any more or less than scrubbing the wall with a detergent? Even though it becomes in effect a part of the wall after application, the can of paint, as such, is consumed or expended in the course of such application. Floor wax may be more readily accepted as within the definition. We have had questions raised as to whether floor tile, and linoleum floor covering, are included. I have been unable to supply authoritative answers.

These determinations are of the sort which are to be made only by the Commission—and some of its determinations may be reviewed by the courts before the questions are finally answered.

The legislative history does not, in my opinion, provide clear and complete guidance to me as a staff member. The Senate Commerce Committee and its Chairman, Senator Warren G. Magnuson, made it quite clear that these legislators were concerned primarily with products customarily found in supermarkets; with those expendable commodities used for personal care and household services. I have referred to paint expended in caring for the wall of your home. Senator Magnuson informed the Senate that the bill was not intended to cover paints and kindred products.

He also expressed the view that the bill was not intended to cover:

1. Durable articles or commodities,
2. Textiles or articles of apparel,
3. Any household appliance, equipment or furnishings,
4. Bottled gas for cooking or heating purposes,
5. Flowers, fertilizers and fertilizer materials, plants or shrubs, garden and lawn supplies,
6. Pet care supplies,

7. Stationery and writing supplies, gift wraps, fountain pens, mechanical pencils, and kindred products.

It may be significant that the definition of a consumer commodity in section 10 carefully excludes some classes of products from coverage of the Act, as I mentioned earlier. Additionally the Act specifically excludes exports to foreign countries and vests authority over imports in the Secretary of the Treasury. The question in my mind, the Act having provided so specifically for exclusion of certain products, is to what extent the Commission will be assisted in its interpretation of the general coverage provisions by the legislative history as expressive of the intent of Congress in the final enactment of this statute.

Of course, once it has been determined that products are covered by the regulations, Section 5(b) of the Act provides for the promulgation of regulations exempting certain commodities from full compliance with the regulations. Such an exemption may be granted by the promulgating authority upon a finding that full compliance is impracticable or is not necessary for the adequate protection of consumers because of the nature, form, or quantity of a particular consumer commodity, or for other good and sufficient reasons. The regulations exempting such commodity shall spell out the extent and conditions thereof, consistent with the policy of the statute.

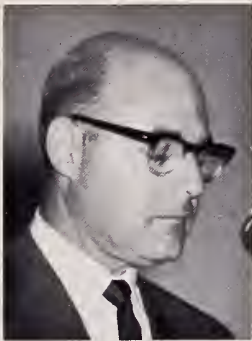
We have been talking about something different. Anticipating the need for interpreting the statute and the regulations with respect to commodity coverage, and possibly other matters, the Commission included section 500.22 inviting submission of such questions to the Commission. It is indicated that these will be considered in the light of the particular situation. No specific procedure is outlined for handling these questions, and I assume that it might vary according to the circumstances.

I would like to close with an urgent invitation for you to express your views concerning these proposals. I stress the word proposals. The Commission, I assure you, is open-minded. Your comments and suggestions, pro and con, those of industry, will provide the Commission with the sort of information and public record which will aid in promulgation of realistic, workable final regulations. Mr. Jensen has been extremely helpful. We are counting on his—and your—continued help.

Thank you.

THE FAIR PACKAGING AND LABELING ACT

by A. J. FARRAR, *Legal Advisor, National Bureau of Standards*



I am delighted and grateful for the opportunity of appearing before you at this 52nd National Conference on Weights and Measures. I recall vividly the pleasant and most profitable meeting in Denver last year. In addition to renewing my acquaintanceship with many of you whom I met at the 51st National Conference, I look forward to meeting as many others as possible at this Conference.

Our attention at this year's Conference is of course largely directed to the Fair Packaging and Labeling Act. This Act was signed into law by the President on November 3, 1966, and was the culmination of proposals and hearings that had been before the Congress since 1961. This law holds much promise for the American consumer. Its implementation will create some major new functions within the Office of Weights and Measures at the National Bureau of Standards.

The purpose of the Act is made quite clear in its Declaration of Policy which states, "Informed consumers are essential to the fair and efficient functioning of a free market economy. Packages and their labels should enable consumers to obtain accurate information as to the quantity of the contents and should facilitate value comparisons."

While this Act may enable the consumer to mount an assault upon the glittering array of eye-catching, impulse-buying items that lie tantalizingly in wait for his hard won dollar, I'm of the view that the "sleeper" aspect of this law is that it holds even more promise to American manufacturers by providing them the opportunity to increase their profits, reduce their costs of operation, and improve the purchasing power of their customers. This feeling stems, in large measure, from the President's statement at the time he signed the Act into law last fall. Mr. Johnson said in part, "A great majority of American manufacturers will welcome this new law. It protects the honest manufacturer against dishonest competitors. It encourages fair competition, competition based on quality, value, and price. It reflects our strong belief that the American producer can meet—and wants to meet—the test of truth."

The subject of labels on packages is certainly not a novel issue, for laws virtually abound on the subject, both on the Federal and State level. A random selection of Federal laws containing labeling and/or packaging requirements includes the

Food, Drug and Cosmetic Act; the Meat Inspection Act; the Poultry Products Inspection Act; the Flammable Fabrics Act; the Fur Products Labeling Act; and the Textile Fiber Products Identification Act.

Moreover, as you well know, on the State level there are weights and measures acts, food, drug and cosmetic acts, acts pertaining to meat and meat products, and other acts pertaining to particular foods. It is not an unfamiliar subject to this Conference either; the National Conference on weights and measures has dealt with this subject at each meeting dating all the way back to the 7th Conference held in 1912.

The question thus arises, "Why was it necessary to have a Fair Packaging and Labeling Act?" As both the Senate and the House Committees which handled this legislation stated in their individual reports urging enactment of this law, "This legislation represents a significant step beyond the traditional policing of intentionally deceptive or fraudulent acts. It is a reflection of the changing relationship between manufacturer and consumer which has marked the technological upheaval in food processing, packaging, and distribution of recent decades."

Tens of thousands of packages containing different consumer commodities now compete for the consumer's dollar. The packages have replaced the salesman. Therefore, it is urgently required that the information set forth on these packages be sufficiently conspicuous and informative to apprise the consumer of their contents and to enable the purchaser to make value comparisons among comparable products.

In short, the main characteristics of the new statute are that it (1) illustrates a deep identification with the needs of the consumer for information and knowledge, (2) requires manufacturers to furnish services in the form of information to meet those needs, and (3) provides the mechanism to deal quickly and perhaps even imaginatively with the problems that may result from its administration.

You may have noticed that I emphasized the words "value comparisons." These same two words appear in the Act's Declaration of Policy and are perhaps the most important concept to the consumer insofar as this law is concerned. I will refer to these words again later.

The Act divides certain responsibilities between the Secretary of Health, Education and Welfare, the Federal Trade Commission and the Secretary of Commerce, though in no sense is this to be interpreted as meaning in equal portions. Joining me this morning in this panel discussion are representatives from the Food and Drug Administration, HEW and the FTC both of whom have advised you of the responsibilities of their respective

agencies under this statute. I shall therefore limit myself to discussing only the responsibilities of the Secretary of Commerce under this Act.

It may be well to point out at this juncture that the Department of Commerce does *not* have the responsibility or the authority under the Fair Packaging and Labeling Act to issue any regulations governing the packaging or labeling practices of private industry. Very briefly, the primary areas in which the Department has responsibility and authority are set out in Sections 5(d), 5(e), and 9(a) of the Act. These are:

1. Determining undue proliferation in any packaged consumer commodity or reasonably comparable consumer commodities.
2. Requesting industry to participate in establishing voluntary standards.
3. Reporting to the Congress with legislative recommendations, and
4. Assisting the States to promote uniformity among State and Federal requirements.

I should like to speak to each of these areas in turn.

1. Undue Proliferation.

The Act calls upon the Secretary of Commerce to determine whether there is undue proliferation of the weights, measures, or quantities in a consumer commodity being distributed in packages for retail sale which impairs the reasonable ability of consumers to make value comparisons. That sentence contains several phrases of interest to us all. First, there is the term "undue proliferation;" secondly, there is the term "reasonable ability;" and finally, the phrase I have mentioned before, "value comparisons." These are terms to which not everyone will attach the same significance or meaning. Nevertheless, one must ask what is meant by "undue proliferation." Also, how does one gauge the reasonable ability of the consumer to make value comparisons with respect to packaged Consumer commodities, or known when such ability is impaired? As is so often the case, the questions are more easily asked than answered. The statute does not furnish us a neatly definitive explanation.

We are not, however, without guidelines or indications of what the Act requires. The condition of undue proliferation must be one which "impairs the reasonable ability of consumers to make value comparisons." Thus the numbers of the packaged product available to the consumer must produce such an effect as to impair his ability to make a reasonable judgment among comparable consumer commodities. Mere numbers however is not the sole factor in determining whether the reasonable ability to make

value comparisons is impaired. Each commodity is different and what might be considered as a reasonable basis for concluding that consumers have suffered an impairment of ability because of the number of weights, measures or quantities in one commodity might be completely inapplicable to another commodity even though the number is greater.

A moment ago I posed the question "How does one determine when a consumer's ability to make value comparisons is so impaired?" This question can perhaps be answered best by pointing out that such a determination will necessarily involve the exercise of a considerable degree of administrative discretion. It may be safely stated that, as a matter of legal interpretation, the statute permits a broad grant of discretionary authority in this connection.

The Department of Commerce has published proposed administrative procedures setting forth the process by which undue proliferation may be determined in a particular case. Under those procedures, the National Bureau of Standards, in cooperation with State and local weights and measures officials, will collect and evaluate information concerning whether there is undue proliferation. When a problem has been identified regarding possible proliferation in a specific consumer commodity, the particular industry connected with that commodity will be notified and be given full opportunity to present its views. In those cases where progress is not being made, and a conclusion is formed that there is undue proliferation under the Act, a tentative determination to that effect will be published in the Federal Register which will invite public comment. All interested parties will be provided an opportunity to present their views on the proposed determination. After such views have been evaluated, the Department will issue a final determination whether undue proliferation exists and will publish that decision. Determinations of undue proliferation under this process will emerge slowly and only after careful deliberation of all the evidence available. Such determinations also will be based on a case-by-case basis until some experience has been built up in this area.

On the question of what constitutes "reasonable ability" on the part of consumers, the resolution of that question will simply have to depend on a particular factual situation. Obviously not everyone has the same talent or ability to make value comparisons. The central issue here is whether there is such proliferation of a packaged consumer commodity that an average person would have difficulty in making a value comparison judgment. Thus while "reasonable" may not be a precise word, the "reasonable man" concept is common in Anglo Saxon jurisprudence.

ence. Hence, I do not anticipate any great difficulty concerning that particular aspect of the statute.

With respect to the term "value comparison," the word "value" in that term is, as most of you know, a replacement for the word "price" that appeared in earlier proposed versions of the Act. Many of the witnesses at both the Senate and House hearings testified that they feared an overemphasis of price as a market factor where price is only one of several considerations in a purchase.

This viewpoint was adopted and the Conference report on the bill in explaining why the word "price" was dropped stated, "The conferees wish to make clear that the concept of "value comparison" is broader than the concept of "price comparison" and includes the latter within the former as a very important factor in making a value comparison." As Senator Philip Hart, the author of this legislation and a prime mover in its enactment said on this point, "This declaration (of facilitating value comparisons) is significant because it enlarges Congressional policy to include 'quality' comparison—a component of value. This 'quality' element has mostly greater implications than the more limited concept of *price*. For instance it opens the door to consideration of legislation such as grade labeling and government testing of consumer products. Historians may consider this declaration of policy to be as significant as the provisions of the legislation itself."

What this in our judgment means, for the determination of proliferation, is simply that not only must technical abilities and problems of the industry be considered, but market practices arising from consumer preference and affecting consumer choice must be examined to see what effect, if any, they have on value comparison. The ultimate decision on whether the reasonable ability of consumers to make value comparisons is impaired will therefore be based on a consideration of all factors identified with that term although the element of price remains as one of the more significant factors.

2. Development of Voluntary Product Standards.

Upon the making of a final determination that undue proliferation exists, the Department will request, as required under the statute, manufacturers, packers, and distributors of consumer commodities to participate in the development of a voluntary Product Standard under the Department's published procedures for such voluntary standards. The whole purpose of this part of the statute is to emphasize the voluntary aspect of correcting the problem caused by the determination that there is undue proliferation. Indeed, as the House Committee on Inter-

state and Foreign Commerce stated in its report urging the enactment of this legislation, "The Committee wishes to make it clear its intent is to encourage the development of purely voluntary standards. Indeed, it is the committee's hope that manufacturers will take advantage of the Commerce Department's voluntary standard procedure without the necessity of a determination of undue proliferation and a request by the Secretary under subsection 5(d) of the bill. A standard adopted in this manner, without a determination of undue proliferation under subsection 5(d), would not be subject to the provision of subsection 5(e)." Thus it may well come to pass that the most successful application of this Act may be accomplished, not by enforcing the Act's provisions, but by generating an acceptable level of cooperation and understanding among business and industry to the end that voluntary standard will be voluntarily arrived at. will be voluntarily arrived at.

3. Reporting to Congress.

If the voluntary aspects provided for under the statute do not accomplish the desired effect, the Secretary of Commerce is required to report this to the Congress. Specifically, the Secretary must make this report if, one year after the date when he first requests the manufacturers and others to participate in the development of a voluntary Product Standard, he sees that a standard will not be published, or if he sees that a published standard is not being observed. Thus, after a lapse of one year, if the Secretary is satisfied that progress is being made toward the publication of a standard even though not yet published, he may defer reporting to the Congress. However, if voluntary efforts are proving to be of no avail, then he must report to the Congress with a statement of the efforts that have been made under the voluntary standards program and give his recommendation as to whether Congress should enact legislation providing regulatory authority to deal with the situation. The Secretary is also required to transmit an annual report to the Congress describing the activities of his Department during the preceding fiscal year.

4. Assistance to the States.

Under Section 9(a) of the Act, the Secretary of Commerce must transmit copies of each regulation promulgated by the Department of Health, Education and Welfare and the Federal Trade Commission to all appropriate State officers and agencies and to furnish to them information and assistance to promote to the greatest practical extent, uniformity in State and Federal regulations of the labeling of consumer commodities. This latter responsibility is entirely consistent with Section 2 of the

National Bureau of Standards' Organic Act which specifically authorizes "cooperation with the States in securing uniformity in weights and measures laws and methods of inspection," and means to us simply an extension of the activities of the Office of Weights and Measures to embrace the requirements of this new statute.

Although the Act will provide the consumer a chance to be more discriminating in his buying habits, I do not mean to imply however that it will necessarily be an easy statute to administer. On the contrary, the establishment of voluntary standards has always involved a delicate balancing of various interests by those affected. The interests of the producer and distributor as well as the consumer must be carefully and impartially weighed. This involves the exercise of patience, understanding, compromise, and sound judgment. With your assistance and cooperation the National Bureau of Standards will strive to carry out its assigned functions under the Fair Packaging and Labeling Act in a manner which will reflect well upon this Conference and the National Bureau of Standards, and in a manner which will win plaudits from consumer groups as well as manufacturers and packagers across this great Nation of ours. In so doing, let me assure you of our determination to be dissatisfied with anything less than excellence.

US PROCRUSTEANS MAKE STRANGE BEDFELLOWS

by C. F. ROBERTS, JR., *Washington Representative, National Association of Manufacturers, Washington, D.C.*



A business friend told me the other day that the status of the new packaging law reminds him of the grasshopper and the ant. Seems the ant spent the summer carefully storing up food, while the grasshopper danced the summer away. When winter came, the ant was well off. But the grasshopper shivered in cold hunger. Desperately he consulted the ant, and the ant said he had a plan.

"What is it?" anxiously asked the grasshopper.

"Well, just cut those long legs off so you can pass as a cockroach, then you can steal your way into some warm kitchen and you will make it through winter quite comfortably."

The grasshopper thought a minute, and then he asked, "Yes, that sounds good, but how do I cut off my legs?"

"Oh," answered the ant, "I've given you the policy; the operation is up to you."

Well, good morning, fellow grasshoppers. We face a cold winter together—those of you in the Federal establishment, those on the State level, and we in industry. For a lot is expected from the Fair Packaging and Labeling Act—indeed, it is a time, as they say of "rising expectations"—and I believe our united desire is to get the job done as well as we can.

I hear it said that industry watered down this bill. Some say this with a sneer. Some say this with a growl. I do not say it at all. And here is why:

The packaging bill was considered by Congress, and by industry as well, on the basis of what would best serve consumers. For industry is acutely aware that what is good for the consumer is in the end good for industry. The bill that emerged from this process contains some features not in the original version. It is, I am deeply convinced, a better law, not a watered down law.

Originally, as all of us recall, the plan was to dictate mandatory package standardization by weight. This was over and beyond Food and Drug's deciding, as it is still trying to do, how many peanuts are needed for peanut butter, and also atop the Federal Trade Commission's open-ended powers to oversee the promotion of hundreds of thousands of consumer items. It was an attempt, really, to legislate away confusion—not a small undertaking, considering how many new products and new versions of old products arrive on the market week by week and month by month.

I agree that industry was somewhat aghast over what was being attempted. But, for that matter, Government, itself, was not too taken with it. For if Government was to carry the whole burden, it also would have to suffer the consequences. Failure to live up to the ambitious objectives of the original bill would have had, we presume, direct political results. That is to say, it would have had if "consumeritis" truly has the grassroots clout claimed for it these days.

Under the bill as finally passed, the Federal enforcers are in a position to claim credit for improvements, but they cannot be blamed by any fairminded voter if nothing happens to reduce, for example, the number of sizes of potato chips in the supermarket. To the extent that the process works, confusion is supposed to be reduced.

I am happy that some progress is being made in this direction by business without waiting for the formalities. In Bethesda there is a dress shop which sells sizes seven to nine, exclusively. This

clears up confusion for my wife instantly. She *KNOWS* nothing they have in that store will fit.

I prefer the revised law over the bill originally proposed. Under this Act, business and Government may act if they can somehow decide what "undue proliferation" is. But they are not compelled to find multiple cures for nonexistent diseases.

In other words, our friends in the agencies have statutory discretion to correct obvious problems, but not a mandate to imagine any. The number of targets is *not* specified. I hope, as I am sure many here do, that the agencies will move slowly. For there are not only many kinds of consumers, but also every individual's needs and preferences change constantly through a lifetime. It is the great miracle of modern American merchandising that we can begin and end our lives eating baby foods, and in between enjoy our steaks and dutifully eat our vegetables, all from the shelves of the same store. We can pick quantities ranging from a few ounces for the debutante to the giant family size that can be bought only when husbands are around to wrestle it out of the car and into the kitchen.

This Act can be beneficial, I believe, if its administration is confined to *real* problems. The job will be reduced to a manageable size if nonproblems do not capture the attention of the authorities and consume their time. It should be realized that even though we now have *this* law, the law of the marketplace still will work for the consumers and should be allowed to function as far as it can.

Some products can be standardized in relatively few packages and sizes, and for that matter already are. I think of salt, flour, and sugar. Standardization occurred without Government intervention. I think we should investigate and discover why standardization has occurred in such products as part of the job of learning what products are suitable for such limits on their sale. (It should be noted that the principal makers of these products also are makers of products that never have been confined to narrow ranges of weights and measures.)

If the elements of the products that have been standardized can be found, we may learn what products lack these elements and, therefore, should not be standardized.

I suspect that a panel of scientists might learn, after some study, that salt, flour, and sugar are used constantly in a household in a variety of sub-quantities, that they are relatively heavy for their bulk, that they keep well on the shelf, that they are not fragile, that they pour like liquids, and that they are inexpensive. They might discover some other aspects as well. Who knows?

Such things, the scientists might note if given enough research

money, a well-equipped lab, and time, are not entirely true of potato chips. I suggest the scientific trappings, because of the present-day contempt for horse sense, which is now fairly labeled "conventional wisdom."

Another thing, and let me say this to the interested agencies: Let us walk the extra mile to stay out of court. Government has more important things to do, and so does business. This is the newest law the FTC and the FDA have to administer, but it is not by any means the most important.

The FDA, for example, has been active lately in protecting us all from salmonella and I, as a consumer, hope that no pre-occupation with the labels on salmon cans will interfere with this matter.

The FTC has been active lately in cracking down on unscrupulous merchants who live by deceiving the poverty stricken. I, for one, would hate to see the FTC abate its zeal in this enterprise while it counts the cherries in frozen pies.

I hope you will not mistake what I am saying as a plea to go easy on business or to evade the intent of Congress. What I am saying is, I hope Government will weigh the value of this law against the value of the other laws it must enforce from the consumer's standpoint, and thus place the new law in perspective.

The *business of business is business*—not litigation. Sometimes, however, in Washington we get the impression that the business of business is litigation, because that is what we so often see. We at the NAM know, of course, that this is not true. Our officers and directors have necessarily had to concern themselves with the issues raised by Government, but their principal contribution to the welfare of their companies and, indeed, to the development of a healthy and expanding economy is the development which leads to new products and market expansion, so we have a vested interest in getting our governmental problems out of the way.

The packaging bill is law now, and it is in everyone's interest to arrive at regulations which will do what Congress had in mind, and to accomplish this rapidly, with least delay to the valid interest of business, and in this category I emphatically include the least possible litigation, because there is little likelihood of gain from litigation.

Especially, we take the position that, where possible, the regulations under this new law should reflect the seasoned judgment and experience of the host of State officials who have been active, and, indeed, pre-eminent, in this field for many years. To this end we have recommended that the FDA regulation (FTC) conform as closely as possible to the Model Law. We do this because, in the first place, we believe the Model Law makes

sense. We feel it represents enough authority so that FDA regulations which depart from it might be successfully challenged as contrary to accepted usage.

I feel I must emphasize the part that many of you in this room have played in developing consumer-oriented practices and packaging. No group in the entire world is more conscious of the difficulties and pitfalls of hasty and unwise action in the field than those of you who work at the State and local levels, and who have contributed so immensely to the National Conference on Weights and Measures.

You are the pioneers and innovators in consumer protection. Yours is the tradition. You have worked out in the hard school of experience your enforcement procedures, based on the basic laws of the States. What you have done in this regard reminds me of what the European countries are now trying to hammer out in arriving at the uniformity of regulations required by the Common Market. You have greatly helped us already, in this country, to obtain a common market.

The National Conference on Weights and Measures has shown the way to cooperation between local and State government and business.

Now, of course, many businessmen do fear regulation by Federal agencies, and that means many *honest* businessmen. Let us be frank and say that they often have reason to do so. Just for instance, take the fellow the Labor Board settled on the other day.

The Supreme Court has said that if a company shuts down one plant to "cool unionism" at its other plants, that is an unfair labor practice. So the Board ruled that this man was unfair in not negotiating before shutting down his business. But the Board's own report of the case showed beyond question that the poor guy was gradually shutting down the business, because his health was failing, he was superannuated, and nobody wanted to buy it.

So long as there are regulatory agencies which render decisions that are burdensome and nonsensical on evidence which shows no wrongdoing, businessmen will continue to be apprehensive. I understand that FTC will have 26 additional people available to work in this area. One of the things these 26 people will be working on is what is small, what is medium, what is large. If they ever find out, will the world be a better place? Will Spring come earlier, or mother love be stronger?

I hope that we will gain something by not having a new agency set up to enforce this bill. I shudder to think what would happen to us all, and the consumer, if someone in the regulatory agencies, with misguided enthusiasm, went beyond the intent of Congress

or the regulations. We could expect, for instance, that the color photo on a package must be an individually made photo of the particular pie in the package.

This would really tend to increase the cost of pie. Why, we might even have a Federal case if Kellogg sold a package of Apple Jacks to a bully—or spinach to Barnacle Bill.

Now, the Packaging and Labeling bill, if it is going to work, requires the cooperation of the agencies and the manufacturer. I submit that Government will get this cooperation, if it is possible for business to give it. Gentlemen, business, of course, would rather work with their own market research analysts, the Better Business Bureaus, the churches, or other private groups to stay atop consumer needs and desires. But they will do their best to cohabit with Government.

There is no reason for any of us, whether in Government or business, to wish for anything except success for the packaging law. While I know there is disappointment among some who labored so faithfully for the Model Law, I suspect that in the end you will find the Federal agencies following many, if, indeed, not most, of the Model Law's footsteps. It has left a trail that is well blazed and wherever they turn the new regulators will find others have been there before.

Truth to tell, they will find in many instances that business was there before.

I think in all solemn reason it will be concluded that the Congress was, indeed, wise to provide for voluntarism.

If we can keep the mood right, and if we can move forward with some measure of mutual trust and understanding, I think the time may even come when we will work happily together counting peanuts in peanut butter. For my own I would like to see this happen—happen before my own kids graduate to popcorn and pizza.

I have uttered some 3,000 words, of which less than one percent were imported. Their net weight is not much. I hope they will not suffer a rational comparison with those of Messrs. Sweeny, Farrar, and Sandbach. That, I am sure, would only confuse you consumers, and me.

But, to end on a serious note, the effective date of the mandatory provisions of the packaging law, July 1, 1967, approaches. The business community, as I know it, awaits orders. It is, I can assure you, quite ready to march.

TRUTH-IN-PACKAGING—A COMING REALITY OR A MIRAGE?

by W. SANDBACH, *Executive Director, Consumers Union,
Mount Vernon, New York*



During the five years that the problem of deceptive packaging was under consideration by the Congress, there was remarkably little discussion of the basic issue. Consumers asking for the legislation lamented: "We cannot compare prices." Industry spokesmen opposing the legislation said all manner of things, but on this central issue what they said came out to little more than, "You can, too." When it became apparent that Congress might actually pass a packaging

law, industry spokesmen, in desperation, discovered that the American female possessed an astonishing ability to calculate. This heretofore unnoted phenomenon won great plaudits from industry and was the subject of some of Madison Avenue's most untrammelled prose. In full page newspaper ads, the Scott Paper Co., for example, hailed the American housewife as "The Original Computer." ". . . A strange change comes over a woman in the store," read the ad. "The soft glow in the eye is replaced by a steely financial glint; the graceful walk becomes a panther's stride among the bargains. A woman in a store is a mechanism, a prowling computer. . . . Jungle-trained, her bargain-hunter senses razor-sharp for the sound of a dropping price. . . ."

None of these lady panthers, however, appeared to testify before any of the Congressional hearings on packaging. The shoppers who did appear belonged to a lesser breed. They were fully aware, their testimony indicated, of the jungle aspects of their buying experiences, and they failed to undergo that metamorphosis so necessary to successful shopping in today's supermarket. They remained, alas, all too human. "We simply could not make price comparisons," they said. But opponents of packaging legislation, having provided the obvious answer to this repeated complaint—turn yourself into a panther and prowl with a computer—exhibited little further interest in the subject.

Little has changed since the packaging bill was approved almost unanimously by Congress. Industry spokesmen are still making speeches in which they say, in effect, that the legislation was unnecessary and that the various agencies involved should do no more than go through the motions when it comes to enforcement. Only recently, Charles G. Mortimer, Chairman of the Executive Committee of General Foods, urged business to unite against fur-

ther encroachments of government in the packaging field, either legislatively or administratively.

Many of us had hoped that with legislation on the books there would be very real efforts at self-regulation by the packaging industry. The bill as passed was meant to encourage self-regulation. In most instances the new law merely tells the Secretary of Commerce to keep an eye out for problems, and, if he finds one, to call together a committee of manufacturers, packers, distributors, and consumers to write a voluntary standard. The Secretary has had authority to do that for many years. But his department has not, historically, championed the consumer's causes. As an administrator of Truth-in-Packaging, the Commerce Department strikes the National Association of Manufacturers, for one, as a strange choice "because Commerce is supposed to represent business viewpoints, and they are well aware that businessmen certainly view the new legislation darkly."

For better or worse, the Secretary of Commerce is now Congress' consumer surrogate, with orders to follow. When the Secretary makes a finding of packaging proliferation or inability to compare prices of a household commodity, he will now be required to initiate standards-making. The drafters of the law, obviously familiar with the painfully slow process of getting competing and often conflicting interests to agree on a standard, wrote into the law a one-year limit on the proceedings. After the deadline, the Secretary must report to Congress, either recommending legislation to create a mandatory packaging standard or advising that no reasonable standard is possible.

The Secretary is also required to report to Congress if, a year after a voluntary standard has been established, it is not being observed. And he must make an annual report to Congress on his standards-making activities.

Despite its shortcomings, Truth-in-Packaging as enacted does, all in all, arm three Government agencies with sorely needed new authority over both packages and labels. Strong, consumer-oriented enforcement and administration of its provisions can turn those 6,000 to 8,000 packaged salesmen along the supermarket aisles into information purveyors of a useful sort.

It was, therefore, heartening that President Johnson, having put his name to the bill, immediately directed the Secretary of Commerce to call in "those industries where the hearings show the protection is most needed."

There is plenty for the agencies administering the Truth-in-Packaging law to do to start putting order into the chaos of supermarket shopping. To start the ball rolling, *Consumer Re-*

ports has updated a 1965 listing of the different package sizes of laundry detergent on sale in one particular supermarket. The Secretary of Commerce might wish to note that on April 28, 1965, a CR shopper counted 29 different quantities of detergent on sale. On December 22, 1966, she counted 20 different quantities. We do not know how the Secretary would react, but as for ourselves, we would say that undue "proliferation" still exists in laundry detergents.

The FTC might wish to note, in judging whether cents-off labels on detergents reflect reductions from the ordinary or regular price, as the law says they must, that eight detergent packages in that one supermarket made the very same cents-off claim that they had made twenty months earlier. And their purchase prices had changed only a penny or two, if at all.

If the new bill is not strongly enforced or, which is more likely, if it is subverted by Congress not providing sufficient funds for enforcement, or if industry makes its enforcement difficult or impossible by lack of sincere cooperation with the agencies, what recourse does the consumer have left?

The only recourse is further political action. Last year, with the passage of the Auto Safety Bill, a Fair Packaging Law, and the Child Safety Act, we heard much about 1966 being "The Year of the Consumer." *Forbes* magazine recently predicted that we have seen nothing yet—that 1967 was likely to be "The Year of the Consumer." That is doubtful, but it is certainly true that since the end of World War II, and coming into full public view for the first time with President Kennedy's issuance of his consumer's "Bill of Rights" message in 1962, the U.S. has witnessed a rising tide of interest in the consumer's welfare. This tide, in the field of safety, has engulfed the automobile industry. The textile manufacturers, running scared, have announced the initiation of a voluntary program of care-labeling for finished garments. Drugs, food, packaging, advertising—you name it—all have been affected by this upsurge of interest in the welfare of the consumer.

More than mere prosperity lies behind the new wave of concern for the consumer. Consumers Union, when it embarked on its testing and reporting thirty years ago, quickly found the interest for its publication *Consumer Reports*, not, as anticipated, among the working class, but rather among the educated middle class. America is now rapidly becoming a middle-class society. More and more people are willing to read to get information. No less a watchtower of our economic scene than *Business Week* asks itself, "What has caused all the excitement about consumer legislation and protection at this particular time?" And it comes right back with the reply—correct, in our experience

—"The best answer seems to be that the American consumer is, indeed, the best educated in the world, and he is beginning to demand more information on which to make purchasing decisions."

In this regard there is a kernel of wisdom in a scene from the play, "Born Yesterday," as related by Clayton Fritchey in a newspaper column. In this scene the wheeler-dealer's not-so-dumb blonde companion is somewhat unimpressed with his bragging about how he can buy and sell people in Government. "To Hell with the public," says the wheeler-dealer. "You better watch your step, Harry," retorts the blonde, "they're getting more prominent all the time."

Being "professional consumers" as our critics like to call us, we at Consumers Union hope that the wheeler-dealer's blonde was right, and that the consumer will not only continue to rise in prominence, but that he will speak out, as did the housewives in their boycotts this past year, for a more consumer-oriented marketplace.

In this regard, at a recent insurance industry conference, Daniel P. Moynihan analyzes what happened to the automobile industry. Mr. Moynihan says: "One year ago, the biggest business in the United States, and, indeed, the world, was utterly free of Government control of any kind. Today it is a regulated industry. . . . The decision to impose that regulation was as nearly unanimous as anything can be in a democracy. . . ." ¹

Mr. Moynihan goes on to ask: "How could this possibly have happened with an industry which has brought the art of management to fabled levels of efficiency?"

In brief, Mr. Moynihan's conclusion was that the industry had lost touch with public opinion. You will remember one auto executive testifying that, "The public does not want safety. Safety does not sell!" Mr. Moynihan explains how this can happen by quoting John Gardner about organizations which fail to renew themselves. Dr. Gardner said:

In the great majority, the trouble was not difficult to diagnose and there was ample warning of the coming catastrophe. . . . But if warning signals are plentiful why doesn't the ailing organization [and I would add, industry] take heed? The answer is clear: most ailing organizations have developed a functional blindness to their own defects. They are not suffering because they can't solve their problems but because they won't see their problems. They can look straight at their faults and rationalize them as virtues or necessities.²

Mr. Moynihan's speech, incidentally, was entitled "Is The In-

¹ Daniel P. Moynihan, "Is The Insurance Industry Next?" *Insurance Advocate*, January 28, 1967.

² John Gardner, "How to Prevent Organizational Dry-Rot." *Harper's Magazine*, October 1965.

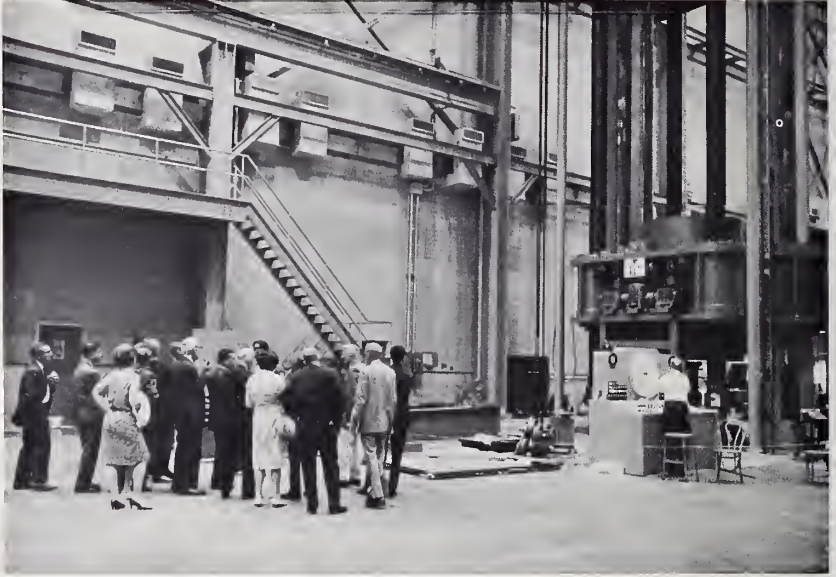
urance Industry Next?" Within the context of this discussion, I would ask you a question: Is the packaging industry due for another round with Congress? My prediction is that unless the industry takes seriously the need for self-regulation, there will be a clamor from the housewives that will not be stilled. There has been nothing in the 31-year history of Consumers Union that has brought us more letters than the subject of packaging. If they continue to come after the new law goes into effect, *Consumer Reports* will be in the forefront of those demanding that more stringent action be taken against the packaging industry.

President Johnson asked for a law that would make it possible for the housewife to compare prices without needing a slide rule. Under the new law she may be able to throw away her magnifying glass, but she is likely to need a slide rule for some time to come.

WEDNESDAY AFTERNOON, JUNE 28, 1967

No Business Session

Conference tour of the new National Bureau of Standards facilities in Gaithersburg, Maryland.

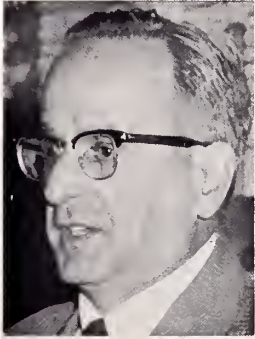


The above group is looking at the twelve-million-lbf capacity hydraulic testing machine, believed to be the world's largest, is being installed in the new NBS Engineering Mechanics Building. A unique facility, the machine will provide the force to calibrate multi-million-lbf capacity force-measuring devices for space and industrial applications and to test full-scale structural components. The machine has a total height of 101 ft, including 21 ft in a pit.

(C. O. COTTOM, *Vice Chairman*, Presiding)

LADDER MEASUREMENT AND LABELING

by B. M. GETZOFF, *Attorney at Law, Echt and Getzoff,
Chicago, Illinois*



Out of the jungle of conflicting and confusing standards existing in the ladder industry, the standards developed by the National Bureau of Standards in April 1965 created order where there was chaos. Today, when a ladder manufacturer represents his ladder as having an overall length of 16 feet long, it must be an actual 16 feet within established tolerances or it is in violation.

Governmental standards are not new. They are not enacted just to add another regulation for the government to enforce, but to serve the public interest. They are intended to prevent confusion and to create public benefits in safety and in health. Standards serve the public interest by encouraging fair dealing and protecting the consumer in his purchase of goods and services. The creation of standards leads to a growing public attitude that the process of setting standards should not be under the sole control of the particular groups whose interests are affected. The history of this development is shown by the various acts that have been enacted by Congress.

In the 1906 enactment of the Food and Drug Act, Congress placed the responsibility upon the Government rather than on the individual food processor, to begin the regulation of unsafe food and drug products. The Securities and Exchange Act of 1933 was enacted to prevent manipulation and abuses in control of stock exchanges. The Meat Inspection and Poultry Product Inspection Acts again showed the development of an interest in protecting public health through safe consumer products. The Cigarette Labeling Act indicated a concern over the hazards to health in smoking. The Fair Packaging and Labeling Act of 1966 reflects a new policy to eliminate confusion among consumers because of undue proliferation of quantities in which consumer commodities are sold.

In the establishment of mandatory standards by the Government, the established public objectives cannot be reached without using the vast industrial competence. It is only through the cooperation of industry that we can expect to establish standards that will produce the public benefits in safety or health without

harmful consequences. Standards must be feasible from the standpoint of cost and engineering.

Our satisfaction with the establishment of standards as to lengths of ladders is tempered by the feeling that while this new extension of standards was necessary and desirable, it has not gone far enough. We submit that the public is no less defrauded and exploited when they contract for a 16-foot extension ladder and receive a ladder of lesser length, than they are when they think they are buying a safe ladder and get something less.

The measurement problem that is of direct concern to this National Conference is, of course, how the quantity is being represented. But I would like to devote a little time to exploration of another measurement problem. If a ladder is represented as having certain dimensions to its parts, such as its rails or steps, that make it a safe ladder, is it a safe ladder when those dimensions are not accurately represented, when they are exaggerated?

The construction of safe ladders is a highly complex engineering subject. Industry, in cooperation with the American Standards Association, has set standards for this. The standards have been set up and established. Only the adoption of these standards is required to make them effective.

These standards were not created solely by the ladder industry as a self-serving operation to set up an umbrella of respectability for marginal ladder manufacturers. Instead, the standards were set up under the auspices of the American Standards Association, now known as the United States of America Standards Institute. The participating committees represented such organizations as:

- American Federation of Labor
- American Society of Mechanical Engineers
- American Society of Safety Engineers
- American Society for Testing Materials
- Associated General Contractors of America
- Association of American Railroads
- Association of Casualty and Surety Companies
- Electric Light and Power Group
- International Association of Fire Fighters
- International Association of Governmental Labor Officials
- National Association of Mutual Casualty Companies
- National Lumber Manufacturers Association
- National Safety Council
- Telephone Group
- Underwriters Laboratory
- U. S. Department of Agriculture
- U. S. Department of the Army, Corps of Engineers
- U. S. Department of Labor, Bureau of Labor Standards

The standards that were conceived and created by these participating organizations were dedicated and designed first and

foremost for the public safety. They represent the combined thinking of the foremost engineers in the country. The standards cover metal as well as wood ladders. These standards are complete. They are now ready for the asking. Not only are they ideally suited for the protection of the public, but they fully qualify as being feasible in terms of cost and engineering. In the case of wood ladders, safety for wood ladders by mathematical formulas has been translated into measurements of rails and steps in the classification of step ladders and into measurements of rails and rungs for extension ladders.

The average weight of a prospective ladder user is computed at 200 pounds. But we all know that the weight of some users may exceed 200 pounds. So, in designing a ladder, the dimensions are so formulated that it will accommodate four times that weight. It is this formula that provides the framework of dimensions in rails, steps, and rungs, that provides the standard for safe ladders.

Step ladders are divided into three classifications, depending on the purposes for which they are intended to be used. Each type of ladder has a specific table of measurements.

Type I ladder is the strongest and heavies. It is designed for heavy industrial use and has a total length of up to 20 feet. of up to 20 feet. It is to be noted, for instance, that the thickness of a side rail for a 12-foot length of a Type I ladder is $\frac{25}{32}$ inch compared with a thickness of $1\frac{1}{16}$ of an inch for a 20 foot length. The same difference is noted in the $3\frac{5}{8}$ -inch depth required for a 12-foot length as compared with the $4\frac{1}{4}$ -inch depth in a step required for the longer length of step ladders.

A Type II ladder is designed for medium duty and covers light industrial use, such as painting and office use. The authorized length is from 4 to 12 feet. The variation in the side rail depth of $2\frac{5}{8}$ inches for a Type II ladder from 3 to 8 feet, as compared with a 12-foot length where the required depth of a side rail is 3 inches.

The design of a Type III ladder is intended for light household use. They are restricted to a length of from 3 to 6 feet. The thickness of the rails and steps is set at $\frac{3}{4}$ of an inch instead of $\frac{25}{32}$ inch. The depth of side rails of $2\frac{1}{2}$ inches for a Type III ladder is less than $3\frac{1}{4}$ inches for the rail in a 12-foot Type I ladder or the $2\frac{5}{8}$ inches required for a 10-foot length of a Type II ladder.

It is to be noted that, when Group 2 woods are used, the thickness of the rails from lengths under 30 feet to 44 feet is constant at $1\frac{5}{16}$ -inch, but the required depth in inches varies from $2\frac{1}{2}$ to 3 inches. For Group 3 woods, there is a variation in required thickness of rails as well as the depth.

Wood drastically differs from metal in that it lacks the uniformity of material that is found in metal products. There are hard woods and there are soft woods. Some woods have stronger qualities than others. In order to construct a comprehensive formula, woods are divided into four categories. Each group is classified as to allowable fiber stress and bending. Allowable fiber stress is the distinguishing factor. In Group 1, the allowable fiber stress shall not exceed 2,150 pounds per square inch; in Group 2, the allowable stress is 2,000 pounds per square inch; in Group 3, the allowable stress is 1,600 pounds; and in Group 4, the stress shall not exceed 1,375 pounds per square inch.

The code for portable wood ladders prohibits serious defects in wood, such as compression wood, cross grain, and knots, beyond certain minimum sizes, that weaken the capacity of the ladders.

Some States, like Florida and Oregon, have borrowed from the ASA Code for Portable Wood Ladders to set up their own industrial code. The adoption of an industrial code, however, would in no way conflict with establishment of standards of dimensions and measurements. Instead of a conflict, each would go hand in hand in supplementing each other and broadening the base of safety.

The expansion of ladder standards to dimensions and measurements of component parts of wood ladders would not only protect the purchaser but also the user as well. Some industrial employers are particularly flagrant in their indifference for the safety of their employees. Each day, too many employers jeopardize the safety of their employees by compelling them to use light household ladders for heavy industrial use.

Some years ago, a ladder of one of our members was involved in an accident. The quality of this manufacturer's product was well known to me and I was puzzled as to why the ladder failed. In my investigation I found that the injured employee was working for a contractor who had developed a prosperous business of installing aluminum storm windows. His products must have been superior to his equipment. He had supplied an inexpensive Type III ladder, costing \$1.98 and designed for light household use, for this industrial job. The ladder failed, because it did not have the capacity for this heavy duty work. As a result of this failure, the employee sustained a fractured heel bone resulting in a permanent and painful disability. This accident could have been prevented if a State agency had required an industrial user to provide heavy duty ladders for heavy duty work.

If the spirit that caused the enactment of standards for uniform length in ladders would likewise be carried one step further to define measurements for Type I, II, and III wood step ladders,

as well as the various lengths of two-section extension ladders, it would be an historical advancement. Not only would the public receive full protection as to the commodity they are buying, but also a greater measure of safety. It is a short step to proceed from the requirement that measurements of a length of a ladder conform to its label, to also require that the measurements of the rail and the steps conform to the code for portable wood ladders. Just as the ultimate goal of ladder measurements for standardized weights and measures will go a long way in excluding ladders of less lengths as substandard, so would the extension of this standardization to include the code requirements for dimensions of steps and ladders for Types I, II, and III ladders increase the protection of the public from being short changed as to safety. The American Ladder Institute strongly supports any governmental agency that seeks to eliminate substandard ladders, and is strongly united in this new program of standardization.

Metal ladders are manufactured in compliance with a metal code, also published by the United States of America Institute. Unlike the wood code, the metal code is more in the nature of a performance code because of the nature of the materials used. Metal parts to a ladder are manufactured in accordance with an alloy and thereby eliminate the variations of material uniformity that is found in wood. Consequently, a greater reliance is made upon performance tests, which are comprised of weight applications to various metal parts of a ladder.

The dimension specifications for metal ladders as to extension ladders, requires that pulleys shall not be less than $1\frac{1}{4}$ inches in diameter and that the ropes used for such pulleys shall not be less than $\frac{5}{16}$ inch. In step ladders, it is specified that the width of the steps shall not be less than 3 inches. I might add at this point that, while performance tests can be applied to metal ladders, the application of weight loads to wooden parts causes damage to the wood fibers that are not readily discernible. If weight tests were applied to ladders prior to their shipment to the consumer, it would not be known whether or not there had been any dangerous injury sustained by the wood fibers. The U.S. Department of Agriculture, through the Forest Product Laboratories that are maintained in various parts of the country, strongly urges that under no circumstances should weight tests be applied to wood ladders prior to shipment to the consumer.

Today there are few ladder manufacturers that deliberately engage in the sale of unsafe substandard products, but I would urge that, if there is on manufacturer that sell substandard ladders and thereby places the public in jeopardy, then that is one too many.

If we are to objectively survey and analyze the basic causes of ladder accidents, we would find that more accidents are caused by improper use than by substandard ladders. Even the best ladder, made of the finest materials, is dangerous if used improperly or carelessly.

Speaking as an attorney, I would say that in this day and age of the growth and development of product liability law, the simple tools of bygone days have now assumed new stature and proportions. Where accidents yesterday would have been charged off to the carelessness of the user, today they become the basis for liability against a manufacturer. Such simple tools as knives, hammers, and ladders, in the eyes of some, have become deadly lethal weapons. Ladders are one of the more common tools, with hundreds of thousands in use daily.

Ladders are designed to serve a simple purpose. They enable the human body to elevate itself to heights beyond the human reach. At least, this was the intended purpose in the past. Today, there are too many users who defy the laws of gravity and, to their sorrow, find they have not been repealed. When users stand on tops of step ladders and lose their balance, when there are no overlaps in extension ladders, when they set up extension ladders at improper angles, they ignore the simple rules of common sense.

Safety is endangered by substandard ladders on one hand and consumer negligence on the other. Against manufacturers of substandard ladders, reputable ladder makers are helpless without government intervention. One of the great phenomenon of this day and age is the ability of consumers' carelessness to convert a simple tool like a ladder into a dangerous instrumentality. Against consumer negligence they have responded by a comprehensive system of labeling. After a comprehensive study of the common acts of consumer negligence, a standardized label has been created by the American Ladder Institute for its members. In this way, the American Ladder Institute has launched a vigorous campaign of enlightenment against consumer carelessness. Today, the practice of affixing these decal labels of instruction has been adopted by all of the members of the American Ladder Institute as part of its constant campaign to make the public safety-conscious. After years of experimentation with various kinds of labels, it has been found that these decals are the most effective and lasting method of providing common sense instructions for ladder safety, when placed in a conspicuous place so that they can be read and understood by the user.

When all is said and done, we want you to know that the members of the American Ladder Institute are solidly united behind standardization efforts. In all of your future efforts we extend our enthusiastic support in the achievement of a common goal . . . the protection of the American consumer.

WHAT'S NEW IN AEROSOL PACKAGING?

by E. D. GIGGARD, *Product Coordinator for Aerosols, Continental Can Company, Technical Research Center, Chicago, Illinois*



The aerosol industry over the years has been characterized by exciting new developments, one of them being compartmentalized packaging. Compartmented packaging itself is going through quite a development period. Today, I appreciate the opportunity to present and discuss the newest, and, we believe, the most versatile of the compartmentalized aerosol packages. It is a completely new system of aerosol packaging or, actually more technically correct, a new system of pressure packaging. We call it Sepro can. I think I can best lead into the Sepro can development through a brief history of the development of the aerosol industry.

The aerosol industry got its start during World War II. The necessity for controlling insect-propagated diseases caused the War Department to commission the U.S. Department of Agriculture to develop a method whereby individual foot soldiers could combat tropical insects. It was through this grant that Lyle Goodhue and William Sullivan of the USDA conceived the idea of combining pyrethrum and sesame oil with liquefied propellant 12 in steel, pressure-resistant containers. These heavy containers were fitted with a valve to produce a fine spray of insecticide. This system was used widely and successfully by our foot soldiers during the war. Naturally, at the end of the war when troops returned home and surplus army goods were sold, the idea spread to the civilian population.

Once lightweight, single-trip containers were made available to replace the heavy, refillable units used during the war, the industry really started to grow. Aerosol dispensers first became a significant part of the packaging industry in 1949 when hair sprays and gas propellants were first combined in a practical marketing-oriented manner. This made available a convenience item in the cosmetics field that had never been available before. It opened new aspects of packaging, untapped until then.

Inspect sprays came along about the same time with a substantial market influence. The rate of growth of the industry was rather sensational. 1950 was up about 18 percent. Shave creams were being packaged in aerosol cans at this time. By 1957, window sprays had come into the aerosol market. The growth rate had been sustained through the years, almost doubling the market in the previous five years.

The next step was de-icers back in 1960. By now aerosols were demonstrating their all-year-round usability and advantages.

In 1961, it was starch spray that sparked the market. The upswing was still running four times the annual growth rate of the country as a whole. Then, four years ago, the personal deodorants began swinging over to aerosol in significant volume. In just 20 years, the aerosol industry has built sales from 0 to better than 2 billion units per year.

Through these past 20 years, aerosol developers and marketers have been taught to think thin. With few exceptions, such as aerosol powders, we were taught to consider product candidates that will flow readily under their own weight.

Our marketing research people told us that if we were to expand the aerosol market significantly, we must develop a means that would permit us to think thick. That is, develop a means of permitting dispensing of very viscous products such as pastes, creams, gels, etc. We believe that the way to accomplish this feat is to build a barrier between the product and the propellant or driving force. This, then, is where the new Sepro concept comes into the picture. In case you are wondering about the word, "Sepro"—it is a coined word derived from the two words "separate" and "propellant" or "product."

The heart of the Sepro can is a pleated plastic bag which serves as the product chamber and is designed to collapse readily upon itself as product is being squeezed from the bag through the valve.

In the construction of the Sepro can (fig. 1), the plastic bag plus the valve cup provides the confines for the product chamber. The Sepro bag is secured in the conventional 1-inch container opening by crimping of the valve cup. The reservoir remaining between the outside of the plastic bag and the inside of the metal container walls serves as the propellant chamber. Propellant is introduced into this chamber after the product has been filled and the container conventionally crimped with a 1-inch valve. Propellant is introduced through a special port in the bottom end unit.

The Sepro principle offers a number of advantages to aerosol marketers:

1. The percent product outage is phenomenally—literally 95–98 percent can be removed by the consumer.
2. The viscosity of products which can now enjoy the convenience of push-button dispensing is broadened, from the very fluid materials upward to heavy pastes, creams, gels, etc. Those of you having young children are undoubtedly familiar with Pladough. We have demonstrated repeatedly that the Sepro Con-



FIGURE 1

tainer will dispense product of this type, consistently and uniformly, with no slowing down of the dispensing rate at the end of the product.

3. The Sepro principle isolates the product from metal contact of the container walls, thereby eliminating corrosion problems inherent in some product formulations.

4. The Sepro can can utilize any of the existing propellant systems—nonliquefied compressed gas, or liquefied propellants, hydrocarbons, and halogenated hydrocarbon alike. A very small amount of liquefied propellant is required since none of these propellants is expelled with the product. In a 6-ounce can, 3 grams of hydro carbon propellan can completely dispense the product.

5. Complete separation of product and propellant is assured. This is important for products where no degree of foaming or bubbling is tolerated, or where product-propellant contact us undesirable.

6. The Sepro can, through proper selection of valves, dispense drops, streams, or a reasonably fine spray or mist. With inclusion of a small amount of lower pressure propellant into the product, a foam-type dispensing can also be achieved.

7. Operation of the Sepro container is foolproof with the container in any position since the propellant cannot bypass the product.

We look to Sepro not as a replacement for existing aerosols, but as a new type of packaging that will expand the application and convenience of push-button dispensing to many new product areas. We believe that, with the aid of the Sepro principle, the total aerosol market by 1970 could reach 40 billion units.

THE PREVAL CARTRIDGE

by R. A. COEVER, JR., *Precision Valve Corporation,
Yonkers, New York*



The PREVAL cartridge is a uniquely constructed propellant container, complete with valve and tube, to conduct the product from the pickup point at the bottom through the cartridge and to the bottom from which it is then expelled. This unit has all the convenience of the conventional aerosol plus the many advantages which are inherent in this new system. These advantages result in improvements in performance, range of products, and appearance, all of which are significant advantages to the consumers.

Because the PREVAL cartridge sprayer does not require a pressurized product container, these containers may be made in a variety of shapes and sizes, using a wide range of materials.

The PREVAL cartridge has two basic ways that it can be used:

1. Inside and completely enclosed in the product container.
2. Externally to the product container, either attached or completely separate.

How it works.

In order to gain a thorough understanding of the basic principles of operation, we can examine the construction details of the cartridge.

1. The pressure cartridge or propellant container is an aluminum impact extrusion with a hole in the bottom and a rolled bead at the top into which the valve is crimped. This opening for the valve is the standard one-inch configuration which has been used on one piece aluminum aerosol cans for a number of years.

2. The mounting cup is a tinplate stamping which joins the parts of the valve and the aluminum cartridge. This cup is also essentially the same as has been crimped to millions of aerosol cans. The only difference is a variation in the flowed-in gasket to maintain a good seal against the higher pressures of propellant 12.

3. The valve housing is a nylon part which is very similar to existing aerosol valve housings. This housing is crimped into the mounting cup and serves as a body for the other internal valve parts.

4. The valve gasket is a Buna N rubber gasket which prevents the propellant from leaking through the stem orifice until the valve is actuated.

5. The valve stem is a nylon part which moves up and down through the hole in the gasket, to provide the path for propellant vapor to go from inside the container to the button. In addition, this stem also offers a direct passage from the internal dip tube to the button.

6. The internal dip tube is a nylon member which is anchored at the bottom of the cartridge and joined to the stem at the top of the cartridge. This tube has an internal opening which allows the direct passage of product from outside the bottom of the cartridge, up to the center portion of the stem, and finally to the button. In addition, this tube acts as a spring, since it is normally in a slightly compressed condition. This spring action, along with the propellant pressure, returns the valve stem to the closed position when the finger is removed from the button.

7. The sealing plug is a special polyethylene tapered plug which seals and anchors the tube to the bottom of the cartridge.

8. The external tube is a polyethylene tube which picks up the product and conducts it up to the bottom of the cartridge.

9. The button is a specially configured piece which provides the vacuum, the mixing chamber, and the outlet for the product and propellant vapor. This is accomplished by passing the propellant vapor first through a very small orifice and then through an expansion and mixing chamber.

One of the principles involved in the operation of this button is the Bernoulli principle, in which the velocity is increased through a venturi type restriction. This velocity increase causes a reduction in pressure. One of the other factors that is important to the performance of the button is the precise geometrical relationship between the length and diameter of the mixing chamber and the location and size of the passages for the product. These relationships are critical to achieving the optimum performance of the PREVAL cartridge sprayer.

Finally, it should be noted that the button can utilize only propellant vapor and not liquid propellant, if it is to function correctly. If the cartridge is inverted and liquid propellant flows to the button, a back pressure rather than a vacuum will be created.

Inherent Advantages.

The PREVAL cartridge sprayer has several advantages over other dispensing methods. From the technical point of view, these can be classified as follows:

1. *No cooling effect.*—The use of only propellant vapor as the energy for expelling the product onto the desired surface creates a “warmer” spray. In conventional aerosols the vaporization of the liquid propellant causes a sharp temperature drop which is detrimental to the application of good surface coatings. However, with the PREVAL cartridge sprayer, these coatings can dry in a warmer environment and without residual liquid propellant bubbling from the surface.

2. *Separation of product and propellant.*—The physical separation of the product and propellant enables one to spray formulations that are not possible in aerosol cans due to the incompatibility factor. Also, because of this separation, it is possible to utilize existing nonaerosol product formulations without any change.

3. *More product with less propellant.*—The more efficient utilization of the liquid propellant by the PREVAL cartridge permits a greater amount of product to be dispensed with a given amount of propellant. A good example of this is the comparison between aerosol hair sprays and hair sprays utilizing the PREVAL cartridge concept. These aerosol hair sprays generally run a 1:1 mixture of hair spray concentrate and liquid propellant. With the PREVAL cartridge, this ratio is generally between 3:1 and 5:1. The cost saving of liquid propellant such as F-12 is quite significant.

4. *Safety—potential advantage.*—One of the characteristics which is unique to the PREVAL cartridge as compared to other pressurized containers is that the product tube is anchored to the bottom of the container at the lower end and attached to the valve stem at the top. When excessive heat causes the internal container pressure to rise, the mounting cup bulges in the middle, carrying the valve up. This flexing occurs at a pressure well below that which is required to blow out the mounting cup or rupture the container. This motion first straightens the dip tube, then actuates the valve by holding the stem down. Finally, under extreme temperature conditions, the cup bulges sufficiently to pull the dip tube completely off the bottom of the stem. This action then provides a pressure escape path through the open end of the dip tube and down through the bottom of the cartridge. At the same time the propellant pressure is escaping through the valve stem at the top.

Precision Valve is presently compiling additional substantiating evidence concerning this pressure relief safety feature, and should be able to insure a 100 percent effective operation very shortly.

Future.

The future of this delivery system also holds possibilities with many products and types of propellants. A wide range of these products have been tested and found to give results superior to applications by conventional methods. These include such products as hair sprays, antiperspirants, oils, window cleaners, polishes, starches, paints, varnishes, and other coatings. Most of the work done thus far has been with the fluorinated hydrocarbon propellant 12. However, there is evidence to indicate that other propellants could be used in the future.

At the present state of development, the PREVAL cartridge can be used as a separate sprayer unit which is attached to the top of a product container, or inserted into a bottle with an appropriate neck opening by the consumer. With the open passage between the bottom and the top of the unit, only powder type products can presently be shipped to the consumer with the cartridge inserted into the filled outer container because of the unrestricted flow of liquid when the unit is inverted. This free and relatively streamlined passage for the product to flow from the outer container to the discharge point, together with the simplicity of the overall valve design, has enabled Precision Valve to offer a relatively inexpensive and trouble-free package for those markets which can utilize its advantages.

For those markets requiring the push-button convenience of a package delivered to the consumer with cartridge inserted and secured inside a bottle filled with product, a more elaborate valving system is required. This system, incorporating a means for preventing the flow of liquid from the product container when it is inverted and a vent to allow atmospheric equalization of pressure in this container, is presently under development.

In the meantime, Precision Valve has decided to feel out the potential market by offering a general purpose *Self Powered Sprayer*. This unit is supplied with an empty bottle, a coupling for screwing the bottle to the cartridge, and a dip tube with a filter screen for picking up the product. The empty bottle that is supplied serves as the product container for whatever liquids the consumer wishes to dispense, and is particularly suitable for such materials as paints because of the mixing and cleaning capability. The unit in this configuration is intended only for household and industrial liquids and not for personal products.

If there is consumer acceptance of this *Self Powered Sprayer*, then it will add one more facet to the PREVAL cartridge concept of delivering materials. The other approaches to the package have already been generally accepted by marketers, as a means of creating new product identities, and there is hope that this acceptance will spread.

MEASUREMENTS ON THE SATURN SPACE VEHICLE

by C. T. N. PALUDAN, *Chief, Measuring Instrumentation Branch, Marshall Space Flight Center, Huntsville, Alabama*

Abstract.



The history of man might be considered as an ever increasing quantity and quality of measurements. Measurements related to space have been made by early astronomers, modern astronomers, and now by aerospace technologists. The manned lunar landing, a major national goal, has given us the means to measure in space. The space vehicle development itself has made heavy demands on instrumentation; this is discussed in some detail in this paper. The advantages of the

International System of Units are mentioned. Some examples are used to illustrate the future of space measurement.

Astronomy.

All of us in this room share a common interest: that of making measurements. From our viewpoint we might consider the history of man to be an ever increasing quantity and quality of measuring technology. From earliest times man has turned his attention to the heavens and pondered how he might know more about the mysteries there. In other words, how he might measure the heavenly phenomena. Even before the invention of the telescope, rather precise measurements were made by men like Copernicus and Tycho Brahe. With Galileo's and Kepler's discoveries came a new era of astronomy, and a new era of space measurement. This era extends to the present day.

Large-scale research with large rockets began shortly after the Second World War. Progress has been rapid, with a major step being taken about ten years ago when orbital spacecraft entered the scene. These vehicles have given us new means to measure the mysteries of the heavens. Their development required the evolution of a new technology which itself has required application of measurement science.

Early Egyptians used a device called a merkhet (fig 1). This was a simple sighting rod with a slit sight. Two plumb lines were suspended in the plane of the observer's meridian, that is, along a north-south line. Sightings of star transits could be accurately made. This could be used to establish the north-south line, to determine the length of the year, and to mark the seasons [1].

In the second century B.C., Hipparchus used a thin metal ring with its plane fixed parallel to the earth's axis to determine the



FIGURE 1

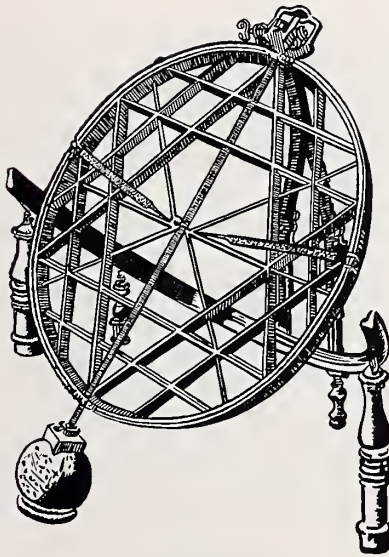


FIGURE 2

time of equinoxes. At the equinoxes the sun lies in the plane of the earth's equator, and the shadow cast by the front of the ring falls exactly on the back. With this, Hipparchus discovered the precession of the equinoxes [1].

A similar, but much more sophisticated instrument was Tycho Brahe's great equatorial armillary (fig 2). With it, and other nonoptical instruments, in the latter part of the sixteenth century, Tycho collected very accurate data on the motions of the planets. These data were the basis for Johann Kepler's formulation of the laws of planetary motion in the early seventeenth century. Through Kepler's laws, Isaac Newton was able to arrive at his great system of universal dynamics [1].

"Less than a century separated the work of Newton from that of Kepler, but in that time the intellectual climate had changed enormously. The man primarily responsible was Galileo Galilei." (Quoted from reference 1.) Galileo gave us not only new instruments and new discoveries, but also the beginnings of experimental physics. He did not invent the telescope, but he quickly put it to work. At last, with optical instruments, men could make accurate measurements of the heavens.

The Saturn Program.

A milestone in man's attempt to measure phenomena related to the earth was the International Geophysical Year (IGY). From it came many measurements of our planet and nearby space, and from it came the discovery of the Van Allen radiation belts in 1958. We saw a major emphasis placed on space exploration culminating in establishment of the manned lunar landing as a major national goal. This was initiated in President Kennedy's second State of the Union message to the Congress on May 25, 1961:

With the advice of the Vice President, who is Chairman of the National Space Council, we have examined where we (the U. S.) are strong and where we are not, where we may succeed and where we may not . . .

Now is the time to take longer strides—time for a great new American enterprise—time for this Nation to take a clearly leading role in space achievement which in many ways may hold the key to our future on Earth . . .

Recognizing the head start obtained by the Soviets with their large rocket engines . . . we nevertheless are required to make new efforts on our own . . . This is not merely a race. Space is open to us now; and our eagerness to share its meaning is not governed by the effort of others. We go into space because whatever mankind must undertake, free men must fully share. . .

First, I believe that this Nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth. No single space project in this period will be more impressive to mankind, or more important for the long-

range exploration of space; and none will be so difficult or expensive to accomplish . . . It will not be one man going to the moon—if we Make this judgment affirmatively, it will be an entire Nation . . . [2]

The manned lunar program is being accomplished by the Saturn launch vehicles and Apollo spacecraft. The Saturn family of vehicles is shown in figure 3. The Saturn I vehicles are used for tests and operations in earth orbit, while the Saturn V is the actual carrier for the manned lunar operations. Development of the Saturn/Apollo has been carried out under direction of NASA's (National Aeronautics and Space Administration) Office of Manned Space Flight (OMSF) by the Manned Spacecraft Center (MSC), the George C. Marshall Space Flight Center (MSFC), and the John F. Kennedy Space Center (KSC).

Development of the Saturn launch vehicles is being accomplished by Marshall Space Flight Center and its contractors. During the development, measurements, both on the ground and in flight played a key role.

Measurements on the Saturn.

During the early development phases of launch vehicle design, it is important to know how well flight conditions have been predicted, and how well the test vehicles are withstanding these conditions. To provide this information, each stage of each of the earliest Saturn vehicles has had an extensive instrumentation system. Later, as the vehicles have proven themselves, they are

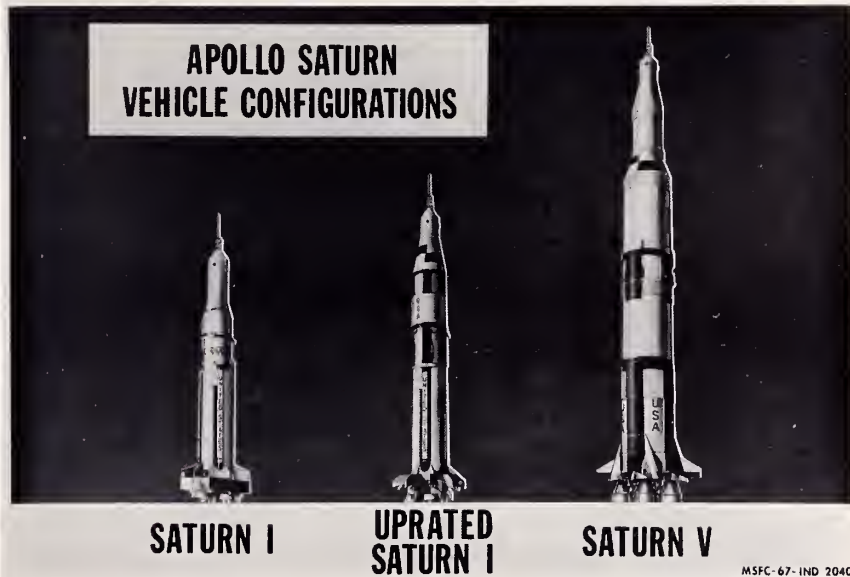


FIGURE 3

UPDATED SATURN I/ INSTRUMENTATION

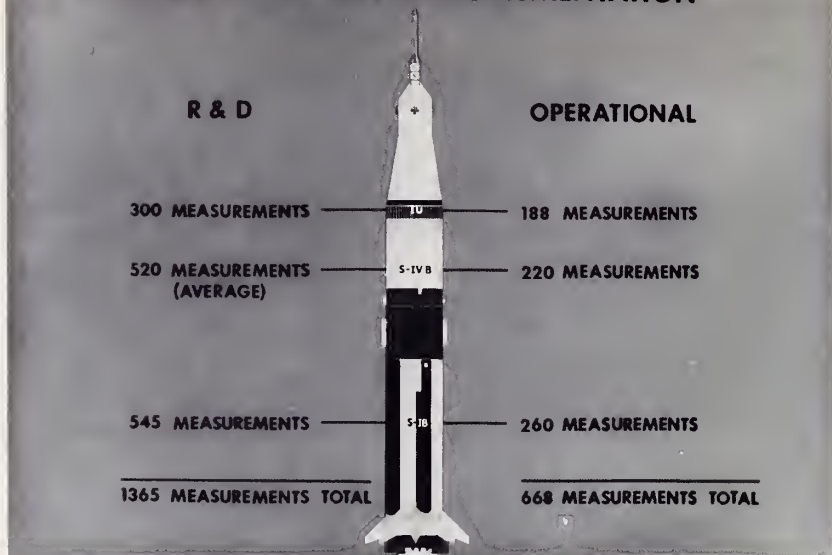


FIGURE 4

considered operational, and the quantity of instrumentation is reduced. The instrumentation is monitored during ground static firings of each stage, during factory checkout, during launch site checkout at Kennedy Space Center, and finally during flight by means of radio telemetry. Figures 4 and 5 show the number of flight measurements on the updated Saturn I and Saturn V respectively. A development flight of the Saturn V transmitted data on nearly 2,800 measurements back to ground stations by 21 telemetry links [3]. The first two stages (S-IC and S-II) do not reach orbital velocity; they fall into the Atlantic Ocean. Data from them are recorded by a string of stations located along the flight path. The S-IVB stage, the Instrument Unit (IU), and the Apollo modules all go into orbit in the usual mission. Data from the orbiting S-IVB and IU are telemetered to ground stations of the Manned Space Flight Network (MSFN) as long as the on-board batteries last—usually about six hours.

Some critical measurements have their data displayed in real time at the Mission Control Center (MCC) in Houston, Texas. Decisions on modifications in the flight mission could be made based on these data. A majority of the measurements are recorded on magnetic tape at each ground station and are subjected to intensive study immediately after the flight. A "quick-look" report is issued very soon, interim reports on various systems follow, and a final evaluation report is issued 60 days after the launching.

SATURN V INSTRUMENTATION

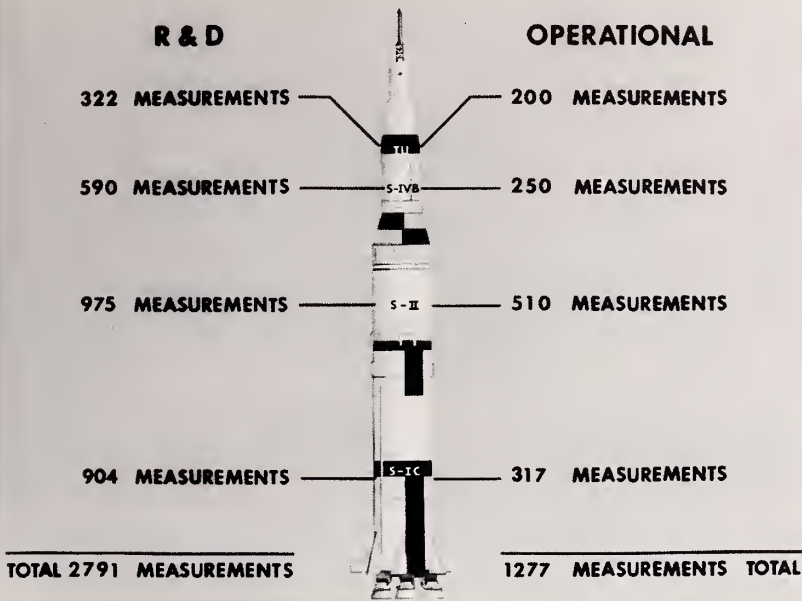


FIGURE 5

The basic mission of Marshall Space Flight Center is the development of the launch vehicles. The large number of flight measurements made during the early "research and development" flights provide the confidence (or lack of it!) that the design is correct. The results of these measurements are used by the design engineers to confirm previous ground testing or to indicate a need for further testing—or even redesign. The latter is a rare event, but occasionally we encounter it. As you may know, the Saturn I has had thirteen flights, all without a failure. On one flight, one of the first stage's eight engines was cut off early because of improper operation. Since the Saturn has "engine out" capability, the mission was not affected. Instrumentation, however, was essential in pinpointing the sequence of events. In many cases, instrumentation data may offer evidence that some flight environment is not as severe as had been predicted. Possible direct results of this information are reduction of cost and increase in payload mass.

A few of the measurements are quite simple off-on switch positions. A few are measured with very complex instruments; for example, the liquid-vapor "quality" meter, which determines the ratio of hydrogen vapor to hydrogen liquid by nucleonic means.

Many of the measurements are made with instruments whose principles are familiar to most of us—thermocouples, resistance thermometers, Bourdon-tube and diaphragm pressure gages, piezoelectric vibration pickups, turbine flow meters, capacitive liquid-level probes, hot-wire anemometers, etc. The differences are that these instruments must survive in rather severe environments, their electrical outputs must be compatible with the telemetry systems, they may be measuring phenomena in unusual ranges, and they must have high reliability.

Electrical adaptation of a transducer's output to the telemetry system often requires the use of a "signal conditioner" [4]. The signal conditioner may contain an amplifier, power supply, Wheatstone bridge, circuits, voltage limiters, and means for automatic pre-flight checkout provisions which use commands to the signal require signal conditioning. The telemetry systems mentioned are the pulse coded modulation (PCM) system, which is digital in nature, the single-sideband (SS) system for wide-band data such as vibration and acoustic, and the frequency modulation (FM) system for low frequency analog data. Also to be noted are the pre flight checkout provisions which use commands to the signal conditioners via the remote automatic checkout system (RACS) and data from the PCM telemetry via coaxial cables. The latter is a data collection system called the digital data acquisition system (DDAS). By means of the RACS and DDAS the entire measuring system for the Saturn vehicle can be checked out rapidly and automatically. A computer usually performs this function.

Almost half the flight measurements made on Saturn are of temperature or pressure. We have concentrated considerable attention toward the development of reliable, but inexpensively mass-produced temperature and pressure transducers. Most temperature measurements are accomplished with either thermocouples or resistance thermometers. A few thermistors are used for measurements over very small spans—such as a total change of 10° C, for example. Thermocouples used in the laboratory usually require ice baths for the reference junctions. In industrial applications, the recording instrument usually employs an electrical or mechanical compensation for the reference junctions' temperature. In the case of rocket vehicles, we solved this problem with a simple, inexpensive, and tiny electrical compensation device. It has permitted the widespread use of inexpensive thermocouples. For pressure measurements, we chose the potentiometer-output transducer when accuracy and time response requirements permitted. This instrument uses a Bourdon tube, diaphragm, or bellows to activate a mechanical linkage to the moving contact of an electrical potentiometer. The electrical output from a poten-

tiometer does not require amplification, so the expense of a signal conditioner is avoided. Temperature and pressure measurements are made throughout the Saturn vehicles. Typical areas monitored include the engines and other parts of the propulsion system, the structure, the propellant systems, and the guidance and control systems.

Other measurements include vibration, strain flow rate, liquid level, acceleration, and electrical parameters.

A majority of the flight measurements require an overall accuracy of ± 5 percent of full scale range. A few special cases require higher accuracy; for example, ± 0.1 percent accuracy has been needed (and obtained) for some engine combustion chamber pressure measurements. These figures include transducer, signal conditioner, telemetry, recording, and evaluation errors. The RACS is scaled to assure these accuracies.

Environmental conditions during a vehicle's flight could lead to instrumentation failures if we had not designed equipment to survive. Electronic equipment can usually be protected from extremes of temperature, and is, therefore, normally subjected to conditions between -20 and $+70$ degrees Celsius. Temperature transducers must withstand the environments they monitor, of course. These range from the temperature of liquid hydrogen, -253°C ., to over 1600°C . (in one case to 2800°C .). Rocket vehicles are notorious for vibration and acoustic pressure because of the operation of the engines and the aerodynamic behavior. A typical environment would involve oscillating vibration levels of plus and minus fifteen times the acceleration due to earth's gravity and sound pressure levels of 150 decibels above a reference level of one dyne per square centimeter (reference is normal threshold of hearing).

Some typical transducers are: a calorimeter (to measure heat flux), a thermocouple, a thermocouple reference junction, two pressure transducers, two liquid level detectors, and a flowmeter with its internal turbine removed (fig. 6).

Calibration Data.

Of particular interest to this Conference might be the calibration facilities. Each stage contractor has a standards laboratory with standards certified by the National Bureau of Standards, and calibration facilities which are geared to mass production, but whose standards are maintained by the standards laboratory. A similar situation exists at MSFC for the calibration of flight pressure transducers, cryogenic flowmeters, and signal conditioners used for temperature measurements. Calibration data on each measurement's transducer and signal conditioner are recorded on magnetic tape in digital form. The mathematical equation of each calibration curve is derived from these data by a computer and

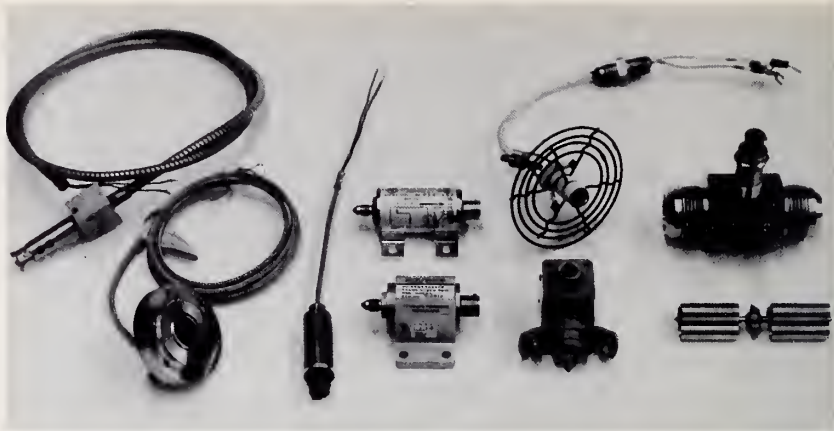


FIGURE 6

stored. During post-flight evaluation these stored equations, plus the ground station recordings of flight data, are used by computers to print out the flight time history of each measurement in both numerical tables and analog graphs. The tables and graphs are in engineering units, such as degrees Celsius, versus flight time in seconds.

Preferred Units.

Since July 1963, the officially preferred system of units at Marshall Space Flight Center has been the International System (Système International d'Unites, or SI). It is also the preferred system at several other NASA centers. However, its use is not mandatory. Some NASA centers had become too involved with the English system to permit an inexpensive changeover. Even MSFC is not completely converted, and several of the Saturn stage contractors give their flight measurement calibration data in English units. Fortunately, the computer is nondiscriminatory and is willing to print out data either or both systems. The final Saturn flight evaluation reports are in International System units.

As you might expect, there has been some confusion in the rocket business due to the mixed systems of units. Probably the worst mistake was in mixing absolute and gravitational units [5]. This led to the specification of rocket engine performance in improper units. Specific impulse (I_{sp}) is the engine thrust in force units divided by the rate of propellant consumption in units of mass per interval of time.

$$I_{sp} = \frac{F}{M/T}$$

Unfortunately, it has been customary to give thrust in pounds force, and propellant consumption in pounds mass per second. The early workers erroneously cancelled the pounds in the numerator and denominator and ended up with I_{sp} in seconds. Simple dimensional analysis will reveal that the correct units are identical with velocity units. This error is so deeply entrenched in the rocket field that even modern workers who know better use "seconds" to describe the performance of rocket engines. It was to avoid errors like this that NASA decided to standardize on *one* preferred system of units.

Future of Space Measurements.

The operational Saturn vehicles, that is, the ones that carry astronauts or other payload, will continue to carry a number of measuring instruments which will have their data telemetered to the ground. However, the quantities are greatly reduced. This is because the basic development of the vehicles will have been completed. This is already the case for the uprated Saturn I. Any new developments in the technology of launch vehicles, such as development of a nuclear stage, would require the inclusion of new measurements.

To return to the theme of discovery of new information from space, we can expect the technological and scientific experiments to use measurements in great number. The manned lunar landing program established as a national goal in 1961 has made available the space vehicles necessary to the large-scale exploration (measurement) of the heavenly—and earthly—phenomena. Many experiments will be conducted by the Apollo Applications Program (AAP).

A few examples of AAP experiments may serve to indicate the scope of this important program. The Apollo Telescope Mount (ATM) is a modification of the Lunar Module (LM) or "Bug," which will provide a group of solar observation instruments [6]. These experiments will concentrate on observations in that part of the spectrum not observable in the earth's atmosphere; for example, ultraviolet and X-rays. Figure 7 is an artists concept of this experiment. Some data will be brought back on photographic film by the astronauts; other data will be telemetered.

Other AAP experiments of interest because of their measuring techniques, are those dealing with meteorology and surveys of the earth's resources. In these cases, the astronauts will turn their measuring eyes back toward the earth. The results of these measurements could have far-reaching effects on the daily lives of the world's inhabitants. Through techniques commonly called "remote sensing," valuable data on weather, agriculture, forestry, geography, cartography, geology, oceanography, air and

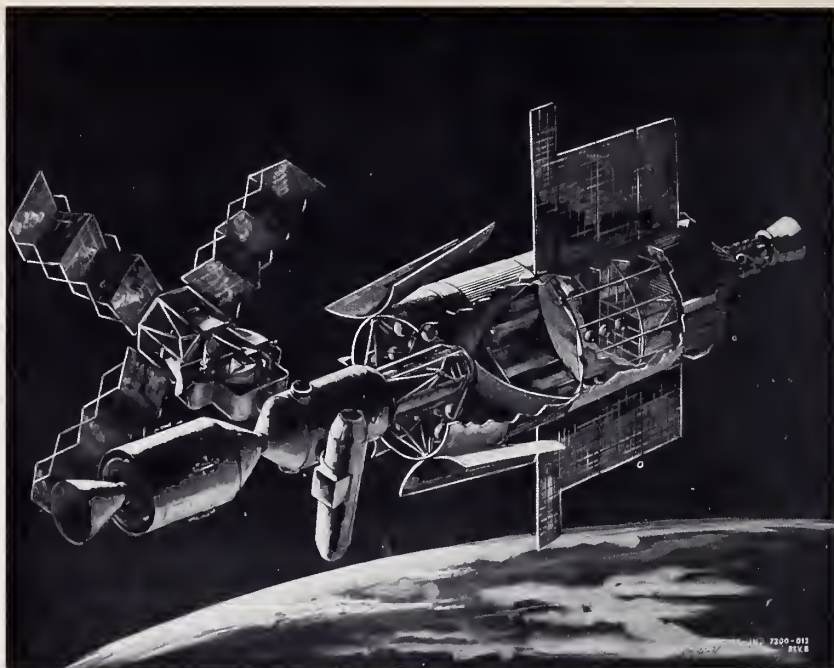


FIGURE 7

water pollution, and even urban planning can be gathered economically [7, 8]. The prospects of using such techniques just for the single objective of aiding in world food production are quite exciting [9]. During the growing season, ability to identify healthy and unhealthy crops and soil conditions would greatly aid farmers and agriculture planners.

Measurement technology, so important to man's rise in civilization, continues to play a major role as man enters space. Those of us who work in the measuring field may well take pride in the future applications of our technology to the benefit of mankind. Perhaps we will do our part to fulfill the admonition of the twenty-fifth chapter of Deuteronomy:

... A perfect and just measure shalt thou have: that thy days may be lengthened in the land which the Lord thy God giveth thee.

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WEIGHTS AND MEASURES AND SCALE MANUFACTURERS PROBLEMS AND OPPORTUNITIES

by G. D. REYNOLDS, JR., *Vice President, John Chatillon & Sons, Kew Gardens, New York, and President, Scale Manufacturers Association*



A prime objective of the National Conference is to promote uniformity of requirements and methods among weights and measures jurisdictions. Speaking for the members of the Scale Manufacturers Association, I can say that we solidly endorse that purpose, and have since SMA was founded in 1945.

Over these years we have cooperated with the National Conference on Weights and Measures to the extent of our ability. I believe we have been quite helpful in this direction, as the drafting of model laws and regulations can be very complex. We have talented technical people who can provide assistance and advice as to the effect of proposed regulations on weighing devices.

We have always tried to be institutional in our advice—that is, objective in character and not trying to favor or harm any particular company's product or any principle of weighing. We hope, and pridefully believe, that we have established a reputation of fair dealing in the views we have submitted to the National Conference and the National Bureau of Standards.

With this brief review of the relationship of your organization and ours, I would like to touch on several very important developments of the past year which will have longtime significance for you and for us. In many respects, these developments represent progress through organized effort and cooperation—yours and ours.

NBS Prototype Examination of Commercial Devices.

As all of you know, in past years, about a fourth of our States have had what has been known as "State type approval" of commercial weighing and measuring devices, prior to sale within the State. This was probably patterned after Great Britain, Canada, and some of the European nations which have centralized weights and measures so that one examination could suffice for the Nation. In addition, the central office was better staffed for technical examination than were the smaller local offices.

Frankly, most scale manufacturers have felt that State examination, with the device to be physically exhibited to as many as 20 or more States, was not a practical solution to official examination for conformance. For a number of years now there has been much talk, and even official endorsement by the Southern and Western Associations, of some form of national type approval to replace State approval. Apparently, many States, even quite a few which have type approval, have felt it burdensome to have staff technicians qualified to make thorough examinations of devices for conformance with the Handbook 44 Codes.

Some scale manufacturers have long been in favor of some form of centralized type approval to avoid examinations in the various States. However, some others felt that centralized type approval might add another layer to the existing approval pattern without compensating benefits. So, the Scale Manufacturers Association, until 1966, opposed either centralized examination or further extension of State examinations. At the same time, we acknowledged that there was a growing position among the States favoring some form of centralized examination.

Under the circumstances, and with our eyes open to progress and changing trends, we had extensive discussions with Malcolm W. Jensen, Chief of the Office of Weights and Measures. Our group was convinced that the time was ripe to establish a program of Prototype Examination of Commercial Devices for Conformance with Handbook 44 at the National Bureau of Standards. We understand that the devices are to be voluntarily submitted to the Bureau by the manufacturers, with the costs to be paid by the manufacturers, and that the Bureau will issue a test report to all the States if the device is found to conform. If the device does not conform, the manufacturer alone will be so advised.

The program is operating, and the officials of all States were so advised last February. We understand that some devices have already been examined, and all States advised of approval of the specifically identified models.

We believe this centralized examination program is sound, quite reasonable, and can be expected to succeed, to the lasting benefit of weights and measures and device manufacturing as

well as the purchasers of devices. We also believe the general public will benefit from this program.

Since all of this is voluntary, its success will depend on further cooperation of all parties concerned, and acceptance by the States, especially by those States which presently have type approval requirements. If they continue to require physical examination of devices, the program loses much of its compensatory value and there would not be the same need for the manufacturers voluntarily to submit their devices for examination. We have in the Bureau an impartial agency in which we all have confidence. They are well qualified, with facilities and trained technicians which can do the examination job for us all.

We strongly urge that all the States now do their part by accepting the approval examination reports. It can be one of the most progressive steps ever taken by weights and measures in the United States.

Model Regulation for Voluntary Registration.

Over the years, individual States have considered and some have adopted regulations controlling servicemen who repair weighing and measuring devices. There is no need to go into the reasons for such controls; it should suffice to say that on some occasions repaired devices have been found not to perform properly as required.

With the remarkable progress in weights and measures since World War II, there seems to be an increasing feeling on the part of officials that servicemen should be responsible for their work and that when a device is found not to conform, the serviceman should account for the nonconformance. He may or may not be at fault, but in either event, the growing feeling has been that he should be held accountable.

Until the late 40's or early 50's the two plans of service controls used by the few States exercising supervision were the "performance bond" plan and the "licensing" plan. These plans were found to have some rather serious drawbacks. The bonds usually issued were so restrictive in their clauses that rarely, if ever, could a scale owner collect on the bond when the serviceman had done improper work. For example, the bond might require prompt inspection of the device after repairs—say within a week or a month. It is very doubtful if your work can be arranged normally to follow-up on all service jobs within so short a time. In some States, the bonding plan requires that there be a court suit and judgment before the bondsman is liable. So, the net effect is that the scale serviceman is required to pay a premium of \$10 to \$20 a year with little or no benefit to anyone. Certainly a bonding company will make little or no investigation of the capability of the mechanic for that small a premium.

A few States have tried the licensing system and found it fraught with problems. An official State license carries at least an implication of responsibility on the part of the State and usually there is an examination. Frequently, a very good scale mechanic is very poor at written or oral examinations and is rejected. And, believe me, it can be very difficult for the State to locate or develop qualified technical people to prepare and conduct examinations, particularly since the scope of the examinations must cover a very wide variety of both weighing and measuring devices.

The third plan, which has developed since the late 1940's, is the "registration" plan. As a general proposition, this calls for voluntary application by the mechanic citing his experience, qualifications, and references. The State will issue registration certificates to approved applicants and will authorize the certificate holder to place in service repaired or newly installed devices. This authority to place in service is of real advantage to the device owner and to the weights and measures department in that it avoids the possibility of a long wait for official inspection. It makes possible also the better scheduling of inspection trips by sealers, without emergency interruptions to inspect repaired devices to get them back into use.

A key point of the registration plan is that if a serviceman's work proves to be unsatisfactory, his certificate may be revoked and his name removed from the registration list, with opportunity for a hearing, of course. Thus, the sealers who inspect repaired and newly installed commercial devices constitute a continuing post-audit of the registered serviceman's performance—certainly an incentive for proper performance. This follow-up inspection system is more valuable by far in determining the capability of the serviceman than is an examination.

For the registered serviceman, he gets recognition of his professional capability in his certificate of registration, in being listed on the published list of registered mechanics (which should be widely distributed to device owners) and he is granted authority to place in commercial service repaired or newly installed devices. The nonregistered mechanic is not denied the right to service devices, but his customers must await official inspection before using the device—reason enough for every qualified mechanic to apply for registration.

The registration plan, in somewhat the above form, has been the accepted plan since around 1950—adopted by practically all States which have invoked serviceman controls. But the plans have varied from State to State, creating nonuniformity, and there has been no reciprocity among the States in allowing registered mechanics of one State to perform work in another State, even in emergencies.

Thus it was that your Laws and Regulations Committee, the National Bureau of Standards, and the Scale Manufacturers Association worked together in 1966 to draft a Model Regulation. The National Scale Mens Association was consulted also. The proposed Model Regulation for State Voluntary Registration of Servicemen and Service Agencies was recommended to the National Conference and approved in 1966. It provides the best available pattern for a State plan for serviceman supervision, based on the experience which has been gained in this area since World War II.

We do not urge the States to invoke serviceman controls, but if a State does decide to exercise such controls, we recommend the Model Regulation for Voluntary Registration as adopted by the National Conference. It is the best of all plans which have been tried.

The Package Labeling Act as it Affects Prepackaging Scales.

The development of the program for centralized prototype device examination and voluntary registration, already mentioned, proceeded smoothly through the cooperation of all concerned with the subject. However, we now come to new Federal legislation in the packaging and labeling area where the understanding of the requirements and practices of weights and measures leave much to be desired.

Last June (1966) we learned that the U.S. Senate had passed a bill which, among other things, would require that net quantities be labeled in type of certain sizes, at specific places on the label, and that packages of less than four pounds (other than even pounds) be labeled in ounces. The Senate bill went to the House and was referred to the Committee on Foreign and Interstate Commerce.

Realizing that the Senate bill as written would declare illegal every retail food store packaging practices for random weight packages (except meat and poultry, which were excepted), the Scale Manufacturers Association's members, who produced prepackage computing and labeling scales, formed a committee to try to have the bill changed to allow for labeling by hand and by prepackage computing scales. Some 25,000 or more of these modern label printing scales are in use.

Most of you are familiar with the labeling practices in food stores and know that the labels produced by the modern prepackaging scales provide more and clearer information to the consumer than on almost any other package. In fact, the data is more informative and clearer than the Senate bill would have required, and yet these excellent labels could not conform with the bill. These labels give not only the net weight, but also the price per pound and the total package cost. These machines

could not be modified to mark packages in ounces or to compute total cost at price per ounce. In addition, the hand labeling of small stores (and for special orders at larger stores) would be prohibited. All of these practices and methods have been developed to conform with the long established requirements of your Model Law to give the consumer the essential facts needed about purchases. In fact, weights and measures and the scale industry were far ahead of the Congress and FDA in this regard.

So this SMA committee, after extensive study, prepared and presented to the House Committee written and oral recommendations for changes in the bill. In this we were only partly successful. The final Act allowed random weights to be labeled in pounds and decimals, as do practically all prepackage computing and labeling scales.

The final Act gave the Food and Drug Administration (FDA) and the Federal Trade Commission (FTC) authority to issue regulations and to grant exceptions. FDA published its proposed regulations on March 17, 1967, with 60 days for comments.

The proposed FDA regulations are actually more restrictive and prohibitive than the original Senate bill for they are issued under both the Fair Packaging and Labeling Act of 1966 and the earlier Food and Drug Act. Under the proposed FDA regulations, almost all present net weight labeling practices in retail foods would be illegal as of the effective date of the regulations, probably July 1, 1967.

Again, the SMA committee went into action and, last April, filed 10 pages of arguments with the FDA supporting our contention that the labeling of random weight packages, or packages which show the weight and price-per-pound, should be exempted from the regulations. Possibly, by the time this paper is delivered at the National Conference, we will know the results of our efforts.

In all these efforts before the Congress and the Food and Drug Administration, we have had the support of the National Conference and the National Bureau of Standards. Mr. Lawrence Barker, Chairman of your Laws and Regulations Committee, appeared before the House Committee last summer, as did your Secretary, Malcolm Jensen. Your Federal Liaison Committee conferred with officials at the Food and Drug Administration about the proposed FDA regulations. In all these appearances, the SMA position on food package labeling by local food stores has been supported.

Conclusion.

We have here discussed three of the most important matters to affect weights and measures progress for many, many years. In all of them there has been the very finest cooperation of weights and measures and the scale industry, represented by the

Scale Manufacturers Association. It is through this kind of cooperation that we can improve conditions and create the greatest progress in weights and measures. After all, to a great extent, we are all in the same business—encouraging good weights and measures practices for the public and for industry.

PETROLEUM INDUSTRY CONCERN WITH METER ACCURACY—1. THE AMERICAN PETROLEUM INSTITUTE

by R. SOUTHERS, *Operations and Engineering Coordinator, American Petroleum Institute, New York, New York*



From your programs you will see that the three of us on the platform have been assigned the broad scope subject of Petroleum Industry Concern with Meter Accuracy. My part is described as simply, The American Petroleum Institute.

At the time that I was first invited to participate on the program of your Conference it was suggested that I speak briefly about the relationship of the petroleum industry with the National Conference on Weights and Measures. I accepted quite readily, feeling that the assignment would be an easy one. After I had some time to think about it, I was not so sure.

What is the petroleum industry? To some people these words bring into mind a picture of the often cartooned Texas Oil Millionaire with his ten-gallon hat. To another, visions of oil field derricks and pumps would come into mind. Others would see refineries with the towering cracking units and mazes of twisting and turning pipes. To the teenager perhaps it's the service station on the corner where he can get a dollar's worth of gas for his set of wheels. The farmer most likely would see the familiar tank truck bringing fuel for his tractor. And still others would see the tank farms.

Except for the Texas Millionaire, who is usually only associated with the oil industry because he owns the land where the oil is found, all of the rest of the things mentioned are a part of the petroleum industry. So when I thought about speaking of the relationship of all of these components of our great industry to your Conference, the task seemed almost impossible.

Then another thought occurred to me. Perhaps it is this complex picture which has at times created some confusion or misunderstanding in your minds about our industry. Therefore, there is a real need to talk about this subject.

Just as you have seen the need to coordinate and further the interests of weights and measures officials through your National Conference, so does the petroleum industry find a similar need. It was for this reason the American Petroleum Institute was founded.

The American Petroleum Institute, more commonly known as API, is an association representing all of the various interests of the petroleum industry. This includes producers, refiners, pipeliners, terminal operators, jobbers, service station operators, and related industries and individuals. Although there are other associations within the petroleum industry, they represent more specific areas of interest, such as the National Oil Jobbers Association. By reason of its more inclusive nature, API has become the responsible organization for representing the petroleum industry in your Conference activities.

Within API there are several divisions. Liaison with the National Conference on Weights and Measures is an activity of the Marketing Division because it is the marketers with whom you most generally have relations. I am a member of the staff of the Marketing Division. The other gentlemen here from our industry all are employees of petroleum companies. Some of them also are here representing API.

In 1955 it was recognized that there was a need for providing for the participation of technical and operating people concerned with the marketing of petroleum products. As a result the Operations and Engineering Committee was formed. As this O&E Committee looked to its structure, it was immediately recognized that one of the most important areas of interest was weights and measures. Hence, the formation of the Weights and Measures Subcommittee. The subcommittees, incidentally, are the working groups.

So that you might better understand the importance attached to weights and measures, let me tell you about the other three subcommittees. The Marketing Facilities Subcommittee is concerned with terminals, bulk plants, service stations, and related equipment. The various code-making bodies and other regulatory and legislative activities (other than Weights and Measures) are the concern of the Major Codes Subcommittee. The remaining subcommittee is known as Aviation Technical Service and is concerned with the rapidly expanding aviation industry.

Bob Primley, who has become familiar to many of you in the past couple of years, is the very able Chairman of the Weights and Measures Subcommittee.

I am very pleased to be able to say to you that our present industry representatives on the Weights and Measures Subcommittee have done a most commendable job in carrying back to

marketing management the need to create better communications with your National Conference, as well as with State and area conferences. It was the recognition of this need which prompted the creation of our Weights and Measures Technical Committee. The members of this committee were chosen because their training and background was such as to allow them to speak your language and understand your problems.

Mr. John Hale of Phillips Petroleum Company, who has for several years been attending both this Conference as well as the local conferences, is the current Chairman of our Technical Committee and will be speaking to you about its activities. Those of you who know John will, I'm sure, agree with me that his acceptance of this responsibility has been most fortunate for both you and us.

In closing, I have one final word. Any of you who have worked with organizations, whether they be church, fraternal, benovolent, or business, have occasionally found that at a particular time everyone seemed to be so busy with other things that something which needed prompt attention was not being handled. This was not because the organization did not hold the project in proper esteem but rather because the necessary emphasis had not been achieved. This kind of situation may have existed in some instances in the past between our industry and you. I can assure you that the proper emphasis now exists and I will do all that is within my power to see that it continues.

PETROLEUM INDUSTRY CONCERN WITH METER ACCURACY—2. THE PETROLEUM INDUSTRY AND ITS WEIGHTS AND MEASURES SUBCOMMITTEE

by J. W. HALE, *Vice Chairman, API Weights and Measures Technical Committee, and Technical Representative, Phillips Petroleum Company, Bartlesville, Oklahoma*



I must take just a moment at the beginning to say that I am delighted to be back among my many weights and measures friends. In addition, I appreciate very much the opportunity to be a part of this three-part program on the subject of Petroleum Industry Concern with Meter Accuracy. My part of the program is to speak briefly on the subject of "The Petroleum Industry and its Weights and Measures Subcommittee."

As most of you are aware, the American Petroleum Institute and the petroleum industry are synonymous. As Dick Southers pointed out, the API is the principal petroleum industry trade association which, because of its inclusive nature, has become the responsible organization for representing, through its Weights and Measures Subcommittee, the petroleum industry at your Conference activities.

At the 50th National Conference on Weights and Measures, considerable excitement was generated when the Specifications and Tolerances Committee tentatively recommended reducing tolerances on wholesale and vehicle tank liquid meters. The excitement was highlighted by many hurried informal conferences and/or conversations among and between various weights and measures officials and the various petroleum industry representatives attending the 50th National Conference on Weights and Measures. As a result of these various conversations and informal conferences, there appeared to be general agreement that because of a lack of technical information, reduced tolerances on wholesale and vehicle tank liquid meters could neither be adequately substantiated nor refuted.

Thus, the Specifications and Tolerances Committee's recommendation to reduce tolerances on wholesale and vehicle tank liquid meters was essentially tabled to allow time for a comprehensive study to be made to determine in more specific terms, meter system performance capability. The responsibility for developing this information was, for all practical purposes, placed with the petroleum industry. Thus, the API, in its continuing role of cooperation with weights and measures officials and this

Conference, accepted the responsibility and appointed a Weights and Measures Technical Committee with the primary function to develop this information.

I am presently the Chairman of the Weights and Measures Technical Committee. The original Chairman of the Committee was Mr. Harry F. Utzerath, American Oil Company, an old friend of many of you attending this Conference. Unfortunately, shortly after his appointment to the chairmanship of the Committee, Harry become ill and subsequently and very regrettably he passed away. Since I was the original Vice Chairman of the Committee, I assumed the chairmanship.

The membership of the Weights and Measures Technical Committee is made up of representatives chosen because their training and background was such as to enable them to speak your language and to understand your problems.

The scope of the Weights and Measures Technical Committee is to develop, in a cooperative effort with this Conference, the National Bureau of Standards, and meter manufacturers, a comprehensive technical review of wholesale and vehicle tank liquid metering systems, in the marketing segment of the American petroleum industry, and to establish liquid metering system performance capability.

In order to expedite the study program, the very well-qualified engineering consulting firm of Morris and West, Atlantic Highlands, New Jersey, was retained by the API. Mr. Richard P. West, Professional Engineer, ably assisted by Mr. Richard Dunning, has been actively conducting the study program. Mr West first prepared a program outline entitled, "Survey and Study to Determine the Practical Limitations of Tolerances for Error in Wholesale Petroleum Metering Systems," which has been reviewed and approved by the Specifications and Tolerances Committee of the National Conference on Weights and Measures and by the API.

The object of this survey is to evaluate the factors which affect the accuracy of wholesale petroleum metering systems in normal usage and to determine their accuracy capability under prescribed test conditions. Field tests under actual operating conditions are conducted by petroleum industry personnel. Cooperating weights and measures officials also conduct tests on the same metering systems, following their standard procedures and, where possible, using their own proving equipment. These field tests are outlined and coordinated by Mr. West, who observes the tests and records the data.

To date, several tests have been conducted; however, I will not elaborate on these since Mr West will do so during his portion of this program.

It has become apparent from my limited conversation with those involved in conducting the tests, as well as those who have attended some of the tests as observers, that much is to be gained through an increase in the mutual understanding of petroleum industry and weights and measures officials problems. In each case, the cooperation and assistance of local weights and measures officials has been outstanding.

In my opinion, it appears that we are finding that if there is any problem existing between the petroleum industry and weights and measures officials, it is one of communication. It really is amazing how much can be learned about each other when you spend a couple of days working and talking together. I guess this is why we have been finding that the relationship which exists between you and the petroleum industry people with whom you work on a day-to-day basis is so fine.

In summary, we as an industry, with your cooperation, have undertaken the responsibility to gain factual information related to wholesale and truck tank liquid meter tolerances. We are doing this with an open mind. All of the information which is being gathered is being made available to your representatives. Together I am sure that we will be able to come to a decision as to what will be both satisfactory as well as proper tolerances which will assure continued accuracy of measurement of petroleum products.

PETROLEUM INDUSTRY CONCERN WITH METER ACCURACY—3. A STUDY TO DETERMINE METER ACCURACY CAPABILITY

by R. P. WEST, *Morris & West, Consulting Engineers, Atlantic Highlands, New Jersey*



Following the October meeting of the American Petroleum Institute's Weights and Measures Subcommittee in San Francisco, Morris & West were authorized to proceed with a series of ten field tests designed to determine the accuracy capability of wholesale petroleum meters. The tests were to include loading rack meters, power flow truck meters, and gravity truck meters. This report covers five of the tests conducted to date. The sixth test at Louisville, Kentucky, was completed late to be included in this interim report.

Tests have been conducted at the following locations in chronological order:

East Boston, Massachusetts
Bucksport, Maine
St. Paul, Minnesota
Charleston, South Carolina
Fairfax, Virginia.

Two of these locations, Bucksport and St. Paul, were chosen so that we could observe the possible effects of seasonal climate extremes. Tests were run under genuine Minnesota blizzard conditions and at temperatures of -10° . We plan to return to both locations and repeat the tests during the summer months.

The terminals visited for the loading rack tests are owned by Mobile Oil Corp., American Oil Co, Phillips Petroleum Co., Cities Service Oil Co., and Webber Tanks, Inc., a large distributor in Maine. Trucks, provers, personnel, and general assistance have also been contributed by Shell Oil Co., Humble Oil & Refining Co., Williams Brothers Pipe Line Co., Texaco, Inc., Hess Oil & Chemical Co., and R. E. Nason & Son, a heating oil reseller in Bucksport, Maine. The cooperation of all of the personnel of these companies has been outstanding and has made our job comparatively easy.

In all cases the local weights and measures officials have participated in the tests with their personnel and equipment. Their cooperation has been excellent and they appear to have a genuine interest in the program and its objectives.

In the conduct of the tests we have had contact with representatives from the following weights and measures jurisdictions or organizations:

The City of Boston
The State of Massachusetts
The State of Maine
The State of Minnesota
The City of Minneapolis
The State of South Carolina
The State of Virginia
The State of Maryland
Prince George's County, Maryland
The National Bureau of Standards
The Canadian Bureau of Standards

We have also had representatives from four meter manufacturers and one manufacturer of steel prover tanks. At our test in Fairfax, Virginia, we had 28 participants or observers.

The following is a summary of the things which we consider significant from the observations made during the program up

to this point. It is emphasized that we are only halfway through the program and it would therefore be improper to draw any conclusions from these observations.

In our tests we have attempted to compare the relative accuracy of several provers at each test location using a given meter as the basis of comparison. Obviously, the repeatability of the meter also enters the picture and at this point, we are not certain just how much influence this may have. Despite this uncertainty, we feel that the results obtained are worthy of examination.

<i>Location</i>	<i>Prover No.</i>	<i>Indicated Meter Variation Percent</i>	<i>Spread of Group Percent</i>
East Boston	1	-0.08	0.12
	2	-0.115	
	3	-0.20	
Bucksport	3	-0.32	0.01
	4	-0.30	
	5	-0.32	
St. Paul	6	+0.01	0.02
	7	-0.01	
	8	0.00	
	9	-0.01	
Charleston	12	-0.05	0.14
	13	-0.10	
	14	+0.04	
Fairfax	16	+0.01	0.10
	17	+0.10	
	18	+0.06	
	19	0.00	

We believe that the good correlation found at Bucksport and St. Paul came about as a direct result of action taken by the local weights and measures officials. At Bucksport the three provers had been calibrated using a Federal standard shortly before the test. This practice represents the proper way to do this job and should be done regularly to all provers. In St. Paul, the State officials also practice a program which emphasizes the regular calibration of privately owned provers. The variations between provers in these two areas agree favorably with the probable errors that one might expect as a result of a statistical analysis applied to the methods and equipment used to calibrate the provers. A typical case would involve a 50-gallon primary standard, calibrated by the National Bureau of Standards with a maximum error of ± 0.020 percent and a probable error of 0.004 percent. If twenty draughts from this standard were used

to calibrate a 1,000-gallon prover, the probable error of the prover would be about 0.0009 percent. Half of all the provers thus calibrated would have errors equal to or smaller than this figure. The other half would have greater errors.

Another matter which arises is the possible change in prover volume which occurs due to expansion or contraction of the metal tank in extremes of temperature. This is recognized in API Standard 1101, but is not generally taken into consideration in everyday practice. The provers are generally calibrated "to deliver" at 60° F and it is usually assumed that the metal in the shell is at the same temperature as the liquid contained. It is also generally assumed that the temperature of the product passing through the meter and the temperature of this same product at the time the prover gage is read will coincide. This may usually be correct but under certain conditions there is a distinct possibility for significant differences to develop. In various areas the range of product temperatures may vary from 90° F to 30° F due to the change of seasons. The net effect on the prover volume based on a 60° F calibration temperature would be about ± 0.05 percent at these extremes.

Thus a good prover with a standard error of 0.02 percent for calibration error and an uncorrected temperature effect at 30° F could have a built-in variation from true volume of ± 0.07 percent. If the prover were one of the statistically poorer groups which represents half of the total, the total error could be 0.09 percent or greater. In order to determine the possible effects of the described temperature extremes on the performance of the meter itself, it would first be necessary to correct the prover volume for the variation from 60° F and also to correct for any possible difference between the temperature of the meter strain and the temperature of the liquid in the prover.

In the five tests under consideration we have worked with 16 large portable provers ranging from 500 to 2,000 gallons capacity. Five of these are publicly owned, that is by weights and measures authorities, and the remainder are owned by the petroleum companies. Since API Standard 1101 seems to be the only comprehensive standard for the construction of such equipment, we have examined each prover to determine whether it complies with this specification.

There are three principal areas where the provers did not comply with the standard. Article 2010 requires that the smallest readable graduation should represent not more than 0.02 percent of the prover volume. Two of the five public provers and four of the eleven private provers did not comply. Article 2011 requires that the volume of the prover neck within the length of the gage shall be at least 2.0 percent of the total prover volume.

Adequate neck size is particularly important in proving heating oil meters at higher flow rates where a great deal of foam is produced. Four of the five public provers and four of the eleven private provers did not comply with this standard.

API 1101 deals at length with temperature effects in proving meters. It recommends but does not specifically require that each prover should be equipped with three thermometer wells. Only two of the private provers had three wells, two had a single well. None of the public provers had thermometer wells. The importance of this will be discussed later.

One private prover was considered as noncomplying because of poor bottom design and two were found to require repairs to bottom valves before they could be used. One was found to have a cup-case thermometer lying in the bottom.

In summary, of the 16 provers only two complied with API 1101 without qualification and two more complied if we disregard the thermometer requirement.

At each of the five terminals visited we examined the tanks, piping, pumps, valves, air eliminators, control systems, etc., looking for anything good or bad that might influence the accuracy of the meters. In four of the five terminals the elevation of the storage tanks was favorable to good meter operation. In the fifth case the tank bottoms were substantially below the meter elevation. They had had some history of check valve trouble but this was not evident during our test. One plant was equipped with remote-operated tank valves which were felt to have had an undesirable influence on the meter accuracy, but this effect was not evident during our test.

In each plant we tested two systems, ten in all. Three of the ten systems had single pumps. Seven had multiple pumps in parallel controlled by various manual and automatic systems. All of the systems had adequate air elimination systems.

One practice that seems to be quite commonly followed in the design of piping systems introduces the possibility for creating unusual meter errors in proving and also makes the proving operation very inefficient and time consuming. In three of the five terminals the product in the provers is pumped back to storage through the same piping that normally delivers the product to the rack. In one case the pump-off connection is located between the air separators and the meters. Only the use of a centrifugal pump and careful manipulation kept this from being a major problem. In one case it was considered advisable to purge the system of air between each successive prover run. In another case it was necessary to send a man some distance into the tank field to line up valves for each pump-off and then to repeat the process before the next run could be made. In all cases

the pumps used were very small and this added greatly to the time required for proving. The ideal arrangement is an independent system with a generous sized pump and a connection at each loading island. It would appear that a review of the standards for such installation would be beneficial for all who operate these systems.

One other item which is known to exist on many loading racks is leakage, downstream of the meter, from the glands in sliding tube loading arms. Unless these are made tight some of the metered product does not reach the receiving vessel. This condition was observed on some loading arms in use but did not exist in the equipment used for testing.

One important and necessary equipment item in the meter system was found to contribute materially to potential inaccuracy. This is the ticket printer which seems to be prone to printing an extra gallon under certain conditions. A total of 89 prover runs were made through meter systems including a register with ticket printer without a temperature compensating device. In 18 of the 89 runs, or 20 percent, there were disagreements between the visible register and the ticket printer in the range of 0.25 to 1.0 gallons. This variable is caused by the change from an analog type mechanism, the visible register, to a digital mechanism, the ticket printer and is independent of the size of the prover run. In a 500-gallon draught a 1.0 gallon variation is 0.20 percent. We believe that this condition is relatively unpredictable and may occur in any series of runs on a random basis depending upon the construction of the register and the exact stop point of the mechanism. Ticket printers, which are otherwise very useful and necessary accessories, appear to make a very sizeable contribution to meter system error in everyday use.

We had the opportunity to compare the performance of two remote data acquisition systems with the visible registers and ticket printers at the rack. Here we have the same basic problem as described for ticket printers. Using the visible register as a base, the ticket printers in one installation made 4 errors in 19 runs and the remote system made 3. The magnitude of the errors ranged from 0.5 to 1.0 gallons. The performance in the second terminal was about the same as the first.

Three of the five terminals have thermometer wells in the risers to the loading arms. One is equipped with small dial thermometers with 2 degree graduations, one has larger dial thermometers with 1 degree graduations and the third, which also has temperature compensated meters, is equipped with first quality mercury thermometers with 1 degree graduations. The other two terminals have no means for taking meter system

temperatures except to assume that they would be the same as the tank or prover can temperatures. A very doubtful assumption either way.

The principal operating problem in the actual proving of loading rack meters was experienced with heating oil meters because of the foaming tendency. It was often necessary to stop the flow several times during a single run to prevent overflows. The small necks of some of the provers made operation at normal flow rates very difficult. It was also necessary to wait an appreciable amount of time, perhaps several minutes, for the foam and bubbles to subside before readings could be taken. This problem was not experienced with gasoline meters.

Test runs were made at maximum flow rates, 50 percent of maximum rate and 20 percent of maximum rate. Comparing the visible register with the prover gage, three of the ten meters tested were found to be out of tolerance, that is, more than ± 0.223 percent variation and were subsequently adjusted to an acceptable condition. Our experience following one of these adjustments was most interesting and pertinent. This occurred at Bucksport, Maine. On the first day of testing the weather was mild and the product temperature for heating oil tank was 32° F. The meter was found to have a variation of -0.30 percent. After adjustment it was -0.006 percent. Two nights later, the temperature dropped to -15° F and was about -2° F in the morning. The provers were outdoors all night. Three runs on the same heating oil meter now showed the average variation to be -0.11 percent, a change of over 0.10 percent in about 36 hours. To account for this sudden change, we have attempted to reconstruct the change in test conditions. In the cold test the prover can was very cold having been outdoors in sub-zero weather all night. The very cold tank would tend to chill the product put into the can. The product temperature in the storage tank was 29° F. The product temperature in the prover was 26° F. If the product going through the meter was at 28° F, the 2 degree drop in the cold prover can would account for an apparent variation of -0.10 percent. In St. Paul where it was also very cold, temperature differences between meter and prover up to 3 degrees were observed. At other locations under less severe conditions, 1 degree variations were fairly common. A 1 degree temperature difference between meter and prover in a 1000-gallon draught will cause an apparent but false meter error of 0.05 percent. As previously mentioned, it is not the usual practice to account for temperature differences in the proving procedure. The importance of this temperature effect came most strongly to our attention in the testing of power-operated truck meters. This occurred at Charleston, S. C. The prover was a 50-gallon can

owned by the State of South Carolina. It was mounted on the back of a pickup truck. The weather was pleasant and sunny with temperatures about 70° F.

The truck being tested has a capacity of 1,530 gallons in five compartments. It has a positive displacement pump driven by the truck engine. The normal operating flow rate is 40 gallons per minute. The product passes through the meter which has a pre-set control and then through a long 1½-inch hose on a reel with a nozzle at the end. Flow can be controlled by the pre-set control or by the nozzle.

The test was made in a conventional manner by a State inspector. We took the added precaution of taking temperatures in the truck compartment being used and in the prover. The same good quality cup-case thermometer was used for all readings. In five runs the average difference between truck compartment and the prover was 5 degrees warmer in the prover. The average variation for the five runs without compensating for the apparent temperature difference was -0.21 percent. The average after compensating for temperature was -0.50 percent. The product was pumped back to the same compartment after each run. The starting temperature in the truck was 64° F, the final temperature in the prover at the last run was 76° F. In the above we have assumed that the truck compartment temperature and the meter temperature were the same. It seems doubtful that this is accurate because we believe that the truck pump, between the tank and meter, adds to the product temperature. We also believe that the long hose, between the meter and prover, makes a sizeable contribution. The prover itself adds something and the prover pump may add some more.

This observation was further substantiated by a later test made under similar conditions but with much cooler weather at Fairfax, Va. Here the temperature difference between truck and prover was 3 degrees. The adjustment to the volume in the prover for this difference would be -0.15 percent.

Another important consideration in the testing of power flow-meter systems outfitted as described is the condition of the system and the manner of control used. This can be done in three ways; by using the nozzle to control flow with pressure on the hose at the start and stop, by using the pre-set device to control flow with pressure on the hose at the start and stop, and by using the pre-set to control flow with no pressure on the hose at the start and stop. At Charleston, the meter showed an uncorrected variation of -0.22 percent under nozzle control, -0.07 percent with pre-set control and pressure on the hose, and -0.32 percent with pre-set control and no pressure on the hose. The difference attributable to this factor was -0.25 percent.

Summarizing our experience with power flow vehicle meters, six were tested in all. Three were brand new and had not been officially tested before. These gave very good results and were well within the tolerances. Of the other three, one showed a variation of -2.8 percent against a tolerance of ± 0.27 percent for a 200-gallon draught. One showed a variation of -0.22 percent against a tolerance of ± 0.44 percent for a 50 gallon draught. The third showed an average variation of $+0.65$ percent against a tolerance of ± 0.32 percent for a 100-gallon draught. All but one of the systems were subjected to a split compartment test and in general performed quite well under this condition.

The program has included tests of four large gasoline transports with gravity meter systems. A total of six meters were tested. These performed remarkably well under both normal and split compartment tests. Only one of the six was found to be out of tolerance. Twelve normal test runs on the five meters found with tolerance showed the average variation to be 0.08 percent against a tolerance of ± 0.223 percent. Split compartment tests on this group showed an average variation of 0.07 percent against a tolerance of 0.43 percent. This remarkably good performance may have been influenced by the size of the provers used. Large provers such as 1200 gallons at Boston and 1500 gallons at Augusta would seem to favor good results in a split-compartment test.

The principal limitation in establishing the accuracy of gravity truck meters appears to be the limited availability of proper prover installations for testing them. In order to simulate the delivery conditions, the prover must be located at an elevation simulating an underground tank. Generally, this requires a fixed installation and one that is fairly expensive to build. Only one of the weights and measures jurisdictions visited had an installation of this type. The others either depended on the petroleum company installations for testing or because of the lack of proper equipment, have no regular program for testing this type of meter.

One of the jurisdictions did some testing using a 100-gallon portable prover sitting on the ground. We evaluated this by using the same truck to make tests with this arrangement and also with a good 500-gallon underground prover. The difference between the results obtained with the two provers was 0.10 percent.

Taking the loading rack meters as a group at normal flow rates and without attempting to adjust or compensate any of the data obtained, we find the group to have a standard deviation of 0.122 percent as compared to the provers for 80 runs. Again, applying the techniques of statistical analysis, this indicates that

the probable error of the group is about 0.08 percent and that 50 percent of the group would have errors no greater than this magnitude. Forty-five percent could be expected to have errors between 0.08 percent and 0.244 percent and about 5 percent would have errors greater than 0.244 percent. In further tests we shall see whether this pattern continues to hold true. This will give a good indication of whether the meter systems tested are truly representative of all such installations.

A similar analysis of 153 prover runs made on eight meters in the Phillips terminal at Charleston, S.C., shows the probable error for this group to be 0.065 percent. This means that 46 percent of this group could be expected to show errors of 0.065 percent to 0.194 percent.

Most terminals seem to have a calibration interval of six months to a year unless there is some indication of trouble with the meter in the interim period. On this basis it takes a very long time to accumulate a significant amount of performance data on any given meter. Ordinarily when such data are examined it is assumed that they are representative of the day to day or week to week performance of the meter and that if a graph of the performance were drawn against time, it would be a smooth line between calibration intervals. We have seen some data from the Phillips terminal at Charleston which causes us to question whether this assumption is correct.

Phillips, unlike most companies, proves their meters about every 30 days. A review of their records for the past year indicates that on a monthly basis there were very significant changes in the apparent meter performance. We say apparent meter performance, because these changes may have been due to some of the influences previously discussed and may not reflect any significant change in the meter itself.

As mentioned earlier, we have completed field test No. 6 at Louisville, Kentucky, but considerations of time did not permit us to include the data in this report. Our future plans include the following additional tests to be made:

St. Paul, Minnesota	-----	July 18, 1967
Bucksport, Maine	-----	August 15, 1967
Lake Charles, Louisiana	-----	September 19, 1967
Los Angeles, California	-----	October 10, 1967

We would like to express our appreciation to all of those present who have participated in this program for their friendly reception and excellent cooperation. We would also like to invite other officials who have not been able to participate to join us, if possible, when we come near your home base.

AFTERNOON SESSION—THURSDAY, JUNE 29, 1967

(F. M. GERSZ, *Vice Chairman*, Presiding)

(Thursday's afternoon session was devoted to reports of the Conference committees, which can be found beginning on page 151.)

MORNING SESSION—FRIDAY, JUNE 30, 1967

(J. E. BOWEN, *Chairman*, Presiding)

ACTIVITIES OF THE OFFICE OF WEIGHTS AND MEASURES, NATIONAL BUREAU OF STANDARDS

by M. W. JENSEN, *Chief, Office of Weights and Measures*

It has become traditional for the Office of Weights and Measures to report to the National Conference on certain of its activities during the previous year. This always is a pleasure for us, and we hope it is informative for you.

This year, presentations will be made by certain of the staff who will be reporting on work in their own areas of responsibility. They will not attempt to provide all of the details of a particular project, but rather will select highlights that should be of interest to you.

First to report will be Harold Wollin, Assistant Chief of the Office. He will be followed, without further introduction, by Tom Stabler, Laboratory Metrologist; Steve Hasko, Engineer; Charles Schreyer, Engineer; Dick Smith, Technical Coordinator; and Larry Chrisholm, Special Coordinator.

H. F. WOLLIN

Assistant Chief, Office of Weights and Measures



The staff of the Office of Weights and Measures has had a good year, although an extremely busy one that has offered many interesting developments and challenging opportunities.

We feel fortunate to have been able to expand our program activities through increases of staff and in our operating budget during the past year, and even greater growth is expected in the year ahead. We are especially optimistic about the future, and we look forward to an expansion in our work with the States, industry, and others who seek our assistance and technical services in the field of weights and measures technology and administration.

The next few minutes will be devoted to reviewing briefly some of the highlights of the OWM program, and other staff members will follow and speak on additional activities in more specific detail.

We are in the process of enlarging our weights and measures laboratory and engineering facilities. When completed, these fully equipped facilities will help substantially to handle in-

creasing requests for (a) the test and calibration of standards of mass, length, and volume; (b) the conduct of engineering research, experimentation, and special measurement studies; (c) the examination of commercial weighing and measuring devices and equipment; and (d) the training of personnel from the States, foreign countries, and others who seek guidance on laboratory operations.

During the past year, over 2,000 mass, length, and volume standards were calibrated by OWM personnel. Included were weights from 10,000 pounds to one-thousandth pound, volumetric provers from 750-gallon capacity to very small precision glassware, and a variety of length standards.

We have been working on the development of new specifications for secondary standards that are used in the field by inspectors and also by some segments of industry. Modernization in this area is needed, and manufacturers are cooperating in this effort to achieve more suitable and uniform field standards. Plans are also under way to develop and publish new laboratory and field test procedures for various standards that will contain many refinements in measurement techniques.

We have completed our study of new materials for an improved test tape for fabric-measuring devices. The material found most suitable is Teflon-impregnated Fiberglass, and in the near future full particulars on a new tape made of this material will be sent out to officials.

As reported earlier during this Conference, a study is being made by OWM of cordage-measuring devices with respect to their design and to present requirements in Handbook 44. This work is nearly completed, and we will report the results of our findings to the Committee on Specifications and Tolerances. This matter will, no doubt, be thoroughly covered by the Committee during the ensuing months and be included in their report next year.

We are also conducting a study on LP Gas vapor meters, which should be completed in time for inclusion in the report of the Specifications and Tolerances Committee in 1968.

We have continued an investigation on the accuracy of odometers in passenger automobiles. Tests were made with a calibrated fifth-wheel device on a number of different makes of 1967 autos. A two-mile road test course was carefully selected and very accurately measured and marked for our use in the calibration of our fifth-wheel device and others submitted to us for test. The fifth-wheel device and associated instrumentation provide a most suitable means for testing odometers, and we believe, on the basis of our work to date, that this type of device could also be used to advantage in many jurisdictions for testing taximeters as well. We plan to continue our cooperation with the States and

with the automotive industry on matters in this area. Special attention will be devoted to the accuracy of odometers installed in trucks and to the development of a simulated road test machine that hopefully will overcome the problems encountered with 2-ply tires in present designs.

An important part of our technical program over the year involves both office and field work on a variety of tasks that come about through requests from many sources or that we uncover and feel need action. Considerable staff time is spent in handling these jobs, some of which require travel, and we do our best to complete them expeditiously and with the desired results.

As most of you know, last fall we sent out an announcement to the effect that the Office of Weights and Measures would accept for examination prototype models of commercial weighing and measuring devices and equipment from manufacturers under a voluntary arrangement. It was assumed that the purpose of our examination would be to determine the conformance of such equipment with NBS Handbook 44 requirements. It was made clear that equipment found to be in compliance would not receive "official" approval by the National Bureau of Standards. Such approval is, of course, granted only by the States. So far, the response from manufacturers has been very good, and we have completed the examination of quite a large variety of weighing and measuring devices. We expect this activity to increase in the future.

Technical training remains a vital phase of our overall program. We have offered training in many form—for example: (1) In the conduct of weights and measures schools and seminars, (2) in field work on test equipment and procedures, and (3) in providing assistance on standards calibration to those who work in standards laboratories. Our training effort continues to expand. Once again, Mr. Tom Stabler traveled to Bogota, Colombia, South America, and participated in a training seminar that was held for officials from Latin American countries. Then, in February, we were pleased to have two engineers from Colombia come to the National Bureau of Standards for some specialized laboratory training in their field of interest. Another item that deserves special mention has been our work with the staff of the Packers and Stock Yards Administration, U. S. Department of Agriculture, in preparing a new audiovisual training aid on the testing of livestock scales. Copies of the slide-tape presentation will be available soon.

You have already heard much about the Fair Packaging and Labeling Act of 1966 during this Conference. I should merely like to note here that many, many official hours and after-work hours have been spent by OWM personnel during the past 12 months

on matters pertaining to this legislation and its impact in the field of weights and measures. A busy line of communications has been maintained with Federal and State agencies, many business and industry representatives, and others on developments in the area of packaging. Over 30 States were paid special visits by OWM personnel to consult with officials on matters pertaining to their law and regulations.

There has been the usual heavy volume of correspondence and communications, which we try to handle efficiently and expeditiously for those who call on us for counsel and assistance. We are also privileged to have a steady stream of visitors come to our office. From foreign countries alone, we had visitors from Korea, Saudi Arabia, Brazil, Iran, Venezuela, Trinidad, West Germany, New Zealand, Canada, England, Thailand, and Australia. Members of the staff were kept busy during the year traveling throughout the country to attend and participate in many State and Regional Conferences and meetings held by various industries and associations. Of course, considerable staff time was also spent in planning and arranging for the conduct of this National Conference.

This concludes my review of our general activities during the past year. We look forward to the months ahead and to our working relationships with you on matters and problems in the field of weights and measures. Our real desire is to expand and improve our services where needed and to develop even better lines of communication throughout the field of weights and measures.

TOM STABLER,

Laboratory Metrologist, Office of Weights and Measures



New State Standards are presently being manufactured and deliveries are underway to the second ten States. The second ten include Arkansas, Florida, Georgia, Hawaii, Maine, Missouri, North Carolina, Pennsylvania, West Virginia, and Wisconsin.

As you have been informed, for the first ten States, installation of standards is in the final stages. Standards have been officially presented in dedication ceremonies at Reynoldsburg, Ohio, and Springfield, Illinois. In addition, instruction in the use of the instruments and in calibration and testing techniques is underway at the Delaware laboratory.

Figures 1 and 2 are pictures of the dedications that took place earlier this month.



FIGURE 1. Pictured above from left to right. Director of Agriculture, Robert M. Schneider, Dr. A. V. Astin, Director of the National Bureau of Standards, Governor Kerner, and Hubert L. Goforth, Head of Weights and Measures in Illinois.

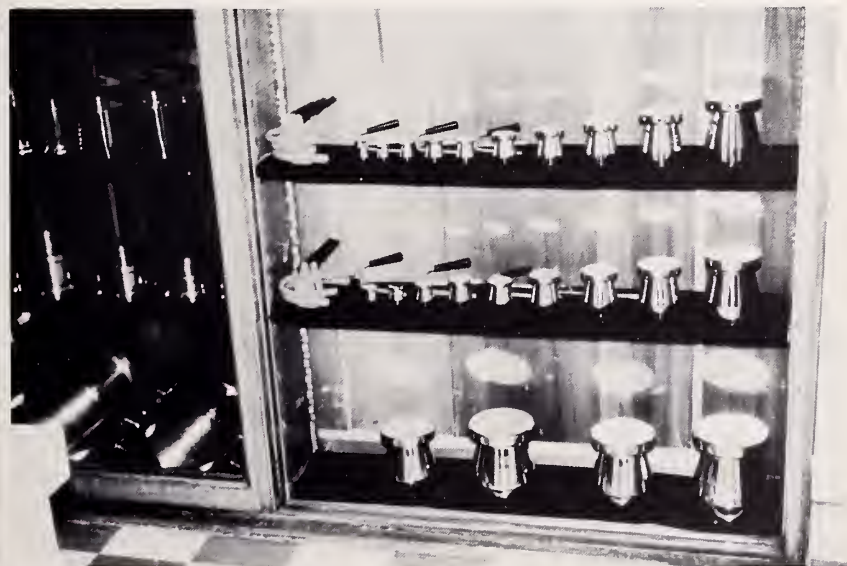


FIGURE 2. Part of the new laboratory and standards dedicated in Ohio.

Dr. Astin plans to present the new standards and instruments to the States of New Mexico and Utah in early August. Training sessions will be conducted at these States this summer.

An important behind-the-scenes activity is taking place, in earnest in some States and less than enthusiastically in others,—and I refer to the preparation for the new standards. This includes the hiring of a qualified technologist and designing a laboratory to accommodate precision balances and standards of weight and measure.

In a period covering the past 20 months we have, by invitation, visited 36 States to consult with officials in an effort to obtain appropriations from State legislatures for laboratories, to plan modifications to existing laboratory facilities, and to design new buildings to house the new State standards.

A few States have construction underway, or at least have approved plans to proceed with necessary preparations, while too many States still have made little progress toward this end. From here, it appears as though considerable effort will be required to complete ten laboratories for third-year distribution. The twenty remaining States will have to initiate vigorous programs *now* in order to meet all requirements and qualify. Failure to do so will cause delays in obtaining the new State standards, as they will not be distributed until adequate facilities are provided and a qualified technologist is hired.

We at the Office of Weights and Measures are prepared to offer our assistance in any way possible in the development and planning of the State weights and measures laboratories.

We urge your immediate, active promotion of the weights and measures laboratories in order to establish each State measurement center prior to the end of this five-year New State Standards Program.

STEPHEN HASKO

Engineer, Office of Weights and Measures



In his book "The American Economy," Jesse Markham states that "Business has a tangible measure of output—the dollars the customer will pay for a product or a service are the same kind of dollars with which any costs are paid. *Thus*, a comparison of input with output is relatively simple. What the public gets from government expenditures (whether Federal, State, or local) varies from indispensable elements of existence itself to services of insignificant value. What

are these varied outputs worth? Some might be worth a great deal more than they cost, but since they are not 'purchased' there is little basis for judgment." The businessman, scientist, or administrator has his own measure of value of any particular program. However, where public funds are involved the criterion increasingly being used by Congress, State Legislatures, and City Councils is cost-benefit analysis.

Cost benefit analysis is a way of assessing the desirability of alternative public projects using given resources. It is not a new concept but was developed by the Department of Agriculture in 1910 when they studied how best to invest their money in seed, education, etc. In 1930 the principle was used in decisions dealing with dam and watershed construction and their optimum distribution. In 1950 the concept was taken over by the Department of Defense and since then has been sold by them throughout the Federal Government.

The National Bureau of Standards is becoming increasingly concerned with the value of the many services it is performing. An economically sound method of cost-benefit analysis would enable the Bureau to stress areas of activity yielding the greatest return on investment.

As a pioneering step in the cost-benefit analysis, six NBS programs were selected for evaluation. A prerequisite was that the program be sufficiently matured to lend itself to an approach that would permit an evaluation of the benefits that were gained because of the program. One of the six selected was the Office of Weights and Measures program in cooperation with the States and industry leading to the development of the Liquefied Petroleum Gas (Liquid) Meter Code, test procedures, and test equipment.

The LPG testing program was inaugurated approximately ten years ago and lent itself to a retro-look. It is felt that tangible benefits that have accrued and are accruing from this testing program may be evaluated. Other programs selected were concerned with semiconductor resistivity, metals in oil, iron and steel standard reference materials, frequency, and force.

In conducting this analysis, we were very much dependent on data supplied by the States active in the LPG testing program and by industry. The following information, or information on which extrapolations could be based, were secured for the first, second, and last year of testing.

1. Number of LP-gas liquid metering devices.
2. Number of meters tested.
3. Time interval between tests.
4. Nominal LP-gas sale price.
5. State LP-gas sales on a liquid metered basis.

6. Number of meters out-of-tolerance and average error of meters out-of-tolerance.

6.1. By over-registration.

6.2. By under-registration.

7. Cost of Testing Program.

This information principally supplied by the States was extremely helpful in this study. Many supplied all the information that was requested. Others, because of short-term record storage policies, were able to supply us with a limited amount of statistics. Extrapolations were made where necessary to fill any holes in the complete network of data.

This data was used to determine the amount of liquid metered LPG that was out-of-tolerance for the individual States where possible. In first year testing this was close to one percent. In the second and last years of test this was $\frac{1}{3}$ to $\frac{1}{2}$ percent. It was then a simple matter to determine the value of the metered LPG which was out-of-tolerance.

Although the study is not yet completed, I would like to discuss some of the data and results obtained thus far.

During the first year of testing of the LPG meters an average of 40 percent of the meters were found to be out-of-tolerance—23 percent by over-registration, and 17 percent by under-registration. In the second year of testing the average of out-of-tolerance meters dropped to 19 percent, 7 percent by over-registration, and 12 percent by under-registration. Note the shift from a majority by over-registration during the first year to a majority in under registration during the second year. In the last year of testing the average was 17 percent out-of-tolerance, 7 percent by over-registration, and 10 percent by under-registration.

We had complete or fairly complete data from twelve States for their first year of testing. We had to eliminate other States because of insufficient data or because prior test programs may have caused some interaction in the data. Evaluation of the data supplied by these twelve States showed total savings or cash benefits to the customer or vendor in excess of \$400,000 during the first year of their test program at a total cost of \$63,000, which included a 10 percent amortization of a \$4,000 prover for each State. The benefits averaged \$34,000 per State. At an average cost per State of \$5,300, the average benefit-cost ratio was 6.5.

Other items of interest determined in the overall analysis were an average test cost per meter of \$25, and average benefit for every meter tested of \$156. During 1966, alone, the 26 States active in the LP-Gas Testing Program saved the customer and vendor \$1,400,000. Although 28 of the 50 States have active LPG testing programs these States use only 40 percent of the LPG that is sold for residential, commercial, and internal combustion

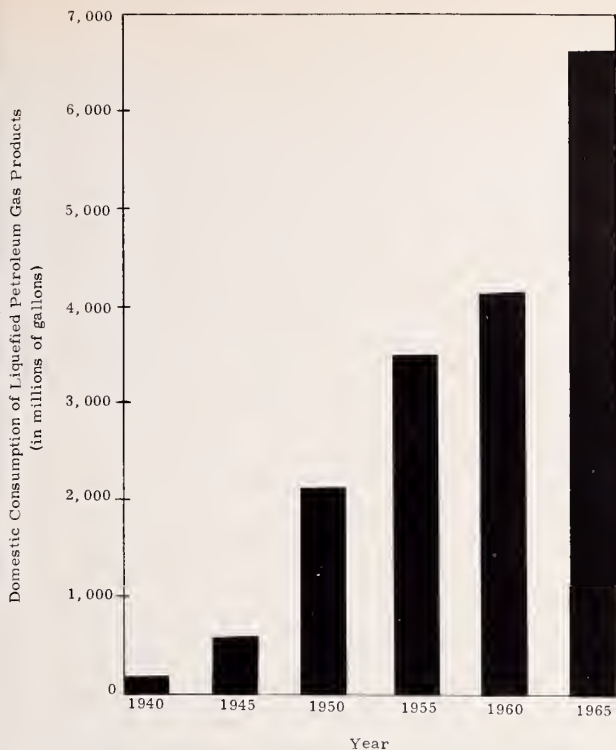


FIGURE 1

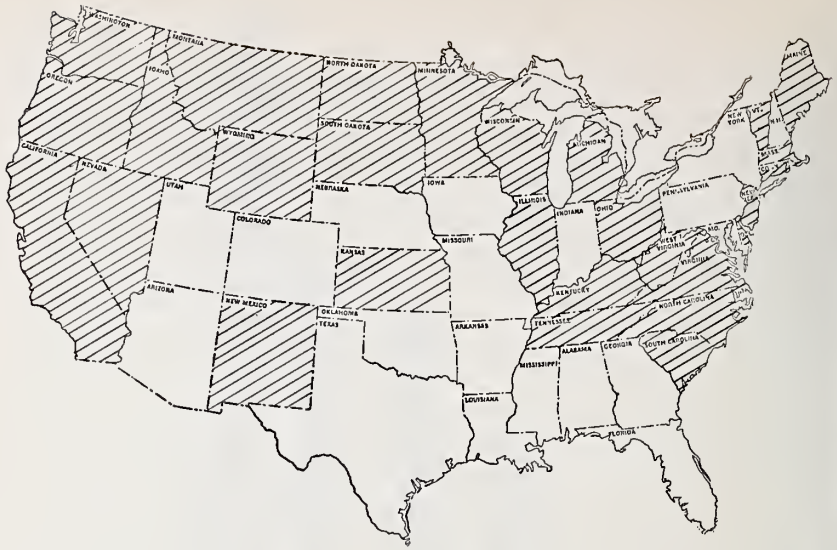
Domestic Consumption of Liquefied Petroleum Gas Products
(exclusive of Industrial, Chemical, and Utility consumption).

use. The remaining 22 States that do not have testing programs use 60 percent of the product.

Figure 1 shows the increase in sales of LP-gas since the 1940's. In 1957 when the LPG Liquid Meter Code Procedure was developed, there were five States testing liquid LPG meters. Today there are 28 and they are shown by cross hatching in figure 2. Figure 3 shows the State sales levels in 1965 of LP-gas and does not include sales for chemical, refinery fuel, synthetic rubber, and the like.

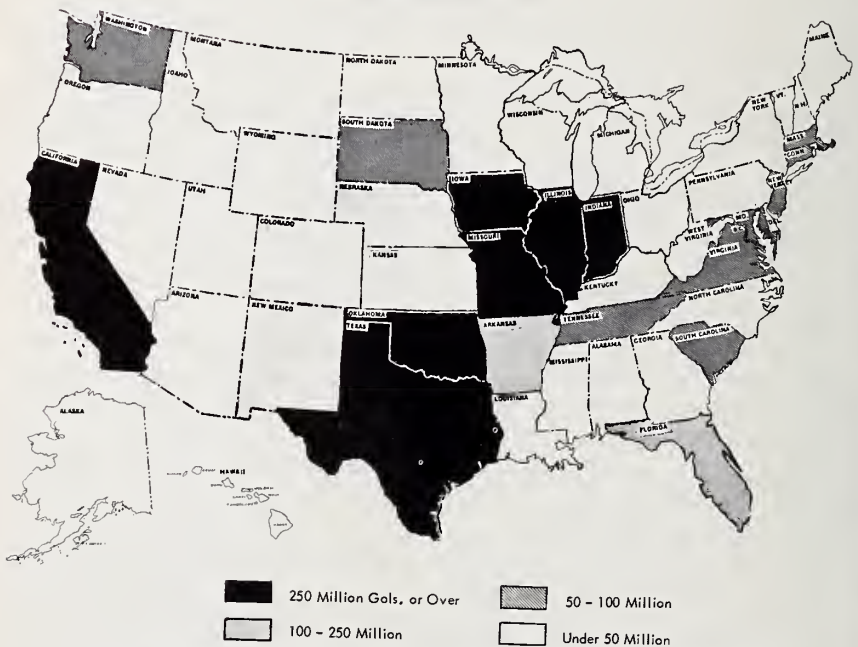
The trend to justifying our existence is becoming increasingly apparent. The taxpayer wants to know in terms he can understand what he is getting for his money. We believe that, consequently, when budget hearings are held, those who can show that the "talents" entrusted to them were put to good use and not buried will be the ones who will have their budgetary requests acted on most favorably.

We believe there is a place for cost-benefit analysis in weights and measures. It is a useful tool for evaluating and determining the priority of the many and varied weights and measures activities. We will try to be of assistance to any State that desires to conduct an evaluation of its activities.



States Active in Testing Liquefied Petroleum Gas (LPG) Liquid Meters
(June 1967)

FIGURE 2
STATE SALES LEVELS - 1965



*Not included are sales for chemical, refinery fuel, synthetic rubber and secondary recovery of petroleum.

FIGURE 3



The use of fertilizers in liquid form can be traced back about 40 years to 1928. The first mention of the commercial measurement of liquid fertilizer at the National Conference on Weights and Measures was made during the 38th Conference in 1953. This was in the form of a report by the Committee on Methods of Sales of Commodities.

At that time, the Committee recommended that, "Anhydrous ammonia and other liquid chemical fertilizers with pressure characteristics be sold by net weight and also, if in liquid form and temperature corrected to 60° F, they may be sold by liquid volume."

In his report to the Conference, which was adopted, the Committee Chairman emphasized the necessity for safety provisions and the need for regulatory action.

In 1956, the Conference adopted a recommendation by the Committee on Laws and Regulations regarding the sale of "Inert Liquid Fertilizer" by volume, as well as by weight, provided temperature corrections were made.

At the 44th National Conference in 1959, the Committee on Specifications and Tolerances reported that it believed a specific code on liquid measuring devices used to determine quantities of liquid fertilizers would be premature at that time, and recommended the application of requirements in the liquified-petroleum, gas code, where appropriate. It is interesting to note here that although the National Conference has on several occasions adopted recommendations concerning the sale of liquid fertilizers on a volumetric basis, no wide-scale trend in this direction has developed.

As some of you may remember, about nine months ago the Office of Weights and Measures requested information from State officials regarding the legal methods of sale and the means of handling liquid fertilizers. The majority response from the States was that legally all fertilizers must be sold on a net weight basis. Dry fertilizers were known and used before the liquid type were produced; therefore, traditional methods of handling are deeply ingrained. It is the logical outgrowth that the field of liquid fertilizers would be dominated by the laws and regulations applying to dry fertilizers. Then too, recommendations by agronomists for fertilizer coverage or chemical requirements are usually expressed in so many "pounds" of this or that per acre. These habits of doing and thinking are hard to break and thus have an obvious influence on present commercial practices.

The term "liquid fertilizer" has different meanings for different people. The most probable reason for this is that different products are more popular or seen more frequently in various areas than are others.

There are three important classes of liquid fertilizers: (1) the "complete analysis," which is a custom-formulated product, (2) anhydrous ammonia or solutions with pressure characteristics, and (3) the nonpressure nitrogen solutions.

The "complete analysis" solutions are formulated to the particular requirements of the customer. In addition to the usual and familiar nitrogen, phosphates, and potash materials used to compound mixed fertilizers, special consideration is given to heating the water mix and the addition of supplemental enrichment materials. The reactor tank for the formulation may be set on scales having a multiple beam or the individual materials may be metered into the tank using automatic pre-set meters for each component. Because of the corrosive nature of the mixture, its tendency to salt out, and the composition or ratio of the materials making up the mixture, this class of liquid fertilizers is normally sold on a weight basis. The purchaser buys a complete batch at one time and without return provisions for any excess.

The liquid fertilizers that are capable of being measured by volume are generally classified into groups according to whether or not they contain what is called "free" ammonia. On the one extreme, we find pure or anhydrous ammonia, and on the other end of the scale we have the nitrates, commonly called the nitrogen solutions. The farmer who buys these products commercially is interested, among other things, in the amount of total nitrogen available for application on a per acre basis.

The nonpressure liquids are usually composed of a mixture of ammonium nitrate and water, with the addition of urea to give nitrogen enrichment from about 25 percent up to 28, 30, or 32 percent total nitrogen. This variety of percentages directly affects the capability of any meter because of the significant changes in specific gravity. Such changes in specific gravity can cause the meter to indicate different values for products of different compositions.

There seems to be no conclusive data available on this subject and we plan to consult with the engineers of various meter manufacturers about this.

"Nonpressure" fertilizers would seem to be best sold on a volume basis. There are three types of tanks used in handling non-pressure products: (1) the large storage tanks, (2) the smaller and portable applicator tanks, and (3) the so-called "nurse" tanks. Although relatively few meters are presently used in commercial sales involving deliveries from such tanks, the

installation and use of meters would seem practical and provide a more accurate means of measuring these products.

It is now a common practice to sell products from a nurse tank on a weight basis—requiring at least three time-consuming weighing operations. How much simpler it would be to use a meter calibrated for the particular product. Conversions from volume to weight could be made easily by following appropriate correction factor tables.

The method of selling liquid “pressure” fertilizers can be equally advantageous using a meter on a delivery truck. Higher chemical concentrations of nitrogen allow economical use of smaller tanks and delivery equipment and meters are especially well suited for split deliveries. Anhydrous ammonia has very definite chemical properties and the specific gravities and pressures are well known at all temperatures.

Any given seller of liquid fertilizers very seldom sells beyond a twenty-five mile radius of his plant and he could well afford to have one or two meters used exclusively for the most popular products.

The type of prover recommended for use in testing of meters handling “pressure” solutions is a modified form of the prover now widely used for liquified petroleum gas. The type of prover for testing meters used for “non-pressure” solutions is a modified form of the prover used for fuel oil or gasoline. I say “modified” because, and this is extremely important, no brass or copper materials can be used with ammonia or nitrogen solutions.

It is quite satisfactory to use aluminum with the nonpressure nitrogen solutions, but with the anhydrous and the diluted ammonia solutions the only really satisfactory material to use is stainless steel.

As far as the weights and measures officials are concerned, the laws of many jurisdictions covering the sale of fertilizers might have to be changed to allow the use of meters and to permit sale by liquid measure. Indeed, about one-half of the States have no legal provisions covering fertilizer in liquid form. Conversion factors are considered as “quality” rather than “quantity” values, and they normally are certified, analyzed, and enforced by the Department of Agriculture—not the Weights and Measures Department.

But, most important from the viewpoint of weights and measures officials would be the adoption of certain Regulations, dealing with the sale of liquid fertilizers, safety requirements, and the like. Such regulations should be uniform among the jurisdictions and would provide tolerances, hose sizes, material requirements, storage tank connections, and identification of equipment.

Anhydrous ammonia is a dangerous, high-pressure product,

which, under certain conditions, can explode or cause suffocation, and requires the use of basic safety equipment. Liquid nitrogen, while not dangerous, requires certain washup and electrical facilities for handling.

I would like to leave this thought with you regarding liquid fertilizers. The use of all types of fertilizers in the United States is increasing from 5 to 8 percent each year. The total amount of fertilizers used last year, ending June 30, 1966, was over 34.3 million tons. Of this amount, 4.3 million tons or one-eighth of the quantity was in the form of liquids. This amounted to well over one billion gallons and all information indicates that an even greater amount will be used in the future. I would like to say that the use of fertilizers is limited to several weeks, perhaps once or twice a year. If liquid fertilizers are required to be weighed, it would appear to be physically impossible to weigh in excess of 4 million tons in this short span of time. The very conservative estimate of the dollar value of fertilizers would be about one-half million dollars per year retail. Of this amount, who can say how much the buyer or seller is losing because of improper measuring procedures?

R. N. SMITH

Technical Coordinator, Office of Weights and Measures



I would like to report to you this morning on two of our continuing projects, both of which I have been closely associated with during the past year: our Technical Training Project and our Railway Track Scale Program.

First, I would like to briefly give you the highlights of the Technical Training Program. It is not my intention this morning to go into great detail about our Training Program because most of you are quite familiar with it. I would like to touch only on the highlights that have occurred during the past year.

Our training program is operated under authority given in the NBS Enabling Act, and to quote from the Act, we are charged—"to cooperate with the States in the promotion of uniformity in laws and methods of inspection."

Certainly, there is no better way to promote uniformity than through a program such as our Technical Training Program. We see not only an opportunity here for the dissemination of information, but a good opportunity to—if you will—take the pulse of weights and measures over the United States.

In the conduct of our training program we are afforded the opportunity of hearing about your problems and bringing these problems back to the proper people in the office, hopefully to find solutions to them.

I think this exchange of information is one of the greatest things that we derive from the Technical Training Program.

Last year, as was reported earlier by the Committee on Education, we had 29 schools. This represented the greatest number of schools during a 12-month period since the inception of the training program.

I think the most significant thing last year was the fact that we were invited to conduct schools in seven new jurisdictions, not new in weights and measures, but new as far as our Technical Training Program is concerned.

Our schools actually take two forms. The new schools are general type schools in which we try to cover in a period of three or four days the broad field of weights and measures. Our other schools were repeat type schools, and I use Indiana and Virginia as good examples of our repeat type of schools. Both of these jurisdictions have picked dates during the year and each year a training school is held on these dates.

In the repeat schools we encourage participation by the officials in the various jurisdictions. We try to have at least a half-day session to bring the jurisdiction up-to-date on any new developments or new activities in our office. We encourage that the rest of the school be handled by the State, county, or city personnel.

During the past year we have placed greater emphasis on the use of audio-visual training materials. We have increasingly come to agree with the old adage that a picture is worth 20,000 words. We have found that with the use of slides, charts, and similar material we can do a better job in the schools.

Along this line, Harold Wollin reported briefly that we did cooperate with the Packers and Stockyards Administration, U. S. Department of Agriculture, in the development of our third audiovisual training aid. This training material consists of 101 colored slides and a thirty-five minute tape on "The Examination of a Livestock Scale."

We are happy to announce that this material will be available for sale and short-term loan shortly after the first of July. This year we have had an increased number of requests for field training. Steve Hasko has conducted four schools on LP Gas meter testing. We also have conducted four schools on aerosol testing procedures, including field training in both areas.

A new area of training that has been started during the year is the laboratory training made necessary by the New State Standards Program. This is, of course, Tom Stabler's project and

will be one of the big parts of our training program over the next few years.

The success of our Technical Training Program depends on you, the weights and measures officials. We have first to know your needs and your desires in this area. As in the past we will do everything within our power to serve your needs.

Now I would like to switch projects and tell you a little bit about our Railway Track Scale Testing Program. This is not a new program at the Bureau. It has been in existence many years and has been in the Office of Weights and Measures before. It was returned to us two years ago and at that time we had the Master Scale Depot in Chicago, the two NBS test cars, and two people transferred to us. During the past year, we operated the Depot on a full time basis and several large mass calibrations were performed. These calibrations were made on weights for industry, large mass standards for the States, and our own test weights that are on the NBS test cars.

After the NBS test cars have been on a testing itinerary, the test weights must be recalibrated. In addition, we calibrated twenty-four scale test cars for the individual railroads. These are test cars that the railroads use to test the scales that are on their respective lines. Many times, the railroads do not have master scales of their own. Therefore, it is important that they get their test cars into Chicago to be calibrated on the NBS Master Scale.

We have made continued improvements on the physical facilities at the Depot during the past year. We also calibrated the seventeen master scales that are located throughout the United States. Actually, through the calibration of these master scales we are able to establish accuracy for railroad weighing in this country. We calibrate the master scales. In turn, these master scales are used by the individual railroads to calibrate their own test cars which are used to calibrate scales that are located on their lines.

During the year, a few commercial tests were made. These were referee type tests made in the event that some argument occurred about weights received over a particular scale.

A significant thing about the Railway Track Project is that we are negotiating with the Association of American Railroads to plan a new program. We are now in a position to offer to the association several things with regard to this new program. We will increase our test load on the NBS cars from the present 80,000 to 100,000 pounds. We will agree to test all master scales at no charge to the railroads. We hope to test between 300 and 400 commercial scales each year on request and for a fee to cover the cost of the test. We are seeking more cooperation from the Association so that we can better serve their needs.

We have a new staff member in this program, Ben Banks, whom Mac Jensen introduced to you earlier this morning. It is our hope to add at least two more inspectors so that we can operate this program on a full time basis.

L. J. CHISHOLM,

Technical Coordinator, Office of Weights and Measures



In the area of publications one of the most pleasing occurrences during the year, pleasing to me and I hope eventually to others, was the publication of NBS M286, *Units of Weight and Measure*. This is a complete revision, a complete revamping of the format, of the book I am sure you are familiar with, NBS M233.

The immediate reason that made the re-writing of M233 necessary was a change in the definition of the liter that rendered many of the conversion factors in M233 inaccurate. So we took advantage of the opportunity to issue a book that has, for one thing, more of an emphasis on the International System, the modernized version of the Metric System. The new publication contains, for example, a brief history of the Metric System in France, the country of origin of the Metric System, and its history in the United States. It contains a listing of important dates in U.S. metric history, a selected bibliography, definitions of units, an expanded abbreviations table, and many other features.

Our idea is to follow this book, with its Metric emphasis, with a revision of NBC LC1035, *Units and Systems of Weights and Measures—Their Origin, Development, and Present Status*, that will emphasize the U.S. Customary System, sometimes called the English System. The two books together should then provide good basic reference sources on the two major systems of units now in use in the World.

M286 is a much larger book than its predecessor. The reason for this is that, although the new book contains much less text than M233, the Tables of Equivalents have been expanded considerably. One thing that we always felt was a shortcoming of M233 was that its Tables of Equivalents were mostly concerned with the length units, to the detriment of the mass units. This had always seemed to be somewhat of an anomaly to us since mass measurement is much more prevalent in everyday commerce than is length measurement. So we increased the number of Tables of Equivalents for mass units.

Over the past several Conferences we have mentioned the National Weights and Measures Archival Library and how it grows. This growth has continued. Important publications on weights and measures appear each week and the library has developed to such an extent that, at this point, it has become obvious to us that what we are dealing with now is not merely a library, but a complete information system. We are considering it as such, and have undertaken a rather ambitious project. The library, or information system, will now contain not just publications, but will have integrated within it a completely cross-catalogued collection of more than 3,000 photographs concerned with weights and measures. Also included in the information system will be a slide file containing more than 1,000 slides. This will also be cross-referenced.

At this point I would like to issue a general invitation to any and all weights and measures officials to make use of this Library. It can be inconvenient for you to come out to it, but if you need to find information, either technical or historical, feel free to drop us a line and we will find the information if it is at all possible.

Part of our job in the information and publications area is to keep abreast of developments in the Metric System.

One of the most significant recent occurrences was the announcement by the Ford Motor Company that they had completed a pilot study within their company aimed at determining what effect a changeover to the Metric System might have on their operation, and what they might do to prepare for it.

The significance of this is that, over the years, the major objection to Metric adoption has come from the so-called heavy industries, those industries that would bear the greatest cost of a conversion, such as the auto industry, machine tool and metal fastener industries.

In the legislative area, each session of Congress since 1961 has seen a proposal entered to make a study of the Metric System. This year is no different. A bill has been entered to authorize the Secretary of Commerce to make a study to determine the advantages and disadvantages of increased use of the Metric System in the United States.

In the last session of Congress, the 89th, a similar bill came very close to being enacted. The Senate Commerce Committee reported it out unanimously, and it received a nearly unanimously favorable floor vote. The proposal then received hearings before the House Committee on Science and Astronautics, and this Committee also reported it out unanimously. The bill then bogged down in the House Rules Committee. Near the end of the session, the Chairman of the Science and Astronautics Committee tried

to place a 21-day rule on the bill so that it might receive a floor vote even without action by the House Rules Committee, but time ran out.

MR. JENSEN

I should like now to present to you other members of the professional staff who have joined us in the Office of Weights and Measures since the Conference last met.

Eric Vadelund, who formerly served the Bureau of Standard Weights and Measures, State of Pennsylvania, in an administrative capacity, joined us as a Weights and Measures Coordinator with specific responsibilities in the implementation of The Fair Packaging and Labeling Act.

Otto Warnlof came to us from the Minnesota State Weights and Measures Department. Otto will also carry the official title, Weights and Measures Coordinator. He will be working in the packaging field with Eric, and, additionally, will participate in our technical training program.

Blayne Keysar should be known to many of you—at least his work here at the Bureau has facilitated the accuracy of the measurements in each of your jurisdictions. Blayne transferred from the Metrology Division where he was in charge of volumetric calibrations. He undoubtedly is the nation's expert in this field. He will be working in standards, laboratories, calibrations, and also in our prototype examination project.

During this past year, because of the seemingly never-ending exchange of the engineering standards work in which I am involved, I have asked Larry Chisholm to serve as my Special Assistant. To succeed Larry in managing our weights and measures library, in preparing publications covering weights and measures units, equivalents, and history, and in answering the many letters from the general public in this area, we have been fortunate to obtain Ross Koeser. Ross already has given evidence of outstanding competence, enthusiasm, and initiative.

We soon will be placing greater emphasis on our program of calibrating master railway track scales and testing commercially used track scales. To participate in this effort, we feel fortunate to have recruited Ben Banks, who has an excellent background and a wide capability in this field. Ben will undergo some training at the Bureau and then will be assigned, for permanent station, to our Clearing Illinois Master Scale Depot. He will be in charge of one of our railway track scale units.

Jon De Buchananne is an example of good fortune in personnel matters. In order to assist the President in finding summer employment for deserving students, and in order to bolster our capability in engineering technology, we agree to hire a male

summer student to serve in this field—sight unseen. Jon was assigned to us and has proven to be a real asset. He has engineering drawing capabilities, he is excellent in taking and recording test results, and he even has demonstrated innovative capabilities. This fall Jon will be entering his sophomore year at East Tennessee State. We hope sincerely that he will return to us each summer until he graduates, and that he will join our staff on a full time basis when he receives his degree.

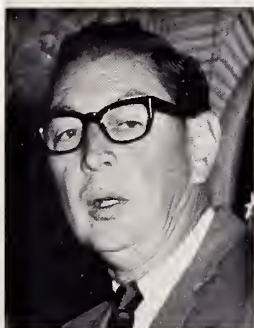
For some time we have known that our weights and measures activities would be strengthened through the acquisition of sound legal talent. With the expanding responsibilities in engineering standards, I have been able to justify a full-time lawyer and am delighted to announce that Rudy Vignone will be reporting to us shortly. Rudy comes to us from the Federal Trade Commission where he has had broad and excellent experience. His talents are obvious. We are confident that each of you will benefit by his counsel in our assistance to you on laws, regulations, legal interpretations, and other similar matters.

Because they are busy elsewhere, it is not possible for me to present to you the girls on our staff. I know I need not tell you that without them we would be of little value to you and the Conference would be unable to function. Permit me at least to publicly express my appreciation to them for able, energetic, and devoted service.

Since the Conference last met, two of our staff members have moved to other positions. Leonard Lambrecht, who operated a railway track scale testing unit, has joined Tommy Thompson's staff in the U.S. Department of Agriculture. John Griffith, who served us for a number of years as an Engineering Aid, is now working on auto safety standards—a field in which he has considerable personal interest.

HAWAII—WEIGHTS AND MEASURES PROGRAM AND PROGRESS

by G. E. MATTIMOE, *Chief, Weights and Measures Branch, Hawaii
Department of Agriculture, Honolulu, Hawaii*



In the following report I will try to highlight some of the major points discussed in our recently published book, *A Brief History of Weights and Measures in Hawaii*.

We were fortunate in Hawaii in having people who were exceedingly interested in helping me compile the history of weights and measures back through the monarchical days and up to the present time. To this end, we spent a great deal of, I am afraid, the taxpayers' money, a great deal of time in

the archives at the University of Hawaii, and in all of the repositories where any information on Hawaii was available. It was difficult at times to separate the truth from the fiction. I am sure that it was not accomplished one hundred percent; however, we have come up with some valuable and interesting information.

In going through our records we could not determine initially whether Hawaii in the monarchical days adopted the English system or the American system of weights and measures. It became quite a challenge to figure this out and we had to go back to the original Hawaiian laws.

The original manuscripts, as they refer to them in the archives, had been misplaced and are presumed lost. However, there were copies that were adequate and, with the help of a State translator, we determined that the original laws of Hawaii were English. They were adopted in 1840 and this is quite interesting in itself. Missionaries from Massachusetts came to Hawaii in 1820 and by 1823 had reduced the melodic sounds of the Hawaiian people to a written language. They had not had a written language before 1823 and in a period of nine short years they taught over two-fifths of the people to read and write. There is no question that the missionaries had a great impact upon the people of Hawaii. The impact was so great that Hawaii adopted the laws of the Commonwealth of Massachusetts which included a weights and measures law for the Kingdom of Hawaii. These laws served until 1845.

The missionaries started to lose some of their influence in Hawaii and the British had started to gain in influence. They gained to the extent that Hawaii for five months was actually a British possession. King Kamehameha, ruler of Hawaii, gave the island to Lord George Paulette under duress. Lord Paulette hap-

pened to have a ship with many guns pointed at Oahu Island, and he asked the Hawaiians to surrender or he would forceably take the kingdom if certain demands were not agreed to. The King did not have weapons to fight back and so he surrendered. The Queen of England did not particularly care for this way of procuring property, so she sent Admiral Thomas to Hawaii and he gave the kingdom back to King Kamehameha.

The laws of 1845 and 1846 were adopted, but they did not worry about abolishing the laws of 1840. So we actually had three sets of laws. We had the monarchical laws or the old Hawaiian laws. We had the laws that were adopted out of Massachusetts which were, in part, British, and we had the British laws. This situation was not cleared up until 1859 when they passed a law to do away with all the laws and start over again.

We can skip almost to the present, because we had such a mess in our whole history of weights and measures that little was done. We had no one who had the actual responsibility to enforce weights and measures. We had laws but did not have any standards. The standards we did have became lost.

The person whom we assumed to be responsible was the Kuhina Nui. The first three were females and they had like powers to the king with veto rights one upon the other. This was a very peculiar situation and to my knowledge the only place where it has ever existed.

We struggled on up to the 1900's. The kingdom was financially unstable and appealed to the United States for assistance, but were turned down. In 1893, the Queen was deposed and a provisional government was founded. In 1894, the Republic of Hawaii was founded and negotiations were underway for annexation. The annexation took place in 1900, and we were ultimately on the weights and measures standards of the United States.

In 1903, a County's Act was passed which made the clerks of the markets responsible for weights and measures. This was later declared illegal. In 1905, the same bill was introduced, but the Minister of Interior became responsible.

The Minister of Interior turned the duties over to the Superintendent of Public Works, who turned them over to the Marshall who in turn turned them over to the Sheriff. This created a confusing situation which I am not sure is resolved yet. The Sheriff did not have funds with which to work, and no one to help him, so he impressed convict labor. Try and visualize the guy in the striped suit, representing the symbol of justice. They turned out to be better pickpockets than they were weights and measures officials, and they were put back in jail. Convict labor was discontinued in this capacity.

Our present problems are not any less than that of our fore-

runners. The neighbor counties or neighbor islands are a nuisance. We do not have a plane big enough to fly a seventy thousand-pound test truck back and forth over the islands, so we have to barge it. Our problems in connection with this are many and the cost is almost prohibitive. We have to request from the Legislature in excess of \$6,000 a year just to barge this truck back and forth from one island to another. We are trying in many ways to solve this problem. We could buy other trucks and leave them on the islands, but at the present time, this is difficult to justify, because we have over 95 percent of the population concentrated on the third smallest island, Oahu.

Upon the island of Kawai, we have just recently installed our first State sealer of weights and measures, and the reports that were coming back were frightening. In his first report he condemned fifty-seven percent of everything he checked. I received a questioning phone call from Senator Fernandez of Hawaii concerning this matter. Three men were sent to investigate this situation, and fifty percent of the equipment checked should have been condemned. Most of the adjustments on the gas pumps were frozen, and the scales were in unbelievably bad condition. I am sure you can visualize what happens to a scale in Hawaii, when automobiles rust out in three years.

We have completed staffing all of the islands and this in itself was a very interesting chore. When I first went to Hawaii—once again I have to thank Malcolm Jensen because most of the work was done for me—it was really just a matter of my finding the people to fit the slots. We had many documents and many guidelines established, and the only problem was to come up with the qualification tests. Our personnel services organization believes that if you are not perfect, you should not be able to pass the test, and I do not even think a perfectionist could pass the tests they wrote. These were the most unbelievably difficult tests that I had ever seen. Surprisingly enough we had 188 applicants apply for the position of weights and measures sealer. Out of the 188, we were lucky—four of them passed. Since that was all we needed, we hired them.

There are fourteen inspectors on the staff in Hawaii now. The women in the office are all commissioned by the director of the Department of Agriculture, to seal or condemn scales. We obviously limit their activities to those items which are brought into the office. It is frequently necessary for our women to check out a fish scale. We do a lot of fishing in Hawaii and this reminds me of a funny incident that actually happened; how Hawaii lost the international game fish record.

On the big island of Hawaii, starting in late June, the Broadbill Tournament begins, and the other islands are deserted. A 2000-

pound spring dial scale was recently purchased for the tournament. This is, of course, without any consultation with weights and measures officials, because it is a different bureau. The scale was hanging in all its beautiful gold splendor when some gentlemen hooked onto a broadbill and landed it after four hours and fifteen minutes. The fish was pulled aboard the boat. They docked immediately and kept the fish wetted down so that it would not start to dehydrate. The skipper also knew he had close to a record if not a record fish. The existing record was eleven hundred pounds, caught off Martinique, in the West Indies, about six months ago. When they hung this marlin on the spring dial scale, it read 1160 pounds, which was over the record by 60 pounds. The international game fish representative stated the device was not legal, and that it had to be weighed on a beam scale. They dropped the marlin, thereby losing quite a bit of fluid blood, and they then hung the fish on the old beam scale. This scale had two-pound graduations and the game fish weighmaster read the scale to 1100 $\frac{1}{2}$ pounds. Now I am not quite sure how he did that, but the law requires you to break the record by one full pound, so he merely tied the record in Hawaii.

REPORTS OF THE CONFERENCE COMMITTEES

REPORT OF THE CONFERENCE EXECUTIVE COMMITTEE

Presented by J. E. BOWEN, *Chairman, City Sealer of Weights and Measures, Newton, Massachusetts*

(Tuesday, June 27, 1967)

The Executive Committee of the National Conference on Weights and Measures met in open session on Monday, June 26, 1967, at 8:30 a.m. Conference dates and location were reviewed and discussed. It was suggested that consideration be given to a mid-July date for upcoming Conferences. Many advantages were given, including reduced hotel rates and the added convenience for whole family participation.

It was recognized that the State of New York has for many years held its annual meeting at this time, and it was the hope of the Committee that New York would consider an alternate time so as not to conflict with the National Conference.

There was a recommendation that at some future time the Conference may once again be held in the western part of the United States in consideration of those western States.

The Committee approved reimbursing Mr. Lawrence Barker, Vice Chairman of the National Conference, for the expenses he incurred while testifying on two occasions before the House Interstate and Foreign Commerce Committee Hearings on the Fair Packaging and Labeling Act.

It is the express wish of the Committee that appropriate recognition be afforded past Chairmen of the Conference. Awards will be presented them on Friday, June 30, 1967.

J. E. BOWEN, <i>Chairman</i>	R. J. FAHEY
R. H. FERNSTEN	I. R. FRAZER
F. M. GERSZ	M. GREENSPAN
J. G. GUSTAFSON	W. H. HOLT
C. C. MORGAN	D. E. KONSOER
R. W. SEARLES	J. H. LEWIS
J. R. BIRD	M. W. JENSEN, <i>Secretary</i>
S. J. DARSEY	Executive Committee

(On motion of the Committee Chairman, seconded from the floor, the Report of the Executive Committee was adopted by voice vote.)

STATEMENT OF THE INCOMING CONFERENCE EXECUTIVE COMMITTEE

presented by C. C. MORGAN, *City Sealer of Weights and Measures,
Gary, Indiana*

(Friday, June 30, 1967)



The Executive Committee for the 53d National Conference met for breakfast at 7:30 a.m. on Friday, June 30, 1967, to consider matters falling appropriately within its authority. Decisions were reached as follows:

1. The dates of June 17-21, 1968, were voted as the most favorable for the 53d Conference. The motion included a recommendation that the Conference establish this period in June as official time for the Conference.
2. The City of Washington, D. C., was chosen for the next year's Conference. It was left to the discretion of the Executive Secretary to choose those hotel accommodations most favorable to the delegates.
3. The registration fee will remain \$15.00.
4. An allocation of \$300.00 was voted for the Committee on Education for expenses associated with National Weights and Measures Week and other committee expenses.
5. The responsibility for planning the program of the 53d Conference was delegated to the Executive Secretary. The midweek luncheon, with an appropriate speaker, was to be continued.
6. The Committee voted to authorize the Executive Secretary to call meetings of the standing committees when needed. Authorization for necessary expenses was voted.

There were many good suggestions made for items to be included in the Conference program. Possibility of the inclusion of these items in the program will be explored by the Executive Secretary.

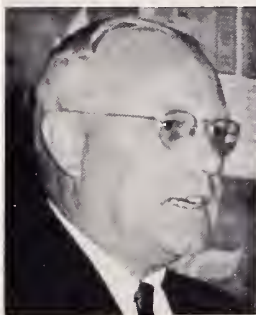
The Executive Committee suggests that the Laws and Regulations Committee develop necessary changes in the Model Law and Model Regulations (made necessary by the Fair Packaging and Labeling Act and regulations adopted thereunder) as soon as possible, so that they may be submitted to the Executive Committee for action and distribution to the delegates of the Conference.

The Executive Committee earnestly requests that delegates and their wives send suggestions for the ladies' program to the Executive Secretary.

REPORT OF THE CONFERENCE COMMITTEE ON EDUCATION

presented by S. H. CHRISTIE, JR., *Chairman, Deputy State Superintendent, Division of Weights and Measures, New Jersey Department of Law and Public Safety*

(Thursday, June 29, 1967)



1. Introduction.

The Committee on Education is committed to a program of the technical training of weights and measures officials, the education of the general public on weights and measures matters, aiding the users of weighing and measuring devices, and assisting with public relations programs for weights and measures officials and organization.

2. Formal Education.

A program of college education in Measurement Science, leading to an Associate Degree in Applied Science, is offered by Alfred Tech, the Agricultural and Technical Institute of the State University of New York. This offering is the result of the activity on the part of executives of the scale industry who have recognized the need of better trained men to install, maintain, and demonstrate their products, which have become the basic components of instrumentation and automation in the industrial field.

Since this is a two-year course and the college has graduated its second class with a real demand for its students, the program can be considered as an established fact.

The establishment of a curriculum is one thing; to keep it going as a successful enterprise is another. Therefore, it is necessary to have, in connection with it, a successful means for rendering financial assistance to desirable students. Failing this, the Measurement Science Courses cannot be competitive in recruitment of students. In order to prevent this, a Measurement Science Course Scholarship Fund has been instituted by members of industry and is chaired by Mr. Mack Rapp. A certificate has been obtained from the Internal Revenue Service allowing contributions to be tax deductible. Your Committee urges that all interested parties, individuals as well as firms and corporations, and, in particular, weights and measures associations, continue an active participation by means of annual contributions to the fund.

It is the Committee's understanding that approximately \$20,000 has been contributed to the Scholarship Fund so far. The hoped for goal is \$100,000. The major portion of this \$20,000 has been contributed by industry, of course, but we understand that more than \$2,000 has been contributed by both individual weights and measures officials and by weights and measures associations. We hope that this support will continue.

Grossmont College of El Cajon, California has submitted to the Committee materials that describe in detail their present offerings in Measurement Science. Although their present course structure centers mainly on instruction in electronic instrumentation, they have expressed interest in the possibility of establishing a curriculum more along the lines of the type offered at Alfred Tech. The geographic advantages of having such courses offered in both the East and West of the United States are obvious. Your Committee will hold discussions with the key figures who were instrumental in making the Alfred Tech Measurement Science course a success to see if similar results may be brought about at Grossmont.

3. Technical Training Schools.

Since the last Conference, twenty-nine technical training schools, including seven new jurisdictions, have been held with technical contributions by the Office of Weights and Measures, National Bureau of Standards. This is the most technical training schools ever held over any twelve-month period.

Emphasis in the schools was placed on package control and, in addition, four field-training sessions were held on aerosols and four on liquid petroleum gas.

The Committee is pleased to learn that plans are being considered to expand the Home Study Course offered by the Office of Weights and Measures, National Bureau of Standards, to include other subjects pertinent to weights and measures activities today.

4. National Weights and Measures Week.

Mr. L. A. Gredy of the State of Indiana, who has so successfully directed National Weights and Measures Week activities in the past, again graciously accepted the part of chairman of this very important subcommittee.

Mr. Gredy encountered an unfortunate last-minute difficulty that has prevented him from reaching the Conference, but the report on National Weights and Measures Week will be included in the printed Report of the 52d National Conference.

During March 1-7, 1967, the observance of National Weights and Measures Week was conducted again throughout the cities,

counties, and States. Interest in the "Week," judging from the reports and from articles in the various newsletters, indicates that it was once more a success. Splendid accomplishments in promoting the "Week" were reported, not just for this year, but for previous years as well. We can say with assurance that weights and measures officials all over the United States have demonstrated considerable promotional ability.

Weights and Measures Week not only had the endorsement and complete backing of the National Conference on Weights and Measures, but received immeasurable support from various organizations, particularly those representing manufacturers of commercial weighing and measuring devices. They, like weights and measures officials, are well aware of the importance of eliminating seemingly small errors on individual sales that, in the aggregate, represent huge sums.

Highlighting the "Week's" promotion were articles by industry, newspaper articles with pictures, newspaper grocery and drug ads displaying the "Week" Emblem, mayors and governors issuing proclamations, radio and T.V. spot announcements, films on weights and measures shown in several schools, and talks given to homemaker and civic organizations. Weights and measures circulars were distributed, the "Week's" Emblem was used on mail, and many reported weights and measures displays were placed in public buildings.

Again, it would have been impossible to have presented the Weights and Measures story during the "Week" if it were not for the cooperation of the scale and other industries who furnished pamphlets, posters, and display material.

5. Public Education Activities.

The Committee has been exceedingly pleased to see the growth of interest in, and forming of, programs of public education in weights and measures. (You will remember the report given by Mr. Kriney of Somerset County, New Jersey in Denver, Colorado, last year.)

The Committee would like to call attention to the efforts of the New York State Weights and Measures Association's Committee on Education that resulted in a helpful booklet entitled "A Guide to Public Education in Weights and Measures." Also, the State of Connecticut conducts a very comprehensive public relations program throughout the year giving special emphasis to the "Week." This year a local sealer, Peter Grassi, had printed a tabloid newspaper containing weights and measures articles for distribution in shopping areas. The Committee is aware that there may be other accomplishments of this kind by other jurisdictions and we would be pleased to be informed of them so they might also receive attention.

Mr. M. Greenspan, of New York City, reports that his city has just embarked upon a concerted effort in the schools and in one of the colleges. The Commissioner of Markets, Mr. R. Brevoort has been made a member of the Advisory Committee on Consumer Protection to the Superintendent of Schools and the review of this entire program on Consumer Protection will be his responsibility. Classes on Consumer Protection will be set up this fall (Sept. '67) in all junior high schools. Approximately 25 percent of the course will be devoted specifically to the subject of Weights and Measures. Classes have already been programmed. Also during the past several months, the Division of Markets has been conducting classes in the Bronx Community College for leaders in the community and civic organizations, and a special speakers staff on Consumer Protection and Weights and Measures has been functioning. Lectures have been given to various civic organizations, P.T.A.'s, Elder Citizens' groups, and in both Elementary and Junior High School assemblies.

Another program that has recently been set up, by the District of Columbia, has been greeted with immediate acceptance and appreciation by the District schools. B. A. Pettit, Chief of Weight, Measures and Markets, assigned Mr. David Forbes to the project and the Committee would like to include portions of Mr. Forbes' report since we feel it gives a good indication of how a public education program can be begun.

This office began a series of talks in the District of Columbia public schools, fourth grade level, on February 4, 1967. Included in our talks were the duties of the weights and measures inspectors, control of accuracy, and the responsibility of the consumer in securing the correct quantity. We have covered twenty-two schools with approximately seventy classes, totaling about 2,450 students. These sessions were also attended by the principals, teachers, and supervisors of the school system, and, frequently, students from other grade levels sat in to hear the talks.

We used posters showing the various types of scales and gave a demonstration of the procedure of checking a scale in a store. Another demonstration which proved to be most helpful was the use of unmarked bags of candy. Three children were elected to choose bags of candy to be weighed to determine who received the best buy, and this led us into talking about how we checked commodities offered for sale in the stores.

I feel that the teachers as well as the students enjoyed and benefited by the talks. Also, we have enjoyed a great deal of satisfaction from the apparent success of this program due to the assistance given to us by the District of Columbia School Board and Mr. L. J. Chisholm of the National Bureau of Standards. We are scheduled to direct talks to the fifth grade as well as the fourth grade upon reopening of the schools in September.

There are many other weights and measures officials conducting public education programs, of course, but what the Com-

mittee hopes to point up by citing these few examples is that, with the proper enthusiasm and interest, a public education program can be set up in many jurisdictions, many more than now exist. The Committee feels that there may be weights and measures officials who would like to set up a public education program but are unsure of what is involved.

In last year's final report, the Committee on Education presented for consideration a series of outlines to be used by weights and measures officials in presentations to schools, local consumer groups, or, in fact, to any organization interested in weights and measures regulation and its history of service to the public.

Discussion engendered by these outlines has led the Committee to consideration of putting together a general education handbook that would include not only the aforementioned outlines, but discussion of public relations techniques, a bibliography for self-education, background for giving presentations, and sample talks. Comments on the handbook idea and on the general interest that may exist in beginning public education programs throughout the United States will be solicited from all weights and measures officials through distribution of a questionnaire before the next Conference meeting. We urgently hope that, when the questionnaire arrives at your office, you will give it your most careful and thoughtful consideration since your reply will, to a great extent, shape our actions.

The Committee is very pleased that Monday's open meeting was so well-attended. The wonderful participation on the part of the delegates resulted in the Committee obtaining a great many valuable ideas and information. These will be of exceptional value in the development of new ideas and proposals, and in the continuation or expansion of present programs.

The Committee is also pleased and encouraged by the increased offers to participate in the Committee affairs by various industry organizations and associations.

Once again, the Committee takes this opportunity to acknowledge its appreciation publicly and to offer our sincere thanks to all who have so splendidly cooperated and assisted throughout the year.

S. H. CHRISTIE, JR., *Chairman*
J. I. MOORE
W. I. THOMPSON
M. W. JENSEN, *Secretary*
L. J. CHISHOLM, *Staff Assistant*
Committee on Education.

(On motion of the Committee Chairman, seconded from the floor, the Report of the Committee on Education was adopted by voice vote.)

MR. GRASSI: I believe that consumer education is one of the basic requirements we should perform in our services to our respective communities. The tabloid mentioned in the Committee Report has, as its masthead, a shield, a drawing, that I think is very appropriate to our work. It depicts a consumer and a store owner shaking hands, with the weights and measures inspector in the center. Anyone who wishes a copy of the drawing, or of the tabloid, should drop me a card or letter at Box 223, Middletown, Connecticut, and I will see that you get one.

The idea is this: we all go to Conference after Conference, meeting after meeting, and we trade wonderful ideas back and forth. Then we all go home and forget them. I have found that this tabloid, after only a few issues, has really awakened the public to our work, to what we do. Public response has been truly gratifying, and enlightening. We have found, through publishing this tabloid, that a consumer education publication can result in a response that is both heartening and surprising.

REPORT OF THE CONFERENCE COMMITTEE ON LIAISON WITH THE NATIONAL GOVERNMENT

Presented by R. J. FAHEY, *City Sealer, Department of Consumer Sales, Weights and Measures, Chicago, Illinois*

(Tuesday, June 27, 1967)



The Committee on Liaison with the National Government has been primarily concerned with the effect of the Fair Packaging and Labeling Act on weights and measures activities. Accordingly, the Committee met with officials of the Food and Drug Administration on April 28 and made representations on behalf of the National Conference on Weights and Measures. The Committee urged the Food and Drug Administration and other Federal agencies concerned to follow the provisions of the Model State Law on Weights and Measures and the Model Package Regulation as closely as possible in developing and promulgating any regulations under the Fair Packaging and Labeling Act.

I would like to bring to the attention of the Conference that the Committee has had very little communication from weights and measures officials or from industry. We urge you to bring to the attention of the Committee your thoughts, complaints, suggestions, recommendations, or activities in any area where Federal and State responsibilities overlap, or where an activity of

an agency of the Federal Government is such as to affect a weights and measures program or a weights and measures oriented industry.

The existence of regional Federal Executive Boards was brought to the attention of the Committee at the open meeting on Monday. The Committee was informed that these regional Boards have established task forces on consumer protection. The Committee was unaware of the existence of these organizations and will investigate their operation to determine whether or not it would be appropriate for weights and measures officials to seek representation.

R. J. FAHEY, *Chairman*

K. C. ALLEN

C. E. JOYCE

R. C. PRIMLEY

M. W. JENSEN, *Secretary*

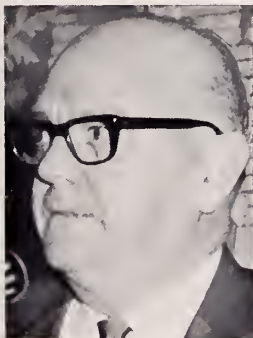
Committee on Liaison with the National Government.

(On motion of the Committee Chairman, seconded from the floor, the report of the Committee on Liaison with the National Government was unanimously accepted by voice vote.)

REPORT OF THE CONFERENCE COMMITTEE ON LAWS AND REGULATIONS

Presented by M. JENNINGS, *Chairman, Director, Division of Marketing, Department of Agriculture, State of Tennessee*

(Thursday, June 29, 1967, Afternoon Session)



The Committee on Laws and Regulations submits its report to the 52d National Conference on Weights and Measures. The report consists of the Revised Tentative Report distributed at the Registration Desk of this Conference as amended by the Final Report.

1. THE MODEL REGULATION PERTAINING TO PACKAGES

Section 12 of the recently enacted Fair Packaging and Labeling Act reads:

SEC. 12. It is hereby declared that it is the express intent of Congress to supersede any and all laws of the States or political subdivisions thereof insofar as they may now or hereafter provide for the labeling of the net quantity of contents of the package of any consumer commodity covered by this Act which are less stringent than or require information different from the requirements of section 4 of this Act or regulations promulgated pursuant thereto.

With this clear statement, the States are mandated to bring their legal requirements pertaining to consumer-type packages into conformance with Federal requirements. The Fair Packaging and Labeling Act becomes effective July 1, 1967. As soon as the regulations of the Food and Drug Administration (for consumer packages of foods, drugs, cosmetics, and medical devices) and the Federal Trade Commission (for all other types of consumer packages covered by the Statute) are issued. The Committee will present to the Conference a model package regulation that is harmonious with the Federal regulations. Prior to the issuance of the Federal regulations, no purpose would be served by recommendations as to amendments of the Model State Regulation.

The Committee has been, and will continue to be, fully informed as to developments in the Federal agencies, and the members of the Committee accept responsibility for the development of documents that will make possible uniformity in this area between State and Federal requirements and among the requirements of the several States.

(Item 1 was adopted by voice vote)

2. MODEL REGULATION FOR ROOFING AND ROOFING MATERIALS

Considerable study has been undertaken since the 51st National Conference on the method of sale of roofing and roofing materials (other than those in liquid form). Consultations and communications with the Asphalt Roofing Industry Bureau and deliberations by the Committee have led to a proposed complete revision of the Model Regulation for Roofing and Roofing Materials, as follows:

Model Regulation for Roofing and Roofing Materials (Except Roofing and Roofing Materials in Liquid Form)

Pursuant to the authority vested in me as set forth in section (Sections 9 and 25 of the Model Law) of Chapter _____ of the _____ statutes of the State of _____ (cite sections authorizing promulgation of general regulation and special commodity sections), I, _____, State Director of Weights and Measures, hereby adopt and promulgate the following regulation:

1. Roofing and roofing materials shall be sold either by the "square" or by the "square foot."

1. 1. The term "square" shall mean the quantity of roofing or roofing material that, when applied according to directions or instructions of the manufacturer, will cover an area of 100 square feet exclusive of side laps or side joints: *Provided*, That, in the case of roofing or roofing material of corrugated design, the side lap or side joint shall be one full corrugation.

1. 2. The term "square foot" shall mean the quantity of roofing or roofing material that, when applied according to the directions or instructions of the manufacturer, will cover 1 square foot (144 square inches) exclusive of side laps or side joints.

2. The declaration of quantity on a package of roofing or roofing material sold by the "square" shall include, plainly and conspicuously, a numerical definition of the term "square," as, for example, "One square covers 100 square feet of roof area."

2. 1. The use of the common fraction one-third ($1/3$) is specifically authorized in the quantity statement of a package of roofing or roofing material when, and only when, used as the common fraction of the "square."

2. 2. No statement relating to the quantity of contents of a package of roofing or roofing material (such as, for example, a declaration in terms of weight) that is in addition to or supplemental to the declaration required by law or this regulation shall be declared unless the same is in juxtaposition with and subordinated to the required declaration and is accurate.

3. This regulation is additive to other valid laws and regulations pertaining to packages and shall not be construed as superseding any such law or regulation.

(Item 2 was adopted by voice vote.)

3. MODEL REGULATION FOR PAPER PRODUCTS

Technical investigation in the Office of Weights and Measures, National Bureau of Standards, disclosed that the Model Regulation for Paper Products also required further consideration.

Since the Fair Packaging and Labeling Act is assumed to cover such paper and similar products as are normally sold to consumers, the Committee will withhold recommendations in this area until after publication or regulations by the Federal agencies.

(Item 3 was adopted by voice vote.)

4. HYGROSCOPIC PRODUCTS

Officials from the State of New Jersey recommended during the 51st National Conference that the Committee consider the inclusion in the Model Law or in the Model Package Regulation of the requirement that packages of hygroscopic products (those that tend to gain or lose weight as a result of gain or loss of moisture) be so marked as to show the net weight and the percent of moisture of the product at the time of packaging.

The Committee has given careful consideration to this matter and feels that, although such package marking might seem to simplify control over packages of such commodities, actually an additional complication would be introduced. Very few weights and measures agencies are equipped to make moisture determinations, and even those that are would find such determinations

to be highly technical and time-consuming. Effective enforcement under labeling as suggested would seem to require the embargo of a lot, shipment, or delivery of a product until after an average moisture determination could be completed by laboratory procedures—to the rather great inconvenience of the marketer.

The National Conference has recommended that, in the case of packages of commodities that tend to lose moisture through exposure, inspection be made at the wholesale level (since this normally is the point at which intrastate commerce is entered into), and that inspection at the retail level be screening checks only. This procedure seems to have been working quite satisfactorily in those jurisdictions that are following it carefully. The Committee recommends its continuance.

(Item 4 was adopted by voice vote.)

5. PEAT MOSS, OTHER HUMUS PRODUCTS, POTTING SOILS, AND OTHER SIMILAR PRODUCTS

The Committee has received several communications from State and local officials requesting specific guidance as to the method of sale and labeling of such products as peat, peat moss, sphagnum peat moss, humus peat, reed-sedge peat, and planting and potting media, natural and synthetic.

During its interim meeting, the Committee held conversations with representatives of this area of commerce and is of the opinion that definite recommendations at this time would be premature. The industries have described to the Committee their vigorous activities now under way to solve classification, labeling, and testing problems, and have committed themselves to the Committee to have firm recommendations in time for inclusion in the report of the Committee to the 53d National Conference in 1968. In the interim, the Committee recommends that weights and measures officials insist only that packages of these products be clearly and conspicuously labeled and that officials check the accuracy of such labeling without attempting to stipulate method of sale.

(Item 5 was adopted by voice vote.)

6. CALKING COMPOUND, GLAZING COMPOUND, AND PUTTY

The 50th National Conference recommended that the Office of Weights and Measures consult with manufacturers and distributors of calking compounds, glazing compounds, and putty regarding the appropriate method of sale of these commodities.

As a result of a report from the Office of Weights and Measures and of additional Committee deliberation, the Committee is of the view that both Section 25 of the Model State Law on Weights and Measures and Section 3.2 of the Model Regulation Pertaining to Packages must be interpreted as requiring that calking compounds, glazing compounds, and putty be sold

by weight, and that packages of these commodities be labeled in terms of weight.

The Committee received a carefully prepared brief submitted by the National Paint, Varnish, and Lacquer Association and heard oral presentations during its open meeting. The point was made that weight is not a true indication of value with respect to these commodities. An industry representative suggested that, rather than a single quantity declaration in terms of weight, a dual quantity declaration in terms of weight and liquid measure, would be acceptable to the industry and informative to consumers. The Committee agrees.

Paragraph 3. 7. 1. of the Model State Regulation Pertaining to Packages states very clearly that required quantity declaration (in this case in terms of weight) may be supplemented by one or more declarations. (There are certain provisions with respect to accuracy, type size, and prominence of supplementary declarations.)

The Committee recommends that a reasonable transition period be afforded the industry and that such method of sale and labeling be enforced by weights and measures officials throughout the United States as of July 1, 1967.

The Committee recommends the adoption of the statement in its Tentative Report as amended by this language.

(Item 6 was adopted by voice vote.)

7. QUANTITY LABELING OF RETAIL PACKAGES SHIPPED INTER-STATE

Mr. George L. Johnson, Director, Division of Weights and Measures, State of Kentucky, has expressed his concern to the Committee regarding the recent amendment to the USDA Regulations Covering the Inspection of Poultry and Poultry Products, *Section 81.130, Wording on Labels*. This section has been amended to permit the exclusion of the statement of quantity of quantity on individual consumer packages of poultry and poultry products, and the inclusion on the wholesale container of the total net weight of the packages contained there in and of the weight of the tare material of an individual package. Mr. Johnson believes that this labeling practice is contrary to the provisions of the Model Law and of the statute of his State. He also feels that this practice may be extended to other commodities if it is permitted for poultry.

The Committee feels it would be inappropriate to take a position on this matter until the U.S. Department of Agriculture determines whether or not it will alter its labeling requirements as a result of regulations to be promulgated pursuant to the Fair Packaging and Labeling Act. (Poultry and poultry products are explicitly excluded from the Act; however, it seems reason-

able to assume that the Act will influence labeling requirements of such commodities.)

(Item 7 was adopted by voice vote)

8. MODEL STATE LAW ON WEIGHTS AND MEASURES

Referring again to Section 12 of the Fair Packaging and Labeling Act of 1966, the Committee acknowledges the necessity of amending the Model State Law on Weights and Measures and of urging immediate action by the States where legislatures currently are in session along these lines. To make the Model Law fully compatible with the Federal Statute and still to retain adequate flexibility for administrative action (regulations) authorized by the law, the Committee recommends amendments to the Model Law as follows:

Amend Section 1 by adding new subsections (9) and (10) as follows:

(9) A "consumer package," or "package of consumer commodity," shall be construed to mean a commodity in package form that is customarily produced or distributed for sale through retail sales agencies or instrumentalities for consumption by individuals, or use by individuals for the purposes of personal care or in the performance of services ordinarily rendered in or about the household or in connection with personal possessions, and which usually is consumed or expended in the course of such consumption or use.

(10) A "nonconsumer package," or "package of nonconsumer commodity," shall be construed to mean any commodity in package form other than a consumer package, and particularly a package designed solely for industrial or institutional use or for wholesale distribution only.

Amend Section 26 to read as follows:

SEC. 26. SAME: PACKAGES: DECLARATIONS OF QUANTITY AND ORIGIN: VARIATIONS; EXEMPTIONS.—Except as otherwise provided in this Act, any commodity in package form introduced or delivered for introduction into or received in intrastate commerce, kept for the purpose of sale, or offered or exposed for sale in intrastate commerce, shall bear on the outside of the package such definite, plain, and conspicuous declarations of (1) the identity of the commodity in the package unless the same can easily be identified through the wrapper or container, (2) the net quantity of the contents in terms of weight, measure, or count, and (3) in the case of any package kept, offered, or exposed for sale, or sold in any place other than on the premises where packed, the name and place of business of the manufacturer, packer, or distributor, as may be prescribed by regulation issued by the Director: *Provided, That*, in connection with the declaration required under clause (2), neither

the qualifying term "when packed" or any words of similar import, nor any term qualifying a unit of weight, measure, or count (for example "jumbo," "giant," "full," and the like) that tends to exaggerate the amount of commodity in a package, shall be used: *And provided further*, That under clause (2) the Director shall, by regulation, establish (a) reasonable variations to be allowed, which may include variations below the declared weight or measure caused by ordinary and customary exposure, only after the commodity is introduced into intrastate commerce, to conditions that normally occur in good distribution practice and that unavoidably result in decreased weight or measure, (b) exemptions as to small packages, and (c) exemptions as to commodities put up in variable weights or sizes for sale intact and either customarily not sold as individual units or customarily weighed or measured at time of sale to the consumer.

Inclusion of the two new definitions (Section 1, subsections (9) and (10)) is admittedly a departure from normal practice in that these terms are not used in the Model Law. Nonetheless, it is the view of the Committee that such definitions may, at the time of regulation promulgation, be points of considerable controversy. Once enacted into law, the definitions will prevail at any time the terms are used in regulations issued under the law, and a clear situation with respect to the meaning of the terms will prevail.

(To clarify, a comma should be placed after the word "distributor," the eleventh word before the first proviso, in amended section 26 of the Model Law, presented in the Tentative Report.)

(Item 8 was adopted by voice vote.)

9. MODEL LAW—SECTION 27—INTERPRETATION

The Committee is aware of certain "automatic" prepackaging scales in commercial use that are equipped so as to print on a label multiple units at a single price, as, for example, "2 pounds for 25 cents," "3 pounds for 29 cents," and "5 each for 39 cents." Nothing in the General Code or the Code for Scales of NBS Handbook 44 would prohibit such a design characteristic.

However, the Committee feels it appropriate to point out that Section 27 of the Model State Law on Weights and Measures must be applied in the case of random packages with labels printed by such scales. Section 27 reads:

SEC. 27 (METHOD OF SALE OF COMMODITIES): DECLARATIONS OF UNIT PRICE ON RANDOM PACKAGES— In addition to the declarations required by section 26 of this Act, any commodity in package form, the package being one of a lot containing random weights, measures, or counts of the same commodity and bearing the total selling price of the pack-

age, shall bear on the outside of a package a plain and conspicuous declaration of the price per single unit of weight, measure, or count.

This section appears to be quite clear in requiring on the label the price of a *single* unit of weight or measure.

10. REPORT OF LAW AND REGULATIONS COMMITTEE OF SOUTHERN WEIGHTS AND MEASURES ASSOCIATION

A number of items were received from the Southern Weights and Measures Association for consideration by the Committee. Each of these items has been attended to with the exception of the recommendation made by Mr. J. B. McGee of Georgia regarding bulk deliveries of commodities.

It is the opinion of the Committee that this matter deserves further consideration. Accordingly, it will be placed on the Committee's agenda for study during the coming year.

11. LAWN CARE PRODUCTS

Both in writing and orally, a representative of a manufacturer of products for lawn care urged the Committee to amend section 29 of the Model Law to permit the advertising of such products in terms of square foot coverage only. Section 29 requires that, whenever a commodity in package form is advertised and the retail price of the package is included in the advertising, there be closely and conspicuously associated with the price statement a declaration of the basic quantity of contents of the package—in this case, the declaration in terms of weight.

The Committee is aware that consumers are interested in square foot coverage of lawn care products, and, as in the case of item 6 of this Report, points out that it is entirely proper to include both on the package and in the advertisement appropriate, helpful, and accurate supplementary quantity information.

12. EXEMPTIONS UNDER THE FAIR PACKAGING AND LABELING ACT

A representative of the Liquefied Petroleum Gas Association referred to Senate legislative history in urging the Committee to consider carefully any language in either the Model Law or the Model Package Regulation that would seem to include those commodities that such history would exclude. The Committee, recognizing the absolute need for compatibility between State requirements and Federal requirements for package consumer commodities, will be guided by the final regulations issued by the Federal regulatory agencies.

Matters relating to laws and regulations, the purview of this Committee, are becoming increasingly complicated and relate directly to the economy of this nation. This Committee is anxious

to receive recommendations or problems that properly lie within its area of authority. The members do believe that such recommendations and problems should be well thought out and that documentation to support recommendations should be included.

The Committee is grateful for the attendance and participation at its open meeting and for the communications received during the year.

M. JENNINGS, *Chairman*

L. BARKER

H. L. GOFORTH

W. A. KERLIN

J. F. LYLES

M. W. JENSEN, *Secretary*

R. N. SMITH, *Staff Assistant*

Committee on Laws and Regulations.

(On motion by Mr. Jennings, seconded from the floor, the Conference by voice vote adopted the Report of the Committee on Laws and Regulations.)

REPORT OF THE CONFERENCE COMMITTEE ON SPECIFICATIONS AND TOLERANCES

presented by G. L. JOHNSON, *Chairman, Director, Division of Weights and Measures, State of Kentucky*

(Thursday, June 29, 1967)



The Committee on Specifications and Tolerances submits its report to the 52d National Conference on Weights and Measures. The report consists of the Tentative Report, transmitted during April as part of the Conference Announcement, as amended by this Final Report.

The report represents recommendations of the Committee that have been formed on the basis of written and oral comments received during the year and oral representations made during the open meeting of the Committee. All recommended "amendments" are to appropriate provisions of the codes of National Bureau of Standards Handbook 44—3d Edition, *Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices*.

1. GENERAL CODE

General Specifications Paragraph G-S.5.1. General [and Tolerances].—It has been pointed out to the Committee that, in the case of any weighing or measuring device of the computing type with both a digital and an analog system of indicating and/or recording, it is technically impractical to require exact agreement between the digital and analog systems at all points. Whereas the analog system can indicate or record between whole values, the digital system can indicate or record whole values only. In the instance where the analog system indicates or records a value precisely half way between two values that can be indicated or recorded digitally, the digital system must choose between the higher and lower value.

It is the opinion of the Committee that no amendment to the code is required. However, weights and measures officials are to be aware of this circumstance. During the official examination, precise agreement between an analog system and a digital system is not necessarily to be expected. The requirement to be observed is simply that both be within the appropriate tolerance.

(The foregoing item was adopted by voice vote.)

General User Requirements Paragraph G-UR.2. INSTALLATION REQUIREMENTS.—A number of States have expressed concern about the possibility of a single indicating or recording

element of a weighing or measuring device being located remotely from the weighing or measuring elements of the device and thus making difficult, if at all possible, both the testing of the device and reasonable protection of the individual buying or selling merchandise over the device.

The Committee recommends that a new user requirement relating to installation be included in the General Code as follows:

G-UR.2.2. INSTALLATION OF INDICATING OR RECORDING ELEMENT.—A device shall be so installed that an indicating or recording element is reasonably adjacent to the weighing or measuring element; otherwise, there shall be means for direct and convenient communication (oral or visual) between the primary indicating or recording element and the weighing or measuring element. [See also G-UR.3.2.] (The present G-UR.2.2. ACCESSIBILITY FOR TESTING PURPOSES will be renumbered as G-UR.2.3.)

(The foregoing item was adopted by voice vote.)

2. SCALE CODE

Specifications Paragraph S.2.1.2. BALANCE BALL.—This specification, which provides that a balance ball or similar device be not rotatable unless automatic in operation or enclosed in a cabinet, has, in any one of several versions, been in the code with nonretroactive status for many years. The Committee is informed that there remain in service many scales with rotatable balance balls and that unreasonable hardship would be created if the requirement were to be made retroactive at this time. Greater progress in the modification or replacement of these old devices should be evidenced.

The Committee recommends that specifications paragraph S.2.1.2. be amended by adding at the end the following parenthetical sentence:

(This specification will become retroactive as of July 1, 1975)

DISCUSSION OF FOREGOING ITEM

MR. D. B. KENDALL: At a meeting in Duluth, Minnesota, on June 11, the Scale Subcommittee of the American Railway Engineering Association Committee 14, of which I am an associate member, reviewed the Tentative Report of the Specifications and Tolerances Committee. Some members were quite concerned about the proposal to make the requirement for nonrotatable balance ball retroactive as of 1975. I pointed out that this requirement had been adopted as a nonretroactive requirement in H-29 in 1947. One member commented that all scales owned by his railroad were at least 20 years old. The subcommittee felt that, although this may be an important detail in livestock weighing, it was not an important factor in scales used by railroads. They had no accurate figure on the cost of conversion, but a general

estimate was about \$100 per scale. AREA Committee 14 endorsed the recommendation of the Scale Subcommittee that a recommendation be made to the National Conference that the present requirement remain nonretroactive. If the National Conference endorses the recommendation of the Specifications and Tolerances Committee, I assume that AREA Committee 14 will come up with more accurate estimates of the cost of conversion and will present a recommendation to a future National Conference that the requirement remain nonretroactive.

(The foregoing item was adopted by voice vote.)

Sensitivity Requirements Paragraph SR.5. FOR CLASS A PRESCRIPTION SCALES AND JEWELERS SCALES.—With the issuance of the Third Edition of Handbook 44 in 1965, the maintenance SR requirement for Class A prescription scales and jewelers scales was reduced from 0.2 grain to 0.1 grain. One State has expressed the view that this reduction might have been too drastic and that numbers of useful prescription scales might be forced into discard.

At the time the new code was proposed, all States were contacted, as were manufacturers of prescription scales. No opposition to the reduction in SR was expressed.

The Committee would like to hear from State and local jurisdictions that have active programs of prescription-scale testing as to their recommendations in this regard and *has recommended that its secretary study this matter in order that more general information may be developed.*

(The foregoing item was adopted by voice vote.)

Tolerances Paragraph T.1.1 [TOLERANCE APPLICATION] TO UNDERREGISTRATION AND TO OVERREGISTRATION.—A State official has pointed out that, under present code requirements, it is possible to have two or more elements (indicating or recording) of a scale in disagreement at a specific test load in an amount equal to the tolerance limit at that test load and in opposite directions; thus, a discrepancy between the elements of as much as twice the appropriate tolerance.

To correct this, the Committee recommends that there be added at the end of paragraph T.1.1. a sentence reading as follows:

When a single test load can be indicated or recorded by two or more elements of a scale, these shall not differ by an amount greater than the value of the minimum graduated interval on the device

(The foregoing item was adopted by voice vote.)

Tolerances Paragraph T.2.1. [MINIMUM TOLERANCE VALUES] GENERAL.—One State recommended to the Committee

that consideration be given to increasing the present minimum tolerance values applied to scales with capacities of 500 pounds and larger to the value of the minimum graduated interval. The Committee had no other request for an increase and no other communication on this particular point. Views of weights and measures officials and of scale manufacturers and users were solicited in the Tentative Report. None was received. Only one view was heard during the open committee meeting.

The Committee recommends no amendment.

(The foregoing item was adopted by voice vote.)

User Requirements Paragraph UR.1.1.6. [SELECTION REQUIREMENTS. VALUE OF MINIMUM GRADUATED INTERVALS ON PRIMARY INDICATING AND RECORDING ELEMENTS] FOR VEHICLE SCALES, AXLE-LOAD SCALES, AND WHEEL-LOAD WEIGHERS ONLY.—Subsequent to the issuance of its Tentative Report, the Committee received a communication from the Scale Manufacturers Association urging that axle-load scales be deleted from this paragraph, and another communication from General Electrodynamics Corporation recommending that the value of the minimum graduated interval on wheel-load weighers be changed from 20 pounds to 100 pounds. All views expressed during the open meeting by weights and measures officials led the Committee to believe that the present requirements are demanded by the States.

The Committee recommends no amendment.

DISCUSSION ON FOREGOING ITEM

(Considerable discussion on this item followed, and an amendment by Mr. V. D. Campbell, State of Ohio, to permit 50-pound minimum graduated intervals on axle-load scales used in law enforcement work was defeated by voice vote.)

(The foregoing item as recommended by the Committee was adopted by voice vote.)

User Requirements Paragraph UR.2.3. [INSTALLATION REQUIREMENTS] PROTECTION AGAINST WIND AND WEATHER EFFECTS.—A recommendation was received by the Committee that this user requirement, which stipulates that the understructure and the indicating elements of a permanently installed scale be adequately protected against wind and weather effects, be deleted. The Committee cannot agree with this recommendation. Wind and weather effects on either the understructure or on an indicating or recording element can be disastrous, not only with respect to a particular weighing operation, but also in connection with the maintenance of a device in proper operating condition. Protection for these elements is traditional, and no hardship can be foreseen. The Committee desires to make

it clear that this user requirement does not require that overhead protection for the load-receiving element of a scale (particularly a large scale) be afforded.

The Committee recommends no amendment.

(The foregoing item was adopted by voice vote.)

Concrete-Batching Scales.—Certain manufacturers of concrete-batching scales submitted to the Committee a recommendation that such scales be considered to be commercial weighing devices and that they be appropriately identified and attended to in the Scale Code of Handbook 44.

As far as the Committee has been able to determine, mixed concrete is universally sold by the cubic yard. The batching scale thus is a device that fixes the ingredients and quality of the mix. Many weighing and measuring devices are used by industry as mixing, batching, quality-fixing, and quality-checking devices.

Under the Model State Weights and Measures Law and under general application paragraph G-A.1. of Handbook 44, the codes address themselves only to commercial weighing and measuring equipment that is used to determine the quantity of goods or services when the payment for such goods or services is based on that quantity (and to certain equipment in official use for enforcement of law).

The Committee is aware that in some jurisdictions the weights and measures officer is requested to check concrete-batching scales for accuracy. It is recommended that, in such cases, the official issue a report that details the results of his examination, or obtains from the agency of government that requests a test, such specifications, tolerances, and testing instructions for the devices as that agency deems appropriate.

The Committee received, after the issuance of its Tentative Report, a number of communications from manufacturers of batching scales, and several weights and measures officials spoke during the open meeting—all indicating a desire for the inclusion under Handbook 44 of concrete-batching scales. The Committee still is of the opinion that, under the terms of the Model Law and of general application paragraph G-A.1., such scales cannot be considered as commercial weighing devices.

The Committee recommends no amendment.

(The foregoing item was adopted by voice vote.)

Axle-Load Scales.—At least one State has taken the position that axle-load scales, either coin-operated or operated by a weigher, are commercial devices and thus must meet the requirements of the General Code and the Code for Scales. Application paragraph A.2. of the Code for Scales specifically exempts axle-load

unless such scales are used officially for the enforcement of traffic and highway laws. The Conference acted, a number of years ago, to the effect that devices that might be deemed commercial only because a charge is made for their services are not "commercial" devices under the terms of the Model Law or Handbook 44. The Committee urges that this interpretation be accepted by all jurisdictions in order that nationwide uniformity may prevail.

(The foregoing item was adopted by voice vote.)

Tentative Code for Belt-Conveyor Scales.—Following the 51st National Conference Seminar on Discrete and Continuous Weighing Systems, during which it was made clear to the industry that technical requirements for such systems were needed by weights and measures officials, the manufacturers of belt-conveyor scales established an informal committee to develop, first, a proposed code for inclusion in Handbook 44 and, second, recommended testing equipment and testing procedures.

A proposed code was received by the Committee and was discussed with the manufacturers during the interim meeting. After careful study, the Committee decided that this proposal could not be recommended to the Conference, as a number of critical points seemed unattended to. The proposed testing methods were either incomplete or inadequate, and the proposed tolerance had not been justified with data derived from experiment or experience.

The Committee suggested in its Tentative Report that, until such time as appropriate code material could be achieved, officials in whose jurisdictions such devices are in use or are being installed, apply such General and Scale Code requirements as seemed appropriate, test according to manufacturer's recommendations, and authorize the commercial use of the device if this seemed proper, and suggested further that belt-conveyor scales not be "sealed" until code requirements were available.

Since the issuance of its Tentative Report, the Committee continued to receive increasingly urgent requests from the States and manufacturers of such devices to develop and submit to the Conference for consideration a tentative code for belt-conveyor scales. Such a code was prepared and copies were mailed to each of the States and to each of the device manufacturers. This topic was the subject of much discussion during the open meeting. The Committee is of the opinion that the adoption of a tentative code is indicated. Weights and measures officials and manufacturers and users of the devices are to be aware that a "tentative" code is just that—a code that is adopted by the Conference on a tentative basis to be used experimentally and for the express purpose of gathering information necessary for the formulation of code requirements.

The Committee recommends the adoption of a Tentative Code for Belt-Conveyor Scales as follows:

TENTATIVE CODE FOR BELT—CONVEYOR SCALES

(See also General Code Requirements)

(This Tentative Code has only a trial or experimental status and is not intended to be rigidly enforced. The requirements are designed for observation and study prior to the development and final adoption of a Code for Belt-Conveyor Scales.)

A. APPLICATION. (Pertaining to the application of code requirements.)

A.1. This code applies to devices installed on belt conveyors for the purpose of weighing bulk materials carried by conveyors. This code *does not* apply to equipment for the discrete weighing of objects moving on conveyors, to weigh feeders that measure quantity on a time basis, to checkweighers, to rate indicators or controllers, or to other auxiliary devices except as they may affect the weighing performance of the device.

S. SPECIFICATIONS. (Applicable with respect to the design of belt-conveyor scales.)

S.1. DESIGN OF INDICATING AND RECORDING ELEMENTS.

S.1.1. GENERAL.—A belt-conveyor scale shall be equipped with a primary indicating element in the form of a master weight totalizer and may also be equipped with a primary recording element. An auxiliary vernier counter used for scale calibration shall not be considered part of the master weight totalizer.

S.1.2. UNITS.—A belt-conveyor scale shall indicate or record weight units in terms of pounds or tons or decimal multiples or subdivisions thereof.

S.1.3. PRINTER.— A recording element, if provided, shall be of the digital type.

S.1.4. VALUE OF SMALLEST UNIT.—The value of the smallest unit of the primary indicating or recording element shall be not greater than $1/1200$ of that value representing the weight that is delivered by the device in one hour operating at rated capacity.

S.1.5. ADVANCEMENT OF PRIMARY INDICATING OR RECORDING ELEMENTS.—The primary indicating and recording elements shall advance only when the belt conveyor is in operation and running. The most sensitive indicating element of the master weight totalizer may advance continuously or intermittently; all other elements shall advance intermittently.

S.2. DESIGN OF WEIGHING ELEMENTS.—A belt conveyor scale shall be so designed as to combine automatically belt travel with belt load in order to provide a determination of the weight of the material that has passed over the scale.

S.2.1. ADJUSTABLE WEIGHING ELEMENTS.—An adjustable element that can affect the balance or the calibration of the device shall be held securely in adjustment and shall not be adjustable from outside the device unless a tool is required to make the adjustment.

S.3. MARKING REQUIREMENTS.—A belt-conveyor scale shall be marked with the following (Item (d) to be marked after calibration):

- (a) The rated capacity in terms of units of weight per hour.
- (b) The belt speed in terms of feet per minute at which the belt will deliver the rated capacity.
- (c) The value of the smallest unit on the master weight totalizer.
- (d) Number of weight units totalized for a specific chain (pounds per foot) for a specific number of feet of belt travel, or for a specific load of test weights for a specific number of feet of belt travel, or for a specific calibrating plate (pounds per foot) for a specific number of feet of belt travel.

N. NOTES. (Applicable with respect to the testing of belt-conveyor scales.)

N.1. GENERAL.—Belt-conveyor scales are capable of very accurately weighing a statically applied test load, yet their ability to accurately weigh bulk material carried on a moving loaded belt may be detrimentally affected by the conditions of the installation. Calibration to theoretical weight figures derived from designed capacity and actual belt speed may have to be adjusted to compensate for effects of belt stiffness and tension. Whenever such a calibration adjustment is made, a simulated test, as described in N.3.3., will confirm that the device is performing satisfactorily. Whenever feasible, the first test of the device should be a Material Test in accordance with N.3.2. and the correlation with the Simulated Test (N.3.3.) suitable for the device should be verified. Subsequent tests may then be made following one of the simulated test procedures described under N.3.3.

N.2. CONDITIONS OF TESTS.—A belt-conveyor scale shall be tested after it is installed on the conveyor with which it is to be used and under such environmental conditions as may normally be expected. The scale shall be tested at between 50 and 100 percent of rated capacity. Each test shall be not less than: (a) 10 minutes duration, and (b) 3 circuits (revolutions) of the belt, and (c) 500 significant figures on the master weight totalizer.

N.3. TESTING PROCEDURES.

N.3.1. ZERO LOAD TEST.—If a belt conveyor has been idle for a period of two hours or more before the start of the test, the conveyor shall be run empty for not less than 15 minutes. The counter shall be read when a marked spot on the belt passes a marked spot on the conveyor before and after the test. The initial test shall be conducted with the belt conveyor empty for an interval of not less than 10 minutes and not less than 3 circuits of the belt. If the zero-load test error is more than 0.1 percent of rated capacity, the device shall be adjusted and the zero-load test rerun before continuing.

N.3.2. MATERIAL TEST.—Use bulk material, preferably that material for which the device is normally used. Either pass a pre-weighed quantity of material over the belt-conveyor scale in a manner as similar as feasible to actual loading conditions, or statically weigh (on a suitable scale) all material that has passed over the belt-conveyor scale during a Material Test. Means for weighing the material test load will depend on the capacity of the belt-conveyor scale and availability of a suitable scale for the test. Where practicable, the substitution method of weighing should be followed. To assure that the test load is accurately weighed and determined, the following precautions shall be observed:

- (a) The containers, whether they be railroad cars, trucks, or boxes, must not leak, and they shall not be overloaded to the point that material will be lost.
- (b) Actual empty or tare weight of containers shall be determined at the time of the test. Stencilled tare weight of railway cars or trucks shall not be used.
- (c) When a pre-weighed test load is passed over the scale, the belt-loading hopper shall be examined before and after the test to assure that the hopper was empty and that only the material of the test load is passed over the scale.
- (d) Any scale used to calibrate a test load of product should, as a prerequisite, be tested first with test weights with a sufficient number of known test loads to permit the compensation for any apparent ratio errors during the Material Test.
- (e) When a railway track scale is used to weigh the test load, not more than 24 hours should elapse between the test on the belt-conveyor scale and the determination of the weight of the test load. When other scales are used, the elapsed time should be not more than eight hours.
- (f) The test shall not be conducted when it is raining or

snowing unless adequate precautions are taken to assure that the weight of the test load is not affected.

N.3.3. SIMULATED TESTS.—One of the following tests, in accordance with the recommendation of the belt-conveyor scale manufacturer, should be used:

- (a) **Chain Test.**—A suitable test chain of the free-roller of wheel, type stamped with a certified weight per foot, may be connected to a stationary part of the structure and allowed to ride on the belt over the scale. The test chain should extend across all scale rollers and, in addition, not less than two idler rollers before and beyond the scale. The length of belt that has passed over the scale during the test must be accurately measured in terms of feet. The test load is the actual belt travel, in terms of feet, divided by the marked belt travel, in terms of feet, times the marked number of weight units totalized.
- (b) **Known Weight Test.**—Test weights equal to the marked test load may be placed upon or suspended from that portion of the scale which supports the belt. The length of belt which has passed over the scale during the test must be accurately measured, in terms of feet. The test load is the actual belt travel, in terms of feet, divided by the marked belt travel, in terms of feet, times the marked number of weight units totalized.
- (c) **Calibrated Plate Test.**—For a noncontact scale where mass is determined by absorption of energy, a suitable plate calibrated by the scale manufacturer and marked in equivalent pounds per foot of belt may be used. The length of belt which has passed over the scale during the test must be accurately measured in terms of feet. The test load is the actual belt travel, in terms of feet, divided by the marked belt travel, in terms of feet, times the marked number of weight units totalized.

T. TOLERANCES. (Applicable with respect to the performance of belt conveyor scales.)

T.1. APPLICATION.—The tolerances hereinafter prescribed shall be applied to errors of underregistration and to errors of overregistration.

T.2. TOLERANCE VALUES.—Maintenance and acceptance tolerances shall be 0.5 percent of test load.

UR. USER REQUIREMENTS. (Applicable with respect to the selection, installation, and use of belt-conveyor scales.)

UR.1. SELECTION REQUIREMENTS.—A belt-conveyor scale shall be operated between 50 and 100 percent of its rated capacity.

UR.2. INSTALLATION REQUIREMENTS.

UR.2.1. PROTECTION FROM WIND AND WEATHER EFFECTS.—The scale and the conveyor at the scale shall be protected from wind and weather effects.

UR.2.2. CONVEYOR INSTALLATION.—The conveyor may be horizontal or inclined, but, if inclined, the angle shall be such that slippage of material along the belt does not occur. Installation shall be in accordance with the scale manufacturer's instructions. Unless the scale is the "noncontact" or nuclear type, or is installed in a short conveyor designed and furnished by the scale manufacturer or built to the scale manufacturer's specifications, the conveyor shall comply with the following minimum requirements to assure satisfactory performance:

- (a) If the belt length is such that a take-up device is required, this device shall be of the counter-weighted type for either vertical or horizontal travel.
- (b) The scale shall be installed at least 20 feet *or* 5 idler spaces, *whichever is greater*, from loading point, skirting, training idlers, head or tail pulley, or convex curve in conveyor.
- (c) There shall be no concave curve in the conveyor between the scale and the loading point. A concave curve beyond the scale shall start no closer than 70 feet from the scale.
- (d) There shall be no trippers in the conveyor.
- (e) The conveyor shall be no longer than 2,000 feet from head to tail pulley.
- (f) The angle of the troughing idlers shall not exceed 35 degrees.
- (g) The idlers on the scale and at least two before and two after the scale shall be concentric, at 90 degrees to the belt centerline and properly spaced.
- (h) Conveyor stringers at the scale and for no less than 20 feet before and beyond the scale shall be continuous or securely joined and of sufficient size and so supported as to eliminate relative deflection between the scale and adjacent idlers when under load.
- (i) Conveyor belting shall be no heavier than is required for the installation. When loaded to 50 percent or more of scale capacity, the belt shall contact the center or horizontal portion of the idlers.

UR.3. USE REQUIREMENTS.

UR.3.1. LOADING.—Feed of material to the scale shall be controlled, if necessary, to assure that at normal operation

the material flow is between 50 percent and 100 percent of the rated capacity.

UR.3.2. MAINTENANCE.—Belt-conveyor idlers and scale shall be maintained in accordance with scale manufacturer's instructions.

DEFINITIONS OF TERMS

BELT-COVER SCALES

The terms defined here have a special and technical meaning when used in the Belt Conveyor Scale Code. Whenever a defined term is used in the Belt-Conveyor Scale Code, it has the particular meaning given here.

belt conveyor. An endless moving belt for transporting material from place to place.

belt-conveyor scale. A device installed on a belt conveyor to measure the weight of bulk material being conveyed.

calibrated plate. A suitable metal plate, provided by the scale manufacturer, determined to have the same effect on a nuclear scale as a specified load of bulk material on the belt conveyor. A calibrated plate is the equivalent of a test chain or test weights used with other types of belt-conveyor scales.

concave curve. A change in the angle of inclination of a belt conveyor where the center of the curve is above the conveyor.

convex curve. A change in the angle of inclination of a belt conveyor where the center of the curve is below the conveyor.

conveyor stringers. Support members for the conveyor on which the idlers are mounted.

head pulley. The pulley at the discharge end of the belt conveyor. The power to drive the belt is generally applied to the head pulley.

idler space. The center-to-center distance between idler rollers measured parallel to the belt.

idlers or idler rollers. Freely turning cylinders mounted on a frame to support the conveyor belt. For a flat belt the idlers may consist of one or more horizontal cylinders transverse to the direction of belt travel. For a troughed belt, the idler will consist of one or more horizontal cylinders and one or more cylinders at an angle to the horizontal to lift the sides of the belt to form a trough.

loading point. The location at which material to be conveyed is applied to the conveyor.

nuclear type (noncontact) scale. A device consisting of a source of nuclear radiation and a detector for that radiation. Absorption of radiation determines the mass of the material passing between the source and the detector.

simulated test. A test using artificial means of loading the scale to determine the performance of a belt-conveyor scale.

skirting. Stationary side boards or sections of belt conveyor attached to the conveyor support frame or other stationary support to prevent the bulk material from falling off the side of the belt.

tail pulley. The pulley at the opposite end of the conveyor from the head pulley.

take-up. A device to assure sufficient tension in a conveyor belt that the belt will be positively driven by the drive pulley. A counter-weighted take-up consists of a horizontal pulley free to move in either the vertical or horizontal direction with dead weights applied to the pulley shaft to provide the tension required.

test chain. A device consisting of a series of rollers or wheels linked together in such a manner as to assure uniformity of weight and freedom of motion to reduce wear, with consequent loss of weight, to a minimum.

totalizer. A device used with a belt-conveyor scale to indicate the weight of material which has been conveyed over the scale. The master weight totalizer is the primary indicating element of the belt-conveyor scale. An auxiliary vernier counter used for scale calibration is not part of the master weight totalizer. Auxiliary remote totalizers may be provided. The totalizer shows the accumulated weight and may be nonresettable or may be reset to zero to measure a definite amount of material conveyed.

training idlers. Idlers of special design or mounting intended to shift the belt sideways on the conveyor to assure the belt is centered on the conveying idlers.

tripper. A device for unloading a belt conveyor at a point between the loading point and the head pulley.

(The foregoing item was adopted by voice vote.)

3. CODE FOR LIQUID-MEASURING DEVICES

Specifications Paragraph S.1.4.4. PRINTED TICKETS.—This specifications paragraph stipulates that a printed ticket issued by a liquid-measuring device of the computing type on which there is printed a total computed price must also have printed thereon the total volume of the delivery and the price per gallon.

Representations were received by the Committee from the Gasoline Pump Manufacturers Association and were explained during the interim meeting, that current technology does not make practicable the printed presentation of all three values, whereas the printing of one of the values can be accomplished without substantially increasing the cost of the device and can afford the purchaser certain advantages.

To attend to this matter, the Committee recommends that specifications paragraph S.1.4.4. be deleted and that there be added a user requirement covering the use of a device, as follows:

UR.3.3. PRINTED TICKET.—Any printed ticket issued by a device of the computing type on which there is printed the total computed price, the total volume of the delivery, or the price per gallon, shall have shown thereon also the other two values (either printed or in clear hand script).

(The foregoing item was adopted by voice vote.)

New User Requirements Paragraph UR.3.4. POSITION OF DISCHARGE NOZZLE.—Because of the problem that has arisen in connection with the apparent proper hanging of the discharge nozzle on the housing and bracket of a retail motorfuel dispenser without actually turning the motor switch to the “off” position, the Committee recommends that a UR paragraph be added to this code as follows:

UR.3.4. POSITION OF DISCHARGE NOZZLE.—The discharge nozzle on a retail motor-fuel device shall be returned to its proper upright position on the dispenser housing and bracket following each delivery to a customer. The position of the nozzle at rest, shall be such that the zero-set-back interlock (see S.2.5.1) is activated.

(The foregoing item was adopted by voice vote.)

The Use of the “Totalizer” on a Retail Motor-Fuel Dispenser as a Commercial Measuring Device.—The weights and measures officer of a large city has informed the Committee that in his jurisdiction, and possibly in others, the “totalizer” on a retail motor-fuel dispenser is being used as a commercial measuring device in the sale of liquid fuel to the filling station. Any indicating or recording element of a liquid measuring device that is to be the determining factor in a commercial transaction involving measurement should, without question, conform to all appropriate requirements for liquid-measuring devices.

(The foregoing item was adopted by voice vote.)

4. CODE FOR LIQUID-MEASURING DEVICE AND CODE FOR VEHICLE-TANK METERS

Meter Accuracy Study.—As a result of recommendations of previous National Conferences and of negotiations by the committee secretary, the Weights and Measures Subcommittee of the Committee on Operations and Engineering, American Petroleum Institute, contracted with a consulting engineering firm to conduct a comprehensive study for the purpose of determining ex-

perimentally, and with precision, accuracy capabilities of petroleum meters installed at loading racks and on vehicle tanks. The Committee was consulted prior to the development of the final plans for the study and will watch the progress closely. The results will be given full consideration and will be reported to the Conference at an appropriate time.

(The foregoing item was adopted by voice vote.)

5. CODE FOR LIQUEFIED PETROLEUM GAS LIQUID-MEASURING DEVICES

Specifications Paragraph S.1.4.4. PRINTED TICKET.—For the reasons set forth under the Code for Liquid-Measuring Devices, *the Committee recommends the deletion of specifications paragraph S.1.4.4. PRINTED TICKET, and the addition of a user requirement as follows:*

UR.2.5. PRINTED TICKET.—Any printed ticket issued by a device of the computing type on which there is printed the total computed price, the total volume of the delivery, or the price per gallon, shall have shown thereon also the other two values (either printed or in clear hand script).

(The foregoing item was adopted by voice vote.)

6. PROPOSED CODE FOR CRYOGENIC-FLUID LIQUID-MEASURING DEVICES

Possible Need for Code Requirements.—In its report to the 51st National Conference, the Committee noted that work was being done by the Compressed Gas Association in connection with the development of a code for liquid-measuring devices for the measurement of cryogenic fluids. The Committee solicited from the States advice as to the desirability of developing such a code, but received no communication from the States on this subject and had no further word from this association prior to the issuance of its Tentative Report.

The Committee received, since the distribution of its Tentative Report, a copy of a proposed tentative code for cryogenic-fluid liquid-measuring devices. This code, carefully developed by the Compressed Gas Association, has been considered by the Committee in light of any apparent nationwide use. The Committee has information of only two States that have interest in this matter and feels it would be inappropriate, at this time, to devote the necessary time and effort to the development of a proposed code. The Committee will watch the progress in this area and, when the need appears to be sufficiently broad, will again consider the matter.

(The foregoing item was adopted by voice vote.)

Application Paragraph A.1. APPLICATION.—A question regarding the broad application of paragraph A.1. of the Code for Milk Bottles, in light of the increasing use of plastic containers for milk, has arisen. This paragraph reads:

A.1.—This code applies to any container that is used for the measurement and delivery of milk and other fluid dairy products at retail.

A weights and measures official of the State of Connecticut has pointed out that plastic containers for milk frequently are used for both the "measurement" and "delivery" of milk, and thus a severe interpretation of this paragraph could prohibit the use of such plastic containers unless or until they meet all requirements of the code.

The NBS Office of Weights and Measures has conducted a continuing study of the measurement capabilities of plastic containers for milk and has determined, beyond doubt, that they do not now, and probably will not in the foreseeable future, meet code requirements. Accordingly, it has been recommended that plastic containers be treated in the same manner as paper cartons for milk and be considered packages under the terms of the regulation pertaining to packages. The Society of Plastic Industries (a trade organization representing manufacturers of plastic bottles) is in full agreement with this view.

Accordingly, the Committee recommends that paragraph A.1. of the Milk Bottle Code be amended to read:

A.1.—This code applies to a container that is designed as a measure container for the measurement and delivery of milk and other fluid dairy products at retail. This code does not apply to containers for milk or other fluid dairy products that are designed to be used as packages and are so labeled as to conform to all requirements for packages.

(The foregoing item was adopted by voice vote.)

8. CODE FOR GRADUATES

Nonretroactive Requirements.—The Committee is aware of the inclusion in the introductory section of Handbook 44 of the statement "It is planned that each existing nonretroactive requirement will be rechecked after it has been effective for ten years, and thus reasonable accuracy can be assured." In the Code for Graduates there are five specifications paragraphs with nonretroactive provisions dated 1956. It seems inappropriate to give these specifications retroactive status without counsel from all of the States. Such counsel will be sought prior to the 53d National Conference.

(The foregoing item was adopted by voice vote.)

9. CODE FOR FABRIC-MEASURING DEVICES

Application Paragraph A.1. APPLICATION.—Since devices similar in design and use are utilized for the commercial measurement of articles other than fabrics, the Committee deems it advisable to make provision for the application of appropriate requirements of the Code for Fabric-Measuring Devices to such other devices.

The Committee accordingly recommends that application paragraph A.1. of this code be amended by adding at the end a parenthetical sentence, as follows:

(Insofar as they are clearly appropriate, the requirements and provisions of this code apply also to devices designed for the commercial measurement of other materials similar to fabrics, in sheet, roll, or bolt form.)

(The foregoing item was adopted by voice vote.)

10. CODE FOR CORDAGE-MEASURING DEVICES

Recommended Amendments.—A manufacturer of cordage measuring devices has submitted representations to the Committee to the effect that this code is in need of amendment on three particular points. (1) The code should require that a cordage-measuring device have marked clearly thereon limitations as to its use, particularly with respect to the types of cordage, rope, wire, or cable that can accurately be measured with it. (2) The code should stipulate that a device be tested with the materials it sets itself forth as being capable of measuring accurately, and not with a steel tape. (3) The tolerances set forth in the code are unreasonably small.

The Committee asked its secretary and his staff to study these matters and to provide experimental data on which proper committee recommendations could be developed, and has been informed that a broad study covering measurement capabilities of these devices is nearing completion. A report to the 53d National Conference will be made.

The Committee recommends no amendment.

(The foregoing item was adopted by voice vote.)

11. CODE FOR TAXIMETERS

Specifications Paragraph S.1.2. ADVANCEMENT OF INDICATING ELEMENTS.—The State of California has pointed out that this specification, which permits the advancement of the indicating elements of a taximeter only when it is being cleared and by the rotation of the vehicle wheels, is delinquent in that it does not acknowledge that an indicating element properly can be advanced by the time mechanism.

To correct this, the Committee recommends that the paragraph be amended to read:

S.1.2. ADVANCEMENT OF INDICATING ELEMENTS.

—Except when a taximeter is being cleared, the primary indicating elements shall be susceptible of advancement only by the rotation of the vehicle wheels or by the time mechanism.

(The foregoing item was adopted by voice vote.)

12. CODE FOR ODOMETERS

Specifications Paragraph S.1.3. VALUE OF MINIMUM INDICATION.—This specification requires that an odometer indicate in intervals of one-tenth mile.

During this past year, the Office of Weights and Measures of the National Bureau of Standards was informed that a number of rental automobiles of foreign manufacture are in service and with odometers with minimum indication of one mile. Weights and measures administrators of the several States, on letter recommendation from the Office of Weights and Measures, agreed to permit the use of such automobiles for a reasonable period and authorized the Office to notify importers of such automobiles that, effective with the 1968 car year, all new vehicles in rent-car service must be equipped with odometers that indicate in terms of one-tenth mile.

The Committee concurs in this action.

(The foregoing item was adopted by voice vote.)

13. CODES FOR TAXIMETERS AND ODOMETERS

Vehicle Lading.—It has been recommended that notes paragraph N.1.3.1. of both the Taximeter Code and the Odometer Code be amended to permit a vehicle under test to carry either two persons or one person and approximately 150 pounds of weight.

The Committee cannot agree with this recommendation. The weights and measures inspector should not be operating a vehicle under test. In certain cases there probably would be definite restrictions in insurance coverage as to the operator of such vehicles. The inspector should not be exposed to safety hazards as would be inherent in vehicle operation and, simultaneously, instrument observation. A vehicle under test should be under the control of an operator supplied by the vehicle owner.

The Committee recommends no amendment.

(The foregoing item was adopted by voice vote.)

Certain other items were suggested for committee consideration, but too late for study this year. These, together with other matters brought to the Committee's attention or originating with-

in the Committee, will be attended to during the forthcoming Conference year.

The Committee is gratified by the obvious uniformity of technical requirements and of interpretations. The aim of the National Conference on Weights and Measures long has been uniformity among the States. The interest of weights and measures officials and of industries and businesses affected by weights and measures supervision is well demonstrated throughout the year and particularly so during the open meeting of the Committee.

It is most unfortunate that Mr. Rebuffo of Nevada, a member of this Committee, was not permitted to attend and participate in this 52d National Conference on Weights and Measures. His contributions were sorely missed. A committee such as the Committee on Specifications and Tolerances functions best only when all of its members are a part of every discussion.

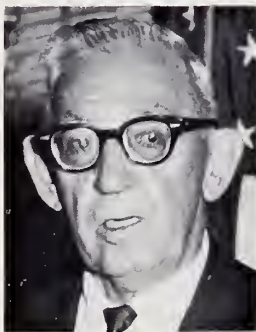
G. L. JOHNSON, *Chairman*
J. F. MCCARTHY
H. D. ROBINSON
C. H. STENDER
M. W. JENSEN, *Secretary*
Committee on Specifications and Tolerance.

(Mr. Johnson moved for adoption and, after a second from the floor, the Report of the Conference Committee on Specifications and Tolerances was adopted by the Conference by voice vote.)

REPORT OF THE CONFERENCE COMMITTEE ON NOMINATIONS

presented by H. E. CRAWFORD, *Chairman, Inspector of Weights and Measures, Jacksonville, Florida*

(Thursday, June 29, 1967)



In line with the requirements of the Organization and Procedure of the Conference, Dr. A. V. Astin, the Director of the National Bureau of Standards, is the President of the Conference and is authorized to designate the Executive Secretary. All other officers are to be elected by the vote of the Conference.

We are indebted to the Executive Secretary for furnishing a list of those who have attended past Conferences and the number of years each has served on various committees.

Due consideration was given by this Committee to attendance records, geographical distribution, and the Conference participa-

tion and interest shown in promoting weights and measures administration of the various officials.

Your Committee nominates for office for the 53d National Conference on Weights and Measures, the following:

Chairman: C. C. Morgan, Gary, Indiana.

Vice Chairmen: N. Berryman, Florida; R. T. Williams, Texas;

J. T. Daniell, Detroit, Michigan; D. E. Konsoer, Wisconsin.

Treasurer: J. F. True, Kansas.

Chaplain: R. W. Searles, Medina County, Ohio.

Executive Committee: G. E. Mattimoe, Hawaii; K. G. Hayden,

District of Columbia; J. B. McGee, Georgia; J. C. Mays,

Miami, Florida; D. I. Offner, St. Louis, Missouri; A. W.

Weidner, Jr., Nassau County, New York; G. L. Delano,

Montana; N. Kalechman, Hartford, Connecticut; L. H.

DeGrange, Maryland; M. R. Dettler, Seattle, Washington.

H. E. CRAWFORD, *Chairman* C. H. STENDER

V. D. CAMPBELL J. F. TRUE

J. E. MAHONEY D. M. TURNBULL

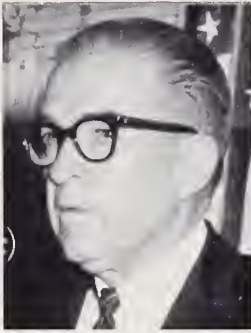
R. E. MEEK Committee on Nominations.

(There being no further nominations from the floor, nominations were declared closed and the officers nominated by the Committee were elected unanimously by voice vote.)

REPORT OF THE CONFERENCE COMMITTEE ON RESOLUTIONS

presented by R. H. FERNSTEN, *Chairman,*
County Sealer of Weights and Measures, Alameda County,
California

(Friday, June 30, 1967)



The Committee on Resolutions, having met and considered resolutions submitted to it by members of this 52d National Conference on Weights and Measures and other resolutions that originated with members of the Committee, now submits to this Conference for its consideration and action the following resolutions that have received the unanimous endorsement of the Committee.

There are included a number of individual resolutions which express appreciation for the arrangements for, conduct of, and participation in the National Conference. In order to expedite the handling of this phase of the Conference program, I request permission of the Chair simply to indicate those to whom appreciation is to be officially expressed:

1. To the Honorable Alexander B. Trowbridge, Secretary of Commerce, for his constructive contribution to the program of the 52d National Conference on Weights and Measures.

2. To the Director and staff of the National Bureau of Standards for their tireless efforts to insure a successful Conference in planning and administering the program and other details so essential to an interesting educational meeting.

3. To the Marshall Space Flight Center, National Aeronautics and Space Administration, for making available the services of Mr. C. T. Paludan, and to Mr. Paludan for the preparation and presentation of his fine address.

4. To Miss Betty Furness, Special Assistant to the President for Consumer Affairs, for her excellent and enlightening address to the 52d National Conference Luncheon.

5. To all program speakers and standing committees for their excellent presentations and contributions to the success of the Conference.

6. To all State and local governing agencies that have arranged for or made possible the attendance at this meeting of one or more representatives of their organizations to participate in the deliberations directed toward the betterment of weights and measures controls throughout the Nation.

7. To business and industry for cooperating with the Conference, for attending and participating in the Conference, and for contributing to the success of the Conference through their participation and their gracious hospitality.

8. To the management of the Sheraton-Park Hotel, who through the facilities and courtesies of its staff, has materially assisted in the conduct of the Conference.

The following resolutions are being read in whole in order that they might receive the consideration of the members of this Conference:

By unanimous resolution of the 52nd National Conference on Weights and Measures we wish to especially commend the Commissioner of Labor Lawrence W. Barker, his staff, and the State of West Virginia for the outstanding service rendered to the Conference in arranging for the signatory Certificates of Commendation by the fifty Governors of the Nation, to National Bureau of Standards Director Dr. A. V. Astin and the Bureau's Chief of Weights and Measures Malcolm W. Jensen. In arranging this Mr. Barker, serving as a representative of weights and measures officials throughout the nation, has done a significant service to weights and measures everywhere and has focused attention on weights and measures throughout the nation, therefore;

We do at this 52nd National Conference on Weights and Measures commend Lawrence W. Barker, his staff and the State of West Virginia for their having arranged for the most appropriate Commendation Certificates to Messrs. Astin and Jensen by the fifty governors of the United States of America.

R. H. FERNSTEN, *Chairman*

J. C. BOYD

P. W. GAITHER

H. P. HUTCHINSON

W. H. NAUDAIN

S. F. VALTRI

C. J. WILLS, JR.

Committee on Resolutions.

(On motion of the Committee Chairman, seconded from the floor, the Report of the Committee on Resolutions was adopted by voice vote.)

REPORT OF THE CONFERENCE AUDITING COMMITTEE

presented by I. R. FRAZER, *Chairman, County Inspector of Weights and Measures, Howard County, Indiana*

(Friday, June 30, 1967)



The Auditing Committee met on the morning of June 28 and inspected the financial statements of the Conference Treasurer, Mr. C. C. Morgan. We found them to be complete and accurate.

I. R. FRAZER, *Chairman*
L. H. DEGRANGE
G. L. DELANO
Committee on Auditing.

(The report of the Auditing Committee was adopted by voice vote.)

REPORT OF THE TREASURER

presented by C. C. MORGAN, *Treasurer, City Sealer of
Weights and Measures, Gary, Indiana*

(Friday, June 30, 1967)

Balance on hand June 10, 1966 \$ 9,726.89

RECEIPTS :

330 Registrations \$15.00 -----	\$ 4,950.00
Received from Trade Party -----	1,275.00
Extra Tickets for Park Trip -----	30.00
Extra Ladies Tickets -----	52.50
Bank Interest Accrued -----	365.26
 Sub Total	 6,672.76
 Total	 \$16,399.65

DISBURSEMENTS :

Dean Burshell, Music -----	250.00
University Hill Travel Center, Bus Tours to Summit Trail Ridge, National Park Entrance Fee and Chuck Wagon Dinners. Ladies Tour to Air Academy, Escorts and Luncheon at Broadmore Hotel -	5,330.25
Franklin Press -----	37.25
Burns Detective Agency, Inc., Service - The Brown Palace Hotel, Flowers Projection Equipment, Dance Beverages Food and Service, Ladies Hospitality Suite, Executive Breakfast and Headquarters Suite. -----	1,391.25
Mountain State Telephone Co. -----	33.50
Lawrence Barker, Conference Expense	59.27
International Business Machine Corp. Expense, Laws & Regulations Committee -----	30.00 919.79
Expense, Specifications & Tolerance Committee -----	721.36
G. G. Tauber, Badge Holders -----	95.00
Expense, Registration Desk (Cash) ---	189.58
Bank Charges -----	8.00
Sub Total	9,104.85
Balance on hand June 1, 1967	7,294.80

DEPOSITORY:

Bank of Indiana

First Federal Savings and Loan Company

(Signed) C. C. MORGAN, *Treasurer*

(On motion of the Treasurer, seconded from the floor, the Report of the Treasurer was adopted by the Conference.)

PERSONS ATTENDING THE CONFERENCE

Delegates—State, City, and County Officials

ALABAMA

City Sealer of Weights and Measures:

Birmingham 35203 L. T. WILLS, 406 City Hall.

ARKANSAS

State G. E. MILLER, Director, Division of Weights and Measures, State Plant Board, 421½ W. Capitol Avenue, Box 1069, Little Rock 72203.

CALIFORNIA

State W. A. KERLIN, Chief, Bureau of Weights and Measures, Department of Agriculture, 1220 N Street, Sacramento 95814.

County Sealers of Weights and Measures:

Alameda R. H. FERNSTEN, 333 5th Street, Oakland 94607.

Los Angeles M. H. BECKER, 3200 N. Main Street, Los Angeles 90031.

San Diego M. L. MCGLIN, 1480 F Street, San Diego 92101.

San Mateo H. E. SMITH, 702 Chestnut Street, Redwood City 94063.

Santa Cruz G. S. ANDERSON, 1010 Fair Avenue, Santa Cruz 95060.

Ventura E. H. BLACK, P. O. Box W, Ventura 93001.

COLORADO

State E. PRIDEAUX, State Inspector, Weights and Measures Section, Department of Agriculture, State Services Building, 1525 Sherman Street, Denver 80203.

H. H. HOUSTON, State Inspector, Oil Inspection Department, 1024 Speer Boulevard, Denver 80204.

CONNECTICUT

State F. M. GERSZ, Deputy Commissioner, Department of Consumer Protection, Room 105 State Office Building, Hartford 06115.

J. T. BENNETT, Chief, Weights and Measures Division.

W. B. KELLEY, Senior Inspector.

City Sealers of Weights and Measures:

Hartford 06103 N. KALECHMAN, 550 Main Street.

Middletown 06457 P. GRASSI, City Hall.

New Britain 06151 A. J. ALBANESE, City Hall, 27 W. Main Street.

DELAWARE

State ----- W. A. NAUDAIN, Director, Department of Weights and Measures, State Board of Agriculture, Dover 19901.

Inspectors:

W. C. BAUMGARDT

F. D. DONOVAN.

W. D. HUDSON.

E. KEELEY.

R. R. SMITH.

F. C. COLAMIAO, 2405 Jessup Street,
Wilmington 19802.

DISTRICT OF COLUMBIA

Weights, Measures, and Markets Branch, Department of Licenses and Inspections, Room 227 Esso Building, 261 Constitution Avenue, N.W., Washington, D. C. 20001.

District ----- B. A. PETTIT, Chief.

K. G. HAYDEN, Assistant Chief.

D. K. FORBES, Supervisor.

I. L. WAGNER, Supervisor.

Inspectors:

J. T. BENNICK.

R. E. BRADLEY.

J. M. BURKE.

H. J. DOUGLAS.

F. C. HARBOUR.

H. P. HUTCHINSON.

G. P. KOSMOS.

M. L. MATTHEWS.

W. A. MATTHEWS.

E. E. MAXWELL.

F. J. MURRAY.

W. W. WELLS.

FLORIDA

State ----- N. BERRYMAN, Director, Division of Standards, Department of Agriculture, Room 107, Nathan Mayo Building, Tallahassee 32304.

C. WOOTEN, Chief, Weights and Measures Section.

S. DARSEY, Inspector of Weights and Measures, 1118 S. 17th Avenue, Hollywood 33020.

City Sealers of Weights and Measures:

Jacksonville 32202 ----- H. E. CRAWFORD, Room 203, City Hall.

Miami 33133 ----- J. C. MAYS, Division of Trade Standards, Building Dept., 3319 Pan American Drive.

GEORGIA

State ----- J. B. MCGEE, Weights and Measures Division, Department of Agriculture, Agriculture Building, Room 330, Capitol Square, Atlanta 30334.

HAWAII

State ----- G. E. MATTIMORE, Chief, Weights and Measures Branch, Department of Agriculture, 428 S. King Street, P. O. Box 5425, Honolulu 96814.

IDAHO

State ----- L. D. HOLLOWAY, Inspector, Division of Weights and Measures, Department of Agriculture, P. O. Box 790, Boise 83701.

ILLINOIS

State ----- H. L. GOFORTH, Superintendent, Division of Feeds, Fertilizers, and Standards, Department of Agriculture, State Fairgrounds, 531 E. Sangamon Avenue, Springfield .62706.

City Sealers of Weights and Measures:

Chicago 60610 ----- R. J. FAHEY, Central Office Building, Room 302, 320 N. Clark Street.

60605 ----- L. PRENDERGAST, Vehicle Inspector, Public Vehicle License Commission, 1111 S. State Street, Room 105.

INDIANA

State ----- R. E. MEEK, Director, Division of Weights and Measures, State Board of Health, 1330 W. Michigan Street, Indianapolis 46207.

County Inspectors of Weights and Measures:

Clark ----- R. W. WALKER, Court House Annex, Jeffersonville 47130.

Floyd ----- E. G. SILVER, City-County Building, Room 325, P. O. Box 362, New Albany 47150.

Gibson ----- W. R. SEVIER, Court House Annex, Princeton 47570.

Grant ----- H. CLINE, P. O. Box 421, Marion 46953.

Howard ----- I. R. FRAZER, 113 N. Washington Street, Kokomo 46901.

Knox ----- W. D. LIDDIL, Court House, Vincennes 47591.

Lake ----- N. BUCUR, 15 W. 4th Avenue, Gary 46402.

LaPorte ----- E. HANISH, 2702 Franklin Street, Michigan City 46360.

Madison	C. W. MOORE, Box 84, Lapel 46051.
Marion	E. H. MAXWELL, Room G-4 City-County Building, Indianapolis 46204.
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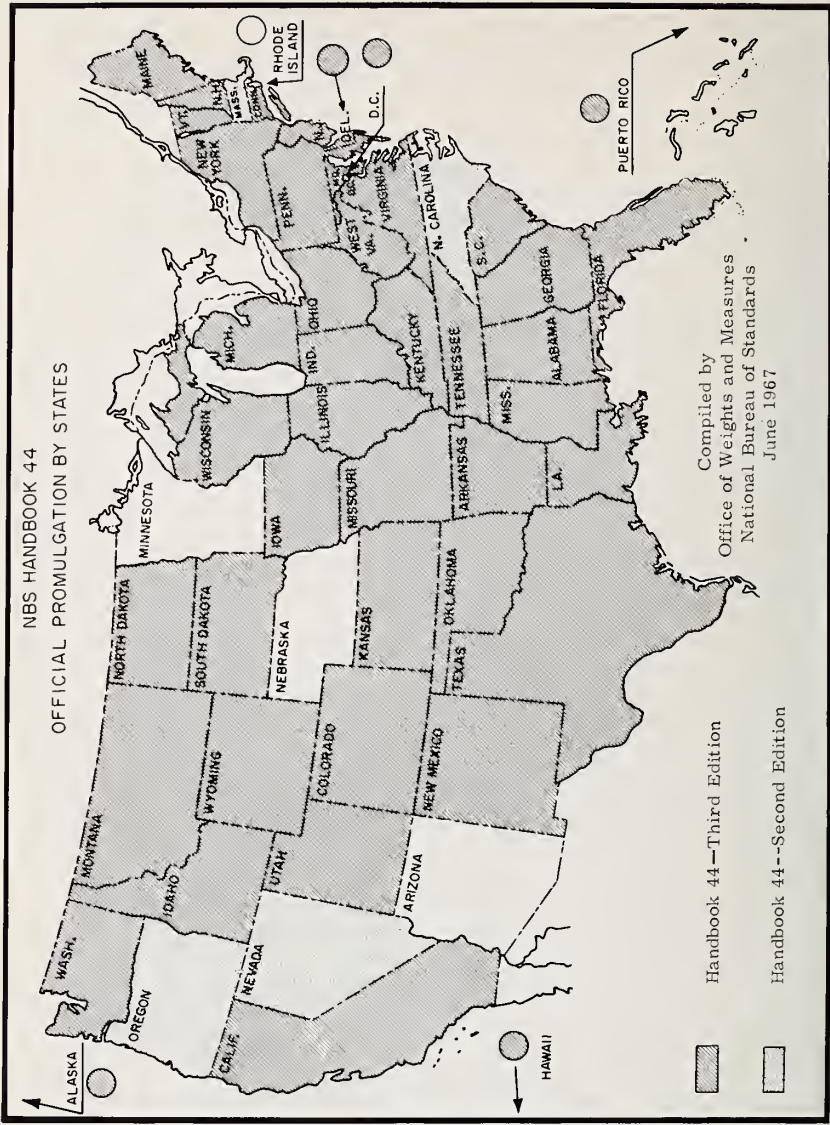
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