

STANDARDIZATION AND THE UNITED STATES

by  
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## PREFACE

For the past decade and more, the United States, through its military departments, other agencies of government, and private organizations, has placed a considerable investment in national and international standardization. A significant portion of this effort has gone into national standardization, but, with the increasing recognition of the principle of mutual defense and economic interdependence, an ever-increasing portion of the effort has been expended to achieve international standardization. However, in spite of good intentions and the application of considerable resources to achieve standardization, the results have been limited and the program, itself, has been marked with frustration, conflict, uncertainty, ignorance, open disagreement, and confusion. This is not directly a criticism of the personnel, agencies, and organizations participating in the program-- it is more a reflection of the conditions and circumstances encountered in society and in the processes of standardization.

For four years (1954-1958) the author of this thesis was in charge of the United States Air Force international standardization effort. During that period, he became uniquely concerned with many aspects of the United States national and international standardization programs. In consideration of this experience, while the author attended the Air War College of the United States Air Force (1958-1959)

he was given authority to conduct an extensive research of the problem of standardization. Based on this research and his personal experiences, the author then prepared for the United States government a lengthy history of the problem of standardization in the United States together with a discussion of the current national and international policy, organizational, and other problems. Due to the sources of much of the information used by the author in this governmental report and the nature of some of the conclusions, the document cannot be made public. However, since there is an almost complete lack of writings in the United States on this most vital national and international subject, the author considered it worthwhile to devote this thesis to discussing those general portions of the problem that were not of a sensitive nature.

In the bibliography appended to this thesis, the author has indicated the full range of the more important documents and information sources to which he has had access. It is not thereby implied that all the cited sources have been used directly in this thesis, but the listing will serve to give the reader a feel for the base upon which the author has built this thesis.

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## CHAPTER I

### THE NATURE OF STANDARDIZATION

"Now throughout the empire carriages all have wheels with the same tread, all writing is with the same characters, and for conduct there are the same rules."<sup>1</sup>

What is standardization? Countless people have asked this question and as many replies have been provided.<sup>2</sup>

Contrary to popular reaction, standardization, far from a narrow and specialized technical undertaking, is a vast and complex discipline. As a result it has become the subject of considerable interpretation and misinterpretation.

Standardization is, as Willis S. MacLeod stated in 1947, "a much-maligned and badly used word and perhaps should be taken out of our vocabulary . . . for the simple reason that it has to be interpreted

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<sup>1</sup>Confucius, The Analects of Confucius, "Doctrine of the Mean," C. XXVIII, Vol. 3, William Edward Soothill, The Analects of Confucius (Yokohama: Fukuin Printing Co., Ltd, 1910), p. 316.

<sup>2</sup>See as an example Benjamin Melnitsky, Profiting From Industrial Standardization (New York: Conover-Mast Publications, Inc., 1953), p. 1; Organization for European Economic Co-operation, Some Aspects of Standardization in the U. S. A. and in Europe (Paris: Organization for European Economic Co-operation, 1953), p. 10; John Gaillard, Industrial Standardization, Its Principles and Application (New York: The H. W. Wilson Co., 1934), p. 33; and P. K. McElroy, "What Standardization Is Not," Standardization, October, 1949, pp. 253-255.

very specifically on every case in point."<sup>3</sup> Conventionally, MacLeod is correct. Standardization may mean one thing to the political scientist and a totally different thing to the biologist, the chemist, the politician, or the law enforcement officer. More than that, standardization may embody totally different meanings for two people of the same profession or occupation. As a result most professional standardizers believe that a large part, perhaps the greatest part, of standardization is essentially agreement on definition. But it must be pointed out that these professional standardizers treat the problem of standardization in only a limited sense or for a specific and specialized purpose. As an example, the military standardization officers generally break their problem down into materiel and non-materiel areas and apply different definitions and rules to each.<sup>4</sup> In some instances these specialists further divide the materiel standardization into sub-areas such as: complete standardization, component standardization, functional standardization, functional interchangeability, operational interchangeability, and adaptability. In turn, they divide the non-materiel standardization into sub-areas such as: operations, administration,

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<sup>3</sup>Willis S. MacLeod, An address before the Industrial College of the Armed Forces, December 17, 1947 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>4</sup>U. S. Army, Army Regulation 1-70, "Standardization Among Armies of the United States-United Kingdom-Canada," June 25, 1957, and U. S. Air Force, Air Force Regulation 81-6, "Specifications and Standards--International Standardization Programs," October 18, 1955.

logistics, doctrine, organization, and training.<sup>5</sup> Each of these sub-areas, of course, involves varying definitions and rules. Along the same line, Benjamin Melnitsky pointed out that industrial standardization roughly involves specification standards, nomenclature standards, dimensional standards, testing standards, rating standards, standard practices, simplification standards,<sup>6</sup> and safety standards.<sup>7</sup> In government, the Federal Supply Service, the successor to the Bureau of Federal Supply, emphasizes commodity standards and acceptable product lists,<sup>8</sup> while the National Bureau of Standards emphasizes standards of measurement, quality, and service.<sup>9</sup> John Gaillard makes a great point about performance standards and standards of measurement as well as the division between basic and other standards.<sup>10</sup>

No doubt the listing of standardization variances could be carried on almost indefinitely for standardization runs the gauntlet of professions, trades, advocations, occupations, and interests. In a very

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<sup>5</sup>Ibid.

<sup>6</sup>Often referred to as "rationalization" standards in foreign countries.

<sup>7</sup>Melnitsky, op. cit., p. 14.

<sup>8</sup>Ibid., p. 206, and U. S. General Services Administration, United States Government Organization Manual 1955-56 (Washington: U. S. Government Printing Office, 1955), p. 407.

<sup>9</sup>U. S. General Services Administration, United States Government Organization Manual 1955-56 (Washington: U. S. Government Printing Office, 1955), p. 280.

<sup>10</sup>Gaillard, op. cit., Chaps. I and II.

real sense all forces of civilization--institutions, customs, laws, literature, art, science, education--involve standardization. This extremely broad application of standardization is clearly stated in the Encyclopedia Britannica where it is observed that:

Manmade standardization is not confined to language nor to weights, measures, money, energy, power, nor to the other material commodities or services subject to purchase. One finds standards in folklore, mythology, legend, taboos, in social customs, ceremonies, codes, practices, procedures, specifications and time. Standardization is important to geography, photography, chemistry, pharmacy, safety, insurance, education, games, sports, music, eligibility to the professions, ethics and religions. There are standards for soils, fertilizers, seeds, fruits, vegetables, grains, meat, poultry, dairy products, natural and synthetic fibres, and clothing. Standards are available for all kinds of aircraft, airposts, highways, bridges, building construction, air conditioning, heating, insulation, plumbing, refrigeration, and roofing. There are even standards for living and standards for success. From prenatal care through burial preparation and rites man has set up standards and incorporated them into law. <sup>11</sup>

But standardization even goes beyond the realm of human control. In fact, human accomplishment in this discipline is insignificant in relation to the accomplishments of nature. In nature one can observe such tremendous feats of standardization as the constellations, the orbits of the planets, the changeless normal properties of conductivity, ductibility, elasticity, hardness, permeability, refractivity, strength or viscosity of materials, the orbits of electrons within the atom, and the structure of cells.

What then is standardization? The answer is everything; yet nothing. It is everything in that it applies to every element of our world:

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<sup>11</sup>"Standardization," Encyclopedia Britannica, Vol. XXI, 19th ed.

material, psychological, and spiritual. But, of itself, it is nothing more than an idea, a concept, or, as some have termed it, a state of mind. Standardization has no mass nor dimension and it imparts no rays, sounds, nor odors. Nevertheless, it has shaped our entire society by its presence and by its absence. It is the element that makes possible a social structure and controls its growth and its decay. Socially, it forms the basis of language, the catalyst of our society. Beyond that, agriculture, industry, science, religion, politics, ideology, technology--everything embodies it. Researching this discipline, Franklin E. Powell observed that:

On historical reflection, standardization is readily discernible as a prevalent and socially sanctioned manifestation of human activity stemming from the earliest periods of social order, as in religious ceremony, protocol, etiquette, construction and furnishing of habitation, and general behavior pattern.<sup>12</sup>

A student of the discipline of standardization soon realizes that the processes of creation, learning, and growth all depend on standardization. As a discipline and as a concept it is the most dynamic and progressive approach to social, industrial, political, economic, and other problems that has been laid at the foot of man. With it he holds the world and the universe in his grasp. Without it he could hardly qualify as a vegetable.

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<sup>12</sup>Franklin E. Powell, "Some Aspects of Standardization and Economic Theory" (unpublished Master's thesis, School of Social Science, Catholic University, May, 1947), p. 5.

If the reader is now reacting adversely to the shadow of the proposition that is being unfolded, his reaction is normal. Standardization in the extreme is alleged to be the deprivation of human freedom.

Now it is true that standardization in any degree limits freedom of action or the right to be different. Anyone who doubts this should try to be a Communist in the United States; to drive on the left hand side of the road in Canada; to build a factory in a residential zone in Hollywood; to run a gasoline engine on water; or to connect a 110 volt appliance to a 220 volt power source. But if standardization did not exist anarchy would prevail, and where it does not exist anarchy does prevail.

It is admitted that any limitation of human behavior is a restriction of human freedom. But it is also recognized that unlimited human freedom and social order are incompatible. It is not intended that this thesis should become a dissertation on the political theories of human behavior and rights; however, it must be pointed out that the concept of human rights is nothing more or less than the limitation of freedom through social standardization or social contract. Nevertheless, it is recognized that most acts of standardization meet resistance both as individual acts and on the basis of principle. Along this line John Perry reported that in the era when standardization was being actively introduced by Herbert Hoover:

Some thoughtful men foresaw a threat to human individuality. Individual examples of standardization might seem trivial: slicing all bread to the same thickness and limiting the number of can sizes.

But when thousands of such limitations were added together, where would it end: If five hundred varieties could be reduced to twenty-five, why not to one? Were we on the verge of building a machine-like society in which everyone dressed alike, ate alike, and--ultimately--thought alike?<sup>13</sup>

Commenting on this trend, Albert W. Whitney observed in 1924 that:

It is not uncommon nowadays to see articles and editorials and letters in the public press deploring the state of uniform mediocrity that standardization will produce if allowed to have its way; this may even be considered a standard objection to standardization; in fact, with fine irony, a syndicated editorial on the evils of standardization has recently appeared in papers throughout the country.<sup>14</sup>

Unfortunately, the concept of standardization has succeeded in creating an unusual paradox by simultaneously stirring and reinforcing the two great but opposing social fears of change and of uniformity or conformity. On the one hand, standardization is viewed and resisted as a "change" to existing practices. On the other hand, standardization is viewed and resisted as the force of "uniformity or conformity" and thus the element that will prevent social change. Complicating this is the sordid fact that society is generally unwilling to view standardization in anything but all black or all white--all bad or all good. Commenting on this point, Melnitsky noted that "the layman and those in industry

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<sup>13</sup>John Perry, The Story of Standards (New York: Funk and Wagnalls Co., 1955), p. 133.

<sup>14</sup>Albert W. Whitney, The Place of Standardization in Modern Life, A paper prepared for the First Pan American Standardization Conference, Lima, Peru, 1924, originally published by the Central Executive Council of the Inter American High Commission, reprinted in Industrial Standardization, January, 1943, pp. 21-25.

who have not been fully or properly initiated into the subject often demonstrate the rather unfortunate tendency of confusing standardization with sameness."<sup>15</sup> In much the same sense, an anti-standardization reaction in the United States can be expected whenever standardization is emphasized by the Soviet Union. To the reactionary, when the Soviet Union decrees that enterprizes will not "turn out goods without properly labeling or marking them" and provides that they "must be produced under controlled technical conditions and according to specification,"<sup>16</sup> the practice of labeling and standardization automatically becomes an undemocratic process.

There is no doubt that standardization's far too common connotations are "monotonous uniformity," "regimentation," "dictatorship," "industrial goose stepping," "thought control," "dull mediocrity," "stagnation," and "living in the same houses, eating the same meals, reading the same papers, wearing the same clothes, and even looking alike." These conceptions, Melnitsky concluded, have:

. . . been fostered by many glaring examples of the misuses of standardization. The peas-in-the-pod houses which blight American suburbia, "standard" engineering methods which stifle inventiveness, building codes which enoble archaic construction methods--literally thousands of the other horrible examples offered by those in the anti-standardization camp come to mind. Yet, the standards tool should not be judged by its perverted uses any more than the motor car should be condemned for the frightening toll of human life lost in

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<sup>15</sup>Melnitsky, op. cit., p. 1.

<sup>16</sup>The New York Times, May 27, 1945, p. 12.

automobile accidents or the monkey wrenches damned for having been slipped between moving gears.<sup>17</sup>

These negative reactions to standardization which, incidentally, are widely held raise two important questions: first, standardization is either a real danger to human existence; or, second, a popular misconception exists.

Is standardization a desirable and necessary process; if so, what is its exact place in the world; and second, how is it susceptible of abuse and how can such abuse be avoided? This was a question analyzed in detail by Albert W. Whitney in 1924, and his analysis is still considered "one of the most basic documents on the philosophy of standardization."<sup>18</sup>

Some mention of standardization in nature already has been made. Whitney too used standardization in nature as a basis for his argument, for he believed that "the processes of nature and of men are, after all, very much alike."<sup>19</sup> The primary difference, he felt, lay in man's ability to experiment rather than to depend on mutation and trial in life itself to produce a standard.

In his view of the world of nature, Whitney saw a discrete and actually enumerable but ordered assemblage of types, each of which had a considerable degree of stability and among which certain type-conserving

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<sup>17</sup>Melnitsky, op. cit., pp. 1-2.

<sup>18</sup>Industrial Standardization, January, 1943, p. 20.

<sup>19</sup>Whitney, op. cit., p. 21.

forces operated, such as those that inhibit miscegenation. This establishment of a system of discrete and enumerable types in nature Whitney saw as the exact analogue of standardization as a purposeful human activity, and he felt the two were subject to the same laws and to the same abuses.<sup>20</sup>

Not only has nature developed types which can be enumerated and classified, but she has standardized for each a multitude of organs and functions. Individuals of the same species resemble each other in the minutest details of structure and function. If this were not so, organized life would be practically impossible. Everything would be an individual problem with no possibility of generalization. Institutions and customs would be impossible, for institutions and customs and laws depend upon an underlying sameness of reaction. . . . An underlying sameness is the basis for every civilization.

I do not overlook the fact that with this sameness goes along a strong flavor or variety and individuality. No two faces are exactly alike and no two temperaments and personalities are exactly alike, but this difference, which undoubtedly gives not only much of the charm to life but which is as well the cutting edge of progress, can flourish only on a deep-lying basis of uniformity. It is the differences that persist, some of them racial but many of them cutting across racial lines, that account for the actual diversity of civilizations and institutions. Thanks for the diversity, but still more deeply, thanks for the sameness that makes the diversity possible and effective!

There are, then, in nature these two fundamental different tendencies: First, a force that is continually operating to produce greater variety and, second, a force that is continually operating to eliminate unsuccessful variations and to concentrate upon relatively few types which in their main features are reproduced faithfully from generation to generation.

Now, both of these processes are absolutely necessary in a world of progress and each depends intimately on the other . . . .

When we come to the directed, purposeful evolution of human society the main lines are the same /as in nature/ . . . .

<sup>20</sup>Ibid., pp. 21-22.

Standardization is here . . . the selective and conservational force, the selection being made consciously, however, instead of through trial and error, although even in human standardization actual experiment has a large part to play.

When the type has been [selected by standardization], economic laws fortify the selection by directing the forces of mass production upon it and it assumes a place much analogous to that of a species in the world of nature. So, just as in nature, standardization operates to capitalize the advance by making it an actually prevailing type.

It is this effect that is commonly in mind when the attempt is made to evaluate the place of standardization in civilization. It is measured in terms of its effect upon mass production, it is evaluated as an instrument for making the advantages of life more abundantly available; and the critics of standardization also attack it at exactly this point, claiming that its effect is coarsening since its results are to be measured in terms of quantity rather than quality. They conceive of standardization as producing a world of universal, dull mediocrity in place of a world of color and scintillating lights and shadows and heights and depths that we have under the play of individual initiative.<sup>21</sup>

Many of the misconceptions surrounding standardization can be corrected simply by contemplating the rational rather than the irrational or diseased elements of the discipline. Some trends in this direction already seem to be taking place. The National Aircraft Standards Committee, as an example, in 1943 observed that: "It is evident that the principles and practice of standardization is in the ascendancy, that men of higher qualifications are volunteering, and are being assigned to the work by industry . . . ."<sup>22</sup> Similarly, Powell contended in 1947 that the word "standard" was actually acquiring a pleasant connotation much

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<sup>21</sup>Ibid., pp. 22-23.

<sup>22</sup>Industrial Standardization, May, 1943, p. 154.

like the word "engineer" and was being used loosely as an indication of desirability. This, he thought, was "evidently due to the reputation standards had acquired in promoting industrial efficiency."<sup>23</sup>

Rationally, the discipline of standardization embodies nothing more than the concept that identical or compatible solutions should be employed for recurring problems. In this context one can see that standards may be both rigid, as in the case of mathematics, or loose, as generally in the case of social mores; they may offer a range of rigid solutions, as in the case of measurements, or a range of loose solutions, as in the case of language; they may be a combination of all of these, as in the case of building codes. Rationally, standardization also embraces the principle that things standardized are not permanently fixed. Rather, the concept involves nothing more than a temporary leveling in a series of progressive steps forward.<sup>24</sup> Anyone familiar with the processes of standardization realizes that few standards tend to have everlasting properties. Accordingly, some standardization bodies require a complete review of all existing standards

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<sup>23</sup>Powell, op. cit., p. iii.

<sup>24</sup>Some standards may be formally recognized as temporary, but there may be a desire, regardless of developments, to retain the temporary standard over a relatively long period of time to permit widespread use and coordination. An early case in point was the recommendation made by Technical Committee No. 3, on Fits, of the International Federation of National Standardizing Associations, to the effect that the values on the manufacturing limits and the permissible wear of limit gages laid down in a system of fits between cylindrical parts developed by the committee should not be changed during the next ten years. (International Federation of National Standardizing Associations, Technical Committee No. 3, Resolution No. 7, adopted at Stockholm, 1930.)

on a definite time schedule. Revision of standards to reflect new requirements, technology, conditions, and knowledge is an accepted element of the standardization process. However, it is recognized that a high frequency of revision of standards is essentially incompatible with the basic idea of standardization.<sup>25</sup> Standardization thus is the theory that quality should be held within certain constants during a time period which is compatible with progress and organization. Since requirements, technology, conditions, and knowledge are constantly changing, standards will tend to lag these elements. But within the realm of good judgment and without destroying the basic discipline, every attempt is made to maintain the standards on a level with these elements. In the words of Robert A. Martino: "Standardization is the modern way of making permanent each advance that we make in our civilization."<sup>26</sup> The motto of the American Standards Association reflects a similar thought: "Standardization is dynamic, not static. It means not to stand still, but to move forward together."<sup>27</sup> Standardization viewed thusly is the basis of advance. As Whitney observed:

Variation is creative, it pioneers the advance; standardization is conservational, it seizes the advance and establishes it as an actual concrete fact. . . . If the world were broken up into an

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<sup>25</sup>As an example, see Gaillard, op. cit., p. 71.

<sup>26</sup>Robert A. Martino, Standardization Activities of National Technical and Trade Associations (Washington: U. S. Government Printing Office, 1941), p. 1.

<sup>27</sup>Quoted in all issues of Industrial Standardization, Standardization, and The Magazine of Standards.

innumerable number of forms, with no rallying point at which nature had carried on mass production, there would be no way of expressing the fact that the successful type had been discovered. In order to make progress not only must there be a better type, but it must be made the prevailing type.<sup>28</sup>

This being true, Whitney contended that the discipline of standardization must be recognized as underlying our entire social structure. Without the force of this discipline, he believed that there could only be chaos and anarchy.

Suppose the world of living nature really had the properties of a continuum; it would be a world of complete individualism; there would be no foci about which to group mass action, about which to gather the integrating and ameliorating forces of affection and loyalty. It would be a mad, restless, wearying world of infinite but meaningless variety and detail, obeying no laws except the laws of probability, to which even the molecules in their aimless wandering give allegiance.

Creative work in such a world as this would be an impossibility. Nothing would stay put; there would be nothing to stand on to make a fresh advance. All one's energies would be used up in meeting the idiosyncrasies of the immediate moment. In the field of industry each piece of machinery would be an individual problem, even each screw, each bolt, and each nut. What time would be left over amid such maddening detail for fresh advance?<sup>29</sup>

But, if without standardization there would be only chaos and anarchy, does the absence of the latter indicate the adequacy of the former? This, unfortunately, is the common allegation of the anti-standardization group: the statement that the absence of conditions of chaos and anarchy indicate a sufficiency of standardization.

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<sup>28</sup>Whitney, op. cit., p. 22.

<sup>29</sup>Ibid., p. 23.

It is true that we are not now in a state of chaos or anarchy, but does our present status attest that our standardization processes and standards are adequate? How far are we removed from the state of chaos and anarchy? And how far are we from the social order we advocate? Few indeed are those who are satisfied with the nation or the world as they find it today. But few are those who recognize that the state of the nation and of the world in the past, present, and future is and will be the direct product of the standardization process and the standards achieved. On this point Herbert Hoover commented that:

The public assumes that . . . progress has come from scientific discovery of natural laws, new materials, inventions, and increasing skills. But . . . the increase in our living standards and comfort has received an enormous contribution from the related ideas of standards, of simplifications and specifications.<sup>30</sup>

Man, it must be recalled, grew up in a vast system of compartmentalization which was reinforced by fear of that outside his own group. Nationalism, caste, creed, class, segregation, isolation, sovereignty, and the ghetto are all symbols of this compartmentalization. And within this system of human compartmentalization it was all too obvious that man would conceive a multitude of solutions for his problems and that these many solutions would become fixed within each given compartment of that society. That most of these solutions were arbitrary is unimportant. What is important is that the social circumstances of

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<sup>30</sup>Herbert Hoover, "The Crusade for Standards," Dickson Reck (ed.), National Standards in a Modern Society (New York: Harper and Brothers, Publishers, 1956), pp. 3-4.

man's growth prevented single solutions and this served to perpetuate and strengthen the compartmentalization that caused the uncoordinated solution in the first instance. As mentioned earlier, non-standardization can be and usually is a highly destroying influence in the social order.

Now in this age man is seeking more and more to remove the walls with which he has surrounded himself.<sup>31</sup> Today he is forced to think in terms of national, regional, and world unity, solidarity, cooperation, and friendship. Today he wishes to live in a peaceful community of nations--among friendly allies. Today he knows that no man, no nation, can guarantee his own survival. But these concepts are as empty words unless the walls with which man has surrounded himself are destroyed. And these walls can be destroyed only through standardization. Fortunately, the force of standardization has a cumulative constructive value in much the same sense the non-standardization serves to reinforce itself. But standardization must be initiated by man's will; it will not materialize of itself.

It is unfortunate that, contrary to popular belief, relatively few natural laws underlie the standards of society. True, the law of survival

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<sup>31</sup>In this regard it is now felt that effective standardization depends at least on national application. This was brought out by the American Standards Association in a pamphlet addressed to Latin America, Elementos de Normalización Industrial (New York: American Standards Association, 1943), p. 14: "La experiencia de los países de gran desarrollo industrial demuestra que la normalización no alcanza a su mayor de eficacia hasta tanto que se enfoca como problema nacional."

may be looked upon as a universal motivation for standardization, but it is hardly directly applicable to the solution of a standardization problem. Only in the case of the exact sciences are natural laws found that dictate some of the standards of society. In all other things standards are the individual or collective product of such things as rationalization, profit, cost, mutual advantage, comparative quality, practice, tradition, custom, pride, simple dictate, random selection, or arbitrary choice. Given a problem in which natural laws did not apply it was inevitable that man, in his socially disorganized environment, would produce a multitude of solutions for every problem. But a society cannot exist that employs a multitude of solutions for each of its problems. Society to exist must not conflict with itself but must mesh and flow in a given direction. Literally, social traffic must be regulated. This can be done consciously by formal standardization or surreptitiously by centralized direction. The ease of the latter is obvious, and it is thus a maxim that standardization generally tends to be weakest in a democracy and strongest in a dictatorship. This is not to denounce democracy; it is to emphasize that, to the extent centralized authority is weakened, to that extent standardization must be approached deliberately and consciously.

There is little question that standardization has always been a social problem, but there have been changes in scope. In ancient times standardization involved the individual, the family, and the tribe. Now it has moved in scope up through the national to the international levels. Today it is a problem of almost infinite extension and infinite facts.

Yet, it is a problem that is studied only superficially. This is not to say that it is ignored. On the contrary, today thousands of national and international bodies have standardization as their primary or secondary objective. These efforts, however, are more the result of the law of necessity than the application of a discipline. Any group of individuals that band together, whether at the local, national, or international level, soon find that their greatest obstacle to understanding and progress is the lack of standards. Of necessity these groups then endeavor to create standards to govern their conduct. Generally, however, these groups fail to understand the broad concept of standardization--the fact that standards to be effective cannot be developed in isolation or in compartments.

The idea of inclusive standardization, the idea that standardization to be effective must be all-encompassing, is recognized by some groups such as the International Organization for Standardization, the Universal Postal Union, the International Electrotechnical Commission, the International Telecommunication Union, and others. But one finds that, even with the large number of inclusive standardization bodies, standardization at that level is still a fertile field with new agencies being formed on a regular basis.

At present the United States is engaged in widespread international political, economic, and military activities and appears destined to remain so engaged. This has caused and is causing an ever greater emphasis of the discipline of standardization. However, this

emphasis is not uniform and varies from the lowest level of lip-service to the serious level found in the military structure. All other elements of the nation it seems may circumnavigate a lack of standardization with reasonable facility. But military forces are unable to do this. Successful military operations, national or international, are entirely dependent on a large number of standards and are enhanced by a host of others. Military, and particularly wartime military, requirements have thus tended to lead the way in national and international standardization. History shows that standardization always has been an important factor in warfare as well as in the preparation for warfare. One writer goes so far as to credit military forces for initiating both standardization and interchangeability:

The pressure of military demand not merely hastened factory organization at the beginning; it has remained persistent throughout its entire development. As warfare increased in scope and larger armies were brought into the field, their equipment became a much heavier task. And as their tactics became mechanized, the instruments needed to make their movements precise and well-timed were necessarily reduced to uniformity also. Hence along with factory organization there came standardization on a larger scale than was to be found in any other department of business, of industry, except perhaps in printing.<sup>32</sup>

The fact that the military lead in standardization means that it is not supported in this endeavor with equal vigor by the other elements of the government or of the nation. In other words, the nation does not

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<sup>32</sup>Brig. Gen. John K. Christmas, Joint Army-Navy Standardization, An address before the Industrial College of the Armed Forces, February 26, 1948 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

respond to standardization as an entity. It may be, in fact, that while the military earnestly need and support standardization other elements in the nation oppose it even though, in the final analysis, the future of the nation may be decided by military strength or weakness having its foundation in standardization.

It is physically impossible for a nation honestly to proceed in two opposing directions at once. Yet this condition often is found in international standardization. National divergence of purpose is evidenced in more fields than standardization; however, the inherent nature of the discipline of standardization--its consideration of the fundamentals of social strength and its elaborate and time-consuming processes--demand something more than a conflicting national purpose if real progress is to be made.

The road to national standardization is not easy to follow, but the road to international standardization is, by far, more complicated. If standards could be established on the basis of natural laws or even logic, standardization would be simple. But the creation of standards involves a host of other considerations, and if it is to be effectively pursued it must be supported by clear-cut, long term objectives, authoritatively supported. International standardization involves programs extending over two, five, ten, fifty, and even a hundred years or more. Unity and continuity of purpose thus become a prime necessity. That these conditions have not always prevailed may be all too obvious to the reader.

Nations are reluctant to speak in such long terms. Yet an international program cannot be successful without them. Even a national program cannot be successful without them.

From the foregoing, it should be apparent that standardization usually is not a natural process. The normal collision of ideas, customs, practices, procedures, and processes, when it does occur, tends to produce some standardization by the thesis-antithesis-synthesis process. But this is the exception rather than the rule. Most standardization of the current era has come about as a result of the violent collision of forces. Wars, economic competition, and power politics symbolize these collisions and a synthesis seldom emerges from them. Instead one of the original standards usually emerges in its pure form.

Opposing the normal collision and the violent collision concepts is the discipline of standardization wherein the end is sought consciously and with the least pain and disruption. This discipline recognizes the intrinsic value of standardization per se even though most of its disciples repeat with monotonous regularity that standardization is not an end in itself. Advancing from this point, the disciples attempt to create an atmosphere of organization, policy, understanding, and, in some cases, coercion whereby the desired ends can be achieved.

As a studied discipline, standardization is both new and of a growing and changing nature; therefore, it can be understood best and, perhaps, only in terms of historical development. On this assumption we will turn to an exploration of some of that history.

## CHAPTER II

### HISTORY OF STANDARDIZATION IN THE UNITED STATES PRE-WORLD WAR II

"The Congress shall have Power To . . . fix the Standard of Weights and Measures . . . ." <sup>1</sup>

The weights and measures in common use in the American colonies at the time of the American Revolution generally were of English origin and tended to be named the same as those in use in Great Britain. But they were far from being established on a scientific basis and a considerable lack of uniformity existed both within the colonies and as between the colonies and Great Britain. This was recognized by the framers of the Articles of Confederation and of the Constitution and provisions for a solution of the dilemma of non-standard weights and measures was written into both documents. <sup>2</sup>

When George Washington took the office of President of the United States he urged the new Congress to use its Constitutional power

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<sup>1</sup>U. S., Constitution, Art. 1, Sec. 8.

<sup>2</sup>For the very early history of standardization in the United States, the author leaned heavily on John Perry, The Story of Standards (New York: Funk and Wagnalls, 1955), John Gaillard, Industrial Standardization, Its Principles and Application (New York: The H. W. Wilson Co., 1934) and briefs of the American Standards Association as contained in the magazines: Standardization, The Magazine of Standards, and Industrial Standardization.

to give the new nation a national, unified system of weights and measures. Acting on this request, the congress set up a special committee to consider the matter and, in due course, this committee asked the first United States Secretary of State, Thomas Jefferson, for his recommendations.<sup>3</sup> However, this request came at a most unfortunate time for Jefferson and for the nation since it coincided with the French Revolution.

In France, Prince Tallyrand was acting with new authority and, like many national leaders of the past, he saw that unity of weights and measures was a key to national unity. Accordingly, he directed the Royal Academy of Sciences to construct a new system of weights and measures based on the decimalized system advocated by the Scottish instrument maker and engineer, James Watt. News of this action soon reached Jefferson and, while it laid before him the opportunity to give the United States a logical system of weights and measures, he responded with an indecisive report to Congress.<sup>4</sup>

Congress did not act on Jefferson's report and after a while Washington renewed his plea for Congressional action. But by then more news had arrived from France and Great Britain and there was

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<sup>3</sup>By this action the Congress apparently showed a recognition that, while it had Constitutional powers to fix the standards of weights and measures, that action had far reaching international implications. In any event, the general division of responsibility for standardization as between the legislative and the executive remains debatable to this date.

<sup>4</sup>This event is discussed at length in John Perry, op. cit.

reason to await further developments and decisions in those two countries regarding the adoption of the new French system.

The next year a third message from Washington prompted the Senate to appoint a special committee to look into the subject of weights and measures. Five months later this committee brought back a recommendation to adopt Jefferson's most radical plan. Startled, the Senate did nothing.

Three more years passed without Congressional action. By then the new French system, then termed the Metric System, had been formalized. In France, the Committee of Public Safety now invited all other countries to join with that nation in making the system world-wide, and Citizen Dombey was appointed as special ambassador to bring the French invitation to the United States. En route Dombey died and his papers were lost. Then some months later they were recovered and sent to the French Ambassador at Washington who presented them to the President who, in turn, sent them to Congress. For weeks thereafter the Congress took no action on this invitation. Then suddenly it burst into action voting down every system of weights and measures in sight: committee proposals, Jefferson's proposals, and the Metric System. United States measures, declared a House resolution, should be those now in use--whatever that meant.

Unfortunately, the Congressional approach to the problem of weights and measures was far from satisfactory and pressure began to

mount for more definite action.<sup>5</sup> A significant portion of this pressure came from the individual states which were discovering that without standard weights and measures interstate commerce was exceedingly difficult. Internationally, the problem was as bad. Complaints from foreign sources pointed out that international trade with the United States was difficult because collectors of customs had very personal ideas as to the weight of a pound or the size of a bushel. As an example, due solely to differences in the definition of common weights and

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<sup>5</sup>The extent of the problem was tremendous. In the early United States one could find such weights and measures as the palm, link, hand, nail, span, cubit, pottle, loom, way, last, firkin, kildren, strike, hogshead, tierce, pipe, butt, puncheon, wine gallon, beer gallon, ale gallon, and, of course, the undefined barrel. In Connecticut a bushel of wheat was 56 pounds while in surrounding states it was 60. Connecticut's bushel of oats weighed 28 pounds, but New Jersey's was 32, Kentucky's was 33 1/2, Missouri's became 35, and the Washington Territory's became 36. Meanwhile the bushel employed by the town of Alexandria, Virginia, dated back to a bushel that was popular in England in 1266 and which was defined in this manner: An English penny, called a sterling, round and without clipping, shall weigh thirty-two wheat corns, from the midst of the ear, and twenty pence shall make an ounce, and twelve ounces one pound, and eight pounds do make a gallon of wine, and eight gallons of wine do make a London bushel, which is the eighth part of a quarter. Even as late as 1902, Brooklyn had as legal the United States foot, the Williamsburg foot, and the foot of the 26th Ward. Since all were legal, confusion reached the point that some property could not be taxed because surveys could show that it didn't exist. But this was not a problem local to the United States. As an example, in the state of Baden, in the beginning of the nineteenth century, 112 different yards were in use. Nevertheless, it is shocking to learn that at the beginning of World War II the United States was still confronted with many major differences in weights and measures. An example of the extent of difference is aptly demonstrated in the weights accorded a bushel of pears. In 1942 these differences were listed as ranging from 58 pounds per bushel in five states, to 56 in two, 55 in one, 52 in one, 50 in four, 48 in four, 45 in seventeen, and a low of 36 in one.

measures, if a shipper landed his cargo in New York he might pay ten percent more import tax than if he docked in Philadelphia.

Acting on this pressure Congress passed a bill directing that sets of standards be furnished to the collectors of customs. This was an excellent idea except that the Congress failed to provide a set of standard weights and measures for the United States. Further, Congress now failed to appropriate any money to carry out the bill so the executive branch of the government was unable to implement the plan. Thus, in spite of Congressional action, customs collectors and others continued to use their own judgment as to the weight of a pound, the size of a bushel, and the length of a foot.

And so it went. State legislatures sent memorial after memorial to Congress pleading that something be done for interstate commerce as well as for foreign trade. President James Madison urged action. Committees were appointed and discharged. Bills were introduced into Congress and then allowed to die unreported.

Without doubt the situation was serious, but facing the alternative seemed to require an answer to the question of what Great Britain was going to do about the Metric System. The merit of the Metric System was secondary. If Great Britain decided to join France and the other nations in adopting the Metric System, the United States would have no choice other than to follow. But if the rest of the world did not unite, Great Britain retaining its standards and France the Metric System, the United States would have to face the difficult task of choosing between

the two. Ties with both Great Britain and France were strong and the United States was not yet an industrial influence of its own.

While the matter of the Metric System was being weighed, Congress, in 1801, was subjected to a revolutionary idea by the inventor of the cotton gin, Eli Whitney.<sup>6</sup> Whitney had obtained a small governmental contract to produce rifles for the new nation and in carrying out this contract he departed from the old production system of customized manufacture. Standardizing production operations, narrowing tolerances, and building reasonably accurate tools and jigs, Whitney was able to produce parts that were interchangeable between all rifles. This achievement amazed the Congress, but they failed somehow to comprehend the implication in the area of standard weights and measures. Whitney and his associates accomplished what they did in spite of the lack of standard weights and measures.

As time passed the problem of the Metric System became more complicated and it was soon denounced for its origins in the French Revolution. Religious feeling even arose against it for the Committee on Public Safety had included a calendar as a part of its reform.<sup>7</sup>

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<sup>6</sup>Contrary to popular opinion, a contemporary of Whitney's, a Frenchman named LaBlanc, had made guns of interchangeable parts at an earlier date than did Whitney. Further, Whitney's demonstration in 1801 was limited to the interchange of parts of locks only. Not until 1824 were a quantity of Hall rifles stripped and remounted in a full demonstration of standard parts.

<sup>7</sup>In this new calendar, the Sabbath was abolished, the week had ten days, the month had three weeks, and the twelve months were given revolutionary names. One day during the year and five days at the year's end were dedicated to the Lord.

Religious bodies striking out at this calendar also struck out at everything else included in the reform. Added to this, the scientists who had designed the Metric System were no longer available to explain it for they had fared badly during the Terror. What was even more disastrous for the System was that it was losing favor in France itself. Efforts to enforce it failed. By the time Napoleon I became Emperor in 1804, confusion was widespread with both old and new units in use and the names of each at times applied to the other. Then Napoleon contrived to make matters worse by sanctioning the measures usuelles.

This was the general state of the metric reform when John Quincy Adams, the Secretary of State, was asked to prepare a new report on weights and measures. To say the least, Adams was hesitant to add to the metric problems of the day. Further, congress had just standardized the nation's currency with considerable unhappy results, and it was felt that an attempt to standardize weights and measures would be even more unpopular.

Proceeding cautiously, Adams enlisted the aid of a man who was later to have a profound effect on the United States standards for weights and measures. This man, a Swiss immigrant named Ferdinand Hassler, helped Adams direct the first comprehensive survey of weights and measures in the United States--a survey that continues to affect United States policy to this date.

After studying the history of weights and measures in the United States and abroad, Adams wrote that reforms had but one object:

When weights and measures present themselves to the contemplation of the legislature, and call for the interposition of law, the first and most prominent idea which occurs to him is that of uniformity; his first object is to embody them into a system, and his first wish to reduce them to one universal system. His purposes are uniformity, permanency, universality: one standard to be the same for all persons and all purposes, and to continue the same forever.<sup>8</sup>

Then answering the obvious question of why these reforms had failed in the past, Adams stated that:

These purposes, however, require powers which no legislature has hitherto been found to possess. The power of the legislature is limited by the extent of his territories and the numbers of his people. His principle of universality, therefore, cannot be made, by the mere agency of his power, to extend beyond the inhabitants of his possessions. The power of the legislator is limited over time. He is liable to change his own purposes. He is not infallible: he is liable to mistake the means of effecting his own objects. He is not immortal: his successor accedes to his power, with different views, different opinions, and perhaps different principles. The legislator has no power over the properties of matter. He cannot give a new constitution to nature. He cannot repeal her law of universal mutability. He cannot square the circle. He cannot divide or multiply parts of the surface, the cube, or the sphere, by the uniform and exclusive number of ten.

The power of the legislature is limited over the will and actions of his subjects. His conflict with them is desperate, when he counteracts their settled habits, their established usages, their domestic and individual economy, their ignorance, their prejudices, and their wants: all which is unavoidable in the attempt to change, or to originate, a totally new system of weights and measures.<sup>9</sup>

Adams' case was most penetrating. The power of the legislature seemed not enough to achieve standardization. His own mortality and the traits of the people were obstacles to its realization. Even more serious was his untenable political position once he acted to approve standardization.

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<sup>8</sup> John Quincy Adams, quoted in Perry, op. cit., p. 65.

<sup>9</sup> Ibid.

Adams offered the Congress two choices if it were to carry out its Constitutional responsibility to fix the standard of weights and measures: tie the United States to the British or the metric system. But Congress, fearful of Adams' predictions, chose instead to adopt once more the course of cautious deliberation. Again memorials were made while resolutions bloomed and faded. Four years later Adams became the sixth President of the United States, but he had nothing to say on the subject of standardization. Thus the United States moved to the end of its first half-century without the pleas for standardization answered--without the authority given to Congress by the Constitution exercised. In the meantime Hassler, the man who had helped Adams prepare his report on weights and measures, was destined to succeed where Congress had failed.

In 1807 Congress directed that a survey be made of the United States coast. Hassler, who had planned the first scientific survey of Switzerland, submitted a proposal to the Secretary of the Treasury. In due course this proposal was accepted and Hassler was brought to Washington as the first superintendent of the Coast Survey. When finally provided money by Congress, Hassler embarked for Europe to buy surveying instruments, an item not available in the United States. But due to the political difficulties with Great Britain he was unable to return to the United States until 1812. When he did return he was caught in the wake of a vacillating Congress that alternately transferred the survey function to the Navy Department and back to the Treasury and then back to the

Navy and back to the Treasury again. While this was going on, Hassler acted to adopt a standard of measure for the United States without reference to Congress.

On his trip to Europe, Hassler had acquired the best available copies of the Troy pound and the kilogram. In 1830, while the survey function was temporarily in the hands of the Navy, Congress asked the Secretary of the Treasury to investigate the old problem of weights and measures in the customs houses. Since Hassler was temporarily free, he was given the job.

Two years earlier the Congress had legalized a pound weight for use by the Mint, but, except for this use, it had no legal status. Hassler now determined that this pound approximated the Troy pound and he accepted it as standard and went ahead with his investigations. Beyond that he also broadened his survey, without authority, to include the weights and measures of all governmental departments and states as well as those of the customs houses. His findings could have been forecast--scarcely two weights and measures used in the United States were alike. But Congress received Hassler's report in its usual manner--with caution and deliberation.

In the meantime Hassler acted on his own. Deciding for himself what the national weights and measures should be, he set up shop in a nearby arsenal and began manufacturing copies of his standards of weight and measure for distribution to the state governments. In time Congress discovered what Hassler was up to and, interestingly enough,

the House adopted a resolution supporting his action. Then in 1836 Congress passed a resolution directing the Secretary of the Treasury to do what Hassler had been doing: to supply the states with sets of standards. This function was to be retained by the Treasury Department until the National Bureau of Standards was created by Congress in 1901.

Three years after Congress took its first cautious step in the standardization of weights and measures, in 1839, 40 men--civil engineers from 11 of the then 27 states--met in New York to exchange ideas and information. From this initial meeting there evolved the American Society of Civil Engineers in November, 1852.<sup>10</sup>

This meeting of American civil engineers marked the serious introduction of engineering and technology in the United States. In 1830, the first locomotive had been placed in service in the United States. Production of locomotives started in the same year. New techniques were required to build roads and bridges strong enough to support the heavy rail loads. The growth of industries and development of better transportation facilities helped build up the cities with a corresponding increase in the demand for waterworks, pumping engines, systems of drainage, and gas works. This great expansion of engineering and technological activity was reflected in the need for orderly coordination

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<sup>10</sup>Initially the American Society of Civil Engineers was called the American Society of Civil Engineers and Architects; however, in 1868, a fragmentation of engineering specialities began to take place and the word "architects" was dropped from the name of the society.

and dissemination of engineering information and, subsequently, standards.

Marking this technological advance, in 1824 the Rensselaer Polytechnic Institute had been founded. In 1846 and 1847, this was followed by the establishment of engineering schools at Yale and Harvard. In 1846 the Smithsonian Institution was chartered. By 1848 locomotives had reached the speed of a mile per minute. In 1851 Morse telegraph was introduced for the control of trains.

Now, while the United States plunged through the ensuing fabulous fifties significant standardization steps were to be taken, mostly by individuals and companies with Congress acquiescing. Foremost, perhaps, was that taken by Brown and Sharpe who introduced a system of wire gage based on a rational, geometric progression. Little noticed at the time, this system was to remain a basic United States standard in years to come. Unfortunately, however, a similar system was to be established in Great Britain and, although using the same designation numbers, was to involve different dimensions.

Following almost immediately on the heels of Brown and Sharpe came a citizen to exert a lasting, profound influence on American standardization. This man, William Sellers, was an engineer, Philadelphia manufacturer, and president of the Franklin Institute. At the monthly meeting of the Institute, Sellers, on April 21, 1864, introduced his now famous paper on a "System of Screw Threads and Nuts." He stated that:

In this country no organized attempt has as yet been made to establish any system of screw threads, each manufacturer having adopted whatever his judgement may have dictated as the best, or as most convenient for himself; but . . . the extent to which manufacturing has attained, admonishes us that so radical a defect should be allowed to exist no longer.<sup>11</sup>

Sellers, like Hassler, acted where Congress should have acted. There is little doubt that Sellers' solution removed a major obstacle to United States industrial expansion, but it also laid the basis for a problem that was to exist for and, perhaps, beyond the next century. For one thing, efforts were already underway to internationalize the metric thread systems that had been used in European Continental countries since 1848; for another, Joseph Whitworth had in 1841 put forth a different thread design that was to become the basis of the United Kingdom system. Again the United States and the United Kingdom were to diverge on a basic standard.

Following the Civil War, the continued advance in engineering and technology resulted in the formation in 1871 of the American Institute of Mining and Metallurgical Engineers. Then in 1874 and 1880 there were organized the American Institute of Electrical Engineers and the American Society of Mechanical Engineers.

Internationally, with the coming of electricity and the telegraph, communications leaped across national borders, but it was soon found that varying national practices and equipment were destroying the usability of this invention. Thus in 1865 there was organized the

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<sup>11</sup>William Sellers, quoted in Journal of the Franklin Institute, May, 1864, p. 344.

International Telegraphic Union,<sup>12</sup> Postal communications were presenting similar problems and in 1863, the year Congress set the Union Pacific Railroad gauge at four feet, eight and one-half inches, representatives of fifteen countries met to consider international postal problems, but the Universal Postal Union<sup>13</sup> did not come into being until 1878. Twelve years after the international postal meeting, in 1875, the International Bureau of Weights and Measures was organized with United States representation. These three international standardization organizations provided the world with its first experiences in standardization at the international level. And all of these organizations were subscribed to by the United States but somehow the United States did not thereby embrace the idea of standardization.

Now related to the pressing demands for standardization in the field of communications was the need for standardization in the new field of electricity. This brought several congresses together during the latter part of the nineteenth century with the Chicago Electrical Congress of 1893 actually reaching the point of defining the words "ohm," "volt," and "ampere." And upon the termination of the Chicago Electrical Congress, the United States Congress, after over a century of reluctance to act in the field of standardization, took the unprecedented step of legalizing these definitions. Unfortunately, it was soon discovered that

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<sup>12</sup>The International Telegraphic Union became the International Telecommunication Union in 1932 as a result of a merger into one convention of radio, telegraph, and telephone.

<sup>13</sup>Initially termed the General Postal Union.

the definitions provided by the Chicago Electrical Congress were not entirely accurate, and so the United States Congress had Adams' earlier warning regarding the limits of the legislature in the field of standardization vividly emphasized.

While all these international standardization actions were taking place another United States citizen acted to fill the tremendous standardization void left by Congress. This man was Charles Ferdinand Dowd an ordinary citizen who, in 1860, was principal of the Temple Grove Ladies Seminary at Saratoga Springs, New York. At that period in history, time was still a local choice. This would not have been too serious except that the introduction of rapid transport, the railroad, made the coordination of wide areas of activity on a time basis a necessity. However, since no action had been taken to provide the nation with a uniform time system, the cities and the railroads elected to establish their own. The dilemma thus caused cannot be overstated. Dowd rebelled against this arrangement and devoted twenty years of his life fighting it. Finally, with the help of an exasperated public, he succeeded in winning over the American Railway Association which adopted the idea of standard time belts for its members on November 18, 1883.<sup>14</sup> In the interim, the standardization of time had been fought vehemently on political, constitutional, and religious grounds--a

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<sup>14</sup>A traveller from Maine arriving in Buffalo might find his watch reading 12:15, the Buffalo city clock reading 11:40, the New York Central assuring him it was 12 noon, and the Lake Shore Railroad asserting it was 11:25.

pattern that was to be repeated in the United States many times in the years to come.

In industry, in the meantime, a revolution was underway. About 1885 Carl Edvard Johansson in Sweden; and Brown and Sharpe, and Pratt and Whitney in the United States; and others developed a broad system of gaging equipment. Following on the heels of this came the modern miracles of mass production and the assembly line.

The effects of rapid transportation, rapid communications, and technological advancement were now beginning to be felt throughout the United States. It was this and the force of industry and education that finally moved Congress to act with greater logic and on March 3, 1901, it established the National Bureau of Standards.<sup>15</sup> But this action still followed by over a decade the establishment of Germany's Imperial Physical Technical Institute.

Hassler's standards were still in use, but the old Office of Weights and Measure in the Treasury Department was not equal to the task of the day for need now exceeded by far the simple requirement for the custody of a few physical weights and measures. The United States now needed precise standards in many fields. England, France, Germany, and Russia already were far ahead in the physical sciences and each had in being a substantial national physical laboratory. No equivalent facility existed in the United States and, because of this and the

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<sup>15</sup>U. S. Congress, Act of March 3, 1901; 31 Stat. 1449; 15 U. S. C. 271.

lack of standards, United States science, education, and industry were lagging.

While the Congress apparently did not realize it, the United States and the world in 1900 was on the threshold of the age of standardization. Industry, education, and trade standards were becoming the subject of the day and were rapidly forming the basis of explosive expansion. But at the turn of the century when gage development, gage usage, and quality control were coming into their own, United States manufacturers could devise standards and yet those standards had no firm basis in terms of national standards. Both measuring and testing equipment were poor or non-existent. Commenting on this the National Academy of Sciences, at its annual meeting in 1900, pointed out that:

The facilities at the disposal of the Government and of the scientific men of the country for the standardization of apparatus used in scientific research and in the arts are now either absent or entirely inadequate, so that it becomes necessary in most instances to send such apparatus abroad for comparison.<sup>16</sup>

Unfortunately, at the beginning of the twentieth century the accuracy of most scientific and industrial gear could not be determined in the United States and unless it bore a European seal it was considered of unknown reliability. Even the Navy Department had to send its navigation instruments to Germany for calibration. Old and new industry and old and new science were being torn asunder by the lack of standards. Typical of the day were the problems being encountered by the new electrical industry. While in 1893 certain key definitions had been

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<sup>16</sup>Perry, op. cit., p. 128.

provided this industry, it still lacked such fundamental standards as brightness tests and suffered severe disintegration from the some 200 varieties of lamp sockets and 10,000 varieties of lamps in being.

In 1900 the United States and the world were at the stage where either standardization became a basis for progress or social disorder took over. Fortunately standardization won out, but it was not always the result of logical thinking or by a significant margin.

From 1900 on there was a marked growth in the number and size of national standards associations and societies. Foremost of these was the American Society for Testing Materials which was formed in 1902. In that same year the National Association of Automobile Manufacturers established its first three standards.<sup>17</sup>

Internationally, the electrical congresses that had been meeting during the last of the preceding century now conceived the idea of a permanent organization capable of carrying out international electro-technical standardization in a methodical and continuous manner. Acting on this conclusion the St. Louis Congress of 1904 entrusted Col. R. E. Crompton of the United Kingdom with the organization of such a body and in 1906 it was established as the International Electrotechnical Commission. Four years later, in 1910, the first, but unsuccessful, attempt to reach international agreement on civil aviation was made by nineteen European nations.

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<sup>17</sup>In 1917 the National Association of Automobile Manufacturers became the Society of Automotive Engineers.

In the United States the year 1910 saw standardization raised again to Congressional level. Congressional complaints that procurement was inefficient and should be standardized led to the creation by the Executive of a General Supply Committee. A year later, this committee was to be placed under the wing of the Treasury Department by Congress.

But 1910 should be remembered in standardization circles more for the fact that that year Henry Hess, a member of the Standards Committee of the Society of Automotive Engineers, visited Europe and came back to the United States impressed with the need for centralized national standardization and some form of international standardization. It was this single visit that was to result, in 1918, in the formation of the American Engineering Standards Committee, the forerunner of the American Standards Association. In this instance, as so often had been the case in the past and was to be the case in the future, the United States was to take the lead from the United Kingdom and such persons as Col. Crompton, L. S. Robertson, and Charles le Maistre, the organizers of the British Standards Committee, later the British Standards Institute.

During the next year, 1911, at the urging of Hess, a United States committee on Joint Engineering Standards met several times to study his recommendations for organized standardization. Advancing from these discussions, in 1912, Hess was planning "that every engineering society or technical body having interest in standards work

of any kind would form a special Joint Engineering Standards Committee."<sup>18</sup> With little doubt, the urging of Hess was finding support for in May of that year the Council of the American Society of Mechanical Engineers voted:

. . . that the Society officially invite the sister engineering societies of the world to appoint committees similar to our own Committee on Standards and, upon the receipt of a sufficient number of acceptances in the judgment of our Committee on Standards, that a conference be held of these, or delegates from these committees and societies, for the formulation of a clearing house to assist in the formulation of standards for the engineering profession.<sup>19</sup>

But the mood of most such organizations was to form first a national coordinating body before proceeding to the international problem.

While the national and international organizational problems were being argued, primarily along engineering lines, another standardization concept was being introduced. This was managerial standardization. In 1912 this concept of standardization, notably as advocated by such disciples as F. W. Taylor, was discussed before a Special Committee of the House of Representatives. Now it was recognized that the performance of an organization as a whole depended on the integration of numerous daily tasks carried out by individuals and that standardization was an absolute necessity to the success of the whole.

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<sup>18</sup>Henry Hess, Letter for F. L. Hutchinson, Secretary, American Institute of Electrical Engineers, May 23, 1912, quoted in Industrial Standardization, December, 1943, p. 318.

<sup>19</sup>Industrial Standardization, December, 1943, p. 319.

Standards for measuring work performance and other standard managerial tools came into their own.

In that same year, 1912, Carl Edvard Johansson started making gageblocks for the American market.<sup>20</sup> But, somehow, Johansson had to overcome the old inch/metric controversy to produce Johansson blocks to meet American needs. This he accomplished by adopting an inch-milimeter conversion ratio of 25.4. The difference between his ratio and the then United States legal ratio, which was about 25.400051, he used as the plus tolerance on his most accurate blocks. This action taken by a Swedish citizen was to have as lasting an effect on the United States system of measurement as Sellers' action had on the United States system of screw threads.

The year 1913 saw a joint meeting of electrical and mechanical engineers, the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, but further joint action temporarily was held up by the urgencies of World War I. Yet, in 1916 the American Society of Mechanical Engineers agreed to approach the American Institute of Electrical Engineers, the American Society of Civil Engineers, and the American Institute of Mining Engineers for the purpose of achieving cooperation in standardization and to avoid duplication and working at cross purposes. This idea was accepted and on December 29, 1916, the first meeting of the Joint Conference on American

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<sup>20</sup>Carl Edvard Johansson, in 1846, designed the method of gaging which bears his name. Since then his system has become world-wide.

Engineering Standards was held. This Committee recommended the formation of an American Engineering Standards Committee in which United States governmental representation was advised. But action on this recommendation was not to take place for two years.

Unwittingly, the standardization that was achieved in the first sixteen years of the twentieth century made World War I technically and logistically possible. Yet, the standardization achievements that accumulated in that period were as minutiae in comparison to the possibilities. It is now seen that standardization rather than money, men, materials, or the consent of the Congress frequently was the ingredient that prevented the optimum build up of United States military forces.<sup>21</sup>

Perhaps nothing had as great an impact on United States standardization as did World War I. The War Industries Board, appointed by President Woodrow Wilson to manage war production, seized upon standardization as a basic strategy to conserve materials and production capacity. Within a relatively short period of time drastic reductions were effected. Approximately 5,500 styles of rubber footwear were eliminated; 446 models of washing machines were reduced to 18; 550 types of harrows were reduced to 38. Similar standardization orders went out to almost three hundred industry groups.<sup>22</sup> But the only real

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<sup>21</sup>The New York Times, June 18, 1917, p. 8: "There is no lack of material. . . . All that is lacking is the consent of Congress."

<sup>22</sup>Perry, op. cit., pp. 131-132.

standards agency in the United States in 1917 remained the National Bureau of Standards.

The work of the National Bureau of Standards in World War I is little known. However, it must be recalled that the Bureau, in addition to its standardization capability and prowess, in 1917, was one of the better scientific and research and development agencies in the United States. This additional capability was developed as a necessary adjunct to its standardization responsibilities. The research, development, testing, and standardization work of the Bureau during World War I was enlarged to the point where most war materials at some stage passed through its hands. Aeronautical research, the synchronized cannon, engines, fuels, hydrogen-helium problems, signalling devices, instruments, and thousands of other wartime items came within the jurisdiction of the Bureau. With little question, the United States moved into World War I essentially a militarily backward nation, and it was largely through the standardization and related efforts of the Bureau that the United States was partially able to catch up.<sup>23</sup>

Pure military standardization in World War I had its problems. In the field of aeronautics, which was reasonably typical of the overall

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<sup>23</sup>This is not to discredit the contributions of the National Advisory Committee for Aeronautics, the Council of National Defense, or other organizations. It is, however, to emphasize the direct and indirect benefits of standardization which, at that date, were epitomized by the National Bureau of Standards.

wartime standardization program, a Joint Board on Aeronautical Cognizance was organized by the Army and the Navy in January, 1917, to stimulate air cooperation. But this Board was more interested in jurisdictional agreements than in operational and procurement economy, and standardization did not appear on its agenda. About the same time another joint Army-Navy board recommended that airplane types adopted by the Army and Navy be "as nearly alike" as consistent with their particular missions; that "aircraft motors, machinery, radio sets, bombs, and other accessories" should be standardized "to the greatest extent compatible" with such missions; and that "there should be had the mutual interchange of ideas and joint cooperation that now obtain in the design and construction of the first Zeppelin."<sup>24</sup> However, standardization as a function was not assigned anywhere in the Air Service, and it was not until after World War I that the Aeronautical Board<sup>25</sup> was expanded to cover standards for parts and materials, and an Army-Navy Specifications Unit was set up as part of the Engineering Division at McCook Field, Dayton, Ohio.

While some good steps and some poor steps were taken in the field of national standardization, the international picture hardly lent

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<sup>24</sup>U. S. Army, Memorandum for the Secretary of War by Board of Army and Navy officers relative to the development of an aeronautical service, March 12, 1917 (in the files of the Department of Army, file: AAG 334.7).

<sup>25</sup>The Board of Aeronautical Cognizance was renamed the Aeronautical Board on December 29, 1919. Many writers, however, place the origin of the Aeronautical Board as 1916. (See as an example Col. D. G. Lingle and Capt. G. A. Seitz, "Army-Navy Aeronautical Standardization," SAE Journal, November, 1942, p. 32.)

itself to any good actions. Insofar as international standardization was concerned, the United States and the Allies were not only faced with differences between the standards of the metric and British systems but there were major differences as between the United States and the British systems. When the United States entered World War I, and even before, it was faced with the tremendous problem of either producing according to current United States standards (which varied even as between like-type industries) and not consider how the resulting non-standard items would blend with existing items; attempting to modify United States industry to produce in accordance with either the metric or British standards; or attempting to modify the metric and British standards to coincide with the real and fictional United States standards. These points were discussed at length throughout the war but were never conclusively resolved.

When the United States entered World War I, it was visited shortly by British and French Missions. The purpose of these Missions was to coordinate the war effort and, after they had studied the standardization problem, they suggested that United States soldiers should use existing types of military equipment and that the United States should endeavor to support the necessary increased production in those two countries. Gen. Tasker H. Bliss appeared to support this concept when he asked the question: "Why should we introduce new calibers on the line while rifles and guns and ammunition, in increasing numbers, are waiting for us to use them, with no chance of confusion

due to different types."<sup>26</sup> Extending this idea Bliss considered the matter of standard communications and suggested that United States forces should train with the British rather than with the French.<sup>27</sup>

World War I standardization difficulties finally multiplied to the point where the Congress took cognizance of them and it reached the conclusion that one of the principal problem areas lay in threaded parts. This is, of course, true since in the manufacture of almost every implement of war the screw thread plays an important part. Unfortunately, the Congress should have thought of this in 1864 when Sellers was putting forth his basic proposals in the Franklin Institute. Now the United States and Great Britain were basically committed to a Sellers and Whitworth thread respectively while France produced in accordance with metric standards that were based on international standards of 1898.<sup>28</sup> Nevertheless, it was felt that something had to be done and in July, 1918, the Congress appointed a National Screw Thread Commission to investigate and promulgate standards for screw threads. One year later, and after a thorough study of conditions of screw manufacture in the United States,

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<sup>26</sup>Gen. Tasker H. Bliss, quoted in Frederick Palmer, Bliss, Peacemaker, The Life and Letters of General Tasker Howard Bliss (New York: Dodd, Mead and Co., 1934), p. 151.

<sup>27</sup>Ibid., p. 148.

<sup>28</sup>International metric standards were agreed at the Zurich Conference of 1898. While national metric standards tended to vary somewhat from the international standard, the differences were slight. (John Gaillard, "What Is the Present Status of Metric Screw Thread Standards?" Industrial Standardization, August, 1945, pp. 183-187.)

the National Screw Thread Commission conferred with British and French engineers and manufacturers of screw-threaded products for the purpose of discussing a tentative report which it had prepared as a basis for international standardization. But while the three countries seemed anxious to cooperate, no agreements were reached and eventually, with the coming of the peace, the idea was deemphasized.<sup>29</sup>

While this activity was going on at the governmental level, United States industry was finding an ever-increasing need for standardization. But it was also realized that unlimited freedom in drawing standards was leading to much overlapping and duplication of work, and, more important, was tending to defeat the very purpose of standardization by perpetuating unnecessary varieties and even creating conflicting standards. Acting on these conclusions, five leading engineering societies set up on October 19, 1918, the American Engineering Standards Committee.<sup>30</sup> The War Department, the Navy Department, and the Department of Commerce were invited to participate in this committee and they accepted.

These and the many other standardization actions that took place as a result of World War I were, however, generally too late to have any

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<sup>29</sup>Combined Production and Resources Board, Report of Conferences on Standardization of Screw Threads and Cylindrical Fits, London, August-September 1944 (Washington: U.S. Government Printing Office, 1944), p. 2.

<sup>30</sup>The American Engineering Standards Committee was established by the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Society for Testing Materials, and the American Institute of Mining and Metallurgical Engineers.

material effect on the conduct of that war. Nevertheless, Lord Stevenson, Vice Chairman of the Ministry of Munitions Advisory Committee in Great Britain said: "If simplification and standardization had not been adopted, we would have lost the war."<sup>31</sup> Unfortunately, these words tended to be lost in the mountains of literature that fell upon man after the close of World War I.<sup>32</sup>

With the cessation of hostilities, the military forces found themselves with huge stocks of war materials deluging their supply systems. The net result was that, for many years to come, they were more engrossed in the use of this equipment than in a standardization program. Industrially and commercially the change from war to peace production brought a great scramble within these groups to capture markets and consumers. In this scramble differences rather than standardization had to be emphasized. Nevertheless, it was found that industries were becoming more dependent on each other in terms of sub-contractors and suppliers. Further, the industries were finding it exceedingly difficult to work in an atmosphere where states and even

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<sup>31</sup>Lord Stevenson, quoted by Howard Coonley, "The Importance of Standardization to Our American Enterprise," An address before the Industrial College of the Armed Forces, February 19, 1948 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>32</sup>One point not lost at the end of World War I was the impending role of aeronautics and the need for international aeronautical standards. The 1919 Versailles Peace Conference created the International Convention for Air Navigation and the International Commission for Air Navigation, the forerunner of the International Civil Aviation Organization.

localities could each specify standards applicable to the industries. This difficulty was highlighted in the many conflicting safety standards that were in use in the United States.

It had originally been intended that the National Bureau of Standards should develop national safety standards for industry. This work was recognized to be of great importance since each state had its own legal safety requirements, and their diversity was an embarrassment and problem to industry. However, the Bureau did not act to provide these standards and an industry-wide conference gave the problem to the American Engineering Standards Committee providing it extend its membership to be more representative of industry. This was done, and in 1920 work on industrial safety standards was started. This endeavor proved successful and the American Engineering Standards Committee's standards were, in a large measure, adopted by the individual states.

The same year that the American Engineering Standards Committee initiated work on industrial safety standards, it organized a Sectional Committee of Standardization and Unification of Screw Threads. This Committee cooperated with the wartime National Screw Threads Committee in developing a National Screw Thread Standard and, in 1924, the first edition of that standard was published.

As a result of the success in safety standards, screw thread standards, and other areas, the stature of the American Engineering Standards Committee was increased and its future seemed to be assured

on lines similar to those of the European national standardization bodies.<sup>33</sup>

While this post-World War I standardization activity was taking place within industry, the rising economic difficulties of the United States were destined to lead to increased national standardization actions. These difficulties prompted Herbert Hoover, then president of the Federated American Engineering Societies, to champion the establishment of a committee to study ways to reduce the high cost of living. This committee drew attention to the manner in which industrial effort was thinly spread over an excessively wide range of products. It considered that as a result there was a wastage of about fifty percent or \$10,000,000,000 a year, and it recommended that the Department of Commerce should assist industry to concentrate its effort, particularly in regard to governmental supplies. But this recommendation was not accepted by the government on the basis that it was essentially an industry problem. Then when Hoover became Secretary of Commerce a few years later, he directed the National Bureau of Standards to set up new divisions to promote the adoption of commercial standards and simplified practices. The Director of the Bureau, Samuel W. Stratton, objected that this was not the kind of thing that the Bureau ought to do, but Hoover overruled him and the function remained with the Bureau until 1950.<sup>34</sup>

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<sup>33</sup>See Appendix A for a description of "Standardization in European Countries."

<sup>34</sup>Stratton objected on the basis that commercial standardization was not a research project and was loaded with controversies, long range

By 1926 the screw thread problem that had been dropped at the end of World War I raised its head again. In that year a British mission, headed by Sir Richard Glazebrook, visited the United States to attempt to resolve the basic differences between the British Whitworth screw thread and the United States standard which embodied Sellers' design, the American National Screw Thread. But the compromise offered by the British was not considered acceptable by the United States and no agreement was reached. There the matter rested until the exigencies of World War II brought it to the fore again.<sup>35</sup>

During the same year that the British screw thread mission visited the United States, an international conference of standardization bodies convened in New York and founded the International Federation of National Standardizing Associations.<sup>36</sup> Two years later, in Prague, its constitution was approved. But the International Federation of National Standardizing Associations was, as one observer noted, "largely under

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implications, and hazards. Commercial standards do not usually have a scientific basis and Stratton felt this activity would open the National Bureau of Standards to political attack which it later did in such notable controversies as the AD-X2 battery additive case.

<sup>35</sup>The National Screw Thread Committee did not actually disband until 1933. Six years later, to meet the need for screw thread standards, the Departments of War, Navy, and Commerce established the Inter-departmental Screw Thread Committee.

<sup>36</sup>The origin of the International Federation of National Standardizing Associations actually dates back to April, 1921, when a Conference of Secretaries of the National Standardizing Bodies was held in London under the auspices of the British Engineering Standards Association. Attending were representatives of Belgium, Canada, Great Britain, Holland, Norway, Switzerland, and the United States.

the aegis of technical men and any industrial interest behind it was spotty . . . . [Further] the two large world trade nations, Great Britain and America, were not overly energetic insofar as their respective commercial interests were concerned."<sup>37</sup> The Association was active until World War II, but in the meantime it became Continental in nature and tended to be dominated by Germany when that nation moved into a position of technical superiority. Eventually this German technical domination became so strong that many were under the impression that the Association was being used as a Fascist "tool to further their aggressive interests."<sup>38</sup> Viewed historically, it is now apparent that this was to be a reaction common among all lesser members of both national and international standardization organizations.

Nationally, consumers began to play an increasing role in the standardization process. Following World War I, there was a phenomenal increase in the number of industrial and technical standardization agencies. Countering this movement, public consumers were attempting, through grade labelling and other standards, to simplify purchasing and to make the consumer a more intelligent and critical buyer. But the most active consumer in the work of standardization was the government. Since about 1920 standardized specifications for equipment and material

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<sup>37</sup>M. J. Wollner, "Standards and World Trade," Industrial Standardization, June, 1946, p. 148.

<sup>38</sup>Benjamin Melnitsky, Profiting From Industrial Standardization (New York: Conover-Mast Publications, Inc., 1953), p. 41.

common to the various federal agencies had been published and disseminated to industry by the Treasury Procurement Division, which was the purchasing agent for all common items needed by the several departments. Its "General Schedule of Supplies" contained about 1,600 specifications, and was the "Bible" of the purchasing agents throughout the federal offices as well as a guide for use by industry and business.

In the military sphere, although the Aeronautical Board's directive did not mention standardization, in 1921 it did make a beginning on certain related problems by preparing a standard procedure for the drawing up of experimental contracts and a uniform procedure for the testing of aeronautical material.<sup>39</sup> In 1922 the National Advisory Committee for Aeronautics urged the importance of materials standards and agreed with the Board that the latter should monitor the work.<sup>40</sup> But the Board was not given this responsibility until fifteen years later; instead, still another Board, the Joint Army-Navy Standards Board of 1923, was set up based on a suggestion by the Engineering Division at McCook Field and incorporated in an agreement between the Director of Air Services and the Navy.<sup>41</sup> The early history of this

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<sup>39</sup>Aeronautical Board, "Annual Report of the Aeronautical Board," October 19, 1921 (in the files of the Department of the Army, file: AAG 334.7).

<sup>40</sup>U. S. Army, Maj. H. W. Harms, Memorandum for Maj. T. R. Bane, May 22, 1922 (in the files of the Department of Army, file: AAG 334.8).

<sup>41</sup>U. S. Army, Gen. Mason M. Patrick, Memorandum for

Board as recorded by the United States Air Force is so typical of later national and international standardization problems and operations that it is worth noting.

One officer was assigned from each service, including Maj. D. C. Emmons for the Army, and they were directed to "harmonize" those differences, many of them "minute and unimportant" by themselves, that burdened the manufacturer with the stocking of materials and parts of odd sizes, dimensions, and specifications. Annual conferences were begun in 1924, alternating between Dayton (McCook Field) and Philadelphia (Naval Aircraft Factory). The board of officers served in addition to their other duties, and they were not assisted by any permanent working committees; but the annual conferences, opened also to representatives of the aircraft industry, did result in the preparation of some specifications for parts that could be used in common. Compromise was always necessary, resulting in slight modifications of the specifications of the Army or of the Navy, respectively. According to an Air Corps report in 1927, the Bureau of Aeronautics was deferring to the Air Corps in about 75 percent of the cases, either because Air Corps specifications were "superior" or because the Navy was "more willing to compromise." Exactly what percentage of specifications were standardized in those years is not known, but by about 1930 "all the bolts, nuts, cotter-pins, washers, rivets, tie-rod terminals, clevis pins, turnbuckles . . . and some larger items of equipment . . . had been made Army-Navy standard"; Army-Navy standard drawings for such parts became familiar to aeronautical draftsmen; and parts manufacturers began to feature the symbol "AN" in their catalogs.

Though the two services could forget rivalry to some extent, there were still weaknesses in the Army-Navy standardization procedure. The "master agreements" negotiated between the two services were not published as actual procurement documents for use by industry, but were merely filed with each service as documents to be "incorporated" in the published specifications of that service. In effect, the "master agreement" was not a common standard but merely a guide to the two specification sections. Deviations and divergencies crept into the published specifications, many of them

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Rear Adm. N. A. Moffett, Chief, Bureau of Aeronautics, May 22, 1923 (in the files of the Department of Army, file: Working Committee, Aeronautical Board, "Standardization").

obscure and indiscernible, especially to higher authority within each service, but quite noticeable and "exasperating" to the manufacturers who had to stock both sets of materials. In some cases, such as that involving the altimeter, the joint agreement was merely "a confession of inability to get together." There were other difficulties as well. In one case four years were spent agreeing on basic structural design values for steel and magnesium alloys. Joint conferences became more and more spasmodic, with no annual meetings between 1934 and 1936. In 1936 a Navy suggestion for an annual meeting was held up in the Air Corps for three months. The confusing explanations for this delay, first that the Materiel Division had not been able to decide on an agenda and a date, and a few weeks later, that the Navy letter had been misplaced, indicated perhaps a lack of positive policy and action on the problem of common specifications.<sup>42</sup>

While the military departments were going through the painful process of growing up in the age of standardization, a similar though, perhaps, not as painful growth was taking place elsewhere. Benjamin Melnitsky reports that:

By 1926 . . . the U. S. Government alone was spending \$4,250,000 yearly on standardization. Trade associations and technical societies were not far behind with an annual expenditure of \$3,820,000. Among the agencies then engaged in this work /in the United States were/:

- 191 trade and commercial organizations,
- 17 professional and technical societies,
- 54 U. S. Government bureaus,
- 81 state highway commissions and other state bureaus,
- 105 city government bureaus or departments,
- 5 national standardizing organizations, and
- 2 American committees on international standards agencies.<sup>43</sup>

In 1927 the additional work of the National Bureau of Standards as assigned by Hoover, which was to eliminate waste through the

<sup>42</sup>U. S. Air Force, Air University, Historical Division, Standardization of Air Materiel, 1939-1944, Controls, Policies, and Procedures, Air Historical Studies: No. 67, November, 1951, pp. 6-8.

<sup>43</sup>Melnitsky, op. cit., pp. 45-46.

establishment of standards of practice, for stock sizes, and varieties of specific commodities that were currently in general production and demand, was extended to include commercial standards. The stated purpose was to establish standard methods of test, rating, certification, and labelling of commodities and to provide a basis for fair competition. The next year, 1928, the American Engineering Standards Committee became the American Standards Association with a board of directors representative of not only technical and industrial societies but also of consumers and other interests. And so the pattern of growth of the discipline of standardization continued. Yet, it still lacked organization, unity, and common purpose.

The depression of the thirties spurred standardization still further. Grade labeling and standards for commodities sold in retail stores became mundane topics for discussion among the public. Similarly, industrial purchasers found in standardization a means for lowering costs of materials, parts, and products. Typifying the trend, Carl Edvard Johansson, who in 1912 started making his famed gageblocks for the American market and who in 1923 had become associated with the Ford Motor Company, on behalf of the Ford Motor Company asked the American Standards Association in 1932 that the inch-milimeter ratio he had used in 1912 be made an American Standard. Following a general conference and a canvas of industry, this conversion was adopted by the American Standards Association in 1933, one year later.<sup>44</sup> Progress in

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<sup>44</sup>Industrial Standardization, October, 1943, p. 293. The 25.4

industry standardization was occurring, but, for every gain, there seemed to arise additional negating factors. As an example, in 1933, the American Screw Thread Company secured the rights to the cross recess screw design owned by H. F. Phillips and went into production. Once the practicability of this design was proved, the Reed and Prince Manufacturing Company introduced a competing design, the Frearson cross recess screw. While the design differences between these two cross recess screws was slight, like the Sellers and Whitworth thread designs, they were sufficiently different to cause major problems in both supply and maintenance. Militarily, the use of both screw recesses was impractical and, starting in 1938, the military attempted to standardize on a single design, either the Phillips, the Frearson, or a modified design. But support was lacking in industry and it was not until two full decades later that standardization on a single cross recess design was achieved. In the meantime the total cost of non-standardization defied estimation, but it was conservatively estimated that, during and after the war years, it cost each company \$50,000 per year just to handle administratively the duplicate varieties.<sup>45</sup>

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inch-milimeter ratio was standardized by American Standards Association B48.1-1933, "American Standard Practice for Inch-Milimeter Conversion for Industrial Use."

<sup>45</sup>For a detailed accounting of the cross recess screw thread standardization problem see Maj. Lester M. Peters, "The Need for a Single Standard Cross Recess for Aeronautical Screws" (a research paper submitted to the faculty of the Air Command and Staff School of the Air University, Maxwell Air Force Base, Alabama, November, 1949), and Lt. Col. James F. Haehnlen, "Why Isn't There an International Screw

In the field of military equipment, and in particular aeronautical equipment, a new low in standardization achievements was reached in the years prior to World War II. Brig. Gen. Henry H. Arnold, acting Chief of the Air Corps, complained of the "very intangible results" over the previous eighteen years,<sup>46</sup> and endorsed, for the first time, the establishment of standardization as a full time function in the Air Corps and in the Aeronautical Board. By agreement between the Secretaries of War and Navy a Permanent Working Committee was established within the Board in February, 1937.<sup>47</sup> However, no appointments to the Board were made until 1938 due to the lack of funds. Ultimately a staff of about fifty officers, civilian engineers, and clerical assistants was assigned to the Board, but this did not come about until forced by the pressures of war.

In support of the 1937 reorganization of aeronautical standardization, an Army-Navy Specifications Unit was established by the

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Thread?" (a research paper submitted to the faculty of the Air Command and Staff School of the Air University, Maxwell Air Force Base, Alabama, April, 1949).

<sup>46</sup>U. S. Army, Brig. Gen. Henry H. Arnold, Memorandum for Plans Section, December 17, 1936 (in the files of the Department of Army, file: AAG 400.1142).

<sup>47</sup>This was based on a plan worked out by Maj. A. J. Lyon of the Materiel Division, in cooperation with Lt. C. F. Cotton of the Bureau of Aeronautics and approved by the Army and Navy members of the Board. Lyon's plan called for a permanent coordinating body to serve as recorder, editor, and publisher of specifications; and the elevation of this agency to the Aeronautical Board, in order to insure greater support by reason of its being in a higher echelon. At the same time, existing agencies were to be used for the actual preparation of specifications.

Materiel Division at Wright Field<sup>48</sup> and a comparable unit was organized by the Navy at the Naval Aircraft Factory at Philadelphia.

The 1937 reorganization of aeronautical standardization was extremely significant. Although there was a major military lesson regarding standardization to be drawn from World War I, the military emphasis placed on it in the post-World War I period was limited to production and maintenance economies. Now with the approach of World War II, while the policy retained this feature, it moved into the broader field of military requirements in the field of combat.

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<sup>48</sup>The Wright Field unit was under the administrative control of the Materiel Division but under the executive control of the Aeronautical Board in Washington. This dual control made the Wright Field unit an orphan in the Materiel Command and necessitated occasional reminders from Army Air Force Headquarters that "all possible assistance" should be rendered by the operating units of the Command to prevent bottlenecks in the Army-Navy Specifications Unit.

CHAPTER III  
HISTORY OF STANDARDIZATION IN THE  
UNITED STATES WORLD WAR II

The General Situation. During World War II the lack of standardization caused such a multitude of problems and, yet, so much effort was expended to achieve essential standardization that a detailed accounting, if one could ever be assembled, would fill untold volumes. On the other hand, a summary accounting would not provide the background information necessary to this thesis.

It has been alleged that, in the years prior to World War II, not sufficient attention was given to the value of standardization to military preparedness.<sup>1</sup> As an example, in the post-World War II period, the Industrial College of the Armed Forces concluded in a study that "the lack of standardization between [United States] Departments, as well as between the military and industry, caused delays, excessive costs, and confusion . . . ."<sup>2</sup>

It is true that on the first page of the United States Industrial Mobilization Plan 1939 the statement was made that: "War is no longer

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<sup>1</sup>Howard Coonley, An address before the Industrial College of the Armed Forces, February 19, 1948 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>2</sup>Industrial College of the Armed Forces, "Industrial Standardization," 1949, Student Committee Report (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

simply a battle between armed forces on the field--it is a struggle in which each side strives to bring to bear against the enemy the coordinated power of every individual and every material resource at its command."<sup>3</sup> But it is known that resources cannot be effectively coordinated without the tool of standardization.

In pre-World War II United States, the concept of standardization seems to have had recognition in many quarters. At least the record shows that standardization was accepted and discussed in military, industrial, governmental, educational, and other circles. Typical of the pre-World War II comments on the subject was the one made in Industrial Standardization in February, 1941.

Standards are basic to the success of our national defense program. There can be no steady flow of blankets, trucks, airplanes, etc. from factories and assembly lines of the country until agreement is reached on standards for materials, for fits of parts, for control of quality, etc. A single government order sometimes extends to hundreds of factories, and until we have a coordinated system of standards which will channel the raw materials through mills and factories and assembly plants to the government supply centers, we will not achieve the full production program which we are after.<sup>4</sup>

And reinforcing these views were the observations made regarding the inevitable consequences of non-standardization. Typical of these was the one made in Industrial Standardization in January, 1941.

Proper standards for materials and detail design requirements for engine mountings, accessory mountings, and other parts

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<sup>3</sup>United States Industrial Mobilization Plan 1939, quoted by Coonley, op. cit.

<sup>4</sup>Industrial Standardization, February, 1941, unnumbered page.

would have been of considerable assistance to the French defense program if they had been available at the beginning of the war.<sup>5</sup>

But, in spite of the outward recognition of the need for standardization, the failings in national standardization were great. Yet, those failings were as nothing in comparison to the failings at the international level where almost insurmountable difficulties were placed in front of the allies due to the lack of standardization.<sup>6</sup>

World War II required an unprecedented degree of international coordination--coordination that was possible only through standardization. However, this need was seen largely after the fact. With hostilities upon them, the allies faced the complex problem of what should be standardized; the difficult issue of the organization for standardization; and the practical question of how standardization was to be achieved. And forcing an answer to all three aspects of the problem were the very real difficulties that were being encountered in production, training, and combat. In spite of this urgency, standardization was to prove difficult to achieve. Naturally time was of the essence, and this ran directly counter to standardization for standardization could be achieved only through negotiations. But to delay production or training pending the resolution of standardization differences generally was unacceptable. In the ensuing frustration between the need for standardization and the

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<sup>5</sup>Arthur Nutt, President, Society of Automotive Engineers, quoted in Industrial Standardization, January, 1941, unnumbered page.

<sup>6</sup>Industrial College of the Armed Forces, "Industrial Standardization," op. cit.

pressure of time, the War Production Board and the Office of Lend-Lease Administration, in 1943, tried unsuccessfully to cause all foreign procurement in the United States to be based on United States standards and specifications.<sup>7</sup> Obviously, such a solution was unacceptable in terms of an allied military operation; yet something had to be done.

It was noted earlier that the International Federation of National Standardizing Associations did not continue through World War II.<sup>8</sup> When it stopped functioning its work was taken up by the United Nations Standards Coordinating Committee<sup>9</sup> which was founded in an effort to save loss of time and money in the manufacture of arms and equipment that was accruing as a result of the lack of uniform standards among the allies. For similar reasons the Combined Production and Resources Board was established to coordinate, principally, the production of the United States, the United Kingdom, and Canada. Backing the Combined Production Resources Board were such organizations as the Anglo-American Conservation Committee set up in London in February, 1942, to consider

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<sup>7</sup>Industrial Standardization, July, 1943, p. 216.

<sup>8</sup>In addition, the International Electrotechnical Commission suspended activity during World War II.

<sup>9</sup>The secretariat of the International Federation of National Standardizing Associations actually was taken over by the Swiss Standards Association which stored records and "kept up all indispensable correspondence." (Industrial Standardization, January, 1943, p. 12.)

"matters of policy of a conservation nature by the several British ministries, the Board of Trade, and the Mission for Economic Affairs."<sup>10</sup>

The mass of organizations established in World War II to solve various aspects of the international standardization problem was great. But, in this review it is not believed practical nor necessary that they all be discussed. Instead, three activities, generally representative of the whole, will be covered. They are communications-electronics, screw threads, and aeronautics. These three activities have been selected to illustrate three different aspects of the international standardization problem. Communications-electronics represents one of the major non-materiel, as well as materiel, areas of standardization and it is widely recognized as the most critical area of standardization in terms of both peace and war. Screw threads represents a perennial standardization problem of nations ranking equal to such things as measurement, drawing practices, tolerancing, gaging practices, welding practices, and basic metals. Aeronautics represents the problem of standardization that is unique to a new and rapidly changing profession, organization, and piece of equipment. From these three activities (communications-electronics, screw threads, and aeronautics) parallels can be drawn to fit most other situations.

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<sup>10</sup> Combined Production and Resources Board, Report of Conferences on Standardization of Screw Threads and Cylindrical Fits, London, August-September 1944 (Washington: U. S. Government Printing Office, 1944), p. 33.

Communications-Electronics Standardization--World War II.<sup>11</sup>

The standardization of communications-electronics by the United States in World War II preceded all other formal military international standardization activity. Undoubtedly this stems from the singular fact that the first requirement of any organized effort is the necessity to communicate. In any event, the first significant discussions of communications-electronics standardization took place between Air Marshal A. T. Harris and Gen. H. H. Arnold during the United States-British Staff Conversations in March, 1941.<sup>12</sup> In these conversations it was provided that the United States and the United Kingdom would establish in London an Associated Communications Committee. This Committee was to have both United States and United Kingdom membership and was to be the supreme controlling body with respect to intercommunications by radio, wire, visual, and sound, affecting the armed services and merchant marine of the two nations.

The United States-British Staff Conversations of March, 1941, that dealt with communications (hereinafter cited as "Annex IV") were limited in scope in that they provided principles to be observed in intercommunication of United States and United Kingdom ships only, but no

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<sup>11</sup>Due to United States administrative restrictions regarding the accurate referencing of certain documents on which this section is based, the full range of documents used by the author cannot be cited.

<sup>12</sup>These Conversations are often cited by historians as the "ABC-1" discussions.

such principles were provided for other services in view of the fact that no United States Army forces, ground or air, were expected to operate in areas, prior to September 1, 1941, where intercommunication with United Kingdom forces would be necessary.

In August, 1941, the United States Army and Navy observers in London submitted a redraft of Annex IV to the British services and, after some consideration by them, a copy was forwarded to Washington. Late that month, Gen. H. H. Arnold suggested to Air Marshal A. T. Harris and Wing Cdr. J. G. Bryans of the Canadian staff in Washington that a Joint Communications Board be established to consider and adopt common communications between the United States Army Air Corps, the air forces of the United States Navy, the Royal Air Force, and the Royal Canadian Air Force. The next month Canada and the United Kingdom agreed to this suggestion.

Meanwhile in late August, 1941, the British services had proposed that a Radio Direction Finding Committee be set up with combined representation from the United States and the United Kingdom. Following this, on September 26, 1941, the United States Chief of Naval Operations proposed that an Inter-Service Communications Board be set up in Washington on similar lines to the Associated Communications Committee in London. It was recommended that this Washington board would serve as the supreme controlling body in the Western Hemisphere for the regulation of communications between the United States and British Commonwealth forces. While the proposal of the Chief of Naval

Operations was being studied by the United States services, on October 14, 1941, the British Joint Services Mission in Washington proposed its own revision of Annex IV which would establish two associated communications committees, one in London and one in Washington. These committees were to be advisory and not executive bodies, but the London committee was to be invested with the final say in any matter which required coordination between the two committees. The British Joint Services Mission also suggested that the Joint Communications Board proposed by Gen. Arnold and the Direction Finding Committee proposed by the United Kingdom should function as subcommittees of the Washington committee.

A week later, on October 27, 1941, the United States services advised the British Joint Services Mission that the subject of revision of Annex IV already was under discussion by a United States committee and that that committee had reached the tentative conclusion that a committee to be designated the "Inter-Service Communications Board" should be formed in Washington composed of representatives of the United States Army and Navy. This Board, it was felt, should be considered an integral part of the Associated Communications Committee and should have cognizance of associated communications in the Western Atlantic and Pacific areas. Recommendations of each committee (London or Washington) were to be subject to review by the other committee, but all recommendations were to have the approval of the British Chiefs of Staff and the United States Chief of Naval Operations and Chief of Staff

prior to being adopted. When adopted, implementation of recommendations would be through normal national channels.

On November 10, 1941, the above tentative conclusion became the agreed United States service position and included in addition to proposals on composition a recommendation for the establishment of fourteen subcommittees. The United States suggested that the Inter-Service Communications Board be formed as quickly as possible and that the first meetings should consider revision of Annex IV and the procedure to be followed by the Board. There then followed an unusual step in military organization.

Although not officially approved, the individuals designated to be members of the Inter-Service Communications Board, if it were approved, met on November 19, 1941, to redraft Annex IV and they continued to function as a de facto communications-electronics standardization organization until April, 1942. During this period they organized themselves as though fully approved and established various subcommittees. Emphasis was given the revision of Annex IV and on February 4, 1942, an agreed draft was forwarded to the London committee. Subsequently, the Combined Chiefs of Staff issued a directive to the London committee and the Washington Board designed to govern communications between the United States and British Commonwealth services, commercial air services, and merchant marine services. This directive superseded Annex IV, and it concerned itself primarily

with provisions of communications arrangements between the two powers and with communications subjects of common interest.

The London Communications Committee, as it was now designated, was to have cognizance of rapid communications matters within areas of British strategic responsibility and the Washington Communications Board was to have cognizance of similar matters within the area of United States responsibility. Joint communications matters were expressly excluded except insofar as might be necessary to prevent unavoidable interference between the services of each nation. The two organizations were directed to consider and recommend communications arrangements required for combined and joint operations on any combination of elements of the two powers and operations involving elements of these powers with other nations.

It was provided that the London Communications Committee and the Washington Communications Board should be of equal standing and that they were to have no power of decision except as to technical agreements of limited scope applicable only to their own areas or to corresponding services of the United States and the British Commonwealth. Each body was to make recommendations to its respective Chief of Staff concerning action to be taken on matters of common interest and the major recommendations of each agency were to be subject to review by the other before submission to the United States Joint Chiefs of Staff or the British Chiefs of Staff for final approval.

The London Communications Committee was to consist of one United States Army officer, one United States Navy officer, one United States Navy aviator, one United States Army Air Corps officer, one officer from the War Office, and one officer from the Air Ministry. The membership of the Washington Communications Board was to be similar with the addition of one officer from the Royal Canadian Navy, one from the Canadian Army, one from the Royal Canadian Air Force, and one representative from the New Zealand and Australian governments.

When the charter of the Washington Communications Board was issued, the Inter-Service Communications Board was, of course, functioning in its de facto status and the Washington Communications Board was organized by the simple process of calling the Inter-Service Communications Board members to meet as the Washington Communications Board. This action took place on April 29, 1942, with the Washington Communications Board taking up the active agenda of the Inter-Service Communications Board.

As soon as the London Communications Committee and the Washington Communications Board began to function, difficulties arose. It should have been seen as inevitable that two coequal communications agencies, one in London and one in Washington, each securing the approval of the other prior to seeking recommendations of the respective United States and United Kingdom Chiefs of Staff, would come into conflict. Recognizing this difficulty, the United States Navy, at the first meeting of the Washington Communications Board, recommended that that board

should report direct to the Combined Chiefs of Staff rather than to the United States Joint Chiefs of Staff. But the British countered that their strategic spheres were more extensive than those controlled by the United States. Further, they held the view that the best war experience and technical knowledge in communications-electronics matters was to be found in London, not Washington. Therefore, the British contended that the London Communications Committee should remain a fully combined committee and have the right of access direct to the Combined Chiefs of Staff. Acting on this conclusion, the British pressed for a more fully informed and representative membership on the London Communications Committee. The British did agree that combined recommendations should be submitted by the London Communications Committee to the Combined Chiefs of Staff through the Washington Communications Board, but they felt that the London Communications Committee should have equal status to that of the Washington Communications Board. In the meantime, the United States services had reached the conclusion that the only answer was to have a single combined communications-electronics standardization agency in Washington directly under the Combined Chiefs of Staff. The view as expressed by the United States Navy was that:

Communications problems for combined operations are at present handled through the machinery of the Washington Communications Board and the London Communications Committee. These agencies are of equal standing and the decision of one can not be carried into effect without the approval of the other. The Washington Communications Board is an agency of and reports to

the Combined Chiefs of Staff while the London Communications Committee is an agency which reports to the British Chiefs of Staff.<sup>13</sup>

It is clear from the above that no communications agency fully representative of United States and British military services with executive powers of decision and action now exists. This makes it difficult in all cases and impossible in some cases to reach timely authoritative decisions--an intolerable situation which should no longer be permitted to continue.

It is therefore recommended that the Washington Communications Board be made a single supreme combined communications agency and be a supporting agency to the Combined Chiefs of Staff in Washington.<sup>14</sup>

Though the relationship of the Washington Communications Board to the Combined Chiefs of Staff was misstated, Admiral E. J. King immediately recommended "a single supreme combined communications agency . . . fully representative of both British and United States services and having executive power of decision and action be set up in Washington as a supporting agency of the Combined Chiefs of Staff."<sup>15</sup>

It was now apparent that the differences of opinion in the London Communications Committee and the Washington Communications Board

<sup>13</sup>This organizational relationship was not concurred in by the British services as a statement of fact.

<sup>14</sup>U. S. Navy, Director of Naval Operations, Letter for the Commander-in-Chief, United States Fleet, subj: "Recommendation for the Creation of a Combined Communications Board," June 22, 1942 (in the files of the Department of Navy, serial 0257220).

<sup>15</sup>U. S. Navy, Letter for the Combined Chiefs of Staff, subj: "Recommendation for the Creation of a Combined Communications Board," June 25, 1942 (in the files of the Department of Navy, serial 10542).

could not be adjusted between those two organizations and the United States members of the Washington Communications Board recommended to the Joint Chiefs of Staff that the Washington Communications Board should be reconstituted as the Combined Communications Board with the duty of taking such action as might be necessary to coordinate methods, procedures, and operations used or useful in combined communications and with authority to make effective agreed decisions with reference to such matters.

Stemming from the United States recommendation to form a Combined Communications Board, the Directors of Signals met in London on July 3, 1942, to consider the relationship between the Washington Communications Board and the London Communications Committee. This meeting resulted in the British conceding that the United States view was more logical than the one they held and the Directors recommended to the British Chiefs of Staff that a Combined Communications Board be set up in Washington responsible to the Combined Chiefs of Staff. It was recommended that the Combined Communications Board should deal with combined communications matters of universal application and be the sole combined communications body. It was further recommended that the London Communications Committee should be replaced by the British Chiefs of Staff and that the United States communications staffs in the United Kingdom should be associated with the British Joint Communications Board as consultants. The British Directors of Signals considered that communications problems in the

various strategic areas should be handled by the joint boards. These joint boards would refer questions to the United States Joint Communications Board or the British Joint Communications Board dependent upon which national strategic sphere they were in.

On July 16, 1942, the Combined Chiefs of Staff approved the first charter of the Combined Communications Board. By its terms the Washington Communications Board was reconstituted the Combined Communications Board and was to be the sole combined communications agency supporting the Combined Chiefs of Staff. The duties of the Combined Communications Board were set forth in very broad terms and included such action as was necessary to coordinate methods and procedures, operations, and all combined communications matters of universal application.

Thus it was that a year and four months after the decision was reached to establish a combined United States and United Kingdom communications coordinating and standardizing body that one finally came into being. In the meantime the war was being fought without the aid of the necessary communications standards.

One month after the charter of the Combined Communications Board was approved, the Combined Chiefs of Staff decided to amend the charter to enlarge the duty of the Board to coordinate methods, procedures, and equipment to include making recommendations for the coordination of research, development, and allocation to meet operational needs. Two months later, at the request of the Joint Chiefs of Staff, the Combined

Chiefs of Staff further amended the charter of the Board to require the approval of the Combined Chiefs of Staff on matters of major policy.

At the time of the first meeting of the Combined Communications Board, on July 24, 1942, combined agreements had been reached through the Washington Communications Board on three items: the Western Hemisphere Recognition System, the Syko System for World-Wide use, and the Self-Evident Code and Letter Coordinates. The principal communications-electronics items then recognized as requiring urgent attention were: priority indication, recognition and identification, authentication, weather codes, combined operating signals, combined phonetic alphabet, combined radio-telegraph procedures, combined radio-telephone procedures, combined teleprinter procedures, combined codes and ciphers, and sector system for reporting aircraft.

The Combined Communications Board proved to be one of the better allied wartime standardization bodies. It also was one of the few combined bodies that possessed the authority to carry out most of its own decisions. Further, because of its broad applicability it developed a unique stature. Eventually, most of its publications were being issued in Spanish, Portuguese, Chinese, Russian, Dutch, Norwegian, Czech, Turkish, Greek, Italian, Polish, and French. Subsequent to 1943, the United States alone produced in excess of two million copies of translated Combined Communications Board documents.

Insofar as standards were concerned, the Combined Communications Board did an excellent job in producing standard radiotelegraph

procedures, visual procedures, indicators, communication instructions, call signs, phonetic agreements, codes and ciphers, radar and racon agreements, frequency allocations, wave propagation studies, electronic countermeasure information, recognition materials, navigation information, crystal data, and many other things of material help to the conduct of the war on a combined basis.

"Standardized" materiel as opposed to "compatible" procedures and materiel was, however, secondary. In December, 1942, the Combined Communications Board did establish a Combined Standardization Committee to advise the Board concerning standardization of communications equipment used in combined operations, but the Board did little to force the production of standardized military equipment during World War II.

Screw Thread Standardization--World War II. It was noted in the preceding chapter that the international screw thread problem had its origins in a period of time that preceded World War II by a century. During World War I considerable effort was expended to eliminate the problem as it existed between the United States, the United Kingdom, and France. However, no success was realized. Between the wars, in 1926, another attempt was made to solve the United States and United Kingdom differences in screw thread design but this died as a result of the lack of United States interest. After that and prior to World War II no formal contact on the standardization of screw threads was made between the United States and the United Kingdom.

With the advent of World War II, the allies, France and the United Kingdom in particular, placed increasing reliance on the United States for the production of war materials. Thus the screw thread problem of World War I once again reared its head. United States industry, as in World War I, found it exceedingly difficult to produce British and French designed equipment or to produce threaded components for British and French produced equipment. France's early defeat, however, reduced the problem to a United States-United Kingdom issue.

Unfortunately official recognition of the scope of the international screw thread problem was slow in materializing. In the meantime stop-gap procedures were employed where possible.<sup>16</sup> But such measures were not a true answer to the production problem facing the United States and the United Kingdom and eventually it was officially recognized that:

The screw thread is as basic to war production as the English language is to our communications. It is as elementary as the needle and thread is to our economy. Unfortunately, however, the screw threads produced in Great Britain and the screw threads used in the United States are sufficiently different in certain important characteristics as to cause tremendous difficulties in the production of thousands of essential items. This results in serious

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<sup>16</sup>As an example, Archibald E. Smith, a United States Army senior ordnance engineer, prepared a truncated Whitworth thread which was interchangeable with the standard British Whitworth thread and which at the same time could be made under normal American industrial conditions and practices. But the acceptance of his compromise thread resulted in the use of not two but three types of threads. (Industrial Standardization, July, 1944, p. 131.)

and unnecessary delays and wasteful use of manpower in the production of goods of war.<sup>17</sup>

Since the screw thread affected production, the problem of non-standard threads fell to the Combined Production and Resources Board for resolution. This board was established by the United States, United Kingdom, and Canada for the purpose of integrating the production program of the three countries. But true integration was impossible so long as the board was confronted with such basic differences as screw threads.

In addition to the international problem, screw thread difficulties existed in the United States and, to meet aeronautical demands, an American Standards Association War Committee was appointed on the request of the National Aircraft Standards Committee "to develop War Standards on Acme Screw Threads for Aircraft."<sup>18</sup> But this did not occur until December, 1942, a full year after the entry of the United States into active participation in World War II.<sup>19</sup> In addition, this American Standards Association War Committee was inadequate to the

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<sup>17</sup>Combined Production and Resources Board, Report of Conferences on Standardization of Screw Threads and Cylindrical Fits, op. cit., p. 1.

<sup>18</sup>Industrial Standardization, January, 1943, p. 12.

<sup>19</sup>As a result of the emphasis on aircraft fasteners--prompted largely by the Interdepartmental Screw Thread Committee, the Army-Navy Aeronautical Board, Wright Field, Army Air Corps, Bureau of Aeronautics, Society of Automotive Engineers, War Production Board, and aircraft industry--the American Institute of Bolt, Nut, and Rivet Manufacturers set up a special Aircraft Fasteners Division in 1943. (Industrial Standardization, July, 1943, p. 216.)

extent that it only recognized part of the screw thread problem.

This was soon seen, and in March, 1943, the work of the committee was enlarged at the request of the War Production Board "to include work on Acme threads for other special purposes as may be required by the Federal Services such as the Army Ordnance Department."<sup>20</sup>

When the American War Standard for Acme Threads was finally published, World War II was all but over.<sup>21</sup>

Simultaneous with the expansion of the scope of the American Standards Association War Committee on Acme threads, another American Standards Association War Committee was organized at the request of the War Production Board "to establish an American War Standard for Truncated Whitworth Screw threads."<sup>22</sup> Considerable difficulty had been experienced in the United States "in the procurement and maintenance of taps, dies, gages, etc. for British Standard Whitworth Screw Threads frequently used in the production of materiel for the various allied armed forces," and some solution seemed necessary.<sup>23</sup>

About this same time, on the international level, the Combined Production and Resources Board invited a British mission to visit the

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<sup>20</sup>Industrial Standardization, April, 1943, p. 114.

<sup>21</sup>American Standards Association, "American War Standard for Acme Threads" (standard number B1.5-1945).

<sup>22</sup>Industrial Standardization, April, 1943, p. 130.

<sup>23</sup>A. E. Smith, Memorandum for the American Standards Association, quoted in Industrial Standardization, April, 1943, p. 130.

United States to discuss and resolve, insofar as possible, problems related to the production of threaded parts for materiel. Representatives of Canada were also invited to participate. Unfortunately, when this first screw thread conference convened<sup>24</sup> the United States already had been at war two years and most production designs were already committed. Nevertheless, considerable effort was put forth and numerous projects were assigned the respective national bodies interested in standard screw thread design. Approximately a year later, in August-September, 1944, a second meeting was convened, this time in London. Originally this meeting had been scheduled for May of that year but the developments of the war in Europe made it necessary to postpone it. Now, three months after Europe was invaded, it was meeting ostensibly to iron out a combined production problem. Had this second meeting been able to reach any positive conclusions it is doubtful if those conclusions could have been placed into the production scheme in time to influence the war. But little was accomplished and a year later, September, 1945, a third meeting was to convene in Canada.

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<sup>24</sup>The New York Conference of November-December, 1943. Attending were representatives of the Canadian Standards Association, Combined Production and Resources Board, National Bureau of Standards, United States Navy, Combined Communications Committee, United States Army, War Production Board, American Standards Association, American Society of Mechanical Engineers, Society of Automotive Engineers, British Standards Institute, and United States, United Kingdom, and Canadian engineering firms as well as the United Kingdom Controller of Jigs, Tools, and Gauges.

The cost of the failure of the United States, the United Kingdom, and Canada to reach agreement on standards for threaded parts for military equipment was estimated at "many tens of millions of dollars in World War II."<sup>25</sup> Thus it was natural that high-ranking officers in the United States Army, the United States Navy, the Aeronautical Board, the United States Maritime Commission, and the State and Commerce Departments should be "unanimous in their opinion that the unification of screw thread standards should be vigorously pursued,"<sup>26</sup> but the termination of World War II was to see all but the end of the international effort.

Aeronautical Standardization--World War II. Aeronautical standardization in World War II represents a collection of problems involving national and international organization, domestic and foreign procurement, military secrets, and the practical need for economy opposing the practical need for speed.

Before World War II actually involved the United States in combat, the United Kingdom was the dominant customer of the United States aircraft industry. France also was a large customer. These foreign aeronautical purchases were generally approved by the Army Air Corps

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<sup>25</sup>A. V. Astin, "Significance of the National Bureau of Standards for Industrial Progress," National Standards in a Modern Society, ed. Dickson Reck (New York: Harper and Brothers, Publishers, 1956), p. 52.

<sup>26</sup>William L. Batt, "International Standards And World Cooperation in War and Peace," Industrial Standardization, December, 1944, p. 249.

as a device for maintaining and expanding the United States aircraft industry. To encourage this, the Air Corps even went to the point of releasing, with the approval of the Aeronautical Board and the Department of State, more and more of its restricted models of aircraft and aeronautical equipment for sale by United States contractors to the British, French, and other friendly nations.

But with the opening of the United States aeronautical industry to meet the needs of foreign governments came a perplexing problem. The foreign governments were not only looking for the production of United States-designed equipment, they were looking for the production of their own designs which they often considered superior. This led to the question of the advisability of introducing non-United States design into the United States production system. As early as 1938, when Stone and Webster, Inc., was preparing to organize an agency for the production in the United States of components of British and French aircraft, the Aeronautical Board opposed the plan on the basis that it would lead to the building of aircraft "to foreign standards of weights and measures, of no help to the United States," as well as result in monopoly, endanger military security, and adversely affect the industry's deliveries to the Air Corps.<sup>27</sup> Nevertheless, it was difficult to overcome the argument that the United States aeronautical industry

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<sup>27</sup> Aeronautical Board, Memorandum No. S10-1 (Case 95), July 8, 1938 (in the files of the Department of Army, file: AAG 334.7).

had a right to such foreign business as it could obtain. Thus the industry began producing more and more foreign-designed items.

By mid-1940, this production of non-United States aeronautical equipment in the country was becoming a threat to the integrated mobilization of industry. France had fallen<sup>28</sup> and its contracts in the United States had been taken over by the United Kingdom. The United Kingdom, in turn, let additional contracts based on the introduction of its own types of aircraft into United States production.<sup>29</sup> But while the related production facilities were welcomed by the Army Air Corps, it could not accept the idea of those facilities being tooled to British design and engineering practices. The Air Corps, the Navy, and the National Defense Advisory Committee argued that the continuation of the production of British type aircraft by the United States industry could lead to "such program confusion, . . . dilution of engineering effort, and . . . increased general burden on the industry" that both the United States and the United Kingdom aircraft programs would be delayed.<sup>30</sup>

Lack of standardization was, of course, at the root of the problem. Not only were there basic differences in weights and measures, but

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<sup>28</sup>To see how a lack of standardization contributed to the defeat of France refer to: "Non-Use of Standards Shown to Contribute to French Defeat," Industrial Standardization, October, 1940, p. 26.

<sup>29</sup>Chiefly the four-engine Sterling bomber, the two-engine Beau-fighter, and the single-engine Typhoon pursuit.

<sup>30</sup>T. P. Wright, Memorandum, August 7, 1940 (in the files of the Department of Army, file: A. J. Lyon, Record Book No. 38).

gages and gaging practices, dimensioning and tolerancing, materials, and even drawing room practices varied. As an example, when it was later decided to produce the British Rolls-Royce aircraft engine in the United States, one year was required to convert the British drawings to drawings suitable for use in the United States industry.<sup>31</sup>

However, this was not something peculiar to aeronautics or as between the United States and the United Kingdom. Indeed months were required for General Motors Corporation to convert the United States Army Ordnance drawings for the production of the M4 Medium Tank into drawings that could be used by the General Motors personnel.<sup>32</sup>

Since the United States objected to the continued introduction of British aircraft types into United States industry, it was forced to offer for British use United States-designed aircraft.<sup>33</sup> This led to the need for some administrative machinery to handle aircraft selection and aircraft modification problems. Acting on this, the Air Corps proposed on August 13, 1940, a combined Army-Navy-British Purchasing Commission Joint Committee. This committee idea was accepted and it commenced operation on September 13, 1940. Standardization was recognized as a

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<sup>31</sup>H. L. Bart, "How Many Pounds in a Pood?" Saturday Evening Post, November 16, 1949, p. 22.

<sup>32</sup>Industrial College of the Armed Forces, "Spare Parts--Standardization," 1946-1947, Student Committee Report (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>33</sup>However, the United Kingdom did, at a later date, attempt to have the Halifax produced in the United States.

pressing problem by the committee and a main subcommittee was given the task. The significance of the centralization of standardization that was taking place at this time is seen in the fact that less than thirty days after this subcommittee met, on November 7, 1940, the Eastern Standards Committee and the Western Standards Committee combined into the National Aircraft Standards Committee.<sup>34</sup> Aircraft engine standards, however, continued to be handled by the Aeronautics Division of the Society of Automotive Engineers.<sup>35</sup>

Aeronautical standardization was not an easy thing to achieve. Yet, it was something desired by many. Thus it was that on February 28, 1941, the Aircraft Section of the Office of Production Management called an aircraft standards coordinating meeting. As a result of this meeting, the Standards Group of the Office of Production Management, Aircraft Section, was set up to act as the standards coordinating unit for the other government agencies having an interest in aircraft standards and specifications. These included the "Army-Navy-British Standardization Subcommittee; the Aeronautical Board (Army-Navy); Air Corps; Bureau of Aeronautics (Navy); and Civil Aeronautics Authority."<sup>36</sup> But because of

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<sup>34</sup>Industrial Standardization, January, 1941, p. 12.

<sup>35</sup>The first group of aircraft engine standards produced by the Society of Automotive engineers, forty-two, were approved in January, 1942. Work on these and other aircraft engine standards had been requested by the Office of Production Management. (Industrial Standardization, January, 1942, p. 12.)

<sup>36</sup>Industrial Standardization, April, 1941, p. 85.

the fast moving situation, this agency was not to play too important a part in the overall aircraft standardization picture.

The Air Corps and the General Staff, United States Army, regarded standardization during this period as a means for insuring that the United States would benefit directly by the expanded production facilities resulting from orders for British aeronautical equipment. While it was believed that standardization would result in greater economy and efficiency throughout the industry, of prime concern was the conclusion that standardization would permit the United States to take over British production promptly in the case of a British defeat.<sup>37</sup> The United States had observed the difficulty the United Kingdom had encountered in putting non-standard arms to use in the defense of the British Isles and it intended to avoid such a problem should the United Kingdom not survive the German onslaught of late 1940. This policy even entered the lend-lease discussions and Congress was assured that by emphasizing standardization in the production of weapons that "they could in an emergency be used by our own forces."<sup>38</sup> When the United States finally was militarily involved in World War II, it was largely because of the previous standardization agreements with the United Kingdom that United States-produced aircraft could feasibly be placed in a common pool for allocation by

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<sup>37</sup>U. S. Army, G-4 Memorandum for the Chief of Staff, August 15, 1940 (in the files of the Department of Army, file: AG 452).

<sup>38</sup>Henry L. Stimson, Statement of October 14, 1941, Hearings Before the Senate Committee on Naval Affairs, Seventy-Seventh Congress, First Session, on H. R. 5783, To Authorize The Construction of Certain Naval Local Defense Vessels, p. 29.

the Combined Chiefs of Staff and the Munitions Assignment Board.

Stemming from the simple standardization process of selecting one or another design of aeronautical equipment there evolved the desire to coordinate ideas at the engineering or even the characteristics stage of new equipment. Thus to facilitate standardization the United Kingdom was given almost blanket approval to visit experimental engineering departments in any United States plant and to fly and be flown in United States aircraft for the purpose of inspecting their characteristics. Eventually it was decided that the best stage at which United States-United Kingdom standardization problems could be worked out was the mock-up inspection and in March, 1941, Gen. Arnold stated as War Department policy that United Kingdom advice and recommendations should be obtained as early in the development stage as the information could be obtained from them, and that the actual standardization should occur during the mock-up stage when the mock-up of a particular type was available. 39

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<sup>39</sup>Mock-up inspection privileges were granted to the British by the Army Air Force partly on the premise of reciprocal privileges for Air Force representatives in the United Kingdom. Although this was nominally granted by the British in September, 1942, Air Force officers gradually became convinced that full reciprocity did not exist. In August, 1944, the Assistant Chief of Air Staff, Materiel and Services, proposed that mock-up inspection procedure be eliminated and that at the end of the European war the Army-Navy-British standardization procedures of the Joint Aircraft Committee be rescinded. While not specifically referencing the British, Materiel and Services made an oblique reference to them by pointing out that new designs of aircraft being developed in 1944 would not be available during the current war because of the two or three year

But the conduct of aeronautical standardization between the United States and the United Kingdom was not without its problems. Part of these problems stemmed from the continued friction between the Army Air Force and the United States Navy and the inability of these two services to agree on standards as between themselves. An equal or greater share of the burden belongs to the United Kingdom which only reluctantly seemed to desire to cooperate in reciprocal standardization actions and seemed unable to establish an effective organization in the United States.

Besides the British Purchasing Commission's air technical staff, which provided representation to the Joint Aircraft Committee standardization subcommittee, the United Kingdom had another mission in Washington headed by Sir Henry Tizard which was working independently among United States scientists and industrialists, including the aircraft industry on the West Coast. Neither of the British agencies were friendly with the other. The Army Air Force wanted a single point of contact with the United Kingdom on standardization matters and the British were finally pressured into designating the Purchasing Commission at that point. But as late as August, 1941, the Materiel Division complained to the British that their organization for the making of detailed standardization decisions was not clear. At Wright Field, it was asserted, the United Kingdom had three separate sections: one each for the Royal Air

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lag between experimental design and quantity production; and by complaining that too many people were present at developmental mock-ups, making the transaction of business difficult.

Force, the Ministry of Aircraft Production, and the Air Ministry. Finally, as a result of United States criticism, the United Kingdom consolidated its air liaison under the single jurisdiction of the British Air Commission. But in the United Kingdom, itself, centralization of aeronautical standardization did not occur until 1943 at which time it was placed under a branch of the Ministry of Aircraft Production.<sup>40</sup>

Paralleling the British laxity in establishing clear channels was their preference to deal outside of such channels as did exist. Rather than working through the established United States channels for standardization, the British desired to deal directly with factory representatives and United States policy-making officers. After August, 1940, this practice became chronic and Brig. Gen. C. H. Brett advised Maj. Gen. H. H. Arnold that:

The British keep calling for all sorts of technicians to go to England but I yet don't understand why they don't send their technicians to the United States, go over the equipment which we are manufacturing and make their changes here or refer the matter to the Joint Aircraft Committee for complete standardization.

During the past ten months since August, 1940 there have been numerous times when it has been practically impossible to get a decision out of the English in connection with standardization. I believe this condition is going to become worse if we endeavor to have somebody in England trying to standardize equipment we are manufacturing in the United States.

May I again emphasize the fact that we must not get out of channels on the standardization phase. The English are extremely

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<sup>40</sup>United Kingdom, Ministry of Supply, Standardization, October, 1956, p. 4.

difficult to deal with and we have managed to keep them in line for the Joint Aircraft Committee. If other people begin to talk standardization and the Materiel Division [represented on the Joint Aircraft Committee] is neglected, we are going to be in a complete spin and get thoroughly in trouble within the next few months.<sup>41</sup>

Finally, the United States began to suspect the true standardization spirit of the British. There was repeated cause for the United States to believe that the United Kingdom had no intention to cooperate in standardization on a reciprocal basis. The Materiel Division went so far as to insure that a centralized record of British requests for information was kept so that the United States would be in a position to demand like information from the British.<sup>42</sup> The policy of British participation in American standardization without reciprocal privileges for the Army Air Force in the United Kingdom was finally challenged by the Director of Military Requirements and in August, 1942, the Joint Aircraft Committee directed its subcommittee on standardization to include in each standardization case a recommendation that similar items produced in the United Kingdom should be made operationally and dimensionally interchangeable with United States standard items. Stemming from this pressure, arrangements eventually were approved by the United Kingdom whereby the Air Force could attend British

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<sup>41</sup>U. S. Army, Brig. Gen. C. H. Brett, Memorandum for Maj. Gen. H. H. Arnold, May 7, 1941 (in the files of the Department of Army, file: AAG 400.1142).

<sup>42</sup>U. S. Army, Maj. M. E. Cross, Memorandum for Maj. A. J. Lyon, September 10, 1940 (in the files of the Department of Army, file: A. J. Lyon, Record Book No. 38).

aircraft mock-up inspections, an action denied the United States even though the United Kingdom had access to United States mock-up inspections.

In the meantime, aeronautical standardization problems were growing in Canada. Canada had been dependent on United Kingdom production of military supplies up to the early part of World War II. But the situation was such in World War II that the United Kingdom could no longer supply Canada with these materials and, therefore, Canada was forced to look to other sources, including indigenous production, for its war materials. With the blossoming of a wartime aircraft production plant, Canada soon found there was an urgent requirement for aeronautical standards. Thus, in 1943, an Aircraft Standards Technical Committee was organized by the Canadian Engineering Standards Association "to set up standards and simplified practices for materials and component parts used in the construction of aircraft in Canada, and to coordinate these standards with the standards used in the United States, Great Britain, and Australia."<sup>43</sup>

The next year, 1944, found a group of National Aircraft Standards Committee and Society of Automotive Engineers personnel accompanied by an Army Air Force representative visiting the United Kingdom in an attempt, through the study of United Kingdom industrial standards for aircraft

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<sup>43</sup>Industrial Standardization, August, 1943, p. 241.

practices, parts, and materials, to obtain uniformity in United States and United Kingdom aeronautical standards.<sup>44</sup>

With little doubt, major efforts were expended to achieve aeronautical standardization, but, in spite of these efforts, World War II was to begin, end, and a decade was to pass with such aeronautical fundamentals as bomb design standardization still undecided.<sup>45</sup>

Summary of Effects of Standardization--World War II. Summing up the military international standardization experience of World War II, Lt. Col. Herbert M. Campbell stated that:

. . . all that had been proved beyond a doubt was that the time for the development of military standards is before a war begins rather than during the course of battle, as was done in the years 1940-1945.<sup>46</sup>

On the broader scene, the American Standards Association was led to conclude that it was the universal opinion "that the international aspect of standardization will be far more important in the future than in the past."<sup>47</sup> Acting on this conclusion, well before World War II terminated, the Association joined with other groups in the United Nations Standards Coordinating Committee and in developing Inter-American

<sup>44</sup>Industrial Standardization, December, 1944, p. 266.

<sup>45</sup>For a discussion of the World War II problems of standardizing bombs and shackles, see Rear Adm. M. F. Schoeffel, "Some Adventures in Military Standardization," Standardization, September, 1951, pp. 277-279.

<sup>46</sup>Lt. Col. Herbert M. Campbell, "Standardization and Collaboration in the A-B-C Air Forces" (unpublished Master's thesis, Department of Political Science, Columbia University, circa February, 1952), p. 10.

<sup>47</sup>Industrial Standardization, May, 1944, p. 92.

standardization. In addition, the American Standards Association established in 1944 two post-World War II Planning Committees. These committees gave special attention to international standardization and their efforts were directed to bringing about a better organization than had previously existed in support of that international effort. It is historically significant that the Association did not emphasize military representation on either of these committees. Apparently, reflecting the times, it was believed that the military in the post-World War II period would not be concerned with international standardization. But circumstances change and when international standardization moved to the fore in the post-World War II period the military were most involved.

## CHAPTER IV

### DEVELOPMENT OF POST-WORLD WAR II CIVIL AND MILITARY INTERNATIONAL STANDARDIZATION

The Primary Situation, 1945-1946. The United States emerged from World War II convinced that world peace and national integrity could be maintained through the cooperation of the world's sovereign states. This idea was embodied in the Atlantic Charter in 1941 and repeated in the Declaration by United Nations on January 1, 1942. A world was desired in which there would be "no aggrandizement, territorial or otherwise"; in which there would be "no territorial changes that do not accord with the freely expressed wishes of the peoples concerned"; in which "the right of all peoples to choose the form of government under which they will live" would be respected; in which "the enjoyment by all States, great or small, victor or vanquished, of access, on equal terms, to the trade and to the raw materials of the world which are needed for their economic prosperity" would be furthered; in which "the fullest collaboration between all nations in the economic field" would be brought about; and, finally, a world that would rest on a peace that would "afford to all nations the means of dwelling in safety within their own boundaries, and . . .

assurance that all the men in all the lands may live out their lives in freedom from fear and want."<sup>1</sup>

At the San Francisco Conference, President Harry S. Truman summed up the United States attitude with these words:

We have tested the principle of cooperation in this war and have found that it works . . . we have shown what united strength can do . . . these lessons of military and economic cooperation have been learned . . . .

Out of this conflict have come powerful military nations . . . . But they have no right to dominate the world. It is rather the duty of these powerful nations to assume the responsibility for leadership toward a world of peace . . . .

By their own example the strong nations of the world should lead the way to international justice.<sup>2</sup>

The backbone of the policy of international cooperation was recognized to be international standardization and even before the war terminated plans were being laid for the reactivation of old international standardization agencies and the creation of new agencies. Emphasis naturally was on civil (educational, scientific, economic, social, industrial, etc.) rather than on military standardization. Unfortunately, this meant that in the United States the implementation of the policy was to rest in the hands of civil rather than governmental agencies with the result that the national policy was to become highly diluted or even ignored in favor of more intimate policies and objectives.

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<sup>1</sup> U. S. Department of State, Toward the Peace, Department of State Publication No. 2298 (1945), pp. 1-2.

<sup>2</sup> Bulletin, U. S. Department of State, July 1, 1945, p. 4.

Under the mantle of peaceful cooperation and competition, in the late World War II and early post-World War II years there evolved two major civil international standardization bodies, the International Civil Aviation Organization and the International Organization for Standardization. In a certain sense these two organizations were a continuation of the pre-World War II activity as was the regeneration of the International Electrotechnical Commission, the International Telecommunication Union, and others. But these two organizations reflected, more than the others, the need for standardization in the broad economic-industrial field and in the relatively new field of high speed transportation. Technological advancements during World War II had caused a relative shrinking of the world and this bringing of communities and nations together in terms of time led logically to the need for more standards.

The International Civil Aviation Organization. The second world war curbed international civil aviation, but by 1944 leaders of civil aviation in the United States and elsewhere foresaw that civil aviation would expand enormously, particularly in the international air transport field, at the war's end. This expansion was expected from the substantial technical strides made in the art of aircraft design and air navigation under the drive of wartime needs. A strong conviction also existed that a largely expanding international civil air transportation industry could be a force for the promotion of trade and commerce and for furthering world peace. Above all, it was felt that the complex and precise demands of international air navigation would demand uniform world-wide

standards for facilities, services, procedures, and certain technical equipment.

The only existing international aviation organization in 1944, the International Commission for Air Navigation, was chiefly concerned with European problems. This organization would require considerable reworking to meet the problems of the post-war world. The United States which had gained the most experience with long distance transport during the war had clearly established its world leadership in this field-- but it was not a member of the Commission. In view of this, the United States conducted exploratory discussions on international civil aviation with other allied nations during the early part of 1944. On the basis of these talks, the United States took the initiative and called an international conference on civil aviation for November 1, 1944, in Chicago. Fifty-two of the 55 states invited attended the conference. For five weeks, the delegates of these 52 states considered problems of international civil aviation, the conference ending December 7, 1944. The outcome was the Convention on International Civil Aviation,<sup>3</sup> the basis of the International Civil Aviation Organization.

The creation of the International Civil Aviation Organization was, essentially, a non-controversial issue. The need for standards for the conduct of international aviation and the need for those standards to be

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<sup>3</sup>Contained in U. S. Civil Aeronautics Board, Aeronautical Statutes and Related Material (Washington: U. S. Government Printing Office, 1954), pp. 339-345.

formulated on a world-wide basis was recognized both by the commercial interests and by the government. Accordingly, there was a broad basis of support in the United States and elsewhere.

The International Organization for Standardization. In earlier chapters the forerunners of the International Organization for Standardization, the International Federation of National Standardizing Associations and the United Nations Standards Coordinating Committee, were discussed. The International Organization for Standardization was founded in 1946 as an outgrowth of the latter organization. Twenty-five states joined in the original discussions which resulted in the creation of the International Organization for Standardization and the First Provisional Assembly was held in London in October, 1946. In 1947, the International Electrotechnical Commission affiliated itself with the International Organization for Standardization as a technical division.

The International Organization for Standardization is billed as the "world's clearinghouse for the development and promotion of international standards. Through [the International Organization for Standardization] the national standards bodies of 33 countries coordinate their standards in the interest of improving international trade."<sup>4</sup>

In the United States, the International Organization for Standardization, backed by the officials of the American Standards Association,

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<sup>4</sup> American Standards Association, The International Organization for Standardization, p. 3.

was brought into being with little resistance. It was not, however, given direct governmental support in that it was looked upon more as a civil agency than as an international governmental agency even though other states were represented in the organization by governmental rather than civil bodies. A contributing factor to the United States view was the fact that at the time the creation of the International Organization for Standardization was being discussed, the government was no longer an active participant in the formation of American Standards Association policy. This had been brought about as a result of certain legal rulings and the general return to the laissez faire theory.

Overall Post-War Security. Post-war security of the United States was envisaged as a blend of several elements: the maintenance of national security by the unilateral use of the nation's own resources; the maintenance of the security of the Western Hemisphere by a collective agreement of the states of the region; the elimination of the threat of the aggressor states by disarmament and control by the allies; the development of a permanent system of collective security operated by all states within the framework of the United Nations; and finally, the support of the whole by a constant attention to the maintenance of great power unity.

The faith that was placed in this approach was near complete. By the end of World War II the mobilized military power of the United States was second to none. But as victory approached and confidence in post-war political solutions increased there arose a public and Congressional

clamor for military demobilization along with the aforementioned return to the laissez faire theory.

In response to this popular demand, United States military forces were severely reduced. Between August 1945 and July 1946, the United States Army strength of eight millions was cut back to two millions. Further, because the bulk of the army personnel consisted of relatively untrained replacements, the combat efficiency of the few existing units was less than 50 percent of the wartime standard. This small and inexperienced army was scattered widely in Europe and the Far East; in Germany, Austria, and Italy; in Japan, Korea, and the Pacific Islands. The effectiveness of the Army Air Force was similarly reduced. Of 218 combat air groups in being at the end of 1945, only two effective groups remained in early 1947. Personnel of the Air Force had dropped from 2.3 millions in 1945 to .4 millions in 1946, most of whom were inexperienced and inadequately trained. During the last half of 1946, the Air Force lost another 100,000 men and combat aircraft readiness which normally should average about 75 percent fell to 18 percent. While the pressures of demobilization actually helped to maintain the strength of the United States Navy, that service also suffered severe cutbacks. Personnel dropped from 3.4 millions to 1.6 millions and the active fleet was reduced from 1,200 to 300 combat ships. Naval aircraft likewise were reduced from 37,000 to 8,000. Reflecting the general military sentiment, the Chief of Staff of the United States Air Force reported to the Secretary of the Air Force,

June 30, 1948: "One prefers not to speculate on what might have happened only one year after V-J Day, . . . if our Air Force had been called upon to resist aggression or to suppress a recurrence of combat activity from an uncontrolled element in one of the occupied countries."<sup>5</sup>

In the process of the demobilization of the United States military might, the Combined Chiefs of Staff arrangement and its standardization activities fell into disrepute. On the one hand, the United States tended to view this association with a colonial power as an uncomfortable post-war political arrangement. On the other hand, the need for such an organization was no longer considered necessary in light of the allied victory and the establishment of the United Nations organization. Also influencing this was the widespread distrust in official circles in the United States of United Kingdom objectives. This feeling of distrust had existed to varying degrees during World War II, but seemed to be on the ascendency during the latter portion of that war.

Although some official circles did begin to develop serious concern about the possible consequences of the rapid dismantling of the military organization and the severance of the military ties of the United States, no steps were taken to modify public opinion, and the Congress, reflecting the then prevailing opinion, retrenched progressively on

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<sup>5</sup>Gen. Hoyt S. Vandenberg, quoted by John C. Sparrow, History of Personnel Demobilization in the United States Army (Washington: U. S. Government Printing Office, 1951), p. 370.

military appropriations and finally, in March, 1947, allowed the Selective Service Act to lapse. At the same time United Kingdom demobilization, which had been delayed in the 1945-1946 period, was moving into full swing.

Meanwhile, between the formal surrender of Japan (September 2, 1945) and the end of the next year, several high-level post-war conferences had convened. These included four meetings of the Council of Foreign Ministers, a meeting of the foreign ministers of the United States, the United Kingdom, and the Soviet Union, three meetings of the General Assembly of the United Nations, and a Peace Conference.

The details of these conferences are now well known. In them it was gradually revealed that, behind the documents by which the Grand Alliance had been cemented and in which the outlines of an international system of state relations had been recorded, the major powers had from the start pursued objectives whose divergence was obscured by their having been expressed in such general terms that contradictory interpretations were always possible. In the course of the attempts at post-World War II settlement and as national post-war policies were developed in action it became apparent that the Soviet Union was not committed to a cooperative international effort for peace and security of all nations. In brief, the Soviet Union appeared to be renewing the thesis of world revolution that its wartime allies hoped had been abandoned.

Communist regimes were maintained in Bulgaria, Hungary, Poland, and Rumania. The self-installed communist regimes of Albania and Yugoslavia were supported. Local communist parties in France, Czechoslovakia, Italy, and Korea were encouraged in political sabotage and in Greece and China were indirectly supported in open civil war. Direct pressure was brought to bear on Turkey and Iran. And the anticipated joint control of enemy states was being made unworkable.

In the course of 1946, the United States and the Soviet Union reached a stalemate regarding Germany. In this and other disagreements with the Soviet Union the wartime Anglo-American association was revived. More and more the United States, which in 1945 assumed the role of mediator between the United Kingdom and the Soviet Union, began to identify its interests with those of the United Kingdom. The importance the United States now attached to the continued position and influence of the United Kingdom was reflected in the British Loan Agreement of 1946 in which the United States provided \$4.4 billions in credits to the United Kingdom.

As the threat of the Soviet Union became more apparent, attention was drawn to the military question. If the relations with the Soviet Union were to continue to deteriorate, war was a distinct possibility. And if the United States was to be involved in a war with the Soviet Union there was every possibility that at least Canada and the United Kingdom would be allied with the United States. The interests of these three states vis à vis the Soviet Union were essentially the same; the United States and Canada

were still linked in the Permanent Joint Board on Defense; by its own admission the defense of the United Kingdom depended on the United States strength; and the range of United States operational aircraft was such that their employment against the Soviet Union depended to a great extent on the use of forward bases in the British Commonwealth. But before discussing how the United States, the United Kingdom, and Canada reacted to this worsening international situation, it would be well to return to the Western Hemisphere.

Western Hemisphere Security. One of the elements of post-World War II security of the United States was envisaged as a system of collective security of the Western Hemisphere. This policy had a history extending back to the days of Simon Bolivar and the 1826 Congress of Panama. In fact, the Treaty of Confederation which was signed by the delegates to the Congress of Panama is alleged to have set the precedents for the future development of the inter-American political system. In addition, it provided for the collective defense of the Americas against armed attack, the precepts for the Inter American Defense Board.

With the outbreak of World War II in Europe in 1939 an emergency Meeting of Consultation of American Foreign Ministers was convened in Panama City. A second Meeting of Consultation of the Ministers of Foreign Affairs of the American Republics was held in Havana in 1940 as a result of the fall of France. At this meeting it was declared that an attack on the part of a non-American state against any American state

would be considered as an attack on all the signatory nations.<sup>6</sup> The Third Meeting of the Ministers of Foreign Affairs of the American Republics, held in Rio de Janeiro in January, 1942, went on to recommend:

The immediate meeting in Washington of a commission composed of military and naval technicians appointed by each of the Governments to study and to recommend to them the measures necessary for the defense of the Continent.<sup>7</sup>

In Washington, on March 30, 1942, the newly appointed delegates of the 21 American Republics met in the inaugural session of the Inter American Defense Board. By December, 1945, the Board had outlined the broad basis for inter-American military cooperation in various resolutions dealing with security against sabotage, production of strategic materials, naval and air bases, anti-submarine defense, standardization of material, and other subjects of a military nature.<sup>8</sup> In line with United States policy and reflecting the general situation there now developed a feeling that the Inter American Defense Board organization should continue on a permanent basis. This concept of permanency was discussed at the Inter-American Conference on Problems of War and Peace held in Mexico City from February 21 to March 8, 1945. Stemming from these discussions a Resolution IV was adopted which recommended:

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<sup>6</sup>Inter American Defense Board, An Introduction to Mutual Security Planning by the American Republics, p. 4.

<sup>7</sup>Inter American Defense Board, Background and Regulations of IADB, p. 2.

<sup>8</sup>Inter American Defense Board, An Introduction to Mutual Security Planning by the American Republics, p. 7.

That the Governments consider the creation, at the earliest possible time, of a permanent agency by the representatives of each of the General Staffs of the American Republics, for the purpose of proposing to the said governments measures for a closer military collaboration among all the Governments and for the defense of the Western Hemisphere.

That the Inter-American Defense Board continue as an agency of inter-American defense until the permanent body, provided for in this recommendation be established.<sup>9</sup>

Under Revolution IV, the Inter American Defense Board began considering measures looking toward the creation of the "permanent agency" and a proposal for the creation of an Inter-American Military Council was drafted and forwarded to the governments. But this proposal was not acted upon.

In 1947, the Inter-American Treaty of Reciprocal Assistance was signed in Rio de Janeiro at the Inter-American Conference for the maintenance of Continental Peace and Security. This treaty elaborated on the previous agreements concerning collective and individual measures to be taken against aggression.

The United States, The United Kingdom, and Canada Act. Simultaneous with the military consolidation of the Western Hemisphere, the Chiefs of Staff of the United States, the United Kingdom, and Canada discussed the problems of employing their forces in a future war and agreed that, if such employment were to be undertaken on short notice, considerable dependence would have to be placed on each other's

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<sup>9</sup>Inter American Defense Board, Background and Regulations of the IADB, p. 3.

operational and logistical systems. To facilitate this, a certain amount of standardization was considered necessary since the forces, equipment, and doctrine of the three military forces of the three countries were diverging rapidly. Therefore, it was agreed that the planning staffs of the three countries should meet and discuss in general terms the problems of standardization and coordination of research and development. These national planning teams met in November, 1946, and agreed to a set of recommendations to be passed to their respective countries for approval. In essence, these recommendations were that the naval, army, and air forces of each country should be able to operate with the services of the others and in certain cases as integrated forces; that reserves of materiel should be held to allow operations to be carried out; and, to allow a rapid turnover of industry from civil to war production, that planning should insure that in all fields the available resources were used in the most advantageous and economical way. To carry out these objectives, the national planning teams proposed the establishment of parallel national standardization agencies joined into an international arrangement.

These objectives and proposals were accepted by the Chiefs of Staff of the three countries without significant alteration. Canada acted promptly and established a Joint Standardization Steering Committee. However, in both the United States and in the United Kingdom opposition developed to the joint approach to the problem of standardization. This unwillingness to approach standardization from the joint level probably

stemmed from the different service approaches to the problem and an initial unwillingness on the part of the Royal Navy and the United States Navy to coordinate naval matters with the Royal Canadian Navy. Aggravating the issue was the bitter debate in the United States over Air Force autonomy.

By mid-1947, the United States, United Kingdom, and Canadian armies were in a position to pursue the standardization program recommended by the planning teams, but on a single-service rather than a joint basis. Six months later, in January, 1948, the Royal Canadian Air Force, the Royal Air Force, and the United States Air Force convened top staff personnel in Washington to discuss the possibility of proceeding with aeronautical standardization. By mid-1948, after considerable interchange of correspondence between standardization specialists in the three air forces, those specialists, organized on a tripartite basis, met in Ottawa, London, and Washington and inaugurated a United States, United Kingdom, Canadian international military aeronautical standardization program. Officially this body was termed the Air Standardization Coordinating Committee.

While the United States, United Kingdom, and Canadian armies and air forces acted to carry out the 1946 conclusions regarding standardization as a counter to the threat of the Soviet Union, the navies of these three countries were unable to come together on a joint basis until 1950. However, some specific standardization projects were undertaken on an ad hoc basis.

Now while the military services of the United States, the United Kingdom, and Canada acted to improve their combined capability through standardization, the international situation tended to worsen.

The International Situation Worsens. In March, 1947, the foreign ministers met in Moscow to discuss the drafting of peace treaties for Germany and Austria. But they were unable to agree on Germany's fate and they left Moscow at the end of April with the problem no nearer solution. The schism in the wartime alliance that had defeated the Axis now appeared irreparable.

Another Foreign Ministers Conference held in London in November 1947, confirmed the stalemate. Shortly afterwards, the Soviet representatives walked out of the Allied Control Council in Berlin. Post-war cooperation between the Soviet Union and the Western States had ceased.

Meanwhile, the Soviet Union was exerting direct and indirect pressure in many parts of the world but more notable in Persia, Turkey, Greece, Manchuria, Korea, South-East Asia, and Malaya.

By early 1947 public opinion in the Western States had reluctantly accepted the fact that the Soviet Union was no longer an ally. In March of that year President Truman asked the Congress of the United States to authorize the support of free peoples who were "resisting attempted subjugation by armed minorities, or by outside pressure."<sup>10</sup> The Congress

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<sup>10</sup>President Harry S. Truman, Address to the Congress of the United States, March 12, 1947, quoted in The New York Times, March 14, 1942.

responded by authorizing an appropriation of \$400 million for aid to Greece and Turkey and the dispatch to those countries of American civilian and military missions. But the situation throughout Western Europe was no less alarming. In spite of emergency aid from the United States, these states were on the brink of economic ruin. And the danger was not just economic; it was also political.

Progress in the Security Council of the United Nations had by now become paralyzed by the use of the power of the veto. Political cooperation by the Soviet Union was lacking. And behind this lack of political cooperation or political aggressiveness the Soviet Union continued to maintain about 4.5 million men on a war footing. In addition, the Soviet Union was engaged in organizing the armies of its satellites along Soviet lines despite treaty obligations to the contrary. Opposing this tremendous political/military force was virtually nothing except the possession of atomic weapons by the United States. Without a doubt, Western political power was on the verge of collapse in the face of the overwhelming strength of the Soviet Union. Faced with this threat to their existence, the Western States finally reacted.

The idea of a defensive alliance between like-minded states within the framework of the United Nations had been voiced by Winston Churchill in a speech at Fulton, Missouri, in March, 1946. However, at that time the Western States were not prepared to embark on such a course of action. But by 1947 the threat was much clearer and public opinion was rallying behind the idea. In March, 1947, France and the

United Kingdom joined in the Dunkirk Treaty. In September, 1947, the Canadian Secretary of State for External Affairs, Louis S. St. Laurent, in addressing the General Assembly of the United Nations, expressed the concern that some nations could be forced into seeking greater security by association with one another. On January 22, 1948, Ernst Bevin put forth a proposal in the House of Commons for a form of western union of Belgium, France, Luxembourg, the Netherlands, and the United Kingdom. The United States backed this idea in general. While it was being discussed by the states in Europe, a communist coup d'etat took place in Prague. With the communist threat thus assuming potent reality, the five states signed the Treaty of Brussels on March 17, 1948, pledging themselves to set up a joint defensive system as well as to strengthen economic and cultural ties. On March 31, 1948, the Soviet Military Administration in Berlin issued an order which prevented the movement of military passenger trains across the border en route to Berlin unless baggage and passengers were checked by their personnel. Berlin was blockaded. On April 30, 1948, the Defense Ministers and the Chiefs of Staff of the five Brussels Treaty states met in London to study their military needs. From July onwards Canada and the United States attended these meetings with a non-member status. In September, 1948, the Brussels Treaty states decided to create a military agency, the Western Union Defense Organization. Meanwhile, on April 28, 1948, St. Laurent put forth in the Canadian House of Commons the idea of a single mutual defense system, including and superseding

the Brussels Treaty arrangement. A week later this idea was welcomed by Bevin. At the same time Senator Arthur Vandenberg was preparing, in consultation with the United States Department of State, a Resolution that would sanction the entry of the United States into additional regional collective defense arrangements. On June 11, 1948, this Resolution was passed by the United States Senate. On July 26, 1948, preliminary talks were undertaken between the United States Department of State and the Ambassadors of Canada and the Brussels Treaty states. These talks ended on September 9, 1948, with a recommendation for a defensive treaty of alliance which was accepted by the governments.

While this action was taking place on the European scene, the Ninth International Conference of American States, held in Bogota in 1948, created the Organization of American States to supercede the Pan American Union. The Organization of American States was provided with an Advisory Defense Committee to consult on call and both the functions of this Committee and the Inter American Defense Board were delineated in the Charter of the Organization of American States, thus making the Inter American Defense Board a permanent structure.

The North Atlantic Treaty And Subsequent Developments. On December 10, 1948, the drafting of the North Atlantic Treaty commenced. Then on April 4, 1949, the North Atlantic Treaty was signed by the Foreign Ministers of Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom, and the United States. Within five months it was ratified

by the parliaments of the member states. Later Greece, Turkey, and Western Germany joined the North Atlantic Treaty.

In furtherance of the North Atlantic Treaty Organization defense consolidation, the first session of the North Atlantic Council now took place in Washington. At this September 17, 1949, meeting the Council took steps to establish the organization necessary to implement the terms of the Treaty. Among other things the Council established a Defense Committee, composed ordinarily of Defense Ministers, and charged with the task of drawing up unified defense plans for the North Atlantic area. It suggested specifically that the military part of the organization should include a Military Committee and certain Regional Planning Groups.

At the second session of the North Atlantic Council, on November 18, 1949, a Defense Financial and Economic Committee was established. In addition the Council approved the action of the Defense committee in establishing a Military Production and Supply Board. Acting on the recommendations of this Board, the Military Committee, at its fourth meeting on October 24, 1950, endorsed the idea of military standardization in the North Atlantic Treaty Organization and established a Military Agency for Standardization.<sup>11</sup>

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<sup>11</sup>Lord Ismay reported the justification for the Military Agency for Standardization (originally called the Military Standardization Agency) as follows: "Two of the limitations to effective co-operation between armed forces of a coalition of nations are: 1. plurality of types of weapons and equipment; 2. differences in systems of staff work and military doctrine. The former complicates the problem of supply and

The next spring, at the Fourth Meeting of Consultation of Ministers of Foreign Affairs, in April, 1951, the instrumentality of the Inter American Defense Board was given further emphasis with the adoption of the "Inter-American Military Cooperation" resolution which stated that:

The expansionist activities of international communism require the immediate adoption of measures to safeguard the peace and security of the continent.<sup>12</sup>

By the next spring, it became increasingly apparent that the permanent structure of the North Atlantic Treaty Organization required further strengthening, and in 1952 the permanent staff was reorganized and consolidated in Paris under Lord Ismay. One of the foremost responsibilities of this new International Staff was logistics, and that staff soon became engaged in a standardization program of its own, commonly referred to as the Groups of Experts. The International Staff, however, approached standardization from the aspect of production rather than from the aspect of military operations as did the Military Agency for Standardization.

By now it had become apparent that no extensive international program of cooperation could succeed without standardization, in fact,

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maintenance, while the latter render close team work much more difficult. It was with those limitations in mind that the Military Agency for Standardization was set up . . . ." Lord Ismay, NATO, The First Five Years, 1949-1954 (Netherlands: Bosch-Utrecht), p. 79.

<sup>12</sup>Inter American Defense Board, An Introduction to Mutual Security Planning by the American Republics, p. 12.

the very backbone of international strength and the counter to the Soviet threat lay in one thing: standardization. In keeping with this conclusion military international standardization was extended beyond the original programs of the Inter American Defense Board and the United States, United Kingdom, and Canadian arrangements, into and beyond the North Atlantic Treaty arrangement. Through the Air Coordinating Committee, the United States military departments exerted an influence in the standardization programs of the International Civil Aviation Organization; through the American Standards Association the military departments had certain influence in the work of the International Organization for Standardization and the International Electrotechnical Commission; military aid programs were turned largely in the direction of standardization of armaments; in the South East Asia Treaty Organization and with Japan and Spain standardization was to be emphasized time and again.

But the mere recognition of the extreme importance of standardization as an element of national and international strength and the creation of a multitude of organizations for the purpose of achieving standardization, military and civil, did not thereby insure that standardization would be achieved. In fact, there is serious question as to whether the divisive forces that create and perpetuate non-standardization are not superior to the motivations for standardizations. This aspect of the standardization problem will be discussed next.

## CHAPTER V

### UNITED STATES ORGANIZATION FOR STANDARDIZATION

"The picture of The United States Government as an organic unit . . . is especially misleading in the field of standardization."<sup>1</sup>

The Overall View. If one were to look in the index of a recent issue of the United States Government Organization Manual, the official organization handbook of the federal government, under the word "standard" would be found these listings:

Standard Stock Catalog, Federal  
Standardization, and Inspection, Office of Cataloging (Defense)  
Standards, Bureau of  
Standards, Bureau of Programs and Civil Service Commission  
Standards Division Civil Service Commission  
Standards Division General Services Administration  
Standards for grades for farm commodities  
Standards, National Bureau of<sup>2</sup>

But it would be a gross error to conclude from this that eight listings accounted for the United States governmental organization for and interest in standardization.

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<sup>1</sup>E. C. Crittenden, "Contributions of Government and Private Agencies to National Standards," Dickson Reck (ed.), National Standards in a Modern Economy (New York: Harper and Brothers, Publishers, 1956), p. 33.

<sup>2</sup>U. S. General Services Administration, United States Government Organization Manual 1955-56 (Washington: U. S. Government Printing Office), p. 761.

In 1941, Samuel P. Kaidanovsky reported to the United States Senate on the activities of forty-six governmental agencies engaged in some phase of work with consumer standards to include basic research and tests leading to or affecting standards and the direct creation of consumer standards or specifications.<sup>3</sup> Obviously this listing was limited by the fact that only consumer standards were covered. Further, since that date standardization has become more widespread in its use and has involved more governmental agencies. Thus, although some centralization of effort was realized in 1952,<sup>4</sup> the organizational picture has become infinitely more complicated at the national level. However, this is but a part of the organizational problem connected with standardization for a very large part of the United States standardization effort is concentrated in state agencies and, a still larger portion, in civil bodies.

All of the states of the United States engage in standardization of a scale almost equalling that of the federal government. Many areas of standardization exist only at state level as powers reserved to the states, as an example the standards for licensing of many professional and trade personnel as well as standards involving such basics as weights and measures. Complicating this situation is the fact that

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<sup>3</sup>U. S. Congress, Temporary National Economic Committee, Consumer Standards (Washington: U. S. Government Printing Office, 1941), p. 5.

<sup>4</sup>U. S. Congress, Public Law 436, "Defense Cataloging and Standardization Act," 82d. Cong., 66 Stat. 320; 5 U. S. C. 173g.

many states use their power of standardization to create and maintain specific differences between themselves and other states. Most numerous, perhaps, are the differences maintained to protect state interests by creating interstate trade barriers.<sup>5</sup>

On the United States civil side, and excluding the many plants and corporations that maintain their own standardization activities, of the some 3000 national and interstate organizations representing various industries, over 450 carry on standardization and simplification activities in one form or another.<sup>6</sup> In addition to these industry bodies, there are a large number of professional and other societies that engage in various forms of standardization and simplification.

Thus, on the whole, one must reluctantly conclude that an organization for standardization does not exist in the United States. This idea was expressed by the Industrial College of the Armed Forces a decade ago.

In the United States there is no one body, either of a wholly industrial or combined industrial governmental nature, that has any authoritative directive to aggressively push standardization forward . . . . It is regretted that the present system does not allow any one authoritative body to survey the various fields and initiate, or have initiated, action toward more rapid standardization . . . .<sup>7</sup>

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<sup>5</sup>Industrial Standardization, February, 1942, p. 39, "Lack of Standards as Trade Barrier Hinders U. S. Defense Effort."

<sup>6</sup>Robert A. Martino, Standardization Activities of National Technical and Trade Organizations (Washington: U. S. Government Printing Office, 1941), pp. 1-2.

<sup>7</sup>Industrial College of the Armed Forces, "Industrial Standardization," 1949, Student Committee Report (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

In making a parallel observation, Lt. Col. A. D. Gough of the United States Army noted that "there is no agency to which the State Department can go for information regarding the U. S. Government policy or position on international standardization . . . ." <sup>8</sup> Of course, one could ask why the Department of State did not itself establish the United States policy for international standardization. If this question were asked, it might reveal the organization inadequacy of the Department of State to formulate a national policy in this complex area. While the executive branch of the government may claim the right to decide the international phase of the question, the legislative branch claims equal rights to decide the national phase of the question. But, since the question is not really divisible, only the most elaborate joint governmental machinery could produce a policy. However, beyond this Cyril Ainsworth noted that there is the feeling that standardization is not even the business of government.

Standards, as we know them, are rules that have been established as a result of voluntary action on the part of industry; they are written on the consensus principle, hence government action, as such, can hardly be considered the motivating force. <sup>9</sup>

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<sup>8</sup>U. S. Army, Memorandum for Brig. Gen. J. K. Christmas, April 21, 1949 (in the files of the Department of Army, file: Standardization Policy).

<sup>9</sup>Cyril Ainsworth, quoted in Combined Production and Resources Board, Report of Conferences on Standardization of Screw Threads and Cylindrical Fits, London, August-September 1944 (Washington: U. S. Government Printing Office, 1944), p. 28.

Apparently recognizing this confused situation, the Department of State seems to have, with the exception of United States policy regarding the International Civil Aviation Organization, essentially contented itself by issuing innocuous statements in general support of international standardization but never outlining a real policy or program.

The Air Coordinating Committee and International Standardization.

The exception regarding United States policy in the International Civil Aviation Organization and the United States organization in which such policy is formulated must be discussed for it represents the only near practical approach to the international standardization problem taken in the United States. It is, however, a governmental approach and a specialized approach for a specialized problem. Further, it fails to consider adequately the fact that the international standardization that occurs in the International Civil Aviation Organization is duplicated in other organizations that are monitored in the United States by means other than the means used to handle International Civil Aviation Organization matters.

As in all other international standardization matters, the Department of State, by itself, could not reasonably expect to formulate the United States policy for the International Civil Aviation Organization. This was recognized early in United States/International Civil Aviation Organization relations. On the other hand, the Department of State was the only governmental department that could, by its terms of reference, represent the United States in the International Civil Aviation Organization.

Fortunately, the coordination of aviation policies and programs already had become a national problem involving more than one governmental department and, by interdepartmental agreement, a coordinating agency consisting of the Departments of State, War, Navy, and Commerce had been established in March, 1945.<sup>10</sup> In September, 1946, this agency was formalized as the Air Coordinating Committee with an expanded membership.<sup>11</sup> One of the primary functions of the Air Coordinating Committee became the formulation of United States positions on technical, economic, and legal matters for the guidance of the Department of State and the United States representative to the International Civil Aviation Organization. Since the Air Coordinating Committee sought industry advice and assistance in the formulation of its positions, a near national approach to the International Civil Aviation Organization standardization problems was possible.

The true effectiveness of the Air Coordinating Committee may be open to question, but it was the only real attempt in the

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<sup>10</sup>U. S., "Interdepartmental Memorandum, Regarding Organization of Air Coordinating Committee," March 27, 1945 (in the files of the Department of Air Force, file: ICAO Policy).

<sup>11</sup>U. S. Executive Order 9781, "Establishing the Air Coordinating Committee," September 19, 1946. Membership was subsequently expanded by Executive Order to include the Departments of State, Treasury, Post Office, Commerce, Army, Navy, and Air Force; the Civil Aeronautics Board; and the Federal Communications Commission. Aviation representation conventionally included the Aircraft Industries Association, the Air Transport Association, and the Airline Pilot's Association, but other groups were called in from time to time depending on the problem under consideration.

United States to solve the international standardization organization and policy question.

The Forces of Decentralization, Profit, and Practicality. The cause of the lack of organization in the United States in the remaining fields of standardization is historic and a reflection of the United States system wherein there is a definite tendency, if not a desire, to avoid federal centralization of anything that can be managed on a lower level. Reinforcing this desire to avoid centralization of standardization is the profit motive. On this point Benjamin Melnitsky states that:

Industrial standardization has validity only if it pays off-- either in the hard cash of increased profits or in the equally valid counterparts of heightened customer good will, improved production, bolstered employee morale, better relations with suppliers, and the like. Failing to do so, standards can be lifted gently by the corner and dropped into the nearest trash receptacle.<sup>12</sup>

But profit is usually a local determination. Therefore, if profit is to be the single motivating force behind standardization, there is little need to consider centralization and much justification to avoid it. If the decision regarding standardization is to be made on no basis other than company or corporate profits, then governmental organization and control should be avoided for the government cannot and should not function on that single basis. Actually, government participation in standardization may be expected, in many instances, to work as a force directly opposing profit on the local level. It is perhaps, the unfortunate role

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<sup>12</sup>Benjamin Melnitsky, Profiting From Industrial Standardization (New York: Conover-Mast Publications, Inc., 1953), p. 17.

of government to seek a greater good for the mass than to protect any individual profit.

Beyond the force of profit as an element in maintaining the lack of United States organization for standardization is the inability in the United States to approach standardization on other than a so-called "practical" basis and, thus, to avoid any theoretical considerations. The use of the word "practical" in itself as an explanation of the United States approach to standardization has an interesting effect for, used as an antonym of the word "theoretical," it tends to define "theoretical" as "impractical." This has a far-reaching effect on organization for the more centralized the organization the more it would tend to be "theoretical" in its deliberations, while the more local the organization the more it would tend to be "practical" in its deliberations. An international standardization mission of the Organization for European Economic Cooperation observing this problem was led to comment that:

It was obvious . . . that American engineers have a strictly practical approach to their work, and any attempt to get them to discuss it from one particular angle, such as that of standardization, met with little response. They are fully alive to the benefits of standardization, but if they do not see those benefits in the particular work they have in hand, they have no compunction whatever in disregarding it. It is undoubtedly the same independence of outlook that has resulted in the organic growth of so many standardizing agencies just when and where they may happen to have been required.<sup>13</sup>

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<sup>13</sup>Organization for European Economic Cooperation, Some Aspects of Standardization in the U. S. A. and in Europe (Paris: Organization for European Economic Cooperation, 1953), p. 25.

The Trend Toward Centralization. In spite of the foregoing, the United States organizational picture is not all dark and dismal. While standardization tended to originate on the local level, with the passage of time, there has tended to be some centralization of effort. This was a natural conditioning brought about by the need for larger markets, mass production, product assembly and integration, specialization, and competition for orders from sources that demanded standardization in the items that they purchased. Profit remained the guiding element of standardization, but the conditioning effect of these other elements on the profit motive led progressively to integration above the strict local level. As a result organizations began to be created having a prime or single task of standardization. Foremost among these was the American Standards Association, the National Aircraft Standards Committee, and the American Society for Testing Materials.

Effect of the Sherman Act and the Federal Trade Commission.

The spontaneous movement toward greater centralization of standardization and thus the greater extension of the standards and corresponding elimination of non-standard items ran directly counter to the principles laid down in the Sherman Act which declared unlawful "every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states . . . ." <sup>14</sup> The possibility

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<sup>14</sup>U. S. Congress, Act of July 2, 1890, 26 Stat. 209; 15 U. S. C., sec. 1.

of this contingency had been seen by Herbert Hoover who, as Secretary of Commerce, in 1922 requested an informal opinion of the Attorney General as to the legality of trade association activity in general and included in his request the question:

May a trade association, in cooperation with its members, advocate and provide for the standardization of quality and grades of product of such members, to the end that the buying public may know what it is to receive when a particular grade of quality is specified; and may such association, after standardizing quality and grade, provide standard form of contract for the purpose of correctly designating the standards of quality and grades of product; and may it standardize technical and scientific terms, its processes in production, and its machinery; and may the association cooperate with its members in determining means for the elimination of wasteful processes in production and distribution and for the raising of ethical standards in trade for the prevention of dishonest practices?<sup>15</sup>

Naturally this question was a key consideration in the organization for standardization. But the hedged reply of the Attorney General really did little to help clear it up.

I can now see nothing illegal in the exercise of the other activities mentioned, provided always that whatever is done is not used as a scheme or device to curtail production or enhance prices, and does not have the effect of suppressing competition.<sup>16</sup>

Standardization does, of course, tend to limit or even eliminate competition, it does enhance prices, and it does curtail non-standard production. Obviously if producing and consuming industries agree to standardize on a certain type of cross-recess screw, competing types will be eliminated, prices will be enhanced, and non-standard production

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<sup>15</sup>Quoted in Industrial Standardization, April, 1946, p. 47.

<sup>16</sup>Ibid.

curtailed. But the attitude of the Federal Trade Commission and the courts during the twenties and early thirties generally was limited to treating standardization as illegal only when it was used for illegal purposes. In the late thirties and thereafter this attitude tended toward modification.

In Milk and Ice Cream Can Institute v. Federal Trade Commission,<sup>17</sup> it was alleged that the members of the Institute:

. . . had maintained an unlawful combination to restrain competition in the manufacture, sale and distribution of milk and ice cream cans in interstate commerce . . . and that they had standardized and promoted uniformity in their products for the purpose of lessening competition.

The basic question, nevertheless, was whether the Institute acted in combination or by agreement for the purpose of fixing prices, or whether its activities contributed to such result. The Institute argued that milk and ice cream cans were a standardized product and from this it was argued that uniformity of price was a natural rather than an artificial result. But, while the court saw merit in the argument that some products such as salt, sugar, and oil might be standard by their nature, they could not agree that a can was in the same category. In this case the court felt that the meticulous effort made by the Institute to standardize their products was a strong circumstance in support of the Commission's finding that their activities were the result of agreement contrary to the Sherman Act.

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<sup>17</sup>152 Fed. (2d) 478 (C. C. A., 7th, 1946).

In Fort Howard Paper Company v. Federal Trade Commission,<sup>18</sup> the Commission ordered the respondents to cease and desist from "adopting or maintaining uniform standards governing creping ratio, sizes, or weights of crepe paper, or the sale of seconds or close-outs, . . . [and] uniform prices for crepe paper." Here the petitioners argued unsuccessfully that crepe paper was a standard product of consistent quality made of the same tissue paper and creped on standard machines so that the resultant product, irrespective of manufacturer, was identical.

In Bond Crown and Cork Company v. Federal Trade Commission,<sup>19</sup> the Commission found that, upon organization of the Crown Manufacturers' Association of America, "one of the first things it did was to bring about more complete standardization of product in that, by agreement of the manufacturers, the decoration of the caps was made uniform, so that those sold by all manufacturers were identically the same." The court supported the Commission in its cease and desist actions because the standardization achieved led to or at least made possible the further standardization of discounts, differentials, prices, etc.

From the above and other standardization cases it is apparent that the legal act of standardization can be and is used as evidence of

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<sup>18</sup>156 Fed. (2d) 899 (C. C. A., 7th, 1947), cert. den. 329 U. S. 795 (1946).

<sup>19</sup>176 Fed. (2d) 974 (C. C. A., 4th, 1949).

illegal acts. Further, zealous standardization may even be looked on as evidence of a scheme in restraint of trade. As James D. Hayes stated:

. . . it appears that there is danger even in an agreement on what the standard shall be in that the Federal Trade Commission and the courts will accept that agreement as evidence of agreement on other matters which the law forbids competitors to agree.<sup>20</sup>

In other words, 'since standardization facilitates price fixing and restraint of production it can always be pointed to as evidence of acts contributing to that illegal end. This was an important consideration in the development of standardization and the standardization organization. And it did not lessen with time. Even during the Korean War John C. Green pointed out that:

Nothing in the present emergency legislation nullifies or cancels the antitrust legislation. The Department of Justice is charged with implementation of that legislation and they do not contemplate going out of business for the duration. Hence, may I caution industry groups who plan to sit down together and work out standardization and simplification programs to give full cognizance to the antitrust interpretation of their activities. I think I can say that the Department of Justice is sympathetic to the problem, but they are not going to overlook violations because they are undertaken during the present emergency.<sup>21</sup>

Again, in 1956, the Air Research and Development Command of the United States Air Force commented that:

Legal problems . . . arise in attempts of firms to cooperate  
/for standardization purposes/. Fear of accusations of conspiracy,

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<sup>20</sup>James D. Hayes, "Standardization and the Antitrust Laws," Industrial Standardization, April, 1946, p. 76.

<sup>21</sup>John C. Green, "Industrial Mobilization and Standardization," Standardization, January, 1951, p. 14.

price fixing, and other actions in restraint of trade damp any enthusiasm for such cooperation. We can conclude that expecting industry itself to standardize for any normal motive on aircraft and missile components is unrealistic.<sup>22</sup>

The extent of the concern of industry over the legal implications of standardization is clearly seen by the frequency with which the American Standards Association and others raise the subject and attempt to extract from those in a position of authority a statement of policy. But the statements of policy provided to industry merely convince industry that the division between legal and illegal standardization is hardly clear if, in fact, such a division does exist. Thus, though industry may be assured that government is not hostile toward "legal" standardization programs,<sup>23</sup> there is little consolation in those words.<sup>24</sup>

These legal difficulties with standardization led to the broad adoption of the operational principle that standards always should be voluntary in their application. This is discussed further in Chapter VIII, but as regards organization it led to the conclusion that the standardization organization should reflect the desires of both consumer and

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<sup>22</sup>U. S. Air Force, Air Research and Development Command, Letter for Western Air Development Command, subj: "Standardization of Aircraft and Missiles Components," November 23, 1956 (in the files of the Department of the Air Force, file: AFDDS-1).

<sup>23</sup>Ephraim Jacobs, "The Legal Implications of Standardization," The Magazine of Standards, January, 1956, p. 27.

<sup>24</sup>An excellent discussion of the question, "Is Standardization Legal?" was written by John F. Sonnett, Assistant United States Attorney General, and is contained in Industrial Standardization, December, 1948, pp. 192-195.

producer. It was reasoned that if a standard was arrived at after consulting not only the producers but also the marketers and consumers, including government, then whatever restraint of trade that resulted from the adoption of the standard would be reasonable. The legality of this conclusion has never been tested, but it has led to the establishment in the American Standards Association of the "all-interested-parties" procedure of standardization. This, in turn, has tended to lead to a greater centralization of the standardization organization and also to the creation of a more complicated structure.

The United States Government in Conflict. While the Federal Trade Commission looks at standardization as suspect of other things, the Commission, itself, advises that it has found it necessary, in some instances, to impose minimum standards on competitors in the exercise of its authority to prevent unfair methods of competition.<sup>25</sup> Beyond this, government has found it very necessary to accept in wartime the principle of limiting competition and fixing prices.<sup>26</sup> It must, of course, be realized that the legality or morality of acts done at the direction of the

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<sup>25</sup>U. S. Congress, Temporary National Economic Committee, Control of Unfair Competitive Practices Through Trade Practice Conference Procedure of the Federal Trade Commission (Washington: U. S. Government Printing Office, 1941), p. 16.

<sup>26</sup>See the "sympathetic" position taken by the Department of Justice regarding wartime simplification as outlined in Industrial Standardization, September, 1941, p. 247.

government are not governed by the same codes as the acts done by non-governmental bodies.<sup>27</sup>

During World War II, the United States government found it necessary to institute a system of price controls. But such a system could not be imposed on the nation unless it was founded on a system of standards. And for it to be enforced it was necessary for the consumer to know the standard to which his purchase conformed. Opposing the system of standards as an element of price controls were groups of manufacturers and distributors who contended that establishing standards and requiring grade labeling destroyed brand names and advertising. Supporting the opposition to standards and grade labeling, Representative Charles A. Halleck stated that:

Grade labeling is the opening gum of as sinister a move as could well be figured by the bureaucrats to despoil our economy for the benefit of the socialist system of production for use and not for profit.<sup>28</sup>

Against the opposition, W. S. MacLeod, the Director, Standards Division of the Office of Price Administration, was able to show how hidden price increases had been made through quality deterioration, thus defeating the price control program. But, in addition, he was able to show that the use of standards and grade labeling did not have a deleterious effect on

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<sup>27</sup>This was a major consideration in the United States' withdrawal from the American Standards Association. In this instance, the government did not wish to make legal by its presence something that might otherwise be illegal.

<sup>28</sup>Industrial Standardization, July, 1943, p. 208.

brand names nor advertising.<sup>29</sup> Nevertheless, as a result of certain industry and distributor pressures the Taft Amendment to the Emergency Price Control Act was passed. This Amendment specifically prohibited the Office of Price Administration from requiring grade labeling on any commodity and from using standards in price regulations unless such standards were already in general use in the trade, were required by governmental agencies, or where the Administrator could find no practicable alternate for securing effective price control. The effect of this legislation on the activities of the Administration was significant. But when the Administration removed the requirements for grading and grade labeling meats, the Office of Economic Stabilization stepped in to continue them. Consumers, themselves, soon reacted stating that, without the establishment of standards and grade labeling, price controls were incapable of enforcement.<sup>30</sup>

Within a year of passage of the Taft Amendment limiting the authority of the Office of Price Administration, Representative Halleck again took the floor against the "scheme of standardization." This time the objection centered around the Administration's use of standards that had been established subsequent to the passage of the Taft Amendment. In opposition to the Administration's use of standards, Representative John Taber introduced an amendment to the Second Appropriation Bill

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<sup>29</sup>Industrial Standardization, July, 1943, pp. 209-210.

<sup>30</sup>Industrial Standardization, December, 1943, p. 298.

prohibiting the use of government funds to pay the salary of any Administration employee who used standards or specifications other than those already in general use.<sup>31</sup> Although this amendment was finally limited to processed fruits and vegetables, it was passed, giving at least temporary victory to the anti-standardization forces in the United States.

Office of Price Administration administrator, Chester Bowles, was quick to protest this action and asked that Congress reverse its ban on the use of government standards in pricing canned goods since the ban made impossible proper enforcement of price ceilings on canned fruits and vegetables and made the American consumer the victim of widespread price increases.<sup>32</sup> The issue, however, was never really settled before the end of hostilities removed it from consideration.

The American Standards Association and the United States Government in Conflict. Complicating the national standards organizational arrangement, when the United States government severed its formal connection with the American Standards Association in 1948, it did so with some degree of violence for it upset a government/industry relationship that had been growing for decades.<sup>33</sup> The extent of the

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<sup>31</sup>Industrial Standardization, August, 1944, p. 156.

<sup>32</sup>Industrial Standardization, September, 1944, p. 181.

<sup>33</sup>"For years [American Standards Association] work has been slowly coming into more intimate contact with the Government--Federal--State--Municipal. The war has speeded this up--especially in our relations to the Federal Government, and still more particularly with the

violence was such that some persons who had previously served as governmental representatives to the American Standards Association actually believed for a time that they were going to be subjected to prosecution.<sup>34</sup>

The attendance and participation in meetings of technical and professional organizations by United States government personnel has always been necessary to proper performance of their work and has had a two-way national benefit. First, it assisted government personnel in keeping abreast of new technological and scientific developments of interest to the government; second, it served as a means of acquainting civil organizations and personnel with the prevailing thought of the government on subjects of interest to both. As stated by the Visiting Committee of the National Bureau of Standards: "It is recognized that effective private control and leadership in standardization involve

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Army, Navy, and the War Agencies. These relationships will be much more important in post-war years." (Industrial Standardization, May, 1944, p. 92.)

<sup>34</sup>In June, 1948, the U. S. Army issued its policy governing participation in the activities of private associations. In this policy it stated that: "It is the view of The Judge Advocate General that a Government department or agency cannot accept legally a membership in a private organization without authority of Congress. JAGT 1947/9333. See also 5 U. S. Code 83; 22 U. S. Code 262; 31 U. S. Code 551; and 18 U. S. Code 93." (U. S. Army, Memorandum 600-10-5, "Participation in Activities of Private Associations," June 30, 1948.) Were this not enough to frighten those who had been participating in activities of the American Standards Association, the U. S. Army included in its policy a sweeping statement pointing out that individuals had to insure that their discussions with private associations were not in conflict with "Anti Trust laws." Thus, the threat of the Federal Trade Commission also was brought to bear on the individual.

government participation and cooperation."<sup>35</sup> However, there has existed some difference of opinion as to whether the government should participate at only the operating level or the policy level or both.

During the years past, the participation by government personnel in technical and other societies proceeded under varying administrative controls of the different government agencies without specific legislation setting forth the basis upon which such participation could be exercised. But Section 8 of the Act of June 26, 1912 did provide that:

No money appropriated by this or any other act shall be expended for membership fees or dues of any officers or employee of the United States or of the District of Columbia in any society or association or for expenses of attendance of any person at any meeting or convention of members of any society or association, unless such fees, dues, or expenses are authorized to be paid by specific appropriations for such purposes or are provided in express terms in some general appropriation. This section shall not be so construed as to prohibit the payment from the appropriations for the Department of Agriculture of expenses incidental to the delivery of lectures, the giving of instruction, or the acquiring of information at meetings by its employees on subjects relating to the work of the Department authorized by law.<sup>36</sup>

With respect to this general problem of governmental membership in technical and professional organizations, the Comptroller General issued many decisions which, to some extent, varied. In early years, the Comptroller General held that the law must be interpreted to mean that it prevented both individual and governmental membership. However, in later decisions this view was modified to allow membership of a

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<sup>35</sup>Industrial Standardization, February, 1945, p. 31.

<sup>36</sup>U. S. Congress, Act of June 26, 1912, Stat. 184; 5 U. S. C.

governmental agency in a technical or professional organization where the membership was sought because of the services to be furnished to, or benefits to be derived therefrom by, the agency itself. But in the post-World War II period, increasing emphasis was accorded the idea of limiting governmental membership on technical and professional organizations to a liaison basis. In 1947, The Judge Advocate General of the United States Army concluded that a government department or agency could not accept legally a membership status in a private organization without the authority of Congress.<sup>37</sup> In 1953, the Congress, itself, felt so strongly about the subject that special language was placed in the Department of Defense appropriation act stating that funds available for travel would not be available for expenses incident to attendance at meetings of technical, scientific, professional, or other similar organizations without the approval of the secretary of the department concerned.<sup>38</sup> This stipulation was repeated in the following year's appropriation act and made permanent.<sup>39</sup> As a result of this Congressional directness, great stress was placed on controlling governmental attendance and participation in

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<sup>37</sup>U. S. Army, JAGT 1947/9333, quoted in U. S. Army, Memorandum 600-10-5, "Participation in Activities of Private Associations," June 30, 1948, and Army Regulation 1-210, "Administration, Participation in Activities of Private Associations," December 14, 1949.

<sup>38</sup>U. S. Congress, "Department of Defense Appropriation Act, 1953," Public Law 488, Sec. 606, 82d Cong., 66 Stat. 531.

<sup>39</sup>U. S. Congress, "Department of Defense Appropriation Act, 1954," 67 Stat. 349.

meetings of technical, scientific, professional, and similar organizations. This tight control was a highly discouraging influence and led to a certain degeneration of the overall organization for standardization.

In the area of American Standards Association/governmental relationship, the strict rules of association had the effect of replacing the past close partnership with a loose, informal arrangement. To further aggravate this, the government liaison personnel, as a result of the changing conditions, were sufficiently unsure of their status as to reduce seriously their effectiveness as coordinators.

In defense of the current organizational situation, however, it must be pointed out that Department of Defense policy reads that nationally recognized industry and technical society standards and specifications will be used to the maximum extent practicable in the development and design of materiel and in the preparation of military and federal standards and specifications.<sup>40</sup> This policy also points out that "the department developing standards and specifications shall assure that adequate coordination has been effected with those sections of industry concerned, including potential and new suppliers."<sup>41</sup>

While this policy was well-intended, practically there was a question as to its implementation. With no central coordination point, every governmental person engaged in standardization would have to

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<sup>40</sup>U. S. Department of Defense, Directive No. 4120.3, "Defense Standardization Program," October 15, 1954.

<sup>41</sup>Ibid.

have had cognizance of the areas of interest and activities of a significant portion, if not all, of the some 50 governmental and 450 civil bodies engaged in standardization. Beyond that, coordination would be most difficult since most of the 500 participants operated on their own unilateral policies and for their own unilateral ends.

United States governmental/industry fundamental standardization relationships are two-fold. First, in the case of the Department of Defense and several other agencies, the government primarily is in the position of a consumer producing specifications and standards. But, internationally these same agencies may also be in the position of coordinators of industry, research, etc., for national and international benefit. Second, some agencies such as the Department of Commerce have specific responsibilities to assist industry in industry-orientated standardization. Somewhat in competition to these two approaches is the national and international role of the American Standards Association.

The position of the moment seems to be that industrial groups interested in obtaining a national standard have an American Standards Association and a governmental channel open to them. Naturally this opens the way for a certain amount of organizational confusion.

At the time the Commodity Standards Division was transferred to the Department of Commerce, there was certain expectation that the Division would urge on its applicants the desirability of presenting their requests to the American Standards Association. In practice this has not resulted. Further to confuse the organizational issue, to a

certain extent, the policies of the American Standards Association and the Commodity Standards Division are in conflict.

In the international scheme, although both the American Standards Association and the government agencies may be discussing the same item with other nations they may never coordinate with each other. Neither do they make a practice of availing themselves of each others international facilities.

United States Representation to the International Organization for Standardization. Without going into the standardization policies and procedures of the Federal Supply Board, the Departments of Labor and Agriculture, the Air Coordinating Committee, and others, the difficulty in the United States in carrying on a coordinated civil/governmental standardization program should be apparent. Fundamentally, there is no civil or governmental organization or organizational arrangement that can reflect a constant, single, unified expression. In this respect it is interesting to note that, although the American Standards Association and the government served their formal relations in 1948, in 1949, when the question was raised as to whether the American Standards Association should participate as the United States member of the International Organization for Standardization for aircraft standardization (ISO TC/20)<sup>42</sup> and,

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<sup>42</sup>The international standardization of aeronautical items had been initiated by the International Federation of National Standardizing Associations, but before any progress could be made World War II caused the cessation of its activities. When the International Organization for Standardization was organized in 1946, a subcommittee was set up to review the projects of its predecessor as a basis for action. The project

if so, whether the Air Coordinating Committee might serve as a channel for obtaining the position of the United States government on questions arising out of this membership, the Air Coordinating Committee decided that the problem was one of primary concern to the aviation industry. This decision was made in consultation with the Air Transport Association and the Aircraft Industries Association. But the aeronautical subjects under discussion in the International Organization for standardization were identical to standards agreed or under consideration by the government in other international organizations. Further, several months prior John Gaillard of the Civil Aeronautics Administration had gone on record that:

. . . in the Technical Division of the Civil Aeronautics Administration they had two or three projects on aircraft servicing standards and that there was a definite need for a channel to get international cooperation in the aircraft field. Mr. Gaillard said that his chief was head of the Technical Bureau of the Civil Aeronautics Administration and his chief's interest in the international developments was the reason why the speaker attended the present conference on ISO TC/20.<sup>43</sup>

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on aircraft was tentatively initiated and the secretariat allocated to the Canadian Standards Association. Canada was selected because it also was the seat of the International Civil Aviation Organization and the International Air Transport Association and would thereby permit quick interchange of information on aeronautical standardization among the affected international bodies. In 1948 the National Aircraft Standards Committee requested the American Standards Association to present five of its standards for ground-to-aircraft servicing connections as the basis for work in ISO TC/20. Shortly thereafter, Canada declined the secretariat on the basis that it lacked technical facilities, and the United States was requested to assume the secretariat of ISO TC/20.

<sup>43</sup>American Standards Association, "ASA Conference on International Cooperation in Technical Committee ISO TC/20 on Aircraft of the International Organization for Standardization, March 28, 1949" (in the files of the Association).

How the United States government could have no interest in a subject which it was actively discussing and for which it stated a need is difficult to explain. The history of the transference of national responsibility to industry is equally difficult to explain but indicative of the overall organizational problem.

Since the National Aircraft Standards Committee was a key figure in the United States position regarding representation on ISO TC/20, an explanation of its original position with reference to this question is worth viewing.

Mr. Allen,<sup>44</sup> in further explanation of the position of the National Aircraft Standards Committee, stated that since the aircraft industry was using military standards that were mandatory, and since the development and evolution of these standards were the concern of military and governmental agencies, the Committee felt that it was necessary to have some statement concerning the attitude of the Government in regard to the policy to be followed in this country, before the Committee could take a definite position in regard to American participation in the international project. The standards to which he had reference actually were the property of the military services and were used by the aircraft industry because they were mandatory in all military contracts. Component parts made to such standards were also used to the fullest extent possible in commercial production. In order to be able to state a definite attitude, the Committee felt that it should be guided by an expression of opinion from the military services.<sup>45</sup>

Beyond this the Committee felt that the decision on international cooperation had to be taken by the people who specified the equipment to be used

<sup>44</sup>Marshall F. Allen, Secretary, National Aircraft Standards Committee, Office of the National Chairman.

<sup>45</sup>American Standards Association, "ASA Conference on International Cooperation in Technical Committee ISO TC/20 etc.," op. cit.

nationally. These were the military services and the airline operators rather than the aircraft industry. But the military services expressed only a lack of interest in the activity of ISO TC/20. This led Cyril Ainsworth, the Technical Director of the American Standards Association, to point out that military and civilian operation could not be separated in this field. Beyond this he reported that the Department of State was very interested in the International Organization for Standardization

. . . project on Aircraft which they believe to be important. The Department was very much in favor of international standardization work as a means of facilitating and extending American business and protecting our foreign trade. The State Department wanted to cooperate fully but raised the question of the military aspects of the international work.<sup>46</sup>

The inability of the American Standards Association to reach a decision on United States participation in ISO TC/20 led to an agreement with its interested members that a statement of policy should be requested from the Air Coordinating Committee. This resulted in the decision already referenced. Although ISO TC/20 paralleled certain military international work and although some governmental departments had expressed an interest in the ISO TC/20 activity, from the policy and operating side of government no interest was expressed and the problem was left to industry. In other words, it could be concluded that the United States government had no interest in international aeronautical standardization.

Obviously industry was confused by the governmental decision. The National Aircraft Standards Committee, in particular, being harnessed

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<sup>46</sup>Ibid.

to governmental standards could not readily envisage how it could carry on an international standardization program without governmental coordination. Therefore, the Aircraft Industries Association and the engine, propeller, and accessory groups stated only a minor interest in ISO TC/20. Thus, the Air Transport Association, as the only major consumer of aeronautical products outside of the government, was led to agree to take the secretariat of ISO TC/20. On this basis the American Standards Association accepted the secretariat of ISO TC/20 for the United States in June, 1953. However, from that time on no cooperation was obtained from American groups despite repeated requests from the American Standards Association for help.<sup>47</sup> Having no other alternative, the American Standards Association subsequently relinquished the secretariat of ISO TC/20 which was then reallocated to the British Standards Institution.

Thus, through a several year cycle international aeronautical standardization started out on a broad governmental/industrial/consumer basis in the United States; was reduced to an industry consideration by the government; was deferred to consumers by industry; eventually was ignored by consumers; and finally was dropped as a matter of United States interest. But, in the meantime, Europeans and others who were

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<sup>47</sup>At the first meeting of ISO TC/20 held in 1951, the United States had one representative present, an observer. He reported that the delegates of the other countries had expressed their keen disappointment that the United States was not more adequately represented. At the next meeting in 1952, there were no United States delegates present whatsoever.

seeking the international standardization of aeronautical items were confronted with the difficult fact that United States influence in such standardization was inescapable but United States participation could not be obtained.

A Summary of the United States Organizational Position Regarding Standardization. The foregoing and related organizational problems had extensive implications when the task of associating the United States with the international standardization movement was undertaken.

Internationally, the United States had not treated standardization as a national problem; quite the opposite was true. Further, while the United States formally endorsed the principle of coordination of standards, that principle was not universally accepted by industry, government, consumers, nor other standardization interests. Complicating the entire problem was the existing, but often unrecognized, fact that there was a great amount of functional overlap among the many independent or semi-independent civil and governmental standardization bodies. Since a similar overlap could be found at the international level, it was not at all uncommon to find many civil and governmental bodies in the United States discussing and coordinating a single problem in several international organizations, supposedly representing the United States in each instance, but more than likely producing and agreeing to different solutions in all instances. The extent of duplication and confusion that exists in this form is vast, but the full international situation is further complicated by the lack of any central guiding policy and the

practice of many bodies to discuss and, perhaps, agree for the United States to international standards when, actually, they do not possess the inherent decision-making powers to do so. In many instances this fact may be legally covered by the skillful use of words, but such technicalities, although real, make little favorable impression on foreign nationals and governments. As regards international and even national standardization, the United States is bankrupt. This situation was commented on by a mission from the Organization for European Economic Cooperation in this manner:

. . . there is no real integration of the machinery to secure joint working of Government and industry in the preparation of standards and the position of the Government vis a vis the American Standards Association is . . . ambiguous.

. . . the principle of coordination of standards, both nationally and internationally, is recognized officially, though it is not universally accepted by industry, in the United States. The procedure of the American Standards Association and its participation as a member body in the work of the International Organization for Standardization is proof of that. But just as the national tradition of independence of action has been a powerful factor opposing the coordinating function of the American Standards Association, so it has been a still more potent factor militating against international co-operation at the technical committee level.<sup>48</sup>

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<sup>48</sup>Organization for European Economic Cooperation, op. cit., pp. 27 and 29.

## CHAPTER VI

### UNIFICATION OF STANDARDIZATION IN THE UNITED STATES

" . . . there is no integrated machinery [in the United States] to ensure from the outset that there is the maximum practicable coordination of Government and industrial standards and the fullest sharing of the work of standards preparation."<sup>1</sup>

The General Problem of Unification. The fact that the United States does not have a national standardizing body should not be interpreted to mean that one is not needed nor that there have not been attempts through the years to establish one. Certain obstacles to the creation of such a body were outlined in the preceding chapter. Those objections did not, however, play a decisive role in preventing the United States from benefiting from a national standardization body.

It should be obvious to any thinking person that the man, men, or agency that controls United States national and international standardization would not only be uniquely powerful in the United States but uniquely powerful in the world. In fact, there are many that fear the creation of such an all-powerful czar for it is felt that his authority could surpass even that of the present major governmental departments.

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<sup>1</sup>Organization for European Economic Cooperation, Some Aspects of Standardization in the U. S. A. and in Europe (Paris: Organization for European Economic Cooperation, 1953), p. 13.

That this has not happened in those countries where a truly national standards body has been established is little proof to the skeptic that it could not happen here. Attempts, therefore, to centralize standardization in the United States under a single authority are generally looked upon with suspicion.

Howard Coonley reported in 1948 that:

During the war there was evidence that the Department of Commerce wanted to take over the whole job of standardization. That resulted in an investigation by the Under Secretary of Commerce, Wayne C. Taylor, which in turn brought out a recommendation by his special survey appointee and later by a committee of industrialists that the responsibility for standards should be vested in private enterprise through the American Standards Association, and that the Department of Commerce should confine itself largely to the fields of research and advice, but not refuse to develop standards where the group which came to them did not want to go to the American Standards Association.<sup>2</sup>

During World War II there was an enormous expansion of United States industry which was coupled with the creation of new articles and materials and great progress in science and invention. This all called for a corresponding increase in standardization. But standardization seemed to lag behind the need. To solve the problem of growing standardization needs two plans were presented. First, it was suggested that the Department of Commerce should take over and enlarge as a government function the work of standardization then being done by private bodies. Second, it was suggested that the American Standards Association should

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<sup>2</sup>Howard Coonley, "The Importance of Standardization to Our American Enterprise," An address before the Industrial College of the Armed Forces, February 19, 1948 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

enlarge its activities so that it could handle "any standard or standardization project which deserves national recognition, whether in the field of engineering, accounting, business practice, or consumer goods."<sup>3</sup>

This was the basic controversy and question that prompted the Visiting Committee of the National Bureau of Standards to recommend an industry conference to consider a solution. This conference ruled in favor of expanding the functions of the American Standards Association and limiting the work of the National Bureau of Standards to fundamental standards and methods of measurement and the development of data needed in standardization activities such as the American Standards Association. It was reasoned that the development of standards rested on negotiation to which it was felt the Department of Commerce could contribute little. But since the development of standards called for facts, research on testing methods, and market analysis, it was believed that the Department of Commerce and the National Bureau of Standards did have a role to play and it was in this latter field.

Based on the conclusions of the conference of industrialists, Wayne C. Taylor, Under Secretary of Commerce, appointed a Policy Committee on Standards, headed by Charles E. Wilson, to advise the Department on the outlined conclusions. In June, 1945, the Policy Committee reported its findings to Gano Dunn, the Chairman of the Visiting Committee of the National Bureau of Standards. In general

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<sup>3</sup>American Standards Association, Resolution, May 19, 1944, quoted in Industrial Standardization, February 1945, p. 30.

they agreed with the earlier findings that no unified standards procedure existed in the United States, that a United States standards body was needed, and that the American Standards Association, appropriately expanded, could fill that requirement.<sup>4</sup>

Within a month the American Standards Association acted to modify its constitution removing the restriction that limited its activities to the engineering field.<sup>5</sup> The succeeding month, September, 1945, representatives of twenty-two member bodies of the Association met and unanimously agreed that the American Standards Association should be incorporated, preferably under a federal charter. The majority considered a federal charter necessary to place the Association on a par with the organizations of the other nations with which it would have to negotiate and because "it would give the American Standards Association Congressional recognition which would be helpful not only in its work with government organizations in the United States but also in its relations with other national standards associations."<sup>6</sup>

On February 28, 1946, Henry A. Wallace, Secretary of Commerce, responded to the industry recommendations on the organization for standardization, agreeing in general with those recommendations, but

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<sup>4</sup>Charles E. Wilson, "Report on the Policy Committee on Standards," Industrial Standardization, July, 1945, pp. 145-149.

<sup>5</sup>Industrial Standardization, August, 1945, p. 175.

<sup>6</sup>Industrial Standardization, November, 1945, p. 259.

pointing out that the Department of Commerce "does not plan, nor can it hope to monopolize this field of activity."<sup>7</sup> This action was hailed as "the first occasion on which Government has indicated its willingness to give back to private enterprize some of the freedom it has lost . . . ."<sup>8</sup>

Running throughout this period of negotiation between industry and the Department of Commerce was a single thread of thought, namely, that standardization was a problem of industry and not of government--it involved industry policy and not national policy. Standardization was looked upon as an industry problem to which industry should find its own solution. Standardization outside of industry was largely ignored. But it was four years later before the Department of Commerce-industry approved recommendation that the Divisions of Simplified Trade Practices and Commercial Standards (renamed the Commodity Standards Division) be transferred out of the National Bureau of Standards was acted upon.<sup>9</sup>

It is rather significant that the post-World War II need for a United States standardization body was, almost traditionally, voiced from two primary sources: the American Standards Association and the General Services Administration. With almost equal tradition, opposition

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<sup>7</sup>U. S. Department of Commerce, Letter for Charles E. Wilson, Chairman, Policy Committee on Standards, February 28, 1946 (in the files of the American Standards Association).

<sup>8</sup>Howard Coonley, "Standards and Free Enterprize," Industrial Standardization, April, 1946, p. 71.

<sup>9</sup>Standardization, November, 1950, p. 302.

was voiced from most other sources. Therefore, employing democratic principles, it would appear that only a minority desired such a body to be established. But, on closer analysis, it might appear that those most informed on the standardization problem advocated the creation of a United States national standardizing body, while those least informed or most desirous of protecting a vested interest least desired such a body.

It is difficult to contest the statement that in the United States the two bodies most experienced in standardization are the American Standards Association and the General Services Administration. Beyond that, these bodies have been fortunate in having some of the most able professional standardization men at their helm. To these men and these agencies standardization bordered on a life and death proposition. In comparison, other agencies tended to treat standardization as a part-time and often minor consideration. In addition, they often manned their standardization offices with personnel only secondarily interested in standardization.

While, by about the mid-1920s, the question of a national standardization body was resolved by most nations in favor of the creation of such a body, this question did not even seriously present itself in the United States until after World War II, two whole decades later.<sup>10</sup>

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<sup>10</sup>The American Standards Association did print a lengthy article in 1932 on the question of "Does Industry Need a National Standards Agency?"

The American Standards Association Attempt to Form a National Standards Body. Subsequent to the formation of the American Standards Association in 1918, ten United States government departments joined it as active participants. These departments had the same status as the other member bodies of the Association and many of the Association's committees were headed by prominent government personnel. However, the government was not in a position to control the Association (nor was industry in the Association in a position to control government) and industry did not wish such control for it believed that governmental control could work to industry disadvantage in securing the most advantageous standards. On the other hand, government was one of the major consumers of industry and it also had a responsibility to the public to achieve the maximum return per dollar expended. In this context, there was considerable concern expressed as to whether governmental participation in an industry-dominated standards organization was in the public interest.

The demands of World War II forced many of the fears and considerations of government vis à vis the American Standards Association to the background and during the war a close relationship between the Association and government evolved. Reflecting this close association, in July, 1944, the Ordnance Department of the Army presented the Association with the Distinguished Service Award. In this presentation, Brig. Gen. Stewart E. Reimel, after reviewing the tremendous service the Association had rendered to the war effort through its standardization

activities, expressed the Ordnance Department's:

. . . hope and firm belief that this great work of providing standards for industry will be carried forward with undiminished zeal in the post-war years. The continued advancement of American industry, with which our national security and our national defense are so closely bound, can be served in no better way than by extending the formulation of standards which have been so essential to our successful wartime program.<sup>11</sup>

Following the Ordnance Department's recognition of the Association's activity, in April, 1946, the Navy presented the Association with the United States Navy Certificate of Achievement. A part of this citation read:

It is of the greatest importance that the wartime teamwork continue in peacetime. In order to keep cost low and to keep government and industrial operations geared harmoniously together, it is necessary that, as far as possible, all differences between government standards and general industrial standards for products used by both shall be eliminated by cooperative effort.<sup>12</sup>

But the elimination of the differences between governmental and industrial standards required a system of central coordination that was possible only in a truly national standards body. This the American Standards Association recognized and the Association honestly conceived itself to be this body. Modifications of the Association's organization were, however, necessary to achieve this end. Nevertheless, these modifications were not really radical, rather, they seemed simply a logical extension of the industry/government wartime arrangements.

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<sup>11</sup>Industrial Standardization, September, 1944, Insert.

<sup>12</sup>Industrial Standardization, April, 1946, p. 81.

In early 1948, Howard Coonley addressed the Industrial College of the Armed Forces on the broad subject of standardization in the United States and summed up his general comments by pointing:

. . . to the necessity for strictly centralized coordination of the national standardization work, with participation on an equal footing by the Armed Services and industry. Evidently, a prerequisite to a successful setup in this regard is that the Armed Services, as well as industry, have complete internal coordination in their approach to the problems on which the fullest cooperation is needed.<sup>13</sup>

There was, of course, considerable evidence, much of which is presented in this thesis, that neither the government nor industry were very well coordinated in the field of standardization. However, Coonley had considerable confidence that the American Standards Association could serve as the coordinating body to bring industry and government together. A year earlier W. Averell Harriman, the then Secretary of Commerce, had expressed a similar thought to the president-elect of the American Standards Association, Frederick R. Lack.<sup>14</sup>

It was in this outward atmosphere of cordiality that Representative Kenneth B. Keating of New York and Senator Ralph E. Flanders of Vermont introduced in the House and Senate on May 10, 1948, bills providing for a federal charter for the American Standards Association. This action had been approved by the member bodies of the Association on May 5 and was designed "to unify the standards and specifications of

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<sup>13</sup>Howard Coonley, "The Importance of Standardization to Our American Enterprise," op. cit.

<sup>14</sup>Industrial Standardization, January, 1947, p. 1.

both Government and industry and increase the flow of goods in interstate and foreign commerce."<sup>15</sup> To achieve this end, the proposed charter included a provision whereby the departments and agencies of the government could be legal members of the Association and designate members to serve on the Board of Directors and lesser bodies of the Association. This latter action was now viewed with considerable concern because:

. . . in the reorganization of the Army, Navy, and Air Force in the Department of Defense, . . . it was found that a law of 1912 prohibited the military organizations from becoming members of any civilian organization. As a result, the Armed Services now have liaison rather than active membership on American Standards Association committees.<sup>16</sup>

Simultaneous with the action taken by the American Standards Association to achieve federal recognition, it acted to incorporate itself under the laws of the State of New York. Such action was considered necessary pending Federal recognition in order to relieve members of the Board of Directors and the member bodies of individual responsibility for actions of the Association. On August 2, 1948, the final steps of incorporation of the Association under the laws of the State of New York were completed. But as a corollary to the state incorporation it was necessary for the Association to accept the resignations of those member bodies which were departments or agencies of the federal government since legal

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<sup>15</sup>Industrial Standardization, May-June, 1948, p. 24.

<sup>16</sup>Ibid.

considerations allegedly prevented their maintaining membership in a state-incorporated body.

The withdrawal of governmental membership from the American Standards Association served to separate government from the Association, but the ties between the two were being severed on yet another score.

During World War II, the American Standards Association had been on contract to the government to do many tasks in the standardization field. This led to difficulty when it was ruled that a government employee could not participate in an organization doing business with the government. What had occurred in the Association/government relationship was that contracts had been given the Association to produce standards which, in turn, were produced by committees having government membership. Obviously this association was right considering the problem, but, unfortunately, legally it was wrong. As a result, government personnel, interested in their personal future, began to back away from association with the Association.

Against this background, the bill to incorporate the American Standards Association under a federal charter was passed to the executive agencies of the government for comment. Here long delays were encountered and, before the end of the year was reached, it became obvious that public hearings could not take place and the bill would expire at the end of the 80th Congress.

The next year the bill to federally incorporate the American Standard Association was reintroduced, but it did not pass.

Had the American Standards Association been authorized a federal charter, the basis for a single United States standardization body would have been laid. But now the Department of Justice recommended against the bill. The reasons for this action are involved and are best described in the words of the Department.

The Department of Justice considers this bill undesirable in that it would make the term "American Standard" the exclusive property of the American Standards Association and in that it would expressly authorize Government agencies to become voting members of that Association and of the Standards Council.

The term "American Standard" is a generic or descriptive term. If it were made the exclusive property of a private organization, others entitled to use it descriptively would be precluded from doing so and the opportunities of using it in misleading advertising would be many.

To authorize Government departments to become voting members of the American Standards Association is undesirable. There is nothing to indicate that liaison participation, such as now exists, is not adequate to meet the needs of Government departments in performing their statutory duties. Liaison participation permits cooperation between members of the Association and Government representatives in collecting and exchanging information and opinions on matters of common interest. Government representatives may attend meetings of the Association, of various technical committees, and of sectional standards development committees. They can receive the benefit of discussions with industry representatives and make contributions of their own. There is little to suggest that non-voting liaison participation cannot be just as effective as voting membership, and no general legislation is needed to permit Government departments to continue this practice of participating in the Association's activities on a liaison basis. There is no suggestion that Government representatives may not take part in the activities of private organizations in the performance of their public duties.

Express legislative authorization of direct membership participation . . . would be objectionable for several reasons. In the first

place, it might be a serious barrier to the antitrust enforcement policy of this Department. It is recognized that some programs for the development and application of standards and simplified practices may be in the public interest. Such programs can result in economies which can be passed on to the buying public. If not accompanied by price fixing, and knowledge of the standards is generally diffused, competition on a price and quality basis may be furthered. On the other hand, standardization programs can be integral parts of plans to fix prices, restrain competition, and limit production. In view of these possibilities, the Government should be free to police standardization programs and bring antitrust actions or other kinds of actions where warranted. Attack upon improper practices becomes more difficult where the practices result from association activities in which Government representatives participate pursuant to express congressional authority . . . . The impediment resulting from Government participation as a voting member in the American Standards Association is a practical, factual impediment, and cannot be removed by putting words in the statute.

Beyond this, it is desirable for Government departments to refrain from direct participation as members in majority-rule organizations which they do not control. This becomes particularly true where, as with the American Standards Association, the organization is bound to be held out or viewed as a quasi-Government association. This results from the very fact of a Federal incorporation itself, from the declaration of policy . . . calling for a unification of the standards and specifications "of both Government and industry," from the statement . . . that one of the purposes is "to cooperate with the Government of the United States . . . in standardization matters," and from the provisions . . . that the Comptroller General shall prescribe the rules for auditing Association accounts and shall receive copies of the annual audit. The provision for active Government participation as voting members in the conduct of the Association's affairs serves to emphasize this effort to identify the organization with the Government itself.

Accordingly, the Department of Justice is unable to recommend the enactment of this bill.<sup>17</sup>

This refusal to support the federalizing of the American Standards Association left entirely unsolved the question of the national standards

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<sup>17</sup>U. S. Department of Justice, Letter for the Chairman, Committee on the Judiciary, Honorable Pat McCarran, December 13, 1950 (in the files of the Department of the Air Force, file: American Standards Association).

body for the United States. In fact, the Department of Justice position never once took into account the need for such a body and how that need should or could be satisfied. Instead its opposition was centered on the desire to suppress standardization as a contributory monopoly practice, and to retain a free hand to process anti-trust suits. It contended that federalizing the American Standards Association would give it a quasi-governmental status and tend to make its standards national. But, rather than a reason for refusing a federal charter to the Association, this was the very reason for giving it a federal charter!

Having been decisively defeated, the American Standards Association elected not to pursue actively its desire to fill the need for a national standardization body through federal chartering. Instead, by indirect reference and subtle statements it continued to press the idea that the Association still welcomed governmental participation in its ranks<sup>18</sup> and still believed that the Association should fill the national standardization vacuum.<sup>19</sup>

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<sup>18</sup>As an example, on a chart on the flow of standardization in the United States, the note was made that: "After 30 years of joint operation of ASA with industry, ten government departments and agencies withdrew membership in 1948, at the time of state incorporation of ASA. Technical cooperation continued. No change in ASA membership structure took place and government agencies may again have membership whenever their policies permit." (Comfort A. Adams, "National Standards Movement--Its Evolution and Future," Dickson Reck (ed.), National Standards in a Modern Society (New York: Harper and Brothers, Publishers, 1956), pp. 28-29.)

<sup>19</sup>As an example, Vice Adm. G. F. Hussey, Jr., managing director of the American Standards Association, stated in November, 1950: "Today the need for achieving standardization, so that the

In retrospect, certain points made by Senator Ralph E. Flanders in his introductory remarks connected with the proposed federal chartering of the American Standards Association are worth noting for, though stated almost a decade ago, they represent the still current United States organizational problem. Of primary significance, Flanders observed that:

Standards are of fundamental importance to government and industry alike. And it is highly important that there be the closest teamwork between them in the development and in the use of standards which are of primary concern to both. To insure this close relationship in standards work, the senior Senator from Wyoming and I are introducing a bill, a major purpose of which is to make it clear that it is the policy of the Congress to encourage intimate and effective cooperation between the Federal Government and industry in the establishment of common standards acceptable and useful to both--in our peacetime economy and in preparation for defense.<sup>20</sup>

This statement is fundamental to the question of organization. Standardization is of joint concern to industry and government. In addition, it is of concern to consumers, academicians, and, in fact, the

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products required by the military can be produced speedily and economically, is greater than ever in the emergency which confronts the country. It is, therefore, again essential that the Armed Forces should be able to avail themselves of the facilities of the American Standards Association in solving their own urgent problems with the aid of industry. Within the past two years, legal questions have been raised which are preventing the full utilization of ASA machinery by the Armed Forces. Means must be found to eliminate these road blocks and once again make available to the Armed Services the free use of this time-tested system of all-party-at-interest standardization." (Standards, December, 1950, p. 318.) See also The Magazine of Standards, April, 1958, p. 123.

<sup>20</sup>Congressional Record, October 6, 1949, 81st Cong., 1st Sess., Vol. 95, Part II, p. 13978.

whole nation. Thus, any organization for standardization, if it is to be truly national, must adequately reflect these multiple interests. Fearing government dominance, industry tends to state that it is an all-industry problem. Fearing industry dominance, government tends to state that it is an all-government problem. It is, of course, neither. This has been recognized in practically every nation except the United States. This condition, however, is a rather recent development for the nation was well on the road to obtaining a truly national standards organization by the end of World War II.

For 30 years, Government departments participated fully at all levels in the work of the American Standards Association. As the work of the Association progressed, one Government activity after another sought or accepted member-body status until in 1947 there were 10 such Government member-bodies--Navy, War, Commerce, Labor, Agriculture, Interior, Treasury, Federal Works Agency, Housing and Home Finance Agency, and the Government Printing Office.

In 1948 the member bodies decided to incorporate the Association under the laws of the State of New York, but because of the nature of the organization to seek Federal incorporation through an act of Congress. Immediately before State incorporation, based on legal rulings by various departmental solicitors and counsel, each of the Federal Government activities withdrew from their membership status on the ground that it had no authority to hold membership in a State-incorporated association. There was thus pulled from the structure of the Association a solid group of 10 foundation stones. Further, certain of the Government departments have instructed their representatives on technical committees who have continued to participate in these important deliberations to act only in a liaison status and to cast no votes . . . . In the light of the legal rulings which have guided the action of the department and agency heads there seems no way of restoring Government activities to member-body status in the American Standards Association short of congressional action. 21

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<sup>21</sup>Ibid., p. 13980.

The damage done to the concept of a national standards body by the refusal to grant the American Standards Association a federal charter was decisive. The effect was seen in December, 1949, when the bill to grant the Association a federal charter was still pending before congress.

Whatever may have been the original ideas which prompted some to believe that a Federal charter for the American Standards Association would be of great value to national standardization, they become dwarfed in comparison with the necessity of providing a means for full government participation . . . .

The American Standards Association cannot continue to function as a national clearinghouse and on the basis that a consensus has been shown, approve as "American Standard," standards in which the government does not have substantial interest, then in regard to standards in which the government does have an interest wink at the absence of government vote and declare that a consensus does exist. For thirty years industry and government have worked together in the operation of the American Standards Association as a national clearinghouse for standards. That chain of years is now broken. The remedy rests in the Federal Charter . . . .<sup>22</sup>

But the remedy was not to be forthcoming.

The Bureau of Federal Supply Attempt to Form a National Standards Body. Coincident with the American Standards Association's unsuccessful attempts to organize an overall United States standardization body and to obtain a federal charter, elements within the government were pursuing a like but equally unsuccessful course. In part this governmental action was directly counter to the mood of the post-World War II period which was to decrease rather than increase governmental centralization and influence. In part this governmental action, which was timed with

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<sup>22</sup>Standardization, December, 1949, p. 327.

the resubmission in Congress of the bill to federally charter the American Standards Association, by its timing also tended to be a competitive move on the part of government to achieve what would otherwise be achieved if the Association were granted a federal charter. In retrospect this seems confusing since the governmental backers of the governmental attempt to organize an overall United States standardization policy body were also the backers in government of the plan to federally charter the American Standards Association. One explanation of this is that the governmental backers of the governmental attempt to organize an overall United States standardization policy body may have conceded that the American Standards Association federalizing idea was doomed to defeat and, therefore, they were merely moving in to fill the vacuum. Another explanation could be that the governmental backers had come to the conclusion that they served to lose too much if the American Standards Association were federalized and, therefore, they desired to counter the Association's actions by presenting a going governmental standards body.

Not too much information has been made public regarding the attempt of the General Services Administration to form a national standardization body. However, in 1950, two years after the General Services Administration initiated its actions to form a national body, Willis S. MacLeod took his losing case to a Company Member Conference during a National Standardization Conference. Here he contended that:

The Federal Property and Administrative Services Act placed broad responsibilities in the General Services Administration for government-wide policies, methods, and procedures covering property management and supply. This required a re-evaluation of our standardization activities to broaden their scope. We have re-examined the interdepartmental relationships and programs involved in the whole field of commodity standardization.

Prior to the passage of the Act, while the need for a government-wide program of commodity standardization had long been regarded as essential to the proper functioning of Federal supply operations, such a program had never been fully established because of lack of clear statutory authority and because of inadequate funds for staff. Certain elements of the program had been in existence operating independently. Standardization of commodities, including the elimination of unnecessary and uneconomical types, grades, and varieties of commodities has been accomplished as an incidental by-product of specifications, cataloging, and inspection operations. Federal specifications, which are widely used not only by Government but by public purchasing agencies and industry, embody a considerable degree of standardization. The Federal Standard Stock Catalog also achieved some standardization. The Commodity Standards Division of the Department of Commerce, recently transferred from the National Bureau of Standards to the Office of Industry and Commerce, makes available to the Government its Commercial Standards and Simplified Practice Recommendations, developed on request of industry and with its collaboration. The military departments have also achieved some standardization incident to their military specifications and standards work. These activities contribute to government-wide standardization but do not achieve it.

. . . previously no organized effort has been made to operate a formalized standardization program concentrating on those products in common use which offer the greatest savings to the Government. Nor has there been any full-fledged program to coordinate government-wide standardization activities to assure uniformity in and eliminate duplication of standardization work, to fully utilize available standards data.

Under the present program of the General Services Administration these things will be done.

/Under General Services Administration chairmanship/ there is a Federal group which correlates Government standards policy.<sup>23</sup>

The action of the General Services Administration to centralize standardization met resistance particularly in industry for it was an end which industry feared and against which it had so painfully and meticulously waged war.

Shortly after the General Services Administration took action to centralize standardization, Wallace R. Bennett, president of the National Association of Manufacturers forcibly commented that:

. . . it is essential that all who support the American system of individual responsibility and enterprise take active part in the voluntary standards movement--because the alternative is standardization which is not voluntary but directed and controlled by government.

We have ample and daily evidence toward complete economic control on the part of many Federal Government officials. In standardization as well as other areas of our economy they are willing and eager to take over.<sup>24</sup>

Following this statement, the American Standards Association and its associates conducted an accelerated anti-government standardization campaign.

Most power groups have their friends and champions in Congress, the battle ground of the nation. Congressional statements, of course, have more effect on the executive branch of the government than do

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<sup>23</sup>Willis S. MacLeod, quoted in Standardization, February, 1951, pp. 48, 49, and 58.

<sup>24</sup>Wallace F. Bennett, "Management Takes Position on Standardization Policy," Standardization, August, 1949, p. 199.

miscellaneous statements on the outside. And in Congress the American Standards Association seemed to have a champion in Senator Ralph E. Flanders. In 1948 and 1949 it was he who introduced the bills to grant a federal charter to the Association. Now, with the General Services Administration seeking the centralization of standardization, it was he who took the stand on the behalf of the opponents to governmental centralization of standardization.

If you control an industry's standards, you control that industry lock, stock, and ledger. On the day that standards become a government function and responsibility, as is now being threatened, the government will take a very long step toward the control of American industry. That is a step which will reach into every manufacturing and operating company, big and little, and consequently will affect every consumer in the country.

There is now a heightened danger that the intensified pressures of war preparedness will cause the consensus principle in standards to be thrown out and War Standards to be handed down by dictate. There is a greater danger that the government, using the war emergency as an opportunity and an excuse, will not only take over full powers in standards activities but will fail to relinquish them when the emergency ends.<sup>25</sup>

Such pressure could not go unnoticed, and it, coupled with internal governmental hostility to the General Services Administration, soon brought the downfall of the Administration's attempt at governmental centralization of standardization. And when the downfall came, United

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<sup>25</sup>Ralph E. Flanders, quoted in Standardization, February, 1951, p. 47. See also Ralph E. Flanders, "How Big Is an Inch?" The Atlantic, January, 1951, pp. 44-48. The importance the American Standards Association attached to the words of Flanders can be seen in the fact that the Association offered free reprints of his remarks on standardization, a practice not generally followed by the Association. (Standardization, February, 1951, p. 47.)

States standardization policy and organization remained as ineffective as it was in the beginning.

## CHAPTER VII

### THE INFLUENCE OF INDUSTRY ON INTERNATIONAL STANDARDIZATION

The Nature of Industry Influence on International Standardization in the United States. In many of the preceding chapters it was apparent that industry, as a collective unit, played a significant part in the national and international standardization programs in the United States. Actually, it is questionable whether the United States government or the United States industry is the greater force in causing and preventing standardization. Consumers, and of course the government is a consumer, do play an important part in the standardization scheme as do academicians. But the role of these latter two forces is minor in comparison to that of industry and that of government as government rather than as consumer. In practice, both the consumers and the academicians can be left out of the standardization process without grave effect. In many cases government too can be left out of the standardization process. But to ignore industry's interest in standardization to any significant extent is to court disaster. Industry is, of course, a strong, organized political force which can mobilize vast strength to combat any significant threat to its views and its interest as it sees them. This has not gone unnoticed in any section of government and there is often a bowing to the

desires of industry even though such action may seem counter to some interests of the nation. After all, in a democratic system of government the politician must first get elected before he can function in government. And to be elected, the politician often must bow to the will of his supporters even though he may not agree with them. To incur the displeasure of strong elements within the society is, for the politician, to be destroyed. This the many elements within the government recognize and, so that they too may survive, they often bow to the will of the strong influence so as not to incur the displeasure of those influences and the politician and thus destroy themselves. This is essentially the democratic process and it is seen at work equally as well in standardization as in other national policy questions. Democratic government must proceed on the basis of doing what seems proper for the future of the state yet never displeasing any powerful segment of the state to too great an extent. It is in this light that industry must be considered in the standardization scheme.

The Attitude of United States Industry Toward Standardization Organization. Prior to World War II, government/industry standardization questions rarely existed. With World War II this no longer was the case. Instead the matter of government/industry relations reached the level of "intense controversy." This was stimulated, to a very large extent, by the wartime work of the Office of Price Administration in its attempts to correlate standards, grade labeling, and price control. Previously standardization had been confined almost exclusively to

industrial goods. Now, by Office of Price Administration action, it was well extended into the area of consumer goods. This injected new elements into the controversy and brought the matter to an "explosive state." One group felt that only the government could deal effectively with the consumer goods problem. Another group felt that the consumer goods problem should be the exclusive property of business.

When in 1944 the standardization controversy was brought to a head, it was over the question of consumer standards and the related roles of the Department of Commerce and the National Bureau of Standards. There were, however, attempts to broaden the question. But questions not relating to the Department of Commerce and the National Bureau of Standards or consumer goods were either looked on as secondary matters or were ignored.

It was in this setting that the Secretary of Commerce called a conference of fifty of the nation's leading executives in industry and retailing to recommend the future functions of government and industry in standardization.<sup>1</sup> That the recommendations of this conference would favor industry and advocate a hands-off policy on the part of government could be expected. But that the policy formulated by this group would form the basis of most post-World War II standardization actions could not be expected. While industry and other advice is often sought by

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<sup>1</sup>For a detailed accounting of the recommendations of this conference, see Industrial Standardization, February, 1945, pp. 29-34.

government, it is seldom accepted by government without great modification. After all, it is only logical that non-governmental and governmental views frequently will not be synonymous. But in this particular case, apparently what was good for industry and retailers was considered good for the country.

Narrowing the problem, in 1946, the primary issue was whether the problems of the post-World War II period "shall be left for the government to solve, or whether those who are directly concerned with them shall find a way to work out a solution of their own through cooperative action."<sup>2</sup> The implication made by industry was that government was incapable of solving the nation's standardization problems while industry was capable. "Real solutions instead of makeshift compromises"<sup>3</sup> was what industry believed could be obtained if government did not interfere in the standardization process. "The public should look primarily to business rather than Government, to evolve the performance data it will want."<sup>4</sup> This was the attitude expressed by Carroll Wilson, Consultant to the Department of Commerce.

Reflecting the popular mood of industry, Henry B. Bryans, president of the American Standards Association, stated that:

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<sup>2</sup>Henry B. Bryans, "National Standardization--Adventure in Free Enterprise," Industrial Standardization, January, 1946, p. 2.

<sup>3</sup>Ibid.

<sup>4</sup>Carroll Wilson, quoted in Industrial Standardization, February, 1944, p. 29.

Peoples all over the world are turning to their governments to solve the innumerable complicated problems that face them . . . . The outstanding exception is this country. Here, I am sure you will agree, business, labor, and government spokesmen take the opposite view. They are confident that private initiative can produce superior results.<sup>5</sup>

And so it was that the trend throughout the world to make standardization a joint effort of government, industry, and consumers was opposed in the United States by the powerful influences of industry. It may have been that industry took this position actually to create a partnership by preventing the government from assuming full responsibility for standardization--an objective of many persons, particularly a strong faction in the Department of Commerce. But the industry tactic of belittling government operations in the field of standardization did nothing to enhance industry/government post-World War II cooperation in that field.

The Problem of Industry and Government Coordination in the United States. In 1946 the Industrial College of the Armed Forces quoted Howard Coonley, the Chairman of the Executive Committee, American Standards Association, as stating:

I can imagine no more fruitful cooperation between industry and the armed forces at present than a thorough review of purchase and performance specifications, sizes, and material requirements for goods which the Army now needs or may need in the future. Such an undertaking on a cooperative basis between industry and the armed forces might well prove the difference between immunity from foreign influence or succumbing to it. The Allies suffered severely in the early stages of the fighting for lack of interchangeability of components

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<sup>5</sup>Henry B. Bryans, op. cit.

and of standard specifications that are requisite for large scale sub-contracting.<sup>6</sup>

From Howard Coonley's statement one could draw the conclusion that industry/government coordination and cooperation had not been satisfactory. Actually, although the United States government was then represented in the American Standards Association and although there were many channels for industry/government coordination, the ends sought by the two were often in disagreement. This was, perhaps, seen with no greater clarity than in the argument over the need for standards as an element of price control and the broad opposition that developed against minimum standards--an opposition that eventually forced governmental investigation and the imposition of restrictions on the use of standards in the price control process. Of course, without minimum standards, the imposition of price controls was meaningless for the producer, wholesaler, and retailer could merely lower quality and thus achieve a relative price increase within the price control ceilings. And this was done to a considerable extent during the war.<sup>7</sup>

But, whether or not the ends desired were the same or different, both industry and government realized that the coordination of the other was desirable. However, this was a selective process. Industry, on the one hand desired to maintain governmental influence in its decisions at a

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<sup>6</sup>Howard Coonley, quoted in Industrial College of the Armed Forces, "Spare Parts--Standardization," Student Report (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>7</sup>See as example Industrial Standardization, 1943, pp. 205, 210, 238, 263, and 298.

minimum. Equally, government on the other hand desired to limit to a minimum industry influence in its decisions. Thus there was developed a mutual principle of minimum coordination as between industry and government. However, officially the principle of coordination was given much greater emphasis.

Commenting on the subject of coordination, Charles E. Wilson stated that:

One of the really priceless dividends we derived from the last few years is a demonstration of the fact that industry can co-operate intelligently with Government.<sup>8</sup>

In a similar tone, B. C. Boulton pointed out that in standardization cooperation is the keynote.

Each group must recognize the real interests of the other groups and direct its efforts so that these basic interests are promoted and not injured.<sup>9</sup>

When the post-World War II military standardization scheme came into being it was surrounded by a wealth of security restrictions. Naturally these restrictions prevented any significant coordination of the program with industry. But, subsequently these restrictions were lifted and an element of the justification for that action was the need for coordination with industry. Later, all involved national military personnel engaged in this standardization effort were individually charged with insuring complete national coordination to include coordination with

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<sup>8</sup>Charles E. Wilson, quoted in Industrial Standardization, February, 1946, p. 49.

<sup>9</sup>B. C. Boulton, "Standardization Tomorrow?" Industrial Standardization, February, 1946, p. 49.

civil bodies. This stated principle of coordination followed closely the Department of Defense principle later laid down for the domestic standardization program which stated:

The department developing standards and specifications shall assure that adequate coordination has been effected with those sections of industry concerned, including potential new suppliers, where appropriate. The impact of the proposed standardization upon the ability of industry to produce in the quantities required must be assessed before final decision to standardize is made. Also, advantage can be taken of industry suggestions for improvement through application of the latest technological advances. It is essential that the industry be aware, at an early stage, of the changing requirements of the Armed Forces and be given an opportunity to evaluate the proposed change in the light of technical soundness; foreseeable costs or procurement delays; need for retooling; new processes or techniques required; training of the labor forces and the effect upon full and free competition.

Coordination shall be accomplished with a representative cross-section of industry, including a proper distribution by geography and size of business, and including both trade association members and unaffiliated companies, and, where appropriate, trade associations, technical societies, and other standardization organizations.<sup>10</sup>

But, while the principle of coordination could be expounded, its application and enforcement were not easy. Full partnership proved most difficult, for both parties suspected that the interests of the other were too self-centered.

The National Aircraft Standards Committee, when considering aeronautical standardization within the framework of the International Organization for Standardization, took the position that they could play no part since aeronautical standards were basically the product of its largest consumer, the government. On the other hand, the Committee

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<sup>10</sup>U. S. Department of Defense, Directive No. 4120.3, "Defense Standardization Program," October 15, 1945.

held that in the framework of the American-British-Canadian standardization program the military pursued a course which would prevent the government specifications and standards from being modified without international coordination. This, the Committee felt, would relegate the specifications and standards to the impotence of the engineering library shelf. The basic conflict of interest shown here is more than obvious.

Of course international standards are less flexible than national standards which, in turn, are less flexible than industry or company standards. But this does not mean that they are, therefore, unwise or unnecessary. When one agrees to become a party to a standard involving more than himself, he tends to lose some of his freedom of action. This consideration was one of the biggest obstacles to the amalgamation of the several industries and societies into the American Standards Association. Many recognized that international standardization involved an even greater loss of freedom of action. And many segments of industry were little desirous of losing any of their prerogatives for the cause of international standardization in the national interest, contending, of course, that such a step would not be in the national interest.

It is obvious that difficulties will arise when two bodies holding differing views and serving different ends attempt to coordinate their efforts for a common end. Nothing attests better to this than the segmented standardization organization in the United States. Here mutual interest and not universality are the basis of the organization and the

standards they evolve. But, if mutual interest as opposed to universality forms the basis of organization then the resultant product will necessarily be limited. Yet, to bring opposing ideas together may be to produce nothing. That this has in fact been the result can be seen in many of the so-called standards of the present.

In the area of aeronautical standardization, Europeans complain that it is pointless to attempt standardization unless the United States participates in the process, for the predominance of United States production is such that standards drawn without consideration of the United States design and thinking would be pointless.<sup>11</sup> However, the United States aeronautical industry has not been inclined to cooperate with the Europeans or anyone else on an international standardization effort and even has raised objections regarding limited governmental efforts in the field. A fundamental position of the aeronautical industry has been that international cooperation in the area of standardization could compromise the United States position of aircraft production leadership.<sup>12</sup> Beyond this, the aeronautical industry has expressed a concern:

. . . over the possibility of this program compromising the design prerogatives of the Industry when international standardization enters the field of detail designs. Industry is prepared to oppose

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<sup>11</sup>Organization for European Economic Cooperation, Some Aspects of Standardization in the U. S. A. and in Europe (Paris: Organization for European Economic Cooperation, 1953), p. 28.

<sup>12</sup>National Aircraft Standards Committee, "Notes on the 19th CMAS Meeting, 17-18 February 1954, NAS, Alameda, California" (in the files of the Department of the Air Force, file: National Aircraft Standards Committee).

this program at high levels unless they are assured that it will serve the best interests of the /United States/, both in Industry and Government. They feel that the Industry may not be able to take full advantage of the advancement of the art in any given field if the /United States/ is committed too strongly to international standardization agreements.<sup>13</sup>

Obviously such industry positions could not go unnoticed in government, and the nature of the threat probably did much to weaken industry/government cooperation and coordination. While the government personnel had no intention of doing anything harmful to United States industry, and industry never showed that the governmental standardization programs were harmful to industry, a barrier tended to be drawn between the two groups.

Governmental Protection of United States Industry. In conducting international standardization operations, governmental personnel have always been plagued with the shadow of industry. Complicating the problem was the fact that while in the United States government and industry were relatively separate elements, in many of the foreign countries with which the United States conducted international discussions industry and government were as one.

Since the most significant post-World War II international standardization programs were those conducted by the military, the military handling of the problem is worth noting. Within the military international

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<sup>13</sup>National Aircraft Standards Committee, "Minutes of the 19th Meeting of the Council for Military Aircraft Standards, 17 February 1954" (in the files of the Department of the Air Force, file: National Aircraft Standards Committee).

standardization program an industry patent and proprietary problem soon manifested itself.

The problem of patent and proprietary rights is very involved. Each nation wishes to protect its own industry which is tantamount to protecting that industry's patent and proprietary information. But it is difficult to protect that information and at the same time conduct international standardization discussions. One solution offered was to accept the principle that no technical, industrial, or trade information would be discussed in the international standardization programs unless it were wholly government owned or proven not to involve patent or proprietary information. This approach to the problem was, however, impossible of implementation for each potential discussion involved scores of items of equipment each of which might potentially involve thousands of individual patents or types of proprietary information. To research the full patent and proprietary implications prior to entering upon an international discussion would mean only that the discussion would never take place. Further, most of such research would be wasted for only the item finally selected as standard really required a resolution of the patent and proprietary rights. Thus, it was eventually agreed that the only reasonable solution lay in agreeing internationally to protect the patent and proprietary rights of each other, and treaties to this end were drawn.

In furtherance of the policy of protecting industry, the military carefully marked all drawings, specifications, etc. used in international

standardization discussions with a notation pointing out that the information was made available with the understanding that all patent and proprietary rights originating in the information would be respected. In the case of personal visits by foreign nationals to United States installations, governmental and private, elaborate steps were taken to require the signing of agreements by responsible governmental personnel of the foreign nation to insure the protection of United States industry patent and proprietary information.

Obviously restrictions such as those outlined above did little to enhance the program of international standardization, but they seemed necessary if United States industry was to be protected. No governmental person wished to be involved as a material party in a patent suit against the United States government, and every precaution was taken to prevent such an eventuality.

The net effect of the threat of industry was that personnel avoided where possible the discussion of anything that seemed to involve patent or proprietary information. Thus it was that the desire to protect industry coupled with the threats of industry worked to prevent considering for international standardization many items. As a result, both government and industry suffered--government because it limited the scope of international standardization discussions and industry because many of its products were never considered for standard international use.

Industry/Government Suspicions. Industry naturally desired that government do nothing in international standardization that would work to the disadvantage of industry. Industry depended on international competition while national security depended on international cooperation. This allowed little room for compromise. Obviously industry was reluctant to release any information to foreign nations and industries that might later profit from this information in the economic field. But international cooperation and standardization could not take place without the release of information. Government/industry cooperation thus seemed limited by inherent restrictions. This divergence of ends had a decided effect on international standardization for industry had to suspect every governmental act as an indirect threat to industry.

On the other side of the problem, government suspected the international actions of industry. C. C. Abbott's comments on this point are most descriptive.

Agreements for the interchange of patents and the results of scientific research are the types of arrangements that have perhaps been most commonly criticized during and since the war. The criticism has in substance alleged that representatives of foreign companies have wormed out of domestic corporations technical information that was of military value, and that the unsuspecting domestic concerns have in return secured information that was of little if any use. Cross-licensing agreements and their attendant arrangements in this view are looked on as a vehicle for high-class espionage.

Commonly cited in this connection are the prewar relations between Bausch and Lomb and the German firm of Carl Zeiss and between the American Bosch Corporation and the German Robert Bosch Company, as well as the exchange of information regarding synthetic rubber that took place between the Standard Oil Company

of New Jersey and I. G. Farbenindustrie. The position of the American companies referred to has in general been that on balance they gained, and many of their arguments are persuasive. Establishment of the facts in these cases is very difficult, even for the trained technician. It seems evident, however, in view of the increasing part played in modern warfare by scientific and industrial technology, that such arrangements must be scrutinized with great care in the future.<sup>14</sup>

Thus it is seen that government is suspicious of industry; concerned that industry will place national interest second when seeking profit internationally.

Obviously if both industry and the nation are to survive some compromise between the opposing needs of the two must be found. This seems possible only if industry agrees to join with government in the quest for international standardization. In this some hopeful signs have been noted by Howard Coonley.

... in 1948 after [the International Organization for Standardization] had set up sixty-nine individual projects, the United States took an active part in only nine. Of these the Americans assumed the secretariat of seven. At the same time, France participated in twenty-seven projects and held twelve secretariats. Now [the International Organization for Standardization] has eighty-one projects and the United States has participating membership in thirty-six, holds the secretariat of eight, and has observer status in the rest.<sup>15</sup>

This is an improvement, but it is still a somewhat dubious position to be held by the technological and industrial leader of the free world.

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<sup>14</sup>C. C. Abbott, "Economic Aspects of Power," Harvard Business Review, July, 1948.

<sup>15</sup>Howard Coonley, "The International Standards Movement," Dickson Reck (ed.), National Standards in a Modern Society (New York: Harper and Brothers, Publishers, 1956), p. 36.

The United States Industry View. If the interest of industry is limited only to its own specific ends, then industry/government cooperation will be most difficult. As indicated, government must take account of industry's needs, but industry need not be forced to take account of government's needs. And one of the points industry representatives made in 1945 regarding the organization of the American Standards Association was that, while government should participate on the working or technical level of the Association, it should not participate at the policy level. This sentiment was repeated again as late as 1958 by Cyril Ainsworth.

The emphatic preference of industry for the present democratic set-up, eliminating all fears that any form of political control would creep in, has been repeatedly confirmed in the subsequent 38 years experience. During that period the present system of handling standardization work is notable for the continuous, active cooperation at the technical level between government and the American Standards Association.<sup>16</sup>

Lest there be any misunderstanding on this point, it would seem that American Standards Association president, H. Thomas Hallowell's words will clear it up.

As president of the American Standards Association, I will do everything within my power to carry out the directive which American industry has given us.

That directive, as I understand it, is to act as an instrument of private enterprize as clearinghouse and catalytic agent in international standards work; to serve as a bridge between industry

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<sup>16</sup>Cyril Ainsworth, "DINNSA," The Magazine of Standards, April, 1958, p. 123 (underlining added). "DINNSA" is used by industry to mean "Does Industry Need a National Standardization Agency?"

and government in standards matters; and to express the viewpoint of American industry at the international level, . . .<sup>17</sup>

More to the point, perhaps, is the report on the United States representation to International Electrotechnical Commission Committee TC-40:

Through company furnished experts and special financial support provided by the Radio-Electronics-Television Manufacturers Association, . . . the U. S. delegation was able to effectively present the viewpoints and protect the interests of the U. S. electronics industry on a wide and challenging list of international standards covering electronics components.<sup>18</sup>

In Summary. Lord Ismary reported that in the North Atlantic Treaty Organization "it has now become the accepted practice for groups of experts, nominated by the various governments, not only to discuss their plans and problems around the table, but also to visit one another's factories and examine in the greatest detail technical processes and methods of production. Thus the benefits of the latest advances can be shared by all."<sup>19</sup> This is, of course, exactly what industry does not want. Industry's first concern is profit and not sharing. No industry logically wishes to assist a competitor to become a better competitor. In fact, the opposite is true. Thus, looking at the problem of

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<sup>17</sup>The Magazine of Standards, January, 1956, p. 17 (underlining added).

<sup>18</sup>American Standards Association, "Report of the Technical Advisor for IEC Committee TC-40 to the U. S. National Committee of IEC on the meetings held in Munich, June 25 to July 6, 1956," August 2, 1956 (underlining added) (in the files of the Association).

<sup>19</sup>Lord Ismay, NATO, The First Five Years, 1949-1954 (Netherlands: Bosch-Utrecht), p. 130.

international standardization and technical collaboration from the viewpoint of United States industry, one can readily understand the concern that exists lest the program go too far. But looking at the narrow interests of industry, one can also see why United States industry cannot represent the nation in international standardization for United States industry cannot be expected to seek ends which may be good for the nation but disadvantageous to industry.

## CHAPTER VIII

### DETERRENTS TO STANDARDIZATION

" . . . it is not a question as to whether one can afford standardization . . . the question is, 'Can one afford to be without it?' . . ."<sup>1</sup>

Deterrents in General. In the preceding chapters it has been seen that the road to standardization is littered with obstacles. In fact, the number and variety of these obstacles may well appear to make the road to standardization impassable. It is thus appropriate that some attention be accorded the source and nature of some of these obstacles.

Perhaps the greatest obstacle or deterrent to standardization was discussed in Chapter I. This was the psychological reaction to standardization which is shared in varying degrees by many: the idea that all standardization is some form of malicious dictatorial regimentation. Standardization to the majority of these people is the antithesis of freedom--la bête noire. To discuss the logical aspects of the discipline of standardization with these persons is difficult if not impossible. For them there seems no middle ground. For them standardization is a creeping disease that in time, if left to grow, will reduce man to an impersonal cog in a great and complex social machine.

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<sup>1</sup> John F. Cramer, "Economic Aspects of Standardization," Industrial Standardization, July, 1947, p. 164.

Few are the people who do not harbor some distrust or fear of the discipline of standardization. And usually this distrust is not founded on a single reaction but on a multiple reaction if not a multiple fear. Beyond this, standardization is impeded by a complex of aged fallacies and modern counter-concepts. In addition, standardization tends to be impeded by relatively unrelated requirements such as national security restrictions and national research and development.

In this chapter there will be discussed several of the more significant deterrents to standardization. National security and national research and development, while significant deterrents to international standardization in that they emphasize and protect the national rather than the international solution, will not be discussed here since a complete, worthwhile review of these deterrents is not possible within the limits of this thesis.

The Political Deterrent. International organization has purpose only in the sense that it furthers national objectives. It follows that progress within international organization can proceed only if the national political thought supports that progress. As an example, military international standardization is designed to prepare for coalition warfare, nothing more or less. This being the case, then the minimum political decision necessary to carry on an international military standardization program is the political support of that condition. But this minimum generally also is the maximum political guidance given that program! Yet much more is needed if the program is to progress in any

reasonable fashion. It is not enough simply to prepare for coalition warfare unless that implies full political support of preparation for all contingencies, which it does not. One must know the type of coalition warfare one is preparing for and the strategic objectives. These are political decisions. Proceeding from there, there must be political support to overcome the economic and other deterrents to the program. Without this political support, and by this is meant support from the highest political level, the entire effort could be expected to degenerate into an expensive waste of resources.

Even as between the United States and Canada, where it is recognized that the compelling forces of the atomic era are forcing the nations closer together, Canada has emphasized that "this closer association . . . should not be confused with the loss of our political freedom."<sup>2</sup>

But certain political freedom must be lost to the individual and nation and merged into a greater whole if international standardization is to be other than a myth.

The Economic Deterrent. Nations are basically in economic competition as a part of a larger international political power struggle that is carried on unceasingly. In this process of international economic competition, continuous efforts are expended by each nation to enhance its own productivity and economic stability and superiority. In this process,

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<sup>2</sup>L. B. Pearson, Secretary of State for External Affairs, Canada, An address before the Canadian Club, Montreal, April 27, 1956, quoted in Canada, Department of External Affairs, Information Division, Statements and Speeches, No. 56/14, p. 2.

there is a continuing attempt to capture greater portions of the world market. And nations vying for a world market are inclined to create and emphasize product or commodity differences. International standardization, except for certain inconsequentials, is the antithesis of this-- international standardization tends to standardize quality and design. As such it tends to limit international competition to the fundamentals of cost of labor and materials. Thus effective international standardization could have a negative effect on the foreign markets of the nations having higher living and labor standards. No doubt, effective international standardization would be a leveling influence on international living standards and economic structures. It also would tend to limit areas of international competition. And one of the basic fears that surrounds any international standardization program, particularly in the United States, is that even a little program can have a serious effect on the international position of competition among certain industries. Further, a little program is merely the beginning of a larger program. And the end economic result is something not widely desired in the United States. It is perhaps for this reason that those portions of international standardization that are a responsibility of the United States industry tend to be ignored. But the other side of this international economic coin is equally impressive. As stated by Herbert J. Wollner:

A supplier separated by thousands of miles from a purchaser can only make "good delivery" when both agree upon the methods by which

his product will be examined and tested, and the standards against which they will be compared.<sup>3</sup>

Beyond this, standardization makes the world market available for competition and not the exclusive property of some nation or industry by reason of technical differences.<sup>4</sup> Further, it enhances price competition because it can make component parts or raw materials available at less cost.<sup>5</sup> Finally, it tends to eliminate trade barriers by creating a language that both supplier and consumer understand.

Whether the economic good of international standardization outweighs the economic bad is yet to be decided, particularly in the United States. But unless it is decided in favor of international standardization, such work will proceed slowly at best.

The Deterrent of a Negative Concept. International standardization is a relatively new endeavor. Only in the field of sea navigation has there been any really long history of international standardization. Nations and industries have been more inclined to create and emphasize differences than to note and emphasize likenesses. Even militarily, much past

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<sup>3</sup>Herbert J. Wollner, "Standards and World Trade," Industrial Standardization, June, 1956, pp. 147-148.

<sup>4</sup>As an example, Germany designed a light fixture that was used extensively in South America in which a United States designed bulb could not be used. However, the German bulb could be used in both the German fixture and the United States fixture.

<sup>5</sup>International grading facilitates the use of raw materials from foreign sources, while such finished products as Phillips cross recess screws can be produced cheaper in areas of low labor cost and imported into the United States for incorporation into United States products which, in turn, can be sold internationally at a more competitive figure.

effort has been expended in the creation of differences. As an example, it was a military decision to create the variety of railroad gauges in use in Europe. Different gauge railroads were a military obstacle to invasion. Along the same lines, Germany in World War I developed a 76 millimeter gun which, conveniently, could fire the allied 75 millimeter round but, in turn, prevented the allies from firing the German round. This type of history coupled with a persistence to think in terms of strict national operations and ends has led to a broad degrading of international standardization. As a result, there has developed a widespread negative approach to the program.

The direct benefits of international standardization are, of course, often difficult to observe particularly in the immediate future. Beyond this there are the popular views that standardization leads only to stagnation. Speaking on this point, Charles J. Eiwien noted that:

One of the commonest misconceptions we encounter is that standardization means stagnation of scientific progress.

This is an impression that provides one of the greatest obstacles to the success of the standards engineer's efforts. Although the engineer engaged in gathering the latest technical information knows that engineering standardization is a dynamic, forward-looking effort, his work is made more difficult because of this misconception. As a result, not only do engineering design, development and production units shy away from standardization but even management is disinclined to support whole-heartedly a standardization effort for fear of being labelled sluggish or even backward-looking.<sup>6</sup>

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<sup>6</sup>Charles J. Eiwien, "Standardization Research," A paper presented at the Fifth Annual Meeting of the Standards Engineers Society at Washington, D. C., quoted in United Kingdom, Ministry of Supply, Standardization, April, 1957, p. 9.

As a result of the negative approach to standardization, hardly any standardization policy or paper has been written that does not emphasize that standardization should not be an end in itself.<sup>7</sup>

Unfortunately, detailed justification in support of standardization, national or international, is sometimes most difficult to assemble and more often than not consumes more time and effort than would be spent in the actual process of standardization. Thus, the emphasis of "need" has placed a very effective road block in the way of standardization. The nature of this road block is easily seen in B. C. Boulton's statement that:

When pressed, engineering executives will generally agree that standardization has some value but that the benefits are too intangible and too far in the future to warrant more than a low priority for standards work in comparison with today's urgent tasks.<sup>8</sup>

What is not recognized by the negativists who argue that standardization should not be pursued for the sake of standardization is that the

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<sup>7</sup>As an example, World War II War Production policy stated: "Unless it is clear that a simplification or standardization project will be of definite benefit, it should not be undertaken." (Industrial Standardization, June, 1943, p. 191.) Similarly, the United States Air Force states that: "Standardization is not an end in itself. Unless practical benefits can be foreseen, standardization should not be attempted." (U. S. Air Force, Air Force Regulation 81-6, "Specifications and Standards--International Military Standardization Programs," October 18, 1955.) Benjamin Melnitsky shared this view and stated that industrial standardization "has value only if applied vigorously to specific industrial problems in such a manner as to produce for its user demonstrable profit." (Benjamin Melnitsky, Profiting From Industrial Standardization (New York: Conover-Mast Publications, Inc., 1953), p. 1.)

<sup>8</sup>B. C. Boulton, "Standardization Tomorrow?" Industrial Standardization, February, 1946, p. 30.

benefits of standardization frequently are of a general nature and cannot be expressed in dollars and cents. Nowhere is this brought out with greater clarity than in the testimonials gathered by the American Standards Association.<sup>9</sup> If these testimonials show one thing, it is that the benefits of standardization while recognizable, mostly after the fact, can seldom be priced and, with even less frequency, demonstrated prior to the accomplishment and implementation of the standards.

It is rather unfortunate that those most interested in advancing standardization are the ones who voice this negative argument with the greatest frequency and vigor. Typical of these statements is the one made by the Ministry of Supply in the United Kingdom:

Standardization is a tool which, when properly used, is beneficial, but it is a means to an end. Those who standardize everything are more harmful than those who oppose standardization, because they would not be satisfied with nothing (sic) short of regimentation, which is certainly not what is required in a modern civilization.<sup>10</sup>

But the Ministry of Supply, in commenting on the operation of the Briggs Motor Bodies, Dagenham, Essex, stated that "the doctrine of maximum standardization" was applied with great success.<sup>11</sup> Obviously, if one speaks of mass production and its modern counterpart, automation, he can only embrace the idea of maximum standardization. Instead of

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<sup>9</sup>Standardization, October, 1951, pp. 305-336.

<sup>10</sup>United Kingdom, Ministry of Supply, Standardization, April, 1955, p. 3.

<sup>11</sup>United Kingdom, Ministry of Supply, Standardization, April, 1957, p. 18.

finding reasons to standardize, the modern production engineer must find reasons not to standardize. Yet, persons of broad standardization background literally will rationalize themselves in circles pointing out that standardization should not be pursued for the sake of standardization because standardization is only a concept and not a direct benefit. This is, of course, much like saying honesty, virtue, fellowship, etc. should not be ends in themselves but should be pursued only when some direct benefit can be demonstrated. That other benefits do arise from the pursuit of these ends is obvious; yet, one is not required to first seek out those other benefits in detail. However, while standardization is often linked with virtue, honesty, etc., it is seldom given a comparable status.

Most opponents and many proponents of standardization will go to great pains to point out that all houses need not look alike; they will allege that the pursuit of standardization as an end in itself would produce nothing but a world of sameness; they will state that standardization approached as an end would result in the production of nothing but quarter inch stove bolts when the world needed many varieties of bolts. But all of this could not be further from the truth. These persons simply fail to understand the process of standardization; they fail to consider that standardization can be both flexible or rigid depending on the problem. And if the problem involves variety, as in the case of home design, then the standardization solution excludes the single answer. Yet, it must be pointed out that the proponents of this

conceptual deterrent willingly subscribe to the standardization principles of modular coordination and preferred numbers,<sup>12</sup> conceding that even variety can occur within limits of standardization.

If national and international standardization is to succeed, it must be approached positively. To require that the concept be defended on each and every issue will be to insure its ultimate destruction.

The Deterrent of Decentralized Action. There is a large and seemingly growing school that believes that standardization can be accomplished best on a decentralized basis. This principle underlies much of the complex United States organization.<sup>13</sup> But the concept of decentralized action and broad standardization tend to be opposing forces. It is a fundamental contradiction to insist that standardization, the act of

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<sup>12</sup>The systems of preferred numbers and modular coordination have been of immeasurable help in effecting standardization or unnecessary variety. Stated simply, the system of preferred numbers is the application of logic to the selection of numbers in a desirable progression so as to limit reasonably the infinite numerical values available to the designer. As a result of the use of preferred numbers, designers in separated locations and without coordination can be expected to arrive at uniform decisions and therefore standard items. Modular coordination approaches the problem of infinite choice in another manner by specifying a module upon which all design within a given field of endeavor will be based. The best example of modular coordination in the United States is in the field of architecture where all design is based on a module cube, four inches high, four inches wide, and four inches deep. Modular coordination also has been employed in such things as furniture design, food handling equipment design, and packaging.

<sup>13</sup>The wide support of the philosophy of decentralization can be traced directly to present educational roots. As an example, in Marshall Edward Dimmock and Gladys Ogden Dimmock, Public Administration (New York: Rinehart and Company, Inc., 1955), p. 335, there is the statement: "In administration, too great a centralization at headquarters leads to an overload of work at that point, loss of contact

reducing variables and independent action, can be carried out on a decentralized basis. But, it is recognized that centralized action agencies are not the most flexible units to be found, particularly at the international level, and thus with centralization there is to be found a certain amount of inherent complexity.

In the national scene there is great fear that centralization of standardization in government, and particularly by legislation, would result in the creation of a system wherein changes could be brought about only with the greatest difficulty. But it is also recognized that if uniformity is to evolve by the separate actions of even the various states on things in which there is no fundamental objection, at least ten years would be required.<sup>14</sup> Further, if decentralized action is permitted, there is every assurance that uniformity will not result. This is seen particularly in the state and local standards that have been established during the years. Addressing himself to this problem and its effect on interstate trade, Frank Bane, executive director of the Council of State Governments, said:

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with local centers, and a failure to take local conditions and aspirations sufficiently into account when determining national policy. Moreover, concentration at the top has an equally disastrous effect on regional and local administration, for it results in inadequate authority, weakened initiative, too many detailed instructions, loss of spontaneity and flexibility, the frustration of officials, and, in the end, an aroused citizenry. Decentralization must therefore be constantly sought."

<sup>14</sup>Howard Coonley and P. G. Agnew, "The Role of Standards in the System of Free Enterprise," Industrial Standardization, April, 1941, Part 2, p. 6, citing the experience of the National Commission for Uniform Legislation.

Hundreds of trade barriers are today obstructing the free flow of commerce among the states . . . . Many of these barriers are local standards in the form of regulations of state governments; some are city ordinances; and others result from generally confused situations. It is clear . . . that most of these barriers could be removed--or better, could have been prevented in the first place by national standards.<sup>15</sup>

Looking at the problems created by the local, voluntary implementation of standards, an American Standards Association Committee on Model Laws and Ordinances studied how obsolete technical requirements in state laws and local ordinances affected business and the public. The studies of this committee<sup>16</sup> point out one singular thing: if implementation of national standards is decentralized then the standard will not be implemented on a uniform basis if, in fact, it is ever implemented universally. The result will be that certain areas will never benefit from the new technology incorporated in the standard. A second result will be that product costs will be higher than necessary since production on a uniform, modern base will not be possible. Illustrating its point, the committee noted that one Ohio town in 1949 was still governed by the 1897 edition of the National Electrical Code. Similarly, although national standards had been drawn up for a uniform range of pipes, obsolete plumbing codes required the use of non-standard items causing manufacturers to continue their production and, eventually, costing the property owner unnecessary expenditures.

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<sup>15</sup>Frank Bane, quoted in Howard Coonley and P. G. Agnew, "The Role of Standards in the System of Free Enterprise," *op. cit.*, p. 9.

<sup>16</sup>American Standards Association, Nationally Recognized Standards

If international or national standardization is to become a reality, centralization must win out over the illogical forces of decentralization.

The Deterrent of Voluntary Action. In the United States it is now rather universally accepted that standardization should be a voluntary action. "General consent" forms a basic part of the definition of a "materiel standard" as outlined by F. G. Jenkins.<sup>17</sup> "Use of American Standards Association standards is not obligatory," but enforcement is much like the enforcement of "common law."<sup>18</sup> It is "most important that standards should not be mandatory . . ."<sup>19</sup> When force is applied, the word is alleged not to be standardization but "dictation."<sup>20</sup> And in the all-black and all-white view of the reactionary, "dictation" must be "bad." Even R. E. Zimmerman, a president of the American Standards Association, contends that:

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in State Laws and Local Ordinances (New York: American Standards Association, 1949).

<sup>17</sup>F. G. Jenkins, "Material Standardization," Iron Age, February 20, 1941, p. 35.

<sup>18</sup>Industrial Standardization, January, 1941, p. 18. See also the recommended "consensus" policy statement the American Standards Association desires included in all American Standards. (American Standards Association, The 400 American Standards in the Electrical Field, 1956 (New York: American Standards Association, 1956), p. 7.)

<sup>19</sup>L. F. Adams and P. L. Alger, "What Role for Standards in Post-War Production," Industrial Standardization, December, 1943, p. 358.

<sup>20</sup>Melnitsky, op. cit., p. 2.

All who have studied the subject agree that the development and use of standards through voluntary standardization is fundamental to our economic development and the maintenance of the system of free enterprise.<sup>21</sup>

Beyond this, internationally one can find comments that "one of the more significant principles of the Tripartite Standardization Program is that it is voluntary,"<sup>22</sup> or "standards derive their authority, not from a compulsory edict, but from their own merits . . . ."<sup>23</sup>

The proponents of the maxim of voluntary standardization or standardization on the consensus basis contend that standardization cannot work when administered by law or external force. Even Albert W. Whitney held that:

The further we progress on the road of . . . standardization, . . . the more clear does it become that standardization must be a process by which a consensus of all interests is reached in a thoroughly representative and democratic manner.<sup>24</sup>

However, the proponents of the voluntary maxim will admit that there are exceptions. In some instances these exceptions have been rationalized with the statement that consensus may be obtained by the democratic

<sup>21</sup>R. E. Zimmerman, "High Spots of ASA Work for 1941," Industrial Standardization, January, 1942, p. 7.

<sup>22</sup>Col. J. S. Lawrence, Jr., "Standardization Among Allies," Army, May, 1957, p. 33.

<sup>23</sup>International Electrotechnical Commission, Charles Le Maistre, His Work, The I. E. C. (Geneva: Central Office of the International Electrotechnical Commission, 1955), p. 17.

<sup>24</sup>Albert W. Whitney, The Place of Standardization in Modern Life, A paper prepared for the First Pan American Standardization Conference, Lima, Peru, 1924, originally published by the Central Executive Council of the Inter American High Commission, reprinted in Industrial Standardization, January, 1943, pp. 21-25, p. 24.

principle of majority rule as in the case of legislation. The proponents of the voluntary maxim may even be swayed to the point where they will admit that the making of standards by people in authority without the consent of those to whom the standard applies is often necessary and logical. They will admit, as an example, that a manufacturer need not obtain the consent of consumers before he establishes a commodity standard or that the police need not obtain the consent of the motorist before they establish every vehicular speed standard. Nevertheless, they will hold, as did Whitney, that "it is the standards that do not represent a real consensus of all those interests that are concerned in progress which we should fear."<sup>25</sup>

The consistent expression of fear of standardization by means other than consensus is to be expected. Few indeed are the people who wish to have their lives ruled by external sources, but such external rule is now an accepted pattern of society. So long as there is justice and logic in the operation of the external power there is nothing to fear. On the practical side, in many areas of standardization, consensus could never be achieved due to vested interests or a host of other reasons. In these cases is the world to be denied the benefits of standardization because of the opposition of a minority?

Fortunately, while the principle of voluntary standardization is still widely held, there is a growing school that believes that certain

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<sup>25</sup>Ibid., p. 24.

standardization should become a legislated, non-voluntary process.<sup>26</sup> It must be noted that during World War II, "to save critical resources, the voluntary principle of standardization was abandoned and mandatory standards were placed in effect. These emergency standards . . . had the weight of law."<sup>27</sup>

Beyond the consideration of application, the voluntary standardization principle works to slow the entire standardization process. This was noted in the North Atlantic Treaty Organization where it was observed that "throughout all phases of the processing of any [standardization agreement] the excessive time required is caused primarily by the voluntary nature of the organization."<sup>28</sup>

But, on the practical side, it must be admitted that the making of standards mandatory except by government action runs directly counter to current United States law. It is to avoid legal problems that a great issue is made of the voluntary nature of all non-governmental standards. While it is generally recognized that standardization and simplification are in themselves legal and unobjectionable, there is equal recognition that agreements to adhere to standards, to make only standard items or to

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<sup>26</sup>This does not mean that all important interests are not consulted or considered in forming the standard. It merely means that authority is employed in fixing and enforcing the standard.

<sup>27</sup>Industrial College of the Armed Forces, Student Committee Report, "Spare Parts--Standardization" (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

<sup>28</sup>Col. Donald R. Bodine, "A Proposal for the Reorganization of the NATO Military Agency for Standardization," April, 1954 (unpublished thesis, Air War College, Maxwell Air Force Base, Alabama), p. 9.

make only the items in the standard product lines, are probably unlawful restraints of trade, unless they can be justified under the rule of reason.<sup>29</sup> Several cases demonstrating this problem were outlined earlier as a part of the organizational problem. Practically, however, if a group of persons, industries, or associations band together to establish standards and simplifications to facilitate their operations, there is at least tacit agreement that they will adhere to the standards that they collectively establish. But this approaches restraint of trade in that they thereby will tend to exclude non-standard products or services. To circumnavigate this difficult question, the principle of voluntary adherence is voiced and to avoid legal problems:

It should be made clear to all members of standardization trade associations and other groups that all parties are free to conform or not to the standards or standard product lines as they wish, and there should be no attempt by the association or any of its members to exert compulsion of any type upon other members, or to invoke moral sanctions, in an attempt to have them confine their manufacturing to products conforming to the standards or to only those items included in the standard product lines.<sup>30</sup>

In reviewing "Standardization and the Antitrust Laws," James D. Hayes reached a parallel conclusion:

. . . it behooves every association engaged in standardization to make clear beyond question both to its members and to the public generally that the promulgation of a standard or standards by it does not preclude any member or non-member from making his own determination as to whether he will manufacture in accordance with the standard.

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<sup>29</sup>Industrial Standardization, December, 1944, p. 261.

<sup>30</sup>Ibid.

Of course, it is natural that a manufacturer who has taken part in setting up standards will in all probability manufacture in accordance with the standards. As long as each manufacturer freely, voluntarily, and in good faith does this, whatever restraint of trade results is incidental . . . . It is only where the freedom of the individual has been taken from him by an agreement express or implied to adhere that the restraint becomes direct rather than incidental. <sup>31</sup>

Obviously some standards need not and should not be mandatory. But other standards, such as those established under the authority given the Food and Drug Administration, must be mandatory if they are to have any meaning. Laws actually are nothing more than standards by another name. And imagine the chaos that would occur if laws were enforced only by a system of voluntary agreement. If laws are worth passing, they are worth enforcing. In the same sense, most standards, if they are worth making, they are worth enforcing.

Actually, most objections raised against the enforcement of standards are weak. E. C. Crittenden, as an example, makes a great point of the fact that the Congress has not had to legislate standard weights and measures in order for the nation to operate under such a set of standards. But he willingly admits that most of the states have adopted weights and measures laws and it is this action that has led to uniformity in the country. <sup>32</sup>

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<sup>31</sup>James D. Hayes, "Standardization and the Antitrust Laws," Industrial Standardization, April, 1946, p. 77.

<sup>32</sup>E. C. Crittenden, "Contributions of Government and Private Agencies to National Standards," Dickson Reck (ed.), National Standards in a Modern Society (New York: Harper and Brothers, Publishers, 1956), p. 32.

If one standard is needed for the nation, what is to be gained by denying national action in favor of fifty separate state actions? And what is to be gained by pressing blindly for the principle of voluntary standardization only thereby to make standardization relatively impossible or, at least, exceedingly difficult?

The Deterrent of Individualism and Nationalism. In Chapter I and in the introductory remarks to this chapter, mention was made of the rather universal psychological reluctance to accept standardization on the basis that standardization destroyed personal freedom. Seldom recognized, but yet a predominant factor in retarding international standardization, are other individual and collective psychological deterrents.

One very important psychological deterrent to standardization stems from the fact that one technician's product is to him almost always better than the product of any other technician. This prejudice or pride of authorship extends to national preference for the achievements of one's own service or country and is referred to by those engaged in standardization as the "NIH" factor (the "Not Invented Here" factor). Although it is intangible, it is very real. It naturally makes everyone skeptical of ideas, procedures, or equipment originating outside his own group.

This state of mind is fortified rather than reduced by the prevailing political systems which emphasize that internationally divisive force, nationalism. The effect of nationalism was in particular evidence during the standardization discussions leading to the adoption of a standard

rifle for the North Atlantic Treaty Organization. Several nations competed in the design of this rifle and each propagandized at length as to the superior features of its rifle. Thus, when the standardization discussions and comparative trials were undertaken, it was a matter of national prestige and not the relative merits of the respective rifles that was under consideration. It is no wonder that a solution proved most difficult for the acceptance of any nation's rifle was for that nation a national victory and for all other nations a national defeat.

Reflecting this general problem, Col. R. C. Heflebower concluded that:

A very real difficulty [in international standardization] lies in the fact that there prevails among our people the feeling that we should state our intentions and that others should fall in line; that we, as the predominant producer and user should set the pace for all to follow. <sup>33</sup>

It was in recognition of this national feeling that one of the United States officers intimately associated with the standardization of the rifle for the North Atlantic Treaty Organization commented:

It is not easy for strong partners, who in the past have with considerable pride developed and produced their arms independently, to acknowledge the need for and practice collaboration. The action of the United Kingdom in reversing its original decision to adopt a British-developed rifle and round in favor of a Belgian rifle and a [United States] round was not only politically courageous, but an unparalleled demonstration of the British intention to encourage allied standardization. <sup>34</sup>

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<sup>33</sup>Col. R. C. Heflebower, "The USAF Program of International Standardization," Standards Engineering, September, 1955, p. 13.

<sup>34</sup>Col. J. S. Lawrence, Jr., "Standardization Among Allies," Army, May, 1957, p. 35.

International standardization develops out of the realization that national differences are unhealthy. International standardization is also a recognition that defense is no longer a national problem but an international problem. But if the problem goes beyond the individual and the state, then it is academic to attempt to emphasize the individual and state interests and prejudices. Yet, so far, it has been found near impossible to deemphasize these interests and prejudices so as to satisfy the greater need. Howard Coonley summed this up by saying that:

The speed with which international standards are set up is going to depend more on changing the attitude in the United States than on any other thing. Again, we are individualists. We want to say to the rest of the world, "Take American standards or none."<sup>35</sup>

The Deterrent of Time. International negotiations are, at best, slow. International standardization negotiations probably are among the slowest. United States Air Force experience has shown that an international standard takes from two to five or more years to resolve with the average standard consuming about three plus years of negotiations. When the time delays involved in the national implementation process are added to the international negotiation times, the delay between the conception of the idea and the realization of result approaches, if it does not exceed, the level of unacceptability. Experience also has shown that personnel change as often as three to six times during the course of discussion of even a simple standard. This, in itself, is a disorganizing

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<sup>35</sup> Howard Coonley, "The Importance of Standardization to Our American Enterprise," An address before the Industrial College of the Armed Forces, February 19, 1948 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).

influence. But when changing concepts and technology are added to the problem the situation borders on the limits of intolerability.

Time considerations are, of course, a measure of the complexity of the problem and of the organization. International machinery, in particular, is ill-adapted to carrying out with speed most programs, let alone one so complicated as the international standardization program.

Reporting on the problem of time in the North Atlantic Treaty Organization, Col. Bodine noted that in extreme cases, the processing of a simple operational procedure standard covering procedures already being used by a majority of the nations took over two years to complete.<sup>36</sup>

Nationally, commenting on the time problem of standardization, the Air Research and Development Command of the United States Air Force stated that:

The fundamental nature of standardization and the high obsolescence rate of Air Force equipment combine to produce an environment in which standardization sometimes is of low payoff. To be effective, a standard must be widely agreed upon and widely applied. A limited standard is of limited utility. Yet the time required to obtain wide acceptance and use of a standard inevitably is long because it requires the agreement and active participation of many different agencies. The standardization process seems to be growing more lengthy because of the increase in complexity and the corresponding increase in engineering and logistic problems which must be resolved before decisions can be rendered.

On the other hand, the performance of weapons systems in the inventory today are orders of magnitude apart as compared to the minor performance differences which existed between systems in World War II. This leads to a very rapid obsolescence of systems and of equipment items. It has been our experience, for example, that we were able to obtain final standardization of some components

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<sup>36</sup>Col. Bodine, *op. cit.*, p. 13.

used in an early K-system only a few months before the particular system itself was due to be phased out of the inventory.

It is clear that if standardization is to be of reasonable benefit to the government, the time required to standardize must be considerably reduced. The engineering decisions involved in standardization probably cannot be compressed. The cycle at present, however, includes many months of processing from agency to agency . . . . Funneling all standardization actions into the present cumbersome military standardization machinery can result only in limited benefits. It appears that the time and manpower invested per item standardized in such an environment will continue to increase to a point at which the value of many such actions may be open to question.<sup>37</sup>

Obviously, if the time required to reach agreement remains excessive, standardization cannot become a reality.

The Deterrent of Cost. Most authors and professional standardizers extoll the savings that accrue from standardization. Indeed, savings are the prime justification for standardization.<sup>38</sup> But the savings that accrue from standardization are usually long term. In the short term, standardization can be expected to cost for any standardization usually results in change on someone's part. And any change is costly, particularly in this era of big business and big industry. Acceptance of a new or differing standard by a civilian firm or industry or by government very often involves considerable financial expense in new tooling, in retraining

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<sup>37</sup>U. S. Congress, Hearings before a Subcommittee on the Committee on Government Operations, House of Representatives, Eighty-Fifth Congress, First Session, January, 30, 31, and March 12, 1957 (Washington: U. S. Government Printing Office, 1957), pp. 341-342.

<sup>38</sup>As an example, Melnitsky, op. cit., devotes an entire chapter discussing "The Underlying Profit Motive" for standardization. In his words: "Standards have actual value only when the money invested in them is recouped with interest."

personnel, in the maintenance of two standards for a period of time to accommodate old customs, and in many other ways. But, before the cost of implementation is incurred, there is the very real cost of formulating the standard. In some cases this initial cost can be sizeable. Yet, if standardization is to be achieved, this cost of standardization must be borne. As Roger E. Gay stated:

Standardization is a function that costs money and must be paid for. Such costs are simply one expense of doing business. They are as much a routine and necessary business expenditure as legal counsel, advertising, or market research.<sup>39</sup>

However, the cost of working towards standardization as opposed to the cost of implementing standards is usually of minor consequence. This latter cost was pointed to by Lord Ismay as one of the inherent difficulties of achieving materiel standardization in the North Atlantic Treaty Organization. In his words, "standardization very often involves the great expense of scrapping existing equipment and retooling production lines."<sup>40</sup> Such a cost can be great and to avoid this type of cost many persons advocate the principle that standardization should be reached prior to the establishment of production lines.

Beyond these conventional costs, it is possible to place other serious costs in the way of standardization. If standardization involves the selection of a proprietary item, the licensing of that item may be

<sup>39</sup>Roger E. Gay, quoted in Standardization, January, 1951, p. 9.

<sup>40</sup>Lord Ismay, NATO, The First Five Years, 1949-1954 (Netherlands: Bosch-Utrecht, n. d.), pp. 79-80.

prohibitive. Also, if standardization involves the selection of an item available only in a high cost area, that fact may prevent standardization for standard items should be made available at terms and prices comparable to that which would be paid for non-standard items.

At present the United States and most other nations approach national and international standardization on the basis that it should be achieved without cost. This is, of course, impossible. And unless this fact is recognized, standardization will never advance beyond the fringes of the problem.

The Technological Deterrent. In a certain sense, standardization and technological advancement are enemies. One seeks to fix design to a degree while the other seeks to improve design through change. In the military fields, and to a large extent in all other fields, technological considerations work against standardization in two ways. First, because of the recognized differences between the two ends coupled with the constant demands for new and improved items in the world's arms, industrial, and social races, every standardization effort embarks with the qualifying clause that it must not be permitted to impede research and development or the development of advanced ideas, tactics, or techniques. Second, techniques and ideas being in a constant state of evolution and the need always existing to advance to new techniques and ideas, there is a tendency to avoid commitment but to attempt to obtain the best possible solution by constantly adjusting to newer but different techniques and ideas. Pursued to its logical end, this could result in preventing any selection, for a new

and better technique or idea would always be just ahead. Unfortunately, a significant number of persons believe that standards may readily become a barrier to progress by making it so easy not to depart from obsolete solutions. Having this concept as a primary consideration, advancement in standardization will be difficult at best.

The Technical Deterrent. There can be little question that differing national technical procedures make the production of identical or standard items difficult if not impossible. The problem arises from the fact that industrial practices and technical equipment of the various nations and industries have grown up without serious consideration given to the idea of international collaboration or even, in some cases, national collaboration. Actually, it is only within the last comparatively few years that aggressive programs have been undertaken within the various countries to achieve domestic industrial standardization among the many firms and industries. The complexity of this problem is appropriately illustrated by the tank contract awarded to the Chrysler Corporation during World War II of which there were a carload and a half of army blueprints. Each of these blueprints had to be redrawn in order to make working drawings that could be understood by the Chrysler personnel. This same process then had to be repeated when General Motors Corporation was awarded a similar contract.

Essentially nations have differing drawing practices, testing procedures, technical symbology, basic fabricating methods, etc. and these differences, which have their origins in centuries past, while

fundamental, make standardization in the more sophisticated levels impossible. This has been recognized, but little is being done about it.

Deterrents in Summary. Many individuals faced with the deterrents in this chapter would be inclined to state that standardization, particularly international standardization, would be impossible to achieve. However, all the deterrents, while significant, can be removed if the will, the priority, and the organization exist to effect their removal. But if they are not removed, there is little question that standardization will never become much more than a subject of discussion.

## CHAPTER IX

### COURSES OF ACTION

" . . . next to providing for the common defense against external enemies, the chief reason for the existence of formal government is the need for the establishment and the enforcement of standards of practice."<sup>1</sup>

General. Standardization in a general sense has developed concurrently with government. But there remains the question as to whether it is now advanced to the point where it is meeting the needs of government. A review of some comments on this point is appropriate.

In 1956 The Magazine of Standards, the national standardization journal, was led to conclude that:

We have come to the point in our highly complex American industrial economy where national standards can give us greater benefits than ever before in lower production costs, added efficiency, and better use of human and material resources.

We are in a new era of new technologies and new industries; diversification, mergers, and decentralizing executive command; high costs and squeezed profit margins; and great dependence of each industrial enterprise on its suppliers and sub-contractors. In this era, we need as never before a common language among industry, science, insurance, labor, government, and the public. A comprehensive set of national standards for dimension, definition, performance, testing, and safety will provide that language.

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<sup>1</sup>E. C. Crittenden, "Contributions of Government and Private Agencies to National Standards," Dickson Reck (ed.), National Standards in a Modern Society (New York: Harper and Brothers, Publishers, 1956), p. 31.

We do not have an adequate set of well conceived national standards. Our progress in standards has lagged behind our advances in other areas of the national economy.<sup>2</sup>

In that same year, 1956, Thomas P. Pike was lead to an almost identical conclusion:

Our national security is dependent on government-industry coordination. Strategic military plans must be supported by materiel to permit our armed services to fulfill their assigned missions. Therefore, our military strength is closely tied to the ability of our industries to produce support materiel. Through government-industry cooperation in the field of standardization, we can increase industrial output for military requirements, as well as improve the logistical support of our armed services.

We have now come to the point where new technologies make it imperative for us to develop quickly many new, coordinated standards. We must make sure that parts fit and that they are interchangeable, simple, and accessible. We must avoid confusion. We must speak the same technical language. We must use the same signs and symbols in our drawings, blueprints, and purchase orders.

For all this we need organizations that give us the facilities to meet on a common ground where we can harmonize and coordinate our ideas and interests in matters of standards.<sup>3</sup>

Looking at the strict military problem of standardization, Life magazine commented in 1951, the year the North Atlantic Treaty Organization moved into full swing to counter the Soviet threat, that:

One of the most complex problems facing the G-4's of Eisenhower's Armies, the men who deal with supplies, is that of utilizing the available old weapons and coordinating the manufacture of the new ones. To supply twelve armies which use 33 types of machine guns and 90 types of heavy guns is a nightmare and one that could end in defeat on the battlefield. Refusal to use the weapons now available in Europe

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<sup>2</sup>The Magazine of Standards, January, 1956, p. 16.

<sup>3</sup>Thomas P. Pike, quoted in American Standards Association, The 400 American Standards in the Electrical Field, 1956 (New York: American Standards Association, 1956), p. 6.

would reduce the NATO's Armies to a pitifully weak force during the danger period of the next few years. The answer to the problem, of course, is some degree of standardization of arms, but meshing a dozen different industrial plants makes this neither a quick nor a simple solution.<sup>4</sup>

Business Week in 1951 was, perhaps, a little more pointed in its commentary:

A lot of [United States] generals have nightmares these days. They dream that American and European infantrymen are fighting side by side in an all out war. The Americans have the guns and the Europeans have the shells. But the European shells don't fit the American guns.<sup>5</sup>

A full decade ago Maj. Gen. Oliver P. Echols, president of the Aircraft Industries Association, stated that standardization efforts in the aeronautical field were confused by a lack of straightforward policy and organization and by considerable overlapping and duplication of responsibility.

Standardization efforts in the aeronautical field of both Government and industry today are far more costly and complicated than they should be . . . . I believe that we have reached a point where we must critically review the entire aeronautical standardization picture to find better methods of accomplishing our purposes with far less expense and red tape.<sup>6</sup>

And Maj. Gen. Echols' words were indicative not just of aeronautical standardization but of the entire national and international standardization picture.

<sup>4</sup>"Headache Standardization," Life, July 16, 1951, p. 116.

<sup>5</sup>"Slow Going on Standardization of Most Weapons," Business Week, November 3, 1951, p. 80.

<sup>6</sup>Maj. Gen. Oliver P. Echols, quoted in Industrial Standardization, July, 1947, p. 176.

This thesis has been devoted largely to the problem of international standardization with a high flavor of military international standardization. However, it was necessary to wander into the national standardization picture to review the broader international problem. Now that this has been done, the reader can reach his own conclusions as to whether the situation described by Maj. Gen. Echols in 1947 has or has not been corrected. The author believes that, while some, actually minor, progress has been made nationally, internationally even less progress has been made and unless major steps are undertaken another decade will pass with the situation as little resolved as it is today.

*Five years ago a military commentary pointed out that despite spending much more money and with many more facilities at its disposal than the communist countries, the free world, as a whole, had such a low peacetime production effectiveness that it was unable to match the communist aircraft production. "The main reasons for this are a lack of standardization of aeronautical material and lack of coordination in prototype and production planning."*<sup>7</sup>

Over a decade ago, when the Soviet Union set about replacing the tremendous damage incurred during World War II, informed Americans were forced to conclude that the Soviet success in this work would have been impossible "without standardization."<sup>8</sup>

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<sup>7</sup>American Aviation, September 27, 1946, p. 20.

<sup>8</sup>Industrial Standardization, January, 1946, p. 20.

Now among the officers of the United States and its allies one can hear the jealous lament that:

On the Russian side you find the same system of Command, staff duties and tactical "doctrine" throughout; and what is more important than all, standardization of equipment. On our side all these vary with the different countries forming the armies of the Western Democracies.<sup>9</sup>

Eight years ago a leading Czech engineer declared in Prague:

"We will put ourselves in the forefront of the greatest system in the world--Soviet Standardization."<sup>10</sup> The reader should contemplate this statement carefully. We have seen advances made in the Soviet Union that exceeded all reasonable expectation of the other nations. We have seen the time between research and development and actual production of complex items of equipment cut to but a fraction of the time required for a similar operation even in the industrially advanced facilities of the United States. We have marveled that a nation could produce so much from so little. But we have failed to take account of the fact that these advances have come about through the application of one of the world's most advanced systems of standardization. Without advanced standardization, the Soviet Union and its satellites would be impotent. With standardization, the Soviet Union with its satellites may well achieve the

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<sup>9</sup>Brigadier J. G. Smyth, The Western Defenses (London: Allan Wingate, 1951), p. 87.

<sup>10</sup>Quoted by William L. Batt, United States Minister for Economic Affairs to the United Kingdom in an address to the Annual Meeting of the American Standards Association, New York, December, 1952, contained in National Aircraft Standards Committee letter, subject: "ASA Annual Meeting--Address of Wm. L. Batt," December 10, 1952 (in the files of the Committee, file: 14.9).

goal they have laid out for themselves. But the final decision rests in the hands of the non-communist nations, particularly the United States. Are the United States and the other non-communist nations willing to institute a system of standardization that will insure their survival--a system that will insure that the strength they possess individually can be possessed collectively--a system that will insure the achievement of maximum strength through minimum cost?

The author will not attempt to justify standardization, national or international, here--in spite of the comments of doubters, it already has been justified by many scores of persons of greater prominence than the author. To further belabor the beneficial effect of broad standardization on world peace, commerce, education, research, development, understanding, labor, standards of living, or even the ability to wage war nationally or in concert with allies would be to drag before the reader that which generally cannot be questioned. It really is not a matter of what should be done, but how should it be done?

Recognizing the world situation as it is today, the author knows that a logical question is: How is the Soviet Union carrying on standardization? Up to the present a comparison of the United States and Soviet Union standardization systems has been avoided because any such comparison tends to bring forth two stereotype group reactions. The first group reaction is to discredit the Soviet way of doing things on the basis that all Soviet actions are non-democratic and, therefore, unacceptable for Western adoption. The second group reaction is to seek acceptance

of the Soviet way of doing things on the basis that Soviet methods must be adopted to counter Soviet gains. The author subscribes to neither approach. But the author does recognize the advantages held by the Soviet Union over the non-communist nations as a result of the Soviet concentration on the subject of standardization.<sup>11</sup> These advantages have been recognized by others.<sup>12</sup>

In the system of international power politics, national mediocrity can be accepted only so long as the threatening force is equally inefficient. But when the threatening force succeeds in advancing beyond these levels, then the maintenance of mediocrity in one's own nation and as between his nation and his nation's allies is a luxury that cannot be afforded. Accordingly, the author agrees with the British that:

. . . the latest proofs of Russia's technical capacity and the reactions to it in the councils of the North Atlantic Treaty Organization . . . emphasize the need to intensify standardization techniques in both military and commercial enterprises.<sup>13</sup>

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<sup>11</sup>Howard Coonley reported in 1950 that the Soviet Union had a larger standardization activity than any other nation. (Howard Coonley, "Industrial Standardization," An address before the Industrial College of the Armed Forces, April 6, 1950 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).) For a description of "Standardization in the Soviet Union" see Appendix B.

<sup>12</sup>"There is too much futility and frustration in standardization in this country . . . . The American Standards Association itself is without authority . . . . Some . . . standards have taken fifteen to twenty years to put through; but, . . . I happen to know that in Russia it is different." (Brig. Gen. Donald Armstrong, "Industrial Standardization," An address before the Industrial College of the Armed Forces, March 14, 1949 (in the files of the Air University Library, Maxwell Air Force Base, Alabama).)

<sup>13</sup>United Kingdom, Ministry of Supply, Standardization, January, 1958, p. 14.

To repeat over the next decade and a half the errors that have been committed over the past decade and a half would be disastrous in the extreme. But unless the free nations, and particularly the United States, are willing to approach this problem with objectivity and resolution, the forthcoming events will be a sordid repetition of the preceding history. In spite of glowing statements to the contrary, the author believes the preceding pages more than warrant the conclusion that in international standardization, and even in national standardization, all is not going well. However, the author is not so naive as to believe that he alone can produce a solution to this complex problem. Yet, in all sincerity, the author feels he is qualified to make certain recommendations for future courses of action.

First, the United States must either move forward in standardization and become the leading influence in the world or some other nation will assume that position with dire effect on the United States trade and technical position. Every industrially advanced nation stands to profit by the adoption abroad of its standards, either directly or through the medium of an international organization such as the International Organization for Standardization. In the past, many nations, the United States excluded, took great pains to promote the use of their standards in the less developed and even in the developed areas of the world. Germany was particularly noted for its effective standards promotional methods. The German national standards body, the Deutscher Normenausschuss, up to 1940 had published four foreign language handbooks devoted to basic

standards, production materials, and bolts, nuts, and accessories. Also, some 170 individual standards concerning various aspects of electrical, civil, and mechanical engineering had been published in foreign languages. The advantages of this program were tremendous. German products began to infiltrate most of the world as did German ideas. Further, the German language was well on the way to becoming the technical language of the world. It was this German aggressiveness in the spread of its standards and related technology that eventually resulted in the criticism raised against its actions in the International Federation of National Standardizing Associations. Had Germany been but a little more patient, its standards and technology would have captured a major portion of the world and the German language would be the world language of technology. That this did not occur is due almost solely to Germany's unwise entry into war in 1939.

It is significant that at the time German standards and technology were capturing the world, the United States was still hardly able to muster even a limited national standardization effort. Even now there does not exist in the United States a national standardization organization which would make possible an international program equal to the pre-World War II program of Germany. But now the United States does not face just the German threat, it faces the British, the French, and, soon, the Soviet threat. Other nations go so far as to install representative offices of their standards bodies in foreign nations solely to prevent, wherever possible, the adoption by the foreign nation of a standard that would differ

from that in use by the home nation. The United Kingdom, as an example, maintained such an office in Argentina. The advantage accruing to the United Kingdom from its program of having its standards adopted abroad is seen in this statement:

One of the most favorable factors arises from the acceptance or use by many countries of British standards. Since replacement or new equipment ordinarily must conform to these standards and specifications, a regular flow of trade is virtually guaranteed.<sup>14</sup>

Should the United States fail to meet this threat and not spread its own standards and its own technical thoughts abroad or should the United States not insure that the standards and technical thoughts accepted abroad are international standards consistent with accepted United States practice, then the standards and technical thoughts of others will be spread to the detriment of the United States. And the trend naturally is away from United States practice because the United States and other nations are already divided on such basic points as weights and measures. In addition, United States products often cost too much; therefore, foreign customers tend to turn to the products and standards of other nations. Under these circumstances, a division on other points is easy. Thus the requirement for positive action on the part of the United States is all the more necessary and urgent.

Second, the United States must either move forward in standardization and become the leading influence among the free and allied nations of

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<sup>14</sup>"Britain's Current Problems in Foreign Trade Reconstruction," Foreign Commerce Weekly, March 29, 1947, quoted in Industrial Standardization, November, 1948, pp. 166-167.

the world or it and its allies will find themselves unable to compete against the organized Soviet system based on full and intelligent standardization. The fact that 400,000 Belgian troops were forced to surrender prematurely because British ammunition did not fit their guns, that United States aircraft grounded in the United Kingdom could not turn to the British for even the most simple parts, that non-standard screw threads cost the United States 600 million dollars in World War II, that a year was required to redraw 2000 blueprints so that the British Rolls-Royce Merlin engine could be produced in the United States, that parts were rushed thousands of miles to meet urgent combat requirements only to find later that the needed items were already in stock under other part numbers, that United Kingdom bombs could not be carried on United States aircraft, that fire hoses from one city did not fit couplings in another, that oxygen could be mistaken for hydraulic fluid because the containers were marked the same--these facts and others adequately point to the utter confusion, waste, and tragedy that accompanies non-standardization. At present and for the foreseeable future military international standardization will hinge on whether the United States takes an active lead in the program. If the United States fails to take this lead and standardization does not materialize between the United States and its allies, then the alliances of the United States will merely represent an assemblage of uncoordinated parts which may actually weaken rather than strengthen the United States.

To the author, given the problem of the Soviet Union and its satellites vis à vis the United States and its allies, the only alternative to greater and fuller international standardization is ultimate defeat. In World War II, the United States could look proudly at itself and say: "We outproduced them." Without international standardization between the United States and its allies, the Soviet Union may well be able to make that statement in the future. Among the Soviet Union and its satellites, and more recently to include China, technical and industrial integration is not only possible, it is a stark fact. Although the centralization of control that accompanies the Soviet system carries with it a degree of excess overhead in comparison to the United States system<sup>15</sup> and although centralization of direction may create certain management inefficiencies, the vast amount of duplication that is avoided makes up for these inefficiencies many, many fold.

At present, in terms of technology and production and, to a degree, in terms of military forces, the United States-dominated series of alliances established to counter the Soviet threat are little more than legal/moral fences. And without standardization they will remain as legal/moral fences. Without standardization, "Western unity"<sup>16</sup> will never have to be feared by the Soviet Union--it will never exist.

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<sup>15</sup>On balance there is a considerable amount of United States overhead not found in the Soviet system.

<sup>16</sup>Field Marshal Viscount Montgomery, The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, K. G. (New York: The World Publishing Co., 1958), p. 474: "Western unity is the only thing the Russians fear . . . ."

Given these two conclusions, and even with lesser conclusions, the question of international standardization vis à vis the United States narrows to the single element of "How?" How can the United States do better in international standardization? How can the history of the past not be repeated? How can the United States achieve unity when it seems basically divided on scores of points all of which seem vital to the question?

The author is inclined to state that it may be more a matter of "must" than of "how," but it would be improper to avoid the one on the basis of the other for they both are material.

In solving the question of "How?" it is necessary to solve the primary question of "What?" What is the full need in international standardization now, in the immediate future, and over the next several decades and centuries: This is a question of policy and of program. And to solve it jointly, the knotty question of organization must be solved. Policy, program, and organization are one inseparable unit. If the wrong organization is drawn to answer the question of policy and program, if, as an example, an all-industry group is again established to answer the question, the answer cannot but be in error.

Complicating this very basic element of the problem is the fact that it must be solved on two planes. First, it must be solved on the national, United States plane. Second, it must be solved on a twin international plane as between the United States and its allies and as between the United States and its allies and the Soviet Union and its satellites. In this regard, the author is of the school that believes that the long

range nature of much international standardization is such that the conventional barriers of friend and foe are impractical criteria for establishing many programs and policies. A brief look at history will show that much work in international standardization benefits neither the friend nor the foe in the military or cold war sense, but it does make the collective world an easier place for both to survive in, to prosper, and to relegate some of their differences to secondary positions. A brief look at history also will show that many important international standardization projects were conducted on a disastrous stop-and-start basis while moods of nations vaillated, while nations inevitably alternated between the status of friend and foe in the play of power politics. One has merely to look at international standardization in terms of international aviation, communications, navigations, health, and now space to see that the conventional friend/foe basis of relations is not particularly applicable to a significant part of the problem. Thus the author rejects the reasoning that may have put forth as cause for the United States not participating with greater vigor in such international standardization bodies as the International Organization for Standardization, the International Electrotechnical Commission, and others.

Returning to the problem of national policy, program, and organization, the author endorses completely the "all-parties" policy advocated by the American Standards Association and the "coordination" policies advocated by the Department of Defense and others. However, in endorsing them the author believes that they should be carried out in their

range nature of much international standardization is such that the conventional barriers of friend and foe are impractical criteria for establishing many programs and policies. A brief look at history will show that much work in international standardization benefits neither the friend nor the foe in the military or cold war sense, but it does make the collective world an easier place for both to survive in, to prosper, and to relegate some of their differences to secondary positions. A brief look at history also will show that many important international standardization projects were conducted on a disastrous stop-and-start basis while moods of nations vaillated, while nations inevitably alternated between the status of friend and foe in the play of power politics. One has merely to look at international standardization in terms of international aviation, communications, navigations, health, and now space to see that the conventional friend/foe basis of relations is not particularly applicable to a significant part of the problem. Thus the author rejects the reasoning that may have put forth as cause for the United States not participating with greater vigor in such international standardization bodies as the International Organization for Standardization, the International Electrotechnical Commission, and others.

Returning to the problem of national policy, program, and organization, the author endorses completely the "all-parties" policy advocated by the American Standards Association and the "coordination" policies advocated by the Department of Defense and others. However, in endorsing them the author believes that they should be carried out in their

true sense. In theory, the government is capable of representing the entire nation. But, in practice, standardization has introduced a new element and problem. Even in the strong central government in the Soviet Union it is recognized that standards must flow from an organization that represents something more than the governmental hierarchy. Standards are down to earth, practical things that must be capable of rapid and dynamic creation, growth, revision, and in some cases, extinction. If the policy, program, and organization does not embody these capabilities, it may well do more harm than good. And the author does not believe a solely governmental standardization body is capable of embodying these capabilities. On the other hand, the author is equally convinced that an all-civil body encompassing producers, consumers, educators, and others does not embody these elements even though government may be represented in a liaison capacity. Specifically, while the author has great respect for the American Standards Association as currently organized, with equal conviction the author does not believe that that organization, as now constituted, properly can represent the nation in international standardization.

For an organization to represent the United States in international standardization (as well as to carry on a meaningful national program) it must embody the several national elements that are effected by the process. Beyond that it must embody a procedure that provides for the reaching of decisions with speed. This means that provision must

be made for decisions to be reached on a basis other than unanimous, voluntary consent. Further, while the voice of government should not be all-powerful, there must be certain areas, such as national defense, health, etc., where the government voice must be final. This, however, is little different than it is now.

These same conclusions extend to the allied level of organization and operation and to the full international level of organization and operation. The idea that narrow, specialized bodies can successfully carry on international standardization, the broadest of subjects, is preposterous. The idea that international standardization can either be military or civilian, can either be operationally or logistically motivated, can be achieved on the basis of organization instead of on the basis of subject--is not sound.

With Reference to Organization on the United States Level. Looking at the United States national level, the author concludes that the nation is in urgent need of a truly national standardization body. If the United States is to engage in international standardization with any purpose, objectivity, or sincerity, it must possess an organization that speaks with authority. At present no organization, government or civil, can do this. As a result there is at present no body in the United States that honestly can conduct international standardization negotiations with other nations. This is recognized by other countries and the effect is sizeable.

But to form a true United States national standardization body will be most difficult for the creation of such a body will run counter to a host

of forces: civil and governmental, group and individual.<sup>17</sup> It is doubtful if the military would ever support such a scheme for it would run counter to the idea of service prerogatives. Further, it would threaten the status and position on many employees who have military-managed international standardization as their sole or primary job justification. It is doubtful if the Department of Defense would support such a scheme for it would tend to degrade a function of great importance to the stature of that organization and to the status and position of many of its employees. It is doubtful if the Department of Commerce would support such a scheme for it would mean the loss of certain functions that have been held by the department for decades. It is doubtful if the Department of Justice would support such a scheme for that department thereby might be forced to pre-judge rather than post-judge

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<sup>17</sup>The author cannot help but recall the words of Edwin O. Stene: "Every large social organization is characterized by the presence of strong centrifugal forces which tend to generate autonomous operation of segments, and counteracting centripetal forces designed to draw the many activities into an integrated unity. In modern American society, with its tradition of political democracy and individual freedom, the centrifugal forces seem to be the more spontaneous and the more readily accepted by the participants. The maintenance of a unified outlook and integrated operation, on the other hand, requires constant attention and planning on the part of an organization's executives. Although the forces of integration in American governmental operations have been strengthened and systematized in recent decades, they have been faced with new and more powerful forces of disunity, and at the same time the enlarged span of governmental activities has increased the difficulties of integration, as well as its importance. Among the most important of these new forces is that of specialization--both specialization within the bureaucracy and specialization of pressure groups that seek to exert influence upon government." (Edwin O. Stene, "Administrative Integration," The Annals of the American Academy of Political and Social Science, March, 1954, p. 111.)

standardization actions. It is doubtful if the Department of Agriculture would support such a scheme for it, like the Department of Commerce, would eventually lose some of its functions to the national standards body. It is doubtful if industry would support such a scheme for it would surely lose some prerogatives to governmental influence. It is doubtful if labor, education, consumers, farmers, or any other major group would really support a true United States national standards body. It is even doubtful that the Congress that already turned down the federalizing of the American Standards Association would support the scheme for, if for no other more intimate political reason, it runs counter to the congressional trend toward organizational dispersion and strategic pluralism. It is probably for these reasons that the subject lies so dormant after once having had such magnificent support.

Yet, while it can be concluded that more than a majority of the forces within the nation would object to the creation of a United States national standards body, when faced with the facts of the problem, how can the need be denied? It cannot except by organizations and individuals who prize their own short term security above the long term security of the nation. True, the creation of a United States national standards body would result in the transfer of many governmental functions that are now piecemealed throughout the government to a central body. True, the creation of a United States national standards body would result in the dislocation of many civil and government employees. True, the creation of a United States national standards body would result in the loss of some

prerogatives to industry and to consumers as well as to government. True, the creation of a United States standards body would require changes in thinking and procedures employed by such agencies as the Federal Trade Commission. *But what is the alternative?*

The alternative to the creation of a United States national standards body is to perpetuate a system wherein not only national but international standardization will not be achieved in the free world system. The United States, because of its current industrial, technical, military, and other predominance, prevents the accomplishment of international standardization by its absence. Although the United States participates in a considerable number of international standardization organizations, it does so in name only for actually only elements of the United States act and are consulted. The result is that the international standards achieved, if any can really be achieved, are questionable and, often, at cross purposes with other actions and activities of the United States. As an example, it would seem that United States monies spent to finance the production of foreign designs operates directly counter to any United States standardization effort. Further, it would seem obvious that industry could not represent the United States government without consulting the government as to its policies and needs. On the other hand a military or other governmental department would appear ill-equipped to negotiate internationally a standard that in the United States was controlled primarily by a civil body. It is easy to imagine the

impossible situation a foreign nation finds itself in when attempting to negotiate a standard with the United States. Thus, on the basis of the evidence available, there seems no acceptable alternative to the establishment of a United States national standards body.

With Reference to Organization on the Free World Level. The problem of the national level is the problem of the international level. Standardization, by its nature, is a central problem and it cannot be handled on a disorganized basis. To state that standardization simultaneously can be done on a military service basis, on a civil defense basis, on a war production basis, on an industrial basis, on a joint basis, on a selected topic basis, and on a host of other divisional bases is to deny the concept. That a half dozen American-British-Canadian organizations can function in the area of standardization is to deny that standardization is possible. To organize North Atlantic Treaty standardization on the basis of several agencies is to insure that standardization will not be achieved. As Field Marshal Viscount Montgomery has stated: "The fact is we are really not an alliance . . . . We are a group of nations unable to agree how to get where we want to go."<sup>18</sup>

But to centralize standardization internationally will be as difficult as the centralization of standardization within the United States. Actually, the two go hand in hand for the international centralization of standardization supports the national centralization of standardization and

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<sup>18</sup>Field Marshal Viscount Montgomery, quoted in Time, November 10, 1958, p. 34.

vice versa. International centralization of standardization will never be possible so long as standardization is not centralized on the national basis. But beyond that the international centralization of standardization would be resisted for it would disrupt the status and position of many employees who are tied directly to the decentralized organization; it would be resisted because it would reduce the numbers of organizations and inevitably the personnel and facilities that are now a part of some local economy; it would be resisted because it is too simple and too direct.

Yet, while it can be concluded that considerable resistance would exist to the centralization of standardization on the international level, can the difficulties caused by the present system be justified?

Centralization must take place on the international level, but it may have to follow centralization on the national level. However, if centralization on the international level is achieved, it could well force centralization on the national level.

With Reference to Organization on the World Level. On the world level, primarily through the United Nations and its affiliates, standardization organization already is largely centralized. But because it has not been centralized on the national level, primarily in the United States, and because the nations, primarily the United States, do not support the program with dynamic and unified action and policy, the program has been and is lagging and will continue to lag until these basic deficiencies are eliminated.

With Reference to Voluntary Standardization. Voluntary standardization is simply a legal out with regard to the restraint of trade question and a counter offensive to standardization-in-seclusion. Certain standards need not be more than recommended practices. But for the good of the nation and its allies many standards should be nationally or internationally mandatory. For national and international well being, red and green should have no opposite meanings to stop and go. For national and international well being only one symbol, not a series of symbols, should be allowed to indicate hazards to life and property. The human mind should not be confused by forcing it to comprehend a host of signals to convey the same message or frustrated with a single signal conveying a series of contradictory messages. But, like all things, there is a gray area in which justification exists both for making standards mandatory and allowing them to be voluntary. For these areas and for all others, no objection should be raised as to whether the standards are mandatory or voluntary so long as in their preparation all parties of consequence are heard, the decision is justified by the evidence, and recourse is open to injured parties.

With Reference to General Deterrents to Standardization. Most of the deterrents to standardization stem from inadequate knowledge of the standardization process, from the actions of incompetent standardization organizations, or from a failure to face squarely the problem of standardization in the short and long range.

On the first point, inadequate knowledge of standardization, only by a broader education in the subject can an appreciation and understanding be found. Parties who have no knowledge of standardization can hardly be expected to support it for in their ignorance they must mistrust it. Except in certain engineering courses, standardization cannot be found in a school curriculum. Military schools, except for the Industrial College of the Armed Forces, do not consider it worth discussing. Unless a knowledge of standardization is disseminated there will continue to be deterrents to the concept and these deterrents will be based solely on ignorance.

On the second point, incompetent standardization organizations, only an appreciation of the need and a complete reorganization of the standardization organization and policy will provide a solution. One cannot expect good work from a poor organization and a poor or non-existent policy.

On the third point, failure to face squarely the problem of standardization, only proper education, organization, and policy will bring the difficulties and solutions into focus. One cannot face squarely a problem when it is not adequately illustrated in terms of program, policy, and organization.

In Summary. There is an inherent air of hopelessness in these final conclusions. This is forced largely by the tremendous obstacles facing the concept of standardization, national and international. But

the circumstances provide little latitude. The past history of the problem adequately illustrates this.

Facing facts is usually difficult, but facts, however distasteful, are real. And in this case the facts seem to show that standardization is a necessary end but an end which will be reached only with the greatest difficulty.

The tug of war that takes place within a democratic society is real and not always guided by the most selfless intentions. Unfortunately, national or international survival is sometimes secondary to short range personal gain and security.

## APPENDIX A

### STANDARDIZATION IN EUROPEAN COUNTRIES

Austria. The Austrian Standards Association (ONA) was created in 1920 on the initiative of Austrian industry so that it is in no way subject to direct governmental control. Numerous industrial enterprises are members of the Association, and official agencies or other organizations may also be admitted. The Association is subsidized by the Federal Chamber of Commerce, but maintains independence from that organization. It is managed by a Council elected at a general meeting.

Austrian standards are prepared by technical committees, comprising representatives of producers, customers, scientists, and authorities as fully equal partners. Standards are adopted by unanimous decision. They have in principle the character of free agreements, but can be declared as binding by any public authority interested in the domain concerned. For instance, the Vienna Municipality has declared numerous construction standards as binding; the Ministry of Social Affairs, for safety reasons, has taken a similar decision for elevators, cranes, and winches.

Austrian standards activity is unique in that the nation remains essentially non-military.

Belgium. Standardization on a national scale began in Belgium in 1919 with an organization built along British lines. This Belgian standards

body, the Association Belge de Standardization (ABS), was supported primarily by industry, but it received assistance from technical associations and scientific circles.

In 1946 the Association was replaced by the Institut Belge de Normalisation (IBN), a non-profit corporate body. It has about a hundred members drawn from scientific institutions, public services, industrial and trade associations, and various other associations concerned with standardization.

The IBN standardization committees include representatives of producers, distributors, and consumers (including public services). For some standardization activities, the committees also include representatives of the educational authorities and representatives of organizations and services concerned with the public safety.

The IBN is legally authorized to enter into agreements with other bodies partly or wholly concerned with similar aims. The purpose here is to cope with the ever-increasing demand for investigations covering a constantly wider range of subjects. The IBN remains responsible for the proper performance of work transferred in this way.

Denmark. The Danish standards association, Dansk Standardiseringsrad (DS), like many other national standardization organizations, has its roots deep in the machine industry where the need for broad standardization was first felt. Currently, however, the activity of the Association covers the greater part of the main groups in the Universal Decimal Classification system.

The DS is an independent non-governmental organization and consists of a council of 27 members appointed by the Ministry of Commerce and representing several government departments, trade associations, technical schools, etc. It is financed mainly from government subsidies and contributions from industrial organizations, trade associations and large independent firms. Its standards are formulated on the committee basis, the committees being formed of representatives of manufacturers, distributors, and consumers.

Some standardization work in special fields is carried out by societies of engineers and architects, generally with DS approval and cooperation. Such standards may be issued as DS standards after processing by the Dansk Standardiseringsrad.

Danish standards are not compulsory, but they are being used to an increasing extent in all activities, including education.

France. The French standards association, l'Association Francaise de Normalisation (AFNOR), was set up on June 22, 1926, to replace the Commission Permanente de Standardisation instituted by Government Order (Décret) in 1918. It was subsequently given official recognition and in 1943 was given legal status providing for an appropriate distribution of work between the standardization bureau, AFNOR, and the Commissaire dé la Normalisation (Standards Commissioner).

The standardization bureaus, working on a national basis and organized by the trades and industries, have been set up in most of the major economic sectors. Various departments of the Ministry of

Agriculture, French Coalfields, Air Ministry, Electrical Mining Equipment Commission, Building Industry and Scientific and Technical Center, and the Committee for Coordination of Telecommunications in the French Union also have the same status as the standardization bureaus. These bureaus are responsible for working out preliminary draft standards in consultation with AFNOR, and they help to elaborate a final draft after a public enquiry has been held.

AFNOR, which is a private association, centralizes and coordinates all work and research relating to standardization. It also revises the draft standards prepared by the standardization bureaus after subjecting them to public enquiry. For standardization subjects that are not the direct concern of the standardization bureaus, AFNOR will convene special committees. AFNOR represents France in international standardization conferences; it controls the use of the national "NF" standard mark which certifies that the approved standards have been observed; and it keeps education informed about questions and progress in standardization.

The Standards Commissioner is a senior official of the Ministry of Industry and Fuel and Power who lays down general policy, controls the fulfillment of the program of work, submits to the Minister for approval as "French Standards" draft standards submitted by AFNOR, makes recommendations to ministerial departments regarding procedures for the application of standards, deals with applications for exemption from the use of standards, and insures that the national "NF" standard mark is used as provided for in the French law. The Commissioner also

has the responsibility to coordinate the work connected with standardization in the government departments as well as the responsibility to pass on French policy governing participation in international standardization conferences.

Germany. The German standards association, der Deutscher Normenausschuss (DNA), was founded in 1917. Membership in the DNA consists of business undertakings, corporations, and organizations which pay a subscription based on the size of their staff. German standards are formulated by trade association committees and by special investigation committees and are subject to public enquiry before approval. The DNA has its own investigative committees for working on basic standards and for such tasks as do not come within the province of any of the trade association committees. The adoption of DNA standards is optional, but official bodies have the power to make them mandatory. The "DIN" standardization mark of the DNA must appear only on goods which conform strictly to the officially recognized standards. The use of the "DIN" mark is controlled by a special "standards mark" department of DNA.

Ireland. In Ireland organized standardization first appeared in 1934 as an offshoot of industrial research. The central Irish standardization organization is the Institute for Industrial Research and Standards set up in 1946. The Institute receives a subsidy from public funds and consists of a Council, Industrial Research Committee, and a Standards Committee. The latter has seven members, of whom three at most may

be members of the Industrial Research Committee and ex-officio members of the Council.

The director of the Institute is appointed by the Minister for Industry and Commerce. His duties are to direct and supervise the drafting of standards, either at the instigation of the Ministry, or in accordance with the direction of the Standards Committee.

The drafting of standards is the responsibility of the Standards Committee. When such work is done at the direction of the Minister, the Committee must act in accordance with his instructions.

Standards are officially approved by the Minister for Industry and Commerce, after which they are submitted to Parliament.

The Minister is the proprietor of the standards marks: "Caighdean Eireabbach" (CE) and "Irish Standard" (IS). The use of these marks can be made compulsory by decision of the Minister for Industry and Commerce.

The Institute is responsible for insuring conformity with standard specifications.

Italy. The Italian standardization association, le Ente Nazionale di Unificazione (UNI), is composed of a Central Office and twelve specialized bodies: automobiles, machine tools, shipbuilding, aircraft, ceramics, refractories and abrasives, chemistry, railways and tramways, non-ferrous metals, plastics, optics, fine mechanics and precision mechanics, ferrous metals.

The UNI is a governmentally recognized association. UNI standards are not compulsory, but the government recommends the adoption

of certain UNI standards for specific purposes or stimulates their use by including them as bases in governmental contracts and works.

Infrequently Italian governmental organizations may create their own standards using, occasionally, UNI standards as references.

The Netherlands. Standardization in the Netherlands is coordinated by the Stichting voor de Normalisatie in Nederland. This foundation is a private, non-profit organization, the statutes of which are approved by the Minister of Economic Affairs. It is financed almost equally by its members and government.

The general management of the foundation is in the hands of the Hoofdcommissie voor de Normalisatie in Nederland (HCNN) consisting of representatives of leading scientific, industrial, and consumer organizations and of the government. The HCNN has from thirty to forty members, eight to twelve of whom may be appointed by the government, each Ministry being represented. The other members are nominated by the different organizations, at the invitation of the HCNN, on the principle that the scientific, technical, economic, and social interests should be fully and adequately represented. The nomination of the chairman of the HCNN must be approved by the Minister of Economic Affairs.

All standardization work is based on the principle of free cooperation between competent representatives of the various interests. This includes public enquiry.

The application of standards is voluntary, but may be made obligatory when they are adopted by bodies having legal authority.

Manufacturers producing recognized standard articles may apply for the right to use the HCNN standards mark: "NENORM."

Norway. The Norwegian central institution for standardization is the Norges Standardiserings-Forbund, a private association of professional and trade organizations in which governmental and semi-governmental institutions are represented without being members. It is financed from government subsidies, voluntary contributions, and sales of standards.

A Plenary Assembly is called at least once a year. Apart from current matters, this assembly approves as Norwegian Standards (NS) the proposals placed before it by its Council or by its Divisions.

Divisions, Committees, and Sub-Committees established on standardization problems usually consist of representatives of the different interested parties: private industry, public authorities, producers, consumers, tradesmen, and scientists.

Standards, when completed, must be published at least two months before being approved as NS.

Provided basic requirements relating to representation, contents, etc. are met, standards drawn up within other Norwegian groups may be accepted by the Plenary Assembly as NS.

Portugal. Standardization in Portugal was organized at the instigation of the government in 1946. In that year there was established the General Inspectorate of Agricultural and Industrial Products (IGPAI) which includes a Standards Bureau and a Standards Council. Subsequently,

the government gave private organizations a part to play in standardization and, in June, 1952, it set up a Standardization Center where, apart from the government, trade associations or independent scientific, industrial, commercial, and agricultural bodies are represented. This Center has its own administrative department but remains under the control of the IGPAI.

Draft standards are investigated either by one of the public or private organizations, or by a technical commission appointed by the Inspector-General of Agricultural and Industrial Products. The findings are submitted to the Standards Department of the IGPAI which, in turn, transmits them to the Standards Council. After a public enquiry, the standard, revised as necessary, is referred back to the Council which then transmits it, with its own recommendations, to the Ministry of Economic Affairs for approval.

A standard becomes final only after one year has elapsed. It can be made mandatory if the Ministry of Economic Affairs and the other Ministries concerned so decide.

*IGPAI is responsible for the control and use of the IGPAI standards mark.*

Final standards must come up for revision at least every five years.

Sweden. The Swedish Standards Association (SIS) is the sole body in Sweden for the preparation of national standards. It was created in 1922 and is composed of representatives from various industrial federations,

technical societies, and governmental departments. The chairman is appointed by the government. In addition, the government ratifies the constitution of the SIS.

The SIS is financed jointly by government and private industry.

Preparation of SIS standards is done on the broad representative basis, but the preparation of the draft, the public enquiry, etc. are not carried out by the SIS but by affiliated industrial organizations under rules and procedures prescribed by the SIS.

The SIS publishes all Swedish standards, is charged with maintaining uniformity in standardization as a whole, and is charged with protecting common interests of the affiliated organizations, including acting as the representative in international standardization organizations.

Switzerland. In Switzerland standardization is carried on by two privately financed organizations: La Société Suisse des Constructeurs de Machines (VSM) founded in 1918, and L'Association Suisse de Normalisation (SNV) founded in 1949.

The VSM deals with the standardization of all products relating to the mechanical and engineering industries; the SNV concerns itself with all other standardization matters. The two are coordinated by the Bureau des Normes de la Société Suisse des Constructeurs de Machines. Internationally, Switzerland is represented in standardization work by the SNV.

The VSM Standards Committee, with a membership of twelve, acts as the controlling authority for any standardization coming within its province.

It decides which items and which products should be standardized and approves the specification in each case. The necessary investigations are entrusted to technical committees, consisting of representatives of manufacturers, government services, the Federal Polytechnic School, the Federal Materials Testing Institute, etc., and includes producers as well as users.

The SNV consists of groups of manufacturers and users who are interested in standardization of products other than those of the mechanical and electrical engineering industries. These groups form independent technical committees which are administratively attached to the SNV. Each group is itself responsible for the working out and official approval of the standards involved.

United Kingdom. The UK standards association, the British Standards Institute (BSI), was founded in 1901. It is an independent organization run by a committee structure representative of industry, trade, and consumer interests.

The financing of the BSI is by government and subscribing members.

The work of the BSI is considered national and authoritative. However, the standards issued by the BSI are not considered mandatory.

The preparation of BSI standards is under the control of Industry Standards Committees. This preparation is done under the principle that such standards must be based on general consent. This includes the consent of the government and, from this consent, the standards obtain their authority.

## APPENDIX B

### STANDARDIZATION IN THE SOVIET UNION

The highest standardization body in the Soviet Union is the All-Union Standards Committee. This committee is under the jurisdiction of the Council of Ministers of the Soviet Union. Its task consists of preparation and approval of All-Union Government Standards (GOST) which are mandatory for all branches of the national economy of the Soviet Union throughout its entire territories. In addition to these All-Union standards, there are standards and specifications for local, departmental, or even factory application and significance. These are obligatory only in the territory of the member-republic which publishes them, or within the jurisdiction of a government department or a factory whose management approves them.

Scientific standardization in the Soviet Union started 35 years ago when a Temporary Standardizing Bureau was created in 1923 by the Soviet government. This bureau made a thorough survey of all local standards which had existed in the factories in the Soviet Union in addition to which it studied the various standardization systems in use abroad. After two years of preliminary work, the Temporary Bureau submitted its proposals, and on September 15, 1925, the Council of People's Commissars of the Soviet Union approved the first constitution of the

Standards Committee at the Council of Labor and Defense and of the Central Bureau of Standards at the People's Commissariat of Workmen and Peasant's Inspection.

Two years later it was found necessary to reorganize and unify the work of these two standardizing bodies and on July 21, 1927, a new constitution was approved for the Standards Committee of the Council for Labor and Defense. Under its provisions the Central Bureau became the secretariat responsible for all technical routine work including the supervision of the activity of local technical committees, and the preparation of final drafts of standards to be submitted to the Standards Committee of the Council for Labor and Defense for approval and publication as All-Union compulsory or recommended standards.

The Standards Committee consisted of representatives of various People's Commissariats, including War and Navy, of delegates of allied autonomous republics, of central unions of cooperative producers and consumers societies, and of the Union of Engineering Societies. All members were elected or delegated by their respective organizations, but the governing board--the "Presidium," vice chairman, secretary, and four members--were appointed by the Council for Labor and Defense.

In 1940, the Standards Committee of the Council for Labor and Defense became the All-Union Standards Committee of the Council of People's Commissars of the Soviet Union. When, in 1946, the Commissars became "Ministers," the All-Union Standards Committee became a part of the Council of Ministers.

Preparatory work on all drafts of All-Union Government Standards is done by the technical bureaus of the various ministries and government departments. These bureaus arrange with various scientific research laboratories, institutions, and organizations to make the studies and carry on the research required in the preparation of a draft standard. Certain ministries have their own central engineering bureaus carrying on standardization work.

All work in connection with the drafts of All-Union Government Standards is done in accordance with a single basic plan which is approved each year by the government.

Each prepared draft goes through the following steps: The first draft is discussed at the meeting of the scientific and technical council of that institution or factory which has originated the draft. After approval by this technical council, the draft is circulated among the interested organizations either producing or using the product covered by the draft. The first draft is also circulated among individual specialists in the field related to the subject of the draft. After all answers are received, the draft is revised by the technical committee for consideration by the respective ministry. Subsequently, the Minister presents the final draft to the All-Union Standards Committee for approval.

The draft received by the All-Union Standards Committee is again studied and examined to check on the thoroughness of the study and on all the technical and economic factors involved. When necessary, the Standards Committee sets up special commissions of experts in respective

branches of the national economy of the Soviet Union. The final revised draft of the proposed standard is then submitted for consideration of the members of the Standards Committee.

The Standards Committee, after approving a standard, fixes the date when it is to become mandatory. In certain cases standards are approved only as recommended specifications and for a limited period of time; this is done when it is necessary to test the standard in practice and to collect factual material.

All-Union Government Standards of exceptional importance are submitted for approval to the Council of Ministers, after being given a preliminary examination by the Standards Committee.

The Standards Committee has a Coordinating Technical Organ to coordinate the standards work of the various industry committees and scientific research institutions. This organ also studies foreign standards from the viewpoint of their usefulness in connection with Soviet standards and is responsible for carrying on relations with the International Organization for Standardization as well as with other international standardizing bodies.

The Standards Committee is empowered by the government to commission various ministries with the preparation of draft standards and with special studies in the field of standardization. It also has the right to demand from ministries all necessary materials and information and to draft for experimental work various institutions and laboratories of the Academy of Science of the Soviet Union and of ministries.

Only the All-Union Standards committee has the right to publish All-Union Government Standards. The committee operates a special publishing office, "Standartgiz," which also takes care of distribution of standards.

Standardization in the Soviet Union is carried on at a higher governmental level than in any other nation. This, in itself, attests to the importance given the subject.

Standardization in the Soviet Union is a centrally controlled operation; nevertheless, it uses local experience and skill in the formulation of the standards. In effect, although standardization in the Soviet Union is centralized in government it employs the "all-parties" procedure used by the American Standards Association.

Standardization in the Soviet Union is considered a necessary element of organization, production, economy, and education. Accordingly, the Soviet Union places great emphasis on standardization, both as regards the numbers of standards written and their enforcement. Many standards in the Soviet Union are mandatory and have the weight of law. Failure to abide by Soviet Standards is punishable and mandatory standards generally carry the warning that:

Noncompliance with compulsory standards is punishable by imprisonment up to two years (Decree of the Central Executive Committee of USSR dated November 23, 1929, Article 128-b of the Criminal Code of RSFSR).

Standardization in the Soviet Union is well-financed and, although starting much later than in most of the other technically-advanced nations, is rapidly outdistancing standardization activities in the rest of the world.

## SELECTED BIBLIOGRAPHY

### Public Documents

Canada, Department of External Affairs, Information Division. State-  
ments and Speeches. No. 56/14.

U. S., Civil Aeronautics Board. Aeronautical Statutes and Related  
Material. Washington: U. S. Government Printing Office, 1954.  
Revision of June 1, 1954.

U. S. Congress. Act of July 2, 1890. 26 Stat. 209. 15 U. S. C.  
Sec. 1.

\_\_\_\_\_. Act of March 3, 1901. 31 Stat. 1449. 15 U. S. C. 271.

\_\_\_\_\_. Act of June 26, 1912. 37 Stat. 184. 5 U. S. C. 83.

\_\_\_\_\_. Act of March 3, 1915. 38 Stat. 930. 50 U. S. C. 151.

\_\_\_\_\_. "Defense Cataloging and Standardization Act." Public Law  
436, 82d Cong. 66 Stat. 320. 5 U. S. C. 173g.

\_\_\_\_\_. "Department of Defense Appropriation Act, 1953." Public  
Law 488, 82d Cong. 66 Stat. 531.

\_\_\_\_\_. "Department of Defense Appropriation Act, 1954." 67 Stat.  
349. 5 U. S. C., *Supp. III*, 174a.

\_\_\_\_\_. Federal Property and Administrative Services Act of 1949.  
Public Law 152, 81st Cong. 63 Stat. 377. 5 U. S. C., *Supp.* 630.

\_\_\_\_\_. Foreign Aid Program, Compilation of Studies and Surveys.  
Washington: U. S. Government Printing Office, 1957. Senate  
Doc. No. 52. 85th Cong., 1st Sess.

\_\_\_\_\_. House of Representatives. Hearings before a Subcommittee  
on the Committee on Government Operations, Eighty-Fifth  
Congress, First Session, January 30, 31, and March 12, 1957.  
Washington: U. S. Government Printing Office, 1957.

\_\_\_\_\_. International Cooperation in the Exploration of Space. Wash-  
ington: U. S. Government Printing Office, 1959. 85th Cong., 2d

Sess. House Report No. 2709. Report of the Select Committee on Astronautics and Space Exploration.

\_\_\_\_\_. "National Security Act of 1947." Public Law 253, 80th Cong., 1st Sess. 61 Stat. 495. 5 U. S. C. Supp. 171.

\_\_\_\_\_, Senate. Hearings before the Senate Committee on Naval Affairs, Seventy-Seventh Congress, First Session, on H. R. 5783, To Authorize the Construction of Certain Naval Local Defense Vessels. Washington: U. S. Government Printing Office, 1941.

U. S. Department of State. Military Assistance to Latin America. Inter American Series 44. Washington: U. S. Government Printing Office, 1953. Publication 4917.

\_\_\_\_\_. Toward the Peace. Publication 2298 (1945).

U. S. Executive Order 9781. "Establishing the Air Coordinating Committee." September 19, 1946.

U. S. Executive Order 10290. "Prescribing Regulations Establishing Minimum Standards for the Classification, Transmission, and Handling, by Departments and Agencies of the Executive Branch, of Official Information Which Requires Safeguarding in the Interests of Security of the United States." September 24, 1951.

U. S. Executive Order 10501. "Safeguarding Official Information in the Interests of the Defense of the United States." November 5, 1953.

U. S. General Services Administration. United States Government Organization Manual 1955-56. Washington: U. S. Government Office, 1955.

U. S. Temporary National Economic Committee. Consumer Standards. Senate, 76th Cong., 2d Sess. Washington: U. S. Government Printing Office, 1941.

\_\_\_\_\_. Control of Unfair Competitive Practices Through Trade Practice Conference Procedure of the Federal Trade Commission. Senate, 76th Cong., 2d Sess. Washington: U. S. Government Printing Office, 1941.

U. S. Department of the Air Force. Standardization of Air Materiel, 1939-1944, Controls, Policies, and Procedures. Air University Air Historical Studies: No. 67, November, 1951, Maxwell Air Force Base, Alabama.

United Kingdom, Board of Trade. Report of the Committee on Weights and Measures Legislation. London: Her Majesty's Stationery Office, 1951.

\_\_\_\_\_, Minister of Defense. Defense, Outline of Future Policy. London: Her Majesty's Stationery Office, 1957.

\_\_\_\_\_, Minister of Defense. Report on Defense, Britain's Contribution to Peace and Security. London: Her Majesty's Stationery Office, 1958.

### Books

American Standards Association. Elementos de Normalización Industrial. New York: American Standards Association, 1943.

\_\_\_\_\_. The 400 American Standards in the Electrical Field, 1956. New York: American Standards Association, 1956.

\_\_\_\_\_. The International Organization for Standardization. n. d.

\_\_\_\_\_. Nationally Recognized Standards in State Laws and Local Ordinances. New York: American Standards Association, 1949.

Beard, Charles A. The Idea of National Interest. New York: The Macmillan Co., 1934.

British Standards Institute. Fifty Years of British Standards. London: British Standards Institute, 1951.

Canadian Broadcasting Corporation. 25 Years of Canadian Foreign Policy. Toronto: Canadian Broadcasting Corporation Publications Branch, n. d.

A Compilation of the Messages and Papers of the Presidents. New York: Bureau of National Literature, Inc., 1897.

Confucius. The Analects of Confucius. Translation by William Edward Soothill. Yokohama: Fukuin Printing Co., Ltd., 1910.

Coonley, H., and Agnew, P. G. The Role of Standardization in the System of Free Enterprize. New York: American Standards Association, 1941.

- Council on Foreign Relations. The United States in World Affairs.  
New York: Harper and Brothers, 1949 and annual thereafter.
- Combined Production Resources Board. Report, Conference on  
Unification of Engineering Standards, Ottawa, Canada, September-  
October 1945. Washington: U. S. Government Printing Office, n. d.
- \_\_\_\_\_. Report of Conferences on Standardization of Screw Threads and  
Cylindrical Fits, London, August-September 1944. Washington:  
U. S. Government Printing Office, 1944.
- Dimmock, Marshall Edward, and Dimmock, Gladys Ogden. Public  
Administration. New York: Rinehart and Co., Inc., 1954.
- Federal Reporter. St. Paul: West Publishing Co., 1946 and 1950.  
Vols. 152, and 176.
- Gaillard, John. Industrial Standardization, Its Principles and Applica-  
tion. New York: The H. W. Wilson Co., 1934.
- Huntington, Samuel P. The Soldier and the State. Cambridge: The  
Belknap Press of the Harvard University, 1957.
- Inter American Defense Board. Background and Regulations of the IADB.  
n. d.
- \_\_\_\_\_. An Introduction to Mutual Security Planning by the American  
Republics. n. d.
- International Civil Aviation Organization. Memorandum on ICAO.  
Montreal: International Civil Aviation Organization, 1958.
- International Electrotechnical Committee. Charles Le Maistre, His  
Work, The I. E. C. Geneva: Central Office of the International  
Electrotechnical Commission, 1955.
- Ismay, Lord. NATO, The First Five Years, 1949-1954. Netherlands:  
Bosch-Utrecht, n. d.
- Kaplan, Morton A., and Coblenz, Constance G. United States Foreign  
Policy, 1945-1955. Washington: The Brookings Institute, 1956.
- Kato, Masuo. The Lost War, A Japanese Reporter's Inside Story.  
New York: A. A. Knopf, 1946.
- Lynd, Robert S. Knowledge for What? Princeton: Princeton University  
Press, 1946.

- Martino, Robert A. Standardization Activities of National Technical and Trade Associations. Washington: U. S. Government Printing Office, 1941.
- Melnitsky, Benjamin. Profiting From Industrial Standardization. New York: Conover-Mast Publications, Inc., 1953.
- Montgomery, Viscount, Field Marshal. The Memoirs of Field Marshal the Viscount Montgomery of Alemain, K. G. New York: The World Publishing Co., 1958.
- Mumford, Lewis. Technics and Civilization. New York: Harcourt, Brace and Company, 1934.
- \_\_\_\_\_. Values for Survival. New York: Harcourt, Brace and Company, 1946.
- Murphy, Arthur E. The Uses of Reason. New York: The Macmillan Company, 1943.
- Organization for European Economic Cooperation. Some Aspects of Standardization in the U. S. A. and in Europe. Paris: Organization for European Economic Cooperation, 1953.
- Palmer, Frederick. Bliss, Peacemaker, The Life and Letters of General Tasker Howard Bliss. New York: Dodd, Mead and Co., 1934.
- Patterson, Gardner, and Furniss, Edgar S., Jr. NATO, A Critical Appraisal. Princeton: Princeton University Press, 1957.
- Perry, John. The Story of Standards. New York: Funk and Wagnalls Co., 1955.
- Problems of Leninism. Moscow: Foreign Language Publishing House, 1945.
- Reck, Dickson (ed.) National Standards in a Modern Society. New York: Harper and Brothers, Publishers 1956.
- Reitzel, William; Kaplan, Morton A.; and Coblenz, Constance G. United States Foreign Policy, 1945-1955. Washington: The Brookings Institute, 1956.
- Ritchie, Ronald S. NATO, The Economics of an Alliance. Toronto: Ryerson Press, 1956.

- Smyth, J. G., Brigadier. The Western Defenses. London: Allan Wingate, 1951.
- Soward, F. H. Canada in World Affairs from Normandy to Paris, 1944-1946. Toronto: Oxford University Press, 1950.
- Sparrow, John C. History of Personnel Demobilization in the United States Army. Washington: U. S. Government Printing Office, 1951.
- Swarthout, John M. and Bartley, Ernest R. Principles and Problems of American National Government. New York: Oxford University Press, 1955.
- Waldo, Dwight. The Administrative State. New York: The Ronald Press Company, 1948.
- Watson, Mark Skinner. United States in World War II, The War Department, Chief of Staff: Prewar Plans and Preparations. Washington: U. S. Government Printing Office, 1950.
- Whitaker, Arthur P. (ed.). Inter-American Affairs, 1945. New York: 1946.
- Whitney, Albert W. The Place of Standardization in Modern Life. Lima: Central Executive Council of the Inter American High Commission, 1924.

#### Articles

- Abbott, C. C. "Economic Aspects of Power." Harvard Business Review, July, 1948.
- Adams, L. F. and Alger, P. L. "What Role for Standards in Post-War Production." Industrial Standardization, December, 1943, p. 358.
- Ainsworth, Cyril. "DINNSA." The Magazine of Standards, April, 1958, p. 123.
- Bart, H. L. "How Many Pounds in a Pood?" Saturday Evening Post, November 16, 1949, p. 22.
- Batt, William L. "International Standards And World Cooperation in War and Peace." Industrial Standardization, December, 1944, p. 249.

- Bennett, Wallace F. "Management Takes a Position on Standardization Policy." Standardization, August, 1949, p. 199.
- Boulton, B. C. "Standardization Tomorrow?" Industrial Standardization, February, 1946, p. 49.
- Bryans, Henry B. "National Standardization--Adventure in Free Enterprise." Industrial Standardization, January, 1946, p. 2.
- Coonley, Howard. "Standards and Free Enterprise." Industrial Standardization, April, 1946, p. 71.
- Coonley, Howard and Agnew, P. G. "The Role of Standards in the System of Free Enterprise." Industrial Standardization, April, 1941, Part 2, pp. 6-9.
- Cramer, John F. "Economic Aspects of Standardization," Industrial Standardization, July, 1947, p. 164.
- Encyclopedia Britannica, 19th ed., Vol. XXI. Article, "Standardization."
- Flanders, Ralph E. "How Big Is an Inch?" The Atlantic, January, 1951, pp. 44-48.
- Gaillard, John. "What Is the Present Status of Metric Screw Thread Standards?" Industrial Standardization, August, 1945, pp. 183-187.
- Green, John C. "Industrial Mobilization and Standardization." Standardization, January, 1951, p. 14.
- Hayes, James D. "Standardization and the Antitrust Laws." Industrial Standardization, April, 1946, pp. 76-77.
- Heflebower, R. C., Col. "The USAF Program of International Standardization." Standards Engineer, September, 1955, pp. 11-13.
- Jacobs, Ephriam. "The Legal Implications of Standardization." The Magazine of Standards, January, 1956, p. 27.
- Jenkins, F. G. "Material Standardization." Iron Age, February 20, 1941, p. 35.
- Lawrence, J. S., Col. "Standardization Among Allies." Army, May, 1957, pp. 31-35.

- Lingle, D. G., Col. and Seitz, G. A., Capt. "Army-Navy Aeronautical Standardization." SAE Journal, November, 1942, pp. 31-32.
- McElroy, P. K. "What Standardization is Not." Standardization, October, 1949, pp. 253-255.
- Schoeffel, M. F., Rear Adm. "Some Adventures in Military Standardization." Standardization, September, 1951, pp. 277-279.
- Sonnett, John F. "Is Standardization Legal?" Industrial Standardization, December, 1948, pp. 192-195.
- Wilson, Charles E. "Report on the Policy Committee on Standards." Industrial Standardization, July, 1945, pp. 145-149.
- Wollner, Herbert J. "Standards and World Trade." Industrial Standardization, June, 1956, pp. 147-148.
- Wollner, M. J. "Standards and World Trade." Industrial Standardization, June, 1946, p. 148.
- Zimmerman, R. E. "High Spots of ASA Work for 1941." Industrial Standardization, January, 1942, p. 7.

#### Unpublished Materials

- Armstrong, Donald, Brig. Gen. Industrial Standardization. An address before the Industrial College of the Armed Forces, March 14, 1949.
- Bodine, Donald R., Col. "A Proposal for the Reorganization of the NATO Military Agency for Standardization." Unpublished thesis, Air War College, Air University, Maxwell AFB, Alabama, April 1954.
- Campbell, Herbert M., Lt. Col. "Standardization and Collaboration in the A-B-C Air Forces." Unpublished Master's thesis, Department of Political Science, Columbia University, circa February, 1952.
- Christmas, John K., Brig. Gen. Joint Army-Navy Standardization. An address before the Industrial College of the Armed Forces, February 26, 1948.
- Coonley, Howard. The Importance of Standardization to Our American Enterprize. An address before the Industrial College of the Armed Forces, February 19, 1948.

\_\_\_\_\_. Industrial Standardization. An address before the Industrial College of the Armed Forces, April 6, 1950.

Haehnlen, James F., Lt. Col. "Why Isn't There an International Screw Thread?" A research paper, Air Command and Staff School, Air University, Maxwell AFB, Alabama, April, 1949.

MacLeod, Willis S. Organization for Federal Procurement. An address before the Industrial College of the Armed Forces, December 17, 1947.

Peters, Lester M., Maj. "The Need for a Single Standard Cross Recess for Aeronautical Screws." A research paper, Air Command and Staff School, Air University, Maxwell AFB, Alabama, November, 1949.

Powell, Franklin E. "Some Aspects of Standardization and Economic Theory." Unpublished Master's thesis, School of Social Science, Catholic University, May, 1947.

#### Newspapers and Periodicals

Advanced Management. 1950-1958.

American Aviation. 1950-1958.

The Annals of the American Academy of Political and Social Science. 1955-1958.

Army. 1945-1958.

Army Information Digest. 1955-1958.

Army-Navy-Air Register. 1950-1958.

The Atlantic. 1945-1955.

Aviation Age. 1950-1958.

Aviation Week. 1950-1958.

The Birmingham News. 1957-1959.

Bulletin (United States, Department of State). 1950-1958.

- The Bulletin of the National Association of Purchasing Agents. 1945-1948.
- Business Action. 1949-1951.
- Business Week. 1951.
- Canadian Army Journal. 1947-1958.
- Congressional Record (United States Congress). 1945-1950.
- The Current Digest of the Soviet Press. 1955-1959.
- The Economist. 1945-1958.
- Fasteners. 1940-1950.
- Federal Register. 1957.
- Foreign Commerce Weekly. 1947-1955.
- Harvard Business Review. 1948-1950.
- Industrial Standardization. 1937-1946.
- Iron Age. 1941-1955.
- Journal of the Franklin Institute. May, 1864.
- Life. 1948-1958.
- The London Times. 1948-1958.
- The Magazine of Standards. 1956-1958.
- NATO Letter. 1955-1958.
- The New York Times. 1914-1958.
- SAE Journal. 1941-1958.
- Saturday Evening Post. 1945-1955.
- Standardization (United Kingdom, Ministry of Supply). 1949-1958.
- Standardization (American Standards Association). 1946-1956.
- Standards Engineering. 1954-1958.

Time. 1945-1958.

Tool Engineer. 1945-1950.

The Wall Street Journal, 1950-1958.

The Washington Post and Times Herald. 1950-1958.

The Winnipeg Free Press. 1945-1958.

Manuscript and Standards Sources

Air Standardization Coordinating Committee

Aircraft Industries Association

American Standards Association

Canada-United Kingdom-United States Joint Communications-  
Electronics Committees

Combined Chiefs of Staff

Combined Communications Board, Combined Chiefs of Staff

International Federation of National Standardizing Associations

National Aircraft Standards Committee

North Atlantic Treaty Organization, International Staff

\_\_\_\_\_, Military Agency for Standardization

\_\_\_\_\_, Military Committee

\_\_\_\_\_, North Atlantic Committee

\_\_\_\_\_, Standing Group

Tripartite Armies

Tripartite Navies

United States, Air Coordinating Committee

- \_\_\_\_\_, Armed Services Electro Standards Agency
- \_\_\_\_\_, Central Intelligence Agency
- \_\_\_\_\_, Comptroller General (Decisions)
- \_\_\_\_\_, Department of Defense (Directives)
- \_\_\_\_\_, Industrial College of the Armed Forces (Student Committee Reports)
- \_\_\_\_\_, Joint Chiefs of Staff
- \_\_\_\_\_, Joint Communications Electronics Committee, Joint Chiefs of Staff
- \_\_\_\_\_, Joint Staff Planners, Joint Chiefs of Staff
- \_\_\_\_\_, United States Air Force (Air Force Regulations and Technical Orders)
- \_\_\_\_\_, United States Army (Army Regulations, Memoranda, and Special Regulations)
- \_\_\_\_\_, United States Navy (OPNAV Instructions)
- Western European Union, Strategic Armaments Committee

Military Files

- U. S. Department of the Air Force, Assistant for Standardization, Deputy Chief of Staff, Development, Headquarters United States Air Force, 1948-1958.
- \_\_\_\_\_, Central Files. AAG 334. 7.
- \_\_\_\_\_, Central Files. AAG 334. 8.
- \_\_\_\_\_, Central Files. AAG 400. 1142.
- \_\_\_\_\_, Project Record Book of Brig. Gen. A. J. Lyon, No. 38.  
"Conferences; Army Navy and British Purchasing Commission, Standardization and Allocation of Airplanes and Aircraft Engines." July-November, 1940.

\_\_\_\_\_, Working Committee, Aeronautical Board. Folder on  
"Standardization." October-December, 1936.

U. S. Department of the Army, Adjutant General's Office. AG 452.