

COMPANY STANDARDIZATION

15 March 1950

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Publication No. L50-110

INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

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Mr. S. H. Watson was born in Watervliet, N. Y., 14 December 1905. He entered the General Electric Company, Schenectady, N. Y., in 1922 and graduated from the G. E. Engineering School in 1927. From 1922 to 1929, concurrently with schooling, he engaged in drafting and design on steam turbines, marine appliance equipment, industrial control instruments and finally radio transmitters and receivers. In December 1929, Mr. Watson transferred to the Radio Corporation in Camden, N. J., and engaged in design and field engineering on automotive and aircraft receivers until the spring of 1941. From 1941 until the fall of 1944, he was engaged as mechanical project engineer on armed forces communications equipment including altimeters and radar. He was appointed manager of the Division Standardizing operation in the general office engineering staff in October 1944. He currently represents RCA in the American Standards Association Company Member Conference, was a member of the Conference Administration Committee from 1947 to 1949, and Chairman of the Conference for the year 1949. He served with the New York National Guard from 1923 to 1927, and was commissioned in ORC in 1925 as a second lieutenant, Signal Corps. Assignment as a Reserve Officer included Office of the Chief Signal Officer, Washington, D. C., 1947; Technical Instructor, Fort Monmouth, N. J., summers of 1926 and 1927; Pine Camp, N. Y. in 1935 with Radio Intelligence Unit; and two field assignments to Northern N. Y. in 1939 and 1940 with the Signal Company, 44th Division Special Troops for the large scale peacetime maneuvers. He is now Manager, Division Standardizing, General Office Engineering Department, RCA Victor Division, Radio Corporation of America.

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COLONEL HENRY: Gentlemen, the subject of standardization can be really broken down into three phases; international standardization, which is exemplified best by the recent getting together on threads; national standardization, as some of you might recognize in fractional horsepower motors, especially in the utility and home appliance fields; and plant standardization of methods and processes. You have heard us talk on the theme of standardization and lead time all the way through our fundamentals of production. That is the phase that we will take up today, "Company Standardization."

There is no need to tell you of the qualifications of our speaker, Mr. S. H. Watson. They are in his biography, and you have seen that. But I merely wish to call to your attention that he is Manager of Division Standardizing of the RCA Victor Division of Radio Corporation of America and has just finished his term as Chairman of the Company Member Conference of the American Standards Association.

I take pleasure in welcoming back to the College, Mr. Watson.

MR. WATSON: Thank you, Colonel.

I have here a collection of books which are representative of what develops in a company that has been engaged in standardization for some time. If some of you wish to look at them after this discussion is over, we can scatter them out on the stage for your examination.

In today's discussion, I plan to apply the main effort to company standardization as practiced in a fairly large industrial organization. By way of orientation, however, a brief preliminary review of the factors which dictate standardizing programs and some of the fundamental problems which must be faced in industry, as well as in government, may be helpful.

Standardization, properly applied, establishes, publicizes, and promotes norms for universal use within a prescribed area: world, nation, state, industry, company, and so forth. In return for moneys and effort expended on standardization, the sponsor realizes reduced and simplified inventories, which, of course, add up to a reduction of capital tied up in inventory; larger volume purchases of fewer items, resulting in efficient utilization of purchasing power; improved availability of higher-quality, more-uniform products, as volume justifies better tooling, mechanization, and improved quality control; and wider application of fewer items, which is conducive to increased interchangeability, or "cannibalization," as it was dubbed during the last war. Stemming from these is a myriad of additional advantages, such as reduced manpower,

more highly developed skills, less warehousing and stores space, a reduction in variety of production equipment, and reduced plant space--to name but a few.

If we trace the history of standardization in any industrial company in which it is well established, we find it was vigorously launched after but a cursory examination of one or more of these factors. An excessively large and inordinately diversified inventory, in which, frequently, the same item is identified by several different stock numbers, or two or more different items are identified by the same stock number, is, by far, the most common motivator.

Briefly, then, standardization, like all other functions of industrial management, is essential because of what happens without it. Also, like other functions, standardization involves problems, some of the more important of which will bear brief mention.

The struggle against variety or unwarranted diversification is a leader. In our system of free enterprise, with its open door to all who wish to compete, there exists a wide variety of all the most commonly used items. Most manufacturers place great emphasis on styling, advertising, merchandising, and sales to achieve leading or substantial positions in their respective fields. In the average American community, one or more of every available type of refrigerator, vacuum cleaner, dishwasher, and other home facilities can usually be found in service. In too many cases, the effectiveness of the sales approach and the eye-appeal of the product, rather than the more important factors of merit, based on performance, and dollar value, clinch a deal. All individuals are more or less vulnerable to sales approaches. Where an approach fails with one individual, it is successful with another. Hence, there is always a strong tendency toward unwarranted diversification where two or more individuals are involved--and an industrial company (and, of course, the Army, Navy, and Air Force) is usually comprised of several hundred people; in many companies, several thousand.

A further problem--and, perhaps, complexity--in standardization is the special and thorough study required in every specific program to assure that the resulting standard is sufficiently restrictive to cure the existing and potential ills that prompted the action and, at the same time, sufficiently broad in range to satisfy the real needs of those who are to accept it and work within its limits.

As an example, let us consider something supposedly simple and commonplace--the shovel. I am naming the shovel because most of us have probably used one for one purpose or another during the course of our careers; on the farm, behind livestock, or in the garden at home. As we ponder on the significance of this implement and the vital part it has played and continues to play in American life, our respect for

it grows, and it becomes obvious that a shovel standardizing program would be, and, in fact, has been, an involved one. This particular industry--specifically the fork and hoe industry--I am advised, has tackled the problem on shovels and done a commendable job. When I look at the collection at home, it would seem we started buying before the standardization job was done.

It would be ideal, from a narrow standardization viewpoint, if one size and type of shovel could be established as standard, to the exclusion of all others. However, the man who wants to shovel snow and get the job done would not be satisfied with a small shovel. A ship's captain would have trouble below decks if he provided snow shovels to handle coal. Then there is the safety factor, which must be carefully considered in every standardizing program. I understand there have been applications wherein the size and shape of the shovel proper were of little consequence, provided the strength of the handle was adequate to support the weight of the heaviest man likely to use it. I understand, further, that there have been a few isolated dispensary cases as a result of inadequate handle strength.

A further perusal of this case study could be quite interesting, and indeed humorous, but the important point fundamental to all standardization is: There are functional considerations peculiar to each subject. The men who develop the standard must collectively know the subject and all the fields in which it is employed. Hence, in standardization, whether it be that sponsored by member bodies of the American Standards Association, or that of the many trade and technical organizations, of the Federal Government and the armed forces, or of industrial companies, an extended effort is made to make all interested groups a party to the work, either through directly participating representatives or guiding consultants.

Adding to the complexity of standardization is the human factor, as it applies in specific cases. Briefly, a knowledge of the people involved, both as individuals and as groups, is essential to standardization. A qualified group assigned a standardization task may clearly recognize the obvious standard dictated by a purely objective approach. A consideration of the individuals and groups affected, however, may challenge the wisdom of the obvious. Many standards, therefore, advance to the ultimate in stages, through an evolutionary process; and many others, revolutionary in nature, fail to gain acceptance.

Within an industrial company, however, changes of a drastic nature resulting from standardization can usually be established more easily than is the case on a national or association level. When the standard is economically sound, all things considered--and it is not good standardization otherwise--the supervision of the operations affected can invariably be sold and will accept and apply the standard.

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often enthusiastically. On a national or association level, standardization, attractive to both manufacturer and user, is often difficult of attainment although, nonetheless, desirable and important. Generally speaking, the larger the area of operations, or the larger the groups affected, the more complex and difficult standardization becomes. It might be said that, in the armed forces, as a result of the size of the bodies involved, you face, perhaps, the most difficult standardizing problem that exists today.

Further complicating standardization is the requirement that all standards should be established for voluntary acceptance. They must be dynamic and not static. All users should understand that they hold an unwritten invitation to "top it if they can." Thus, the tendency toward fixation, inherent in standardization, does not become an unbreakable shackle barring change and progress.

The term "voluntary acceptance," as applied in an average company, bears some comment. It does not leave every individual completely free and unrestricted. Common sense and good judgment are demanded in the use of standards, as in all other things, and where a trend toward unwarranted diversification exists in a group, or in an operation, it is a function of supervision and management to exercise the necessary controls. In some exceptional cases, common sense and good judgment dictate the use of a "special" in preference to a "standard." That, of course, may be particularly true in a large production operation where, by weight of volume, almost anything can conceivably be a standard. And although a company such as ours may have a standard established for a certain general type of purpose, if we find that we can fulfill the requirement in a particular case and save a half cent, a cent, or whatever it happens to be, then, in that specific, or special case, it is smart to buy the lower-cost item in preference to the existing standard. That applies where volume is the controlling factor.

Before concluding these preliminary comments, I want to say that the term "fixation" mentioned a moment ago suggests the hazards of standardization and stresses the importance of reflecting in standards the best known to the art, all things considered, and of proceeding cautiously when standardizing in the face of advances and developments that may shortly dictate major changes.

The most outstanding and often-mentioned present-day example of the inflexibility that may arise from standardization is in the American railroads. I understand that railroad designers, in order to improve stability and provide a smoother ride, would like to work to a track spread of 5 feet, 6 inches, or even 6 feet. However, the present standard of 4 feet, 8.5 inches, is nationwide in the form of millions of miles of track and billions of dollars worth of rolling stock. How a change to a wider gauge can ever be made in the face of this investment, and in the face of the cost of changeover, is a question not easily answered.

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A consideration of the railroad problem, however, or any other similar case wherein standardization has gradually introduced inflexibility, should not be critical of standardization itself, because the standardization usually is vitally necessary. I remember Admiral Cochrane's address at the annual meeting of the American Standards Association in New York, in 1944, in which he described the hopeless situation faced in Australia during the then current war--a different railroad gauge in each province. Some of you here were probably faced with that situation. When passengers or freight arrived at a border, a change was necessary to cars fitting the gauge of the next province, and so on across the country. Imagine traveling from Portland, Maine, to San Francisco on this basis!

In the case of the railroads, it is hard to see any way in which this inflexibility could have been avoided. The chances are that a wider gauge would never have gained universal acceptance. It is vitally important, however, in all standardization that inflexibility, on the one hand, be recognized and understood as part of the price and, on the other, minimized, if not eliminated, through vision and ingenuity.

In the Radio Corporation and, more specifically, in its manufacturing arm, the RCA Victor Division, which I represent, we are constantly weighing such factors in a continuing drive for dynamic standards that will stand the test on the firing line.

I have a few charts here that will help give you a picture of the setup in the RCA Victor Division. (Charts 1, 2, 3, pages 21-24.)

First, I might briefly touch on the corporation itself, although I do not have a chart for it. It is pretty well known that the Radio Corporation consists of the National Broadcasting Company, its broadcasting arm; RCA Communications, for radio communications; RCA Institutes; Radio Marine, for marine equipment; RCA Laboratories, for research; RCA International; and the manufacturing arm, RCA Victor Division, which is shown on the first chart.

Chart 1, RCA Victor Division Organization.--The chief of the RCA Victor Division is the executive vice president. Immediately below him we find the top vice presidential level--vice presidents in charge of Services, Distribution, Consumer Products, and Technical Products. They drop down to the operating level, the middle level on the chart, which shows operating departments. In the center of the chart is the operating vice president. That line drops down to the staff--Accounting, Engineering, Finance, Law, Materials, Personnel, Plant Engineering, and Public Relations. We are concerned today with the Engineering Department.

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Chart 2, RCA Victor Engineering Department Organization.--The Engineering Department has a very small breakdown. There is the engineering vice president and director and two assistant directors--one for Advanced Development and the other for Consulting and Standards. Dropping off and reporting to the Assistant Director of Consulting and Standards is Division Standardizing, which is specifically the activity I plan to talk about now in the last half of this discussion.

Chart 3, Division Standardizing Organization.--This is the breakdown of Division Standardizing, which we can follow as we go along.

Within the RCA Victor Division, standardization is applied in a number of ways, and hundreds of people participate. Full-time effort is confined to the Engineering Department and is concentrated on the industrial standards required in the company's diversified line of electronic products. Other operations, such as purchasing and manufacturing, enjoy a healthy state of "standards-mindedness"; and although personnel is not available specifically for purposes of standardization, managers and supervisors, nevertheless, apply the principles and frequently realize significant results in operating efficiency.

The responsibility for organized and planned standardization rests with the vice president and director of Engineering, a member of the General Office Management Staff. Two assistant directors aid in this broad function; one of them is directly responsible for standardization, in addition to other functions of a consulting and administrative nature. Division Standardizing, the functioning group, is headed by a manager and reports to the assistant director.

Although standardization activity in the RCA Victor Division dates back some 40 years, the pattern followed today was established in 1944, at which time organizational changes were introduced which emphasized clearly defined product department operation.

It was recognized at the outset that, although Division Standardizing is an engineering unit, its activities would, as in the past, have a bearing upon the interests of other operations. Therefore, included in the current standardizing organization is the Division Standards Policy Committee, with the function of establishing broad policies to guide standardization. The policy committee consists of an engineering and a manufacturing representative from each operating department, the Assistant Director of Engineering, a representative of the General Office Purchasing Department, with the manager of Division Standardizing serving as chairman and a member of Division Standardizing serving as secretary.

Most of the policies established by this group are very broad in nature. Strictly speaking, one of them is perhaps my authority for

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being here today. It covers our policy of cooperation and coordination with the armed forces and other Federal agencies. It is a liberal policy, as it should be.

The policy group now meets approximately once a year. In the earlier, formative stages, meetings were more frequent. Substantial broad policies in a limited number have been firmly established and are used effectively.

In addition to the General Office, or central group, Division Standardizing, the engineering department of each operating department conducts its own standardizing activity, consisting of one or more men serving full or part time. The volume of effort allocated to standardization in the case of each operating department depends upon the needs of the activity as determined by the chief engineer. The engineer in charge of standardization in an operating department is, in most cases, the chief engineer's representative on the Division Standards Policy Committee.

Division Standardizing has the responsibility of coordinating standardization throughout the division and of sponsoring those standards required for general interdepartmental use. It is organizationally and functionally divided into four main groups: Electrical, Mechanical, Finishes, and Materials. In each case there are some subassignments.

The Electrical Section handles or coordinates all standardization pertaining to electrical components, wiring devices, and accessories. The more prominent items in this category are capacitors, resistors, coils, tube sockets, switches, meters, batteries, quartz crystals, insulators, connectors, lamps, relays, rectifiers, transformers, electron tubes, terminals, terminal boards, and so on. A large number of engineers in the various operating departments, qualified experts in their respective fields, contribute substantially to over-all standardization and, in some cases, carry the entire burden. Standardization on electron tubes, for instance, and liaison with industry and the Radio Manufacturers Association on matters pertaining to electron tubes are administered by the Tube Department. Similarly, the transformer design engineers of the parts operation are the authorities who are looked to for guidance on transformer problems. The experts on piezoelectric quartz crystals in the Engineering Products Department guide standards in that field. On items such as capacitors and tube sockets, obtained almost entirely from outside sources, the burden falls largely on the Electrical Section in Division Standardizing. When a new electron tube is in the process of development, and the need for a new type of socket is anticipated, the Tube Department usually contacts the supervisor of the electrical group in Division Standardizing. He coordinates the development of the required socket with the tube design engineers of the Tube Department, the equipment design engineers of both the Home Instrument and Engineering Products

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Departments, and with the engineers of outside companies who are interested in tooling for and producing the final socket. Such an item is usually released as a division standard shortly after the first production run.

The supervisor of the Electrical Section also functions as industry coordinator and maintains liaison with the American Standards Association, the Radio Manufacturers Association, and other trade and industry groups. Members of the electrical group participate in standardizing committee activity sponsored by ASA, RMA, ASTM, NEMA, and others. Many engineers throughout the division are also active, particularly on RMA projects. The Electrical Section maintains a file of all participants, follows the progress of the many projects, and functions as a central information and processing agency.

Coordination with standardizing agencies of the Federal Government and the armed forces is a function of the Electrical Section. The development and progress of military standards and specifications is followed closely. In some cases, standards engineers of Division Standardizing serve as industry participants on military task groups in the drafting of standards. We were more active in that phase of the work during the war than we are now, but there is still some activity.

Many proposed new and revised military standards are now being processed, for industry comment, through the procedures of the Radio Manufacturers Association. The Electrical Section handles this processing within the RCA Victor Division. Copies of drafts supplied by the armed forces agency are received in bulk and distributed to qualified individuals in interested operating departments. The returned comments are combined into a composite draft and forwarded to RMA and to the military agency. These proposed military standards are given careful study by the division. This military practice of processing for industry comment is considered very effective in promoting close coordination between industry and the armed forces. It is the policy of the RCA Victor Division to assist the military in every way possible in the development of sound standards and specifications.

A small laboratory devoted largely to the qualification testing of standard electrical components is maintained. This operation is carefully supervised by the Electrical Section. Test activity is strictly confined to components where qualification control is mandatory. Time-consuming exploratory and research investigations are avoided. Engineers from operating departments or from the plants of suppliers frequently join with Division Standardizing personnel in conducting tests involving problems of mutual interest. Reports are prepared covering the results of each test and distributed to those directly concerned.

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The Mechanical Section, in its field, operates in a manner closely paralleling that of the Electrical Section. Here, again, many qualified engineers throughout the division have a sharp, active interest in mechanical standardization and participate regularly in the work. The pursuits of the Mechanical Section are essentially those of most industrial company standardizing departments and include such specific subjects as assembly methods, drafting and shop practices, cans, shields, bearings, drive components, cabinets and racks, name plates and marking methods, cases and boxes, hardware, fastening devices of all types, springs, and tools. Many of the items in this category are the staples common to every RCA production plant operation.

The Mechanical Section includes the drafting staff; it handles drafting requirements for all sections of the department. High standards of drafting quality are rigidly maintained. Each drawing is carefully planned as an example of good practice. Many of the drawings are subsequently used, in whole or in part, as masters in the printing of standards. All standards are printed on 8.5 by 11 stock. The photo-offset process is used in most cases.

Drafting practices used throughout the division are centrally coordinated by the mechanical group, whose supervisor is chairman of the Division Drafting Coordination Committee. This committee, composed of a drafting representative from each operating department, is one of the few permanent committees maintained for purposes of standardization. The group normally meets several times a year, depending upon the volume of business. National standards, such as those of the American Standards Association and its member bodies, are invoked, usually without deviation. As an example, standard drafting forms used throughout the company are limited to the five sizes recommended by the American Standards Association. These five sizes, incidentally, are also standard joint Army-Navy-Air Force standards. This is an example of an item, in which we have excellent national standardization. Drafting practices developed and issued by the committee make up the division drafting manual, which is currently serving in approximately 700 locations from New York to Hollywood and from Montreal to Buenos Aires.

The division drawing numbering system used through the operating departments is controlled by the Mechanical Section. A straight sequential system is used, running from 1 to 10 million. Assignments are now being made from seven-digit blocks in response to requests from the widely separated operations previously mentioned.

The Mechanical Section also administers the division numbering system for standards. The system is a modified Dewey decimal type with no planned pattern of significance. Basic code numbers from one up are assigned in sequence to broad subjects.

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Each division standard is designed to serve all interested operating departments and in most cases proves to be adequate. In many specific instances, usually for "reduction of items" purposes, an operating department issues its proprietary standard, in which some of the items included on the division notice are omitted. In other cases, items peculiar to the needs of one operating department are standardized by that department and do not appear as division standards. Such standards carry the number of the existing or potential division standards and, within the issuing department, are found in the same location in the division standard books. Although the operating departments are, on their own, developing and issuing standards, the standards all funnel into many volumes which are then made a part of the practice procedures of all departments. It is an integrated system, even though much of the work is advanced more or less independently, on a coordinated basis. The individual department standards contrast with the equivalent division standards in color of paper and an added significant letter suffix used with the page number. In the Engineering Products Department, for instance, all standards are printed on a blue paper stock, are known as "blue sheets," and carry the suffix "E" after the page number.

The Finishes Section is responsible for all finishes required for protective, functional, and decorative purposes. Standards in this field include a wide variety of organic, electroplated, and chemical types. Finishing requirements vary from those on military equipment, which must withstand the most severe service conditions, to those used on home instruments, where eye-appeal is the primary consideration. I might add that, although eye-appeal is of first importance in home instruments, we give a lot of attention to quality, as well.

The finishes activity contrasts rather sharply with the electrical and mechanical group activities in that it is more an operating function and deals closely with requirements peculiar to specific equipments. This is due primarily to the fact that specialized know-how on finishes is concentrated largely in Division Standardizing. Much of the effort is of a design engineering nature, in direct collaboration with equipment engineers, stylists, procurement personnel, manufacturers' representatives, and with supervision in the plants of outside specialty concerns that are frequently engaged to fabricate and finish parts and assemblies.

Often, new finishes and processes must be developed to fulfill new and unique requirements. These are confined, in the main, to aggregations of old or new-known factors. The development programs are usually short-term projects, often conducted under pressure. The laboratories of suppliers frequently contribute substantially to the end result. When new finishes are anticipated and require careful, time-consuming, fundamental investigation, they are usually assigned to the Chemical Engineering Department, which handles all chemical development work. The physicists and chemists of Chemical Engineering also frequently contribute to standardizing requirements in a consulting capacity.

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The specialists of the Finishes Section spend considerable time in the field at the various RCA plants and at the plants of suppliers and subcontractors. Field work is mostly of a consulting nature and involves equipment layout, application techniques, qualification of products, and problem analysis.

The finishing standards are distributed to approximately 150 locations throughout the division and are used as operating documents in much the same manner as blueprints or specifications issued by the engineering departments of the operations. They cover materials, processes, equipment requirements, inspection, and appearance criteria. Many finishes are types used consistently in many equipments. They are continuously active, have a permanent place in the division standards books, and are subject to revision from time to time to reflect improvements and economies available as a result of material, process, or equipment developments. Many others are special in nature and are confined to the needs of but one model season. Periodic reviews are made at least once a year. Finishes not in current use are canceled. In this way, the books in the field reflect only current needs. Any canceled finish may be reinstated on demand. Less than 10 percent of all canceled finishes are reactivated.

All organic finishing materials are thoroughly type-tested for source approval before production quantities are procured. This function is one of the most important in the section and is rigidly enforced by procurement and manufacturing authorities in the operating departments. It reveals and corrects any shortcomings that might otherwise cause expensive delays and confusion in production and insures freedom from finish failures in the field.

The Materials Section, like Finishes, is close to operations and works directly with engineering, purchasing, material control, and manufacturing personnel in the operating departments on specific equipment requirements. The main function of the Materials Section is the development of RCA purchasing specifications and supporting division standards. The company purchasing specifications are procurement documents but serve effectively for reference purposes in engineering, material control, and manufacturing. They cover the complete range of raw and semiprocessed bulk materials required in the design and manufacture of RCA products. Materials in accordance with Federal and military specifications, as well as the more common commercial grades, are included. In the preparation of specifications, full use is made of existing national and trade standards by reference and quotation.

The supporting standards on materials, like all other standards, are designed primarily for internal use. They provide design data, suggested uses, application limitations, workability, size ranges, tolerances, and any other information that might be generally useful to interested personnel. An important responsibility of all sections is

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that of keeping abreast of new developments and evaluating them in terms of existing or potential RCA Victor requirements. This phase of activity has been particularly prominent in the Materials Section. Many wartime developments have been analyzed and reduced to practice. Currently, a new insulated wire is being introduced in operations. It promises to supplant six other types, some of which are more expensive than the new wire.

Like the engineers in other sections, those in the materials group are active in industry and trade association standardizing activity. The supervisor is chairman of the Radio Manufacturers Association Hook-up Wire Committee is a member of various ASTM committees on metallic and insulating materials, and maintains close liaison with the Underwriter's Laboratory and with military agencies.

The purchasing specifications and material standards are distributed to books in about 150 locations in the various plants. In addition, a specification service is maintained to provide copy ordered by the purchasing departments for use as documents in transactions with suppliers.

The activities of all sections are standardized procedurally to that extent consistent with the variety of specialized fields involved. Thus, standardization within a standardizing operation is a major factor in the over-all efficiency of a department that is comparatively small for the wide range of fields in which it operates. I touch upon standardization within the standardizing activity because I have found cases in standardization where the standardizing group is devoting all its attention to the field for which it is setting up standards and unwittingly gets involved in peculiar diversification within its own operation. All drafting and printing requirements are handled by the Mechanical Section. All stenographic and clerical functions and all distributions and distribution records are handled by the Finishes Section. Hence, the detail masterminding and implementation peculiar to these activities are concentrated under one supervision and not multiplied by four.

The approach to standardization in the RCA Victor Division depends upon the nature of the subject and the factors involved. Permanent and, particularly, large committees are avoided except in a few pursuits, such as drafting practice coordination, where the small permanent committee has been proved effective. In general, a single qualified individual spearheads the effort and, in the process of development, coordinates the work with other interested individuals. In some cases, a temporary committee is established, holds a sufficient number of meetings to complete an assignment, and is discharged.

In Division Standardizing and in the standardizing activities of the operating departments, the emphasis is on the effectiveness of the service. The principle of voluntary acceptance and application and

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freedom to act in good judgment is strongly supported. Standards are designed as tools of industrial management and applied on a business basis with pay-off a dominant factor. An effort is made to publicize standards thoroughly--how they may be used to advantage as well as when not to use them. If a standard does not enjoy acceptance in the areas for which it was designed, its need is questioned or revisions are made to overcome objections. These factors are usually considered in the process of development, however, and seldom remain as obstacles after a standard has been finally released.

RCA Victor Division standards operate on a five-year cycle. All standards that have served for five years are subject to cancellation, revision, or reaffirmation. This is an essential practice in any standardizing activity if standards are to be truly dynamic. An old date is viewed with suspicion, and rarely is a standard suitable for reaffirmation after five years of life, without some constructive change. In the absence of a fixed plan of review and reissue, it is too easy to carry old items at the obscure bottom of an imaginary list and, under pressure of current requirements, never get to them except in the form of emergency improvisation, which is too often more costly and time-consuming than doing the job with considered deliberation at a proper predetermined time.

Hence, with the exception of a few items on the current activity schedule, all RCA Victor Division standards carry a date of 1944 or later. In the normal course of events, many items are reissued before the expiration of five years. In final effect, the five-year plan dictates the reprocessing of approximately 20 percent of the contents of 14 volumes of standards material each year. The policy has added health and vigor to the RCA Victor standardizing program.

Such is the story, gentlemen, on the RCA Victor Division as a specific industrial company engaged in standardization.

COLONEL HENRY: Gentlemen, we are ready for your questions.

QUESTION: Sir, how does the Sherman Antitrust Act affect inter-industry standardization attempts?

MR. WATSON: So long as price fixing, or price control, does not enter into standardization on an industry or a company level, there are no restrictions. That is something that is very carefully guarded against by all companies engaged in standardization. As a matter of fact, normally, the personnel engaged in standardization usually work on an engineering level and are not too much concerned with the price-merchandising factor. They are usually thinking in terms of the desirable engineering or standard result and leave the price considerations to merchandising and sales people.

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A former Assistant United States Attorney General, Mr. John F. Sonnett, wrote a fairly complete article on the legal aspects of standardization. I could supply a copy of that article to the College for the benefit of anyone who wants to pursue the subject.

QUESTION: We in the military are fairly well sold on the idea of standardization, but, so far, we have made very little progress, and in most of our attempts we have been stopped by industry. I refer to several cases. One example is typewriters. We are required to buy typewriters from the General Services Administration, and that agency, in turn, is required to buy them from 10 different companies. As a result, we have to carry 100,000 typewriter parts. The same problem has arisen with respect to material-handling equipment, refrigerators, and stoves. Industry refuses to let us standardize because of the competition of the various firms supplying these goods. The trade associations go along with us, but the people who are not members of an association bring down Congress on us in another direction. What could we in the military do to get standardization from industry?

MR. WATSON: I think that question takes us out of the field of standardization somewhat, although the standardization consideration is important.

As I understand it, generally, in government, you are faced with a problem that is not so binding on industry as it is on government, in that your procurement is based on competitive and unrestricted bidding; and, to a great extent, all suppliers of a particular type of equipment who fall within the requirements of the military or the Government have an equal chance to manufacture and supply. I believe that is generally true.

Now, in a company such as RCA, I believe our materials and procurement people would like to operate in the same way, but it is not economically feasible, nor would the various companies with whom we might deal like it. Our volume, of course, does not begin to compare with the volume of the government and military agencies. Therefore, if we were to divide any particular commodity impartially among all the reputable sources, no one would get a volume of business that would be of particular interest to him. Consequently, in industry, you will find there are two or three--maybe four--sources developed, and those are dealt with pretty much to the exclusion of all others.

Typewriters, refrigerators, ranges, and so on, are a little out of my field, and I am not familiar with the exact situation in industry in so far as supply to the government and the armed forces is concerned. In these facilities as well as in many others, such as the automobile, we are concerned with complete operating units; and standardization has not made much progress in this field. An examination of all the factors

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suggests that perhaps this is best. To begin with it might be said that our system of free enterprise, rather than industry, is a restraining influence on standardization of equipment. In the case of typewriters, from a purely maintenance point of view, it would seem to be desirable to have spare parts common to all makes. If this were the case, and rigidly adhered to, a state of fixation or inflexibility would exist. In the absence of such standardization some ten manufacturers, independently to a large extent, aggressively work out and introduce improvements and strive to provide a better and more foolproof machine. This free competition is responsible for the advanced state of the typewriter and and hundreds of other arts today.

Another factor vital to National Security should be considered. The number of highly skilled craftsmen and the volume of plant facilities which have developed throughout the nation under free enterprise far exceed those required to produce fixed standard equipments and spares. We in America remember with pride and satisfaction, and our enemies with chagrin, the job this generous supply of men and factories did for us during the last war.

QUESTION: Sir, what are the prospects for a complete changeover to the metric system in this country?

MR. WATSON: For a quick answer, and an answer that applies only as I see it, I would say hopeless.

QUESTION: Perhaps you are familiar with the problem of rpm's in respect to phonographs. I am wondering what the prospects are of ironing out a thing like that. How did you ever get together on 78 rpm to start with, how do you keep the present rpm's separated, and what will be the mechanics of getting what may be considered a new standard rpm?

MR. WATSON: I purposely dodged that one in my prepared remarks because I wanted to carefully avoid anything that might appear to be promotional. I think, however, we can discuss the phonograph situation from a purely objective standpoint.

I mentioned the railroads as a situation in which inflexibility has taken hold, and we see no way in which they can break away to a wider gauge. That same situation held in the phonograph and phonograph record business for some time. I believe the 78 rpm, the 10- and 12-inch records, and the little hole in the center came into the picture some 45 years ago as a starter. That standard held until about a year ago. Two other speeds have appeared on the scene--33-1/3 and the new standard 45.

The 33-1/3 came in 1929 or 1930, and, as you probably know, it has been a standard for transcription purposes in studios over a period of approximately 20 years. The 33-1/3 is not a new speed. It has enjoyed quite a bit of usage.

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The advent of the 45 and, particularly, the big hole in the center of the record is something the industry reluctantly avoided for some 40 or 50 years. Until the 45 came along, all the automatic record changers were very complex mechanical devices because they had to work to the little hole in the center of the record. The 45 rpm and its companion record changer constitute a case where a record and an automatic changer were designed one to complement the other and to break off the shackles that the old standard represented.

Of course, as you probably know, it takes courage to break a standard like that, a standard which was deeply imbedded in the lives of the people not only of the United States but of the world. I think our people in management must have had great courage to take the plunge. But they did, and it has enjoyed better success than was anticipated at the offset.

Normally, when something like that is introduced, it is a long, hard struggle to build it up gradually. In this instance, the building up has taken place rather rapidly. It is a case where a very deeply imbedded and firmly seated standard was finally broken, and we are now in the process of seeing with what success the company that took that step will get it into popular acceptance.

That was done in spite of the fact that we have a lot of very good customers and followers throughout the world who have large libraries of 78 rpm records. They like them and enjoy playing them. That is why we are continuing to build 78 rpm records as well as the new 45. And, for that matter, we are building the 33-1/3.

But to answer the specific question--what will come out of it or how will we ever resolve them into a single standard?--that may take some time.

The first time that question was given to me--I ran into it unexpectedly in New York in the American Standards Association and, as a matter of fact, before I was familiar with what was going on to any extent--I was asked, "What is happening in the record industry? New speeds are coming up faster than we can keep up with them." The person who asked me that question pointed out that he had just heard RCA was coming out with another one--the 45. He asked, "What is going to be the standard?" I asked him what speed he had said RCA was introducing. He said the 45. I said, "Well, that's probably the new standard."

Of course, what will become the standard is not in the hands of RCA or, for that matter, of any company, but depends upon public acceptance. If, in the 45 system, the public feels it has something it does not have in the other systems, that is something in its favor

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toward ultimately becoming a standard. But, in any event, it is the public, and not RCA or any particular group, that is going to give that answer.

COLONEL HENRY: We have a number of guests today. We welcome questions from them.

QUESTION: You speak of standardization as a program which has a separate organization and cuts across many lines in your other organizations. Sometimes management is pretty hardheaded. Do you ever have trouble convincing top management that this program is worth its cost?

MR. WATSON: That problem exists in many areas. It is a fluctuating program in any company. When things get a bit tight, there is a tendency to scrutinize all costs pretty closely and to ask the question you have just posed.

In RCA--and I think this is generally true in any electrical or electronic industry, where standardization perhaps is more deeply seated than it is in some other industries--there is a very strong and healthy recognition of the continuing value of standards and standardization. We have had no problem in getting the necessary funds to continue conducting a good, aggressive standardizing program.

It is interesting, in the case of RCA, that it was in about 1935, in the depths of the depression, when RCA really embarked on a comprehensive standardizing program. In spite of the depth to which industry and commercial activities in general had fallen at that time, RCA appropriated the money and embarked on a comprehensive program. The operation with which I am now associated is a continuation of that establishment, except for organizational changes that were made in 1944, just before the war ended.

There are other companies, however, that have had serious troubles in that regard. But, in most cases, they weathered through them and have come out with pretty good health in their standardizing activities.

As a result of the past war, an understanding and appreciation of the value of standardization has been sold to a good many companies, and I believe it has been largely through the efforts of the representatives of the armed forces during the war that standardization has been sold to a good many firms. Many of them have very aggressively entered into standardizing programs since the war started.

COMMANDER BALL: I would like to carry that question just a little further. I think there are some 22,000 companies in which the Munitions Board is interested in connection with production mobilization planning. Could you tell us roughly how many company members ASA has?

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MR. WATSON: About 2,000.

COMMANDER BALL: About 10 percent. Now, you very modestly said that your description is typical of the standardizing activities of those companies that have standardizing sections. Could you give us just a little more on just how extensive the standardizing activities of other companies are?

MR. WATSON: The activities vary in size. Many companies, of course, have from 200 to 1,000 employees and are in what we might call a smaller category. In companies of that size, you will frequently find that the chief engineer or his engineering aide handles standardization and spends full or part time at it. Or the chief engineer himself may direct standardization and use some of his personnel part time here and there with no particular program. I saw that working in a company in Detroit, the Excello Tool Company. A very excellent standardizing job was done, but, so far as I know, that company has no established group for the purpose. The chief engineer, in that case, has his fingers on all operations. There is one chief engineer and one engineering department, therefore, the job is not too difficult.

Then, generally, as companies increase in size and as the complexity of their operations increases, or as the diversification of their products increases, the more complex and the more difficult the job of standardization becomes; they get larger and larger and need more people to properly conduct standardization. Further, the larger a company becomes, the more important standardization becomes, because it gets involved in larger purchasing power, which must be used efficiently and it is involved in mass production, which suggests mechanization. In entering into an investment for mechanization, it is important to have standards well established before starting to spend money.

COMMANDER BALL: I would like to carry that just a little further. Actually, many of the smaller companies operating as suppliers, say, that they get a good bit of direct service from your own standardizing group do they not?

MR. WATSON: Yes. We have letters coming in quite frequently which say, "Please send one set of your standards." I had such a request from the Department of the Army in the Pentagon, and, as I understand it, the Army was surprised when it got a 3-foot shelf of books, whereas it thought it was going to get two or three books. We don't supply these books to anyone who sends a letter in. But many companies, even without having the books, do operate to RCA standards.

One good example, which is somewhat of a problem to us, is in the field of enamels, lacquers, and paint. We recognize that there are hundreds of very reputable paint, enamel, lacquer, and varnish companies.

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Many of them submit their materials and would like them tested and approved by RCA. We point out that, while we would like to do business with them, if we broke up our business, as I pointed out before, among so many different firms, nobody would get enough business to make it worth while. And the comment we get back is, "We don't care whether we get any of your business. We just want to get on the RCA approved list."

That brought out this: During the war, and to a certain extent on a continuing basis, we have used literally hundreds of smaller firms--subcontractors, job shops, specialty firms--in doing much of our work. In that work, where finishes are involved, they are required to work to the RCA standards and use RCA approved materials. In practically all cases, having used the RCA approved materials, they usually become sold on them and then continue to use those materials in their various other job work for any and all comers. And it is in that field that these many companies are interested, not in the RCA business.

Our standards do serve other people, and, to a certain extent, others in the smaller category avoid the expense that they would otherwise incur if they had to do their own standardizing.

COLONEL HENRY: Mr. Watson, on behalf of the Commandant, the faculty, and the student body of the College, we thank you for a most interesting lecture and discussion.

MR. WATSON: Thank you very much.

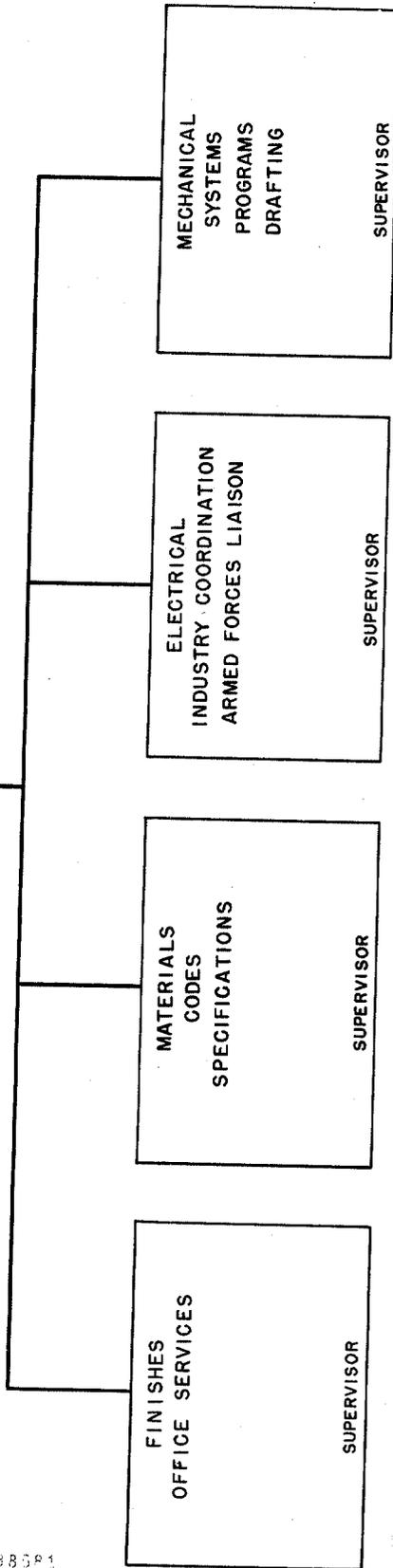
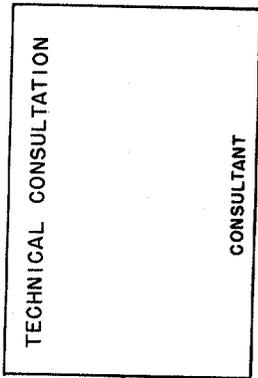
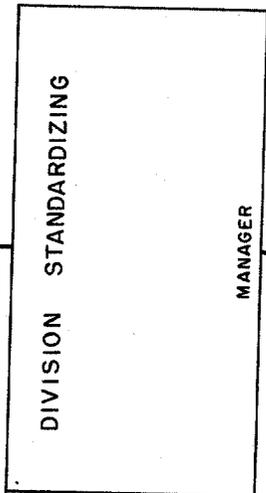
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