

STANDARDIZATION

THE ADMIRALTY PICTURE

BY

A. H. L. TRAPNELL

This paper is the substance of a lecture delivered on several occasions by the Author as part of the courses arranged by the School of Management, Portsmouth.

Introduction

Standardization is an instrument of Government policy for the defence of the realm. It enables demands to be made on supplies which are more likely to be readily available and at lower cost than special-to-purpose items. It facilitates repairs and maintenance and makes repair by replacement a practical policy. It saves time and money at the design stage and it enables store-keeping to be carried out at the lowest cost. Finally, it reduces the number of spares to be carried on shipboard and does much to eliminate the necessity for special purpose tools and techniques.

It is not a policy of restriction ; there must always be sufficient scope within standards to meet functional requirements. That standardization can be effective without being restrictive can be illustrated by reference to music notation. Within a limited range of internationally standardized tone and time pitches, it is possible to construct an infinite number of musical compositions of widely differing character.

Criticism is sometimes levelled that standardization is either static (inhibiting progress) or, conversely, that it follows the straight line law and changes before advantages can accrue. Neither statement is true. Standardization aims to progress in a series of broad steps. It should legislate for the best that is available at any given time and remain so until new development enables an upward step to be taken.

THE ADMIRALTY PICTURE

There are three or more classifications of standardization in the Admiralty, They include :

- (a) Operational
- (b) Logistic
- and (c) Material.

This paper is concerned with material standardization as conducted in the Admiralty by the Superintendent, Admiralty Material Standardization (S.A.M.S.). The word 'material' is used in its broadest sense, to include parts and processes in addition to metal and other substances, and as a distinction from the operational and logistical standards of the Fleet.

There are three broad divisions of Admiralty material standardization. They are as follows :—

- (i) With British Industry —Through the medium of the British Standards Institution (B.S.I).
- (ii) With other British Government Departments —Through the Ministry of Defence.

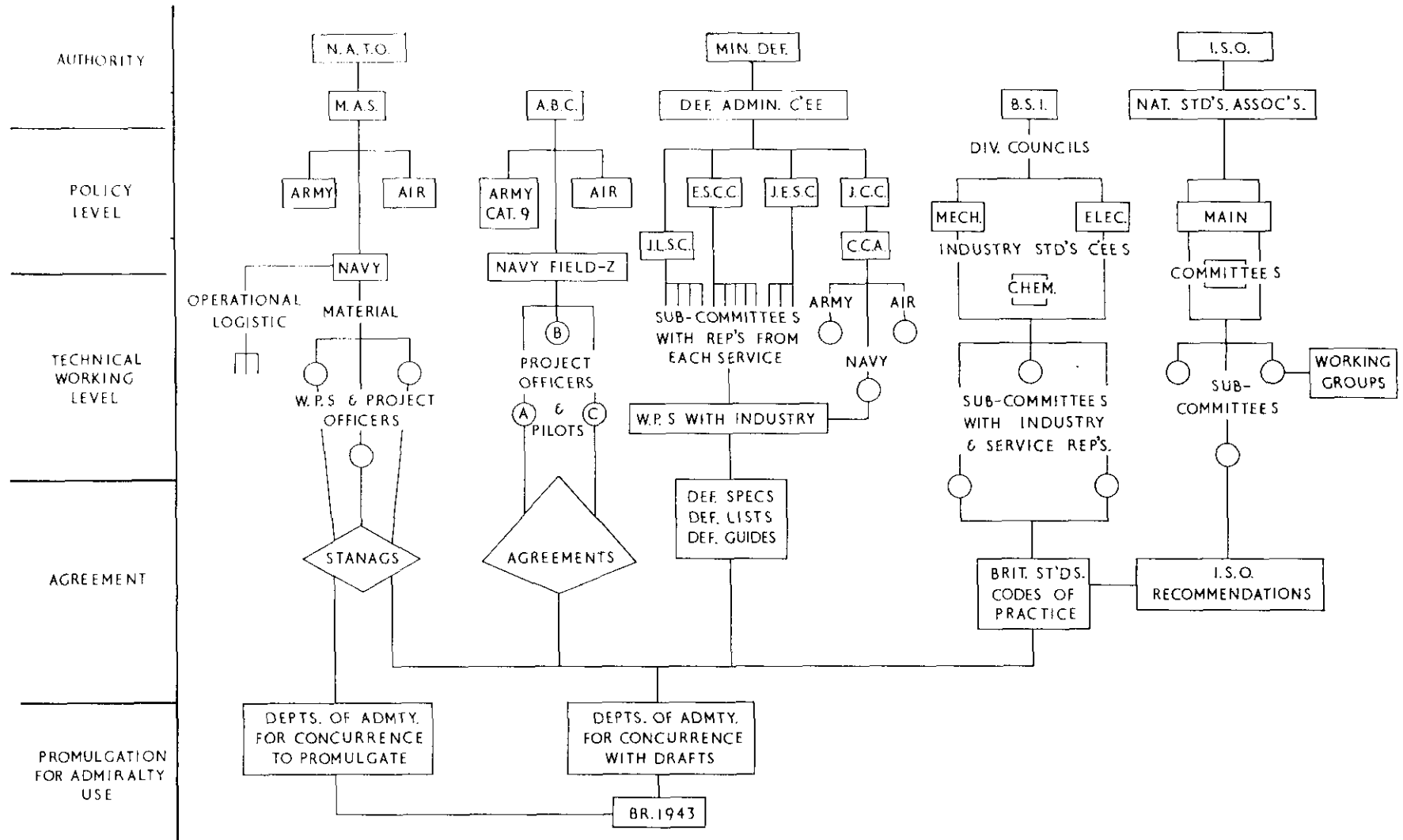


FIG. 1—THE FIELD OF MATERIAL STANDARDIZATION WHICH HAS A BEARING ON THE ADMIRALTY

(iii) *International*

—Through the media of the International Standards Organization (I.S.O.), the International Electrotechnical Commission (I.E.C.), NATO and ABC Field Z. (America, Britain, Canada—Navy).

The Admiralty picture within the field of material standardization with its routes for operation, is shown in FIG. 1.

All material standards adopted for Admiralty purposes are promulgated in one volume—B.R.1943, *Standardization Design Memoranda (Naval)*. The Army and Air Force have equivalent volumes as S.D.M. (L) and S.D.M. (A), but whereas the Army has a companion volume, S.S.M.(L)—*Standard Stores Memoranda (Land)*, the Navy relies upon its *Rate Book of Naval Stores* for its provisioning of spares. It is incumbent on all Admiralty personnel to ensure that the *Rate Book* reflects standard parts and materials wherever possible and that they are annotated as such in accordance with regulations, i.e. 'STD'. These STD parts should be incorporated in new design wherever practicable.

B.R.1943 promulgates all Admiralty material standards of all kinds, in whatever form or from whatever source. It does so in two ways. The first part of the book is an index of titles and reference numbers, and the second part is reserved for original Admiralty standards or Admiralty reservations or qualifications on standards published from other sources.

ORDER OF PREFERENCE OF STANDARDS

The order of preference for standardization in the Admiralty is :

- (a) British Standards
- (b) Joint Service (Defence) Standards
- (c) Admiralty Standards
- (d) Departmental Standards

each taking note of the other and of international work in the field concerned.

British Standards

The object of giving first preference to the use of British Standards is to facilitate meeting Service requirements from British industrial sources. The Services participate in the preparation of all British Standards in which they are interested and it is incumbent upon our representatives to see that Service requirements are incorporated in the British Standards wherever possible. British Standards also take account of international standards and consideration is given to ABC work and to ISO work. Whereas there is a tendency for industrial interests to lean towards ISO, it is official policy for Service interests to lean towards ABC. It should be the objective to obtain the maximum degree of compatibility between ISO and ABC. Service representatives have a considerable responsibility in this and must not let ISO predominate without very careful consideration. While similar remarks apply to IEC, it would seem that there is more American participation in IEC than in ISO, and IEC has effective liaison with ISO in the field which it covers, so that the risk of diversification is less likely on electrical matters.

The field of NATO standardization is operated by the Director of Tactical and Weapons Policy Division. It covers operational, logistic and sometimes material standards. NATO material standards are referred through the channels which normally apply to material standards and are included in the subject of this paper. NATO material standards are published as STANAGS, but it is usual for agreements reached to be incorporated or reflected in the National or Service Standard of the subscribing nations.

Joint Service Standards

Joint Service Standards are those prepared in areas outside the normal requirements of industry. They may relate to essential Military items or they may be prepared when the Services have special requirements over and above those required for normal industrial purposes. Joint Service Standards are published by the Ministry of Defence in the form of Defence Specifications, Defence Lists, or Defence Guides, through the Engineering Standards Co-ordinating Committee (E.S.C.C.), the Joint Equipment Standardization Committee (J.E.S.C.) and the Joint Electronics Standardization Committee (J.L.S.C.) of the Defence Administration Committee.

Service items negotiated through any of the standardization channels are codified by the Central Codification Authority (C.C.A.) of the J.C.C. (Joint Cataloguing Committee) in the NATO system of NATO stock Nos. This codification system is supported by a British Joint Service Glossary of Item Names, the whole comprising a fully co-ordinated system for mutual understanding and availability.

The importance of Joint Services Standardization can be illustrated by reference to the colour identification of pipelines. There was an instance where separate projects were under consideration by Air Ministry and Admiralty and brown was selected as the colour for H.T.P. in one Service and paraffin in the other. As this was observed and suitable steps taken in time, it is not possible to say what would have happened if a brown ship pipe had been connected to a brown aircraft pipe on an aircraft carrier.

In these days of inter-dependence, the importance of joint Service standardization cannot be over emphasized. The Army uses boats, the Navy uses aircraft, and guided weapons, electronics, fuels and atomics are used by all the Services. Joint Service standardization can play an effective part in ensuring that duplication and overlapping of effort, and diversification of parts, processes and materials does not arise without necessity.

Admiralty Standards

Admiralty Standards are compiled where National or Joint Service Standards are either non-existent or inappropriate for naval purposes. They are only undertaken for common user parts, processes or materials, and are published only with the concurrence of all the departments concerned. Any such Admiralty standards should take account of other standardization relative to the subject where it exists.

Departmental Standards

Departmental Standards should be prepared only where none of the foregoing types of standard is available, and this may be expected to be in respect of the specialist items which are the concern of particular departments. In such cases they can be most useful.

ABC Field Z Agreements

ABC—Field Z agreements are applicable to the navies of the three countries. They are negotiated by correspondence and are usually incorporated or reflected in the standards used by the three navies, although they may be promulgated in their own right when appropriate standards are not otherwise available. The Armies and Air Forces of the three countries have equivalent arrangements for making agreements relative to their requirements. An exchange of information between the British Services helps to eliminate diversification at home.

The importance of taking account of international work in standardization can be illustrated by the case of screw thread inserts. The preparation of a British Standard was undertaken at the instigation of the Admiralty to over-

come the differences of two proprietary products which were not interchangeable. After considerable progress had been made, it was found that comparable work was proceeding in an ABC air committee. Efforts were conjoined and agreement has been reached between the A, B and C Air Services and the British Standard. This is being expanded to cover A, B and C naval Services and no doubt will extend to Army use.

STANDARDIZATION COMMITTEE PROCEDURE

It is the recognized procedure for standardization committees to be formed from all interested parties. The Admiralty is invited to nominate its representatives to serve on the B.S.I. and Joint Service Committees, and representatives are appointed whenever the subject matter is of sufficient concern. It is of importance to realize that representatives so appointed represent the Service as a whole and not only the department in which they serve. Admiralty representatives are expected to acquire their briefs from departments, to which they may add from their expert knowledge, and to report back from time to time as may be necessary to give or obtain information. They should correspond as may be necessary in the course of their committee duty, not 'for department XYZ', but as 'Admiralty representative on committee PQR, department XYZ' where 'department XYZ' is the address of the Admiralty representative. Obviously committees cannot work from rigidly prepared standpoints of members, and negotiation must proceed. When a committee is agreed upon the recommendations it wishes to make, the committee secretary should prepare a draft standard, specification, list or guide and this should be referred for committee agreement. When so agreed, it is usual to seek wider confirmation by the issue of a draft 'for comment'. It is at this stage that full departmental consideration is requested and from this an Admiralty comment is prepared. Departmental comment is not referred as such, it being a requirement that any departmental differences of opinion be overcome. It is a most desirable feature of Admiralty work with B.S.I. and Joint Service Committees that this Service speaks with one voice. The committee concerned reviews the comment received and amends its draft as may be appropriate. British Standards then go for publication but Joint Service Standards are again referred 'for endorsement'. Endorsement constitutes an undertaking to use the document and adhere to its provisions in all subsequent work.

It is of course possible to 'endorse with reservations'; although this is sometimes done, it is much better to seek to eliminate the cause of the reservations.

No standards, specifications, lists or guides are promulgated for Admiralty purposes without the prior concurrence of all departments concerned. The entire contents of B.R.1943 have been agreed by the Departments of Admiralty, and should therefore be invoked at all stages of design, inspection and manufacture. The standards and specifications should also be invoked for stores requisitioning and purchase action, except for those replacement purposes where it is essential for previous patterns to be supplied. It is for the record, and without comment, that the standards of Soviet Russia conclude with a paragraph reading—'This standard is enforceable by all the power of the Law'.

ABC Field Z and NATO agreements are not conducted through committees but by correspondence between Project Officers. The Project Officer of one country is made the Project Pilot and it is his duty to progress the work to its conclusion.

ISO recommendations are established by committees of the participating nations and although published as Recommendations, they are for incorporation into National Standards. In Britain, ISO recommendations are reflected in British Standards.

ADSPECS AS THE MOST EFFECTIVE MEDIUM FOR ADMIRALTY STANDARDIZATION

British Standards, and to a lesser extent Defence Publications, may not be entirely suitable as self-contained documents for the several purposes for which standards are required by the Admiralty. For most purposes it is desirable to have specifications in which the precise requirements are set out in as much detail as necessary. Adspecs have been authorized for this purpose. They constitute an important series in which the agreed requirements of departments can be stipulated, or in which reference can be made to 'specials' which depart in one or more particulars from the standard. Adspecs may be entirely self-contained full technical documentation, or may refer to other published work together with reservations or qualifications required for Admiralty purposes. Supplementary clauses may refer to special tests, packaging and the like. It is a feature of the series that each Adspec is complete with an appendix listing by name and reference number those Admiralty items which are in conformity with the provisions of the Adspec. Thus the Adspec is a complete document for purposes of design reference, inspection, manufacture and stores reference, and for purchasing when used as one of the contract documents. This series is designed to replace the obsolete technical content of Contract Schedules, many of which are technically inadequate and often quite wrong. Considerable effort is entailed in completing the series and progress is slow. It is hoped that every effort will be made to prepare this form of publication for all common user parts, processes and materials whenever opportunity occurs or an apparent need has to be met.

STANDARDS AND STOREKEEPING

Standardization not only assists in keeping first costs and maintenance to a minimum, it can also play a significant part in the cost of storekeeping. Work study has shown that the average annual cost of storekeeping is 20 per cent of the capital cost of items stored. Being translated, this means that the cost of an article has doubled when it has been kept in store for five years, or if five varieties have been stored for one year where one would have sufficed, again the cost has doubled. A system has been evolved whereby proposals to add to naval stores are routed through S.A.M.S. on Forms D.117 or P. for P.s (Proposals for Purchase) for his concurrence that the proposals conform to the policy of standardization. Nevertheless, there is a large backlog of diversification in the *Rate Book* and work is proceeding in an endeavour to effect standardization and rationalization of these items. This work entails considerable research into the uses to which the items have been put, and is proving to be very time-consuming and expensive. Every effort must be made to ensure that no unnecessary extension is made to store holdings.

STANDARDIZATION REFERENCE LIBRARY

S.A.M.S. maintains a reference library of all British Standards, all Defence Publications, most American and Canadian Service Specifications for common user parts, processes and materials, and many British and American industrial specifications in the same field. This library, intended for reference, is also operated as a loan service. Any standard or specification may be borrowed on short period loan by telephoning Bath 6977, extension 6143, for same day despatch, if in stock.

ADMIRALTY INTERNAL ARRANGEMENTS

S.A.M.S. receives standards and specifications from internal and external sources and undertakes co-ordination with all departments concerned, through

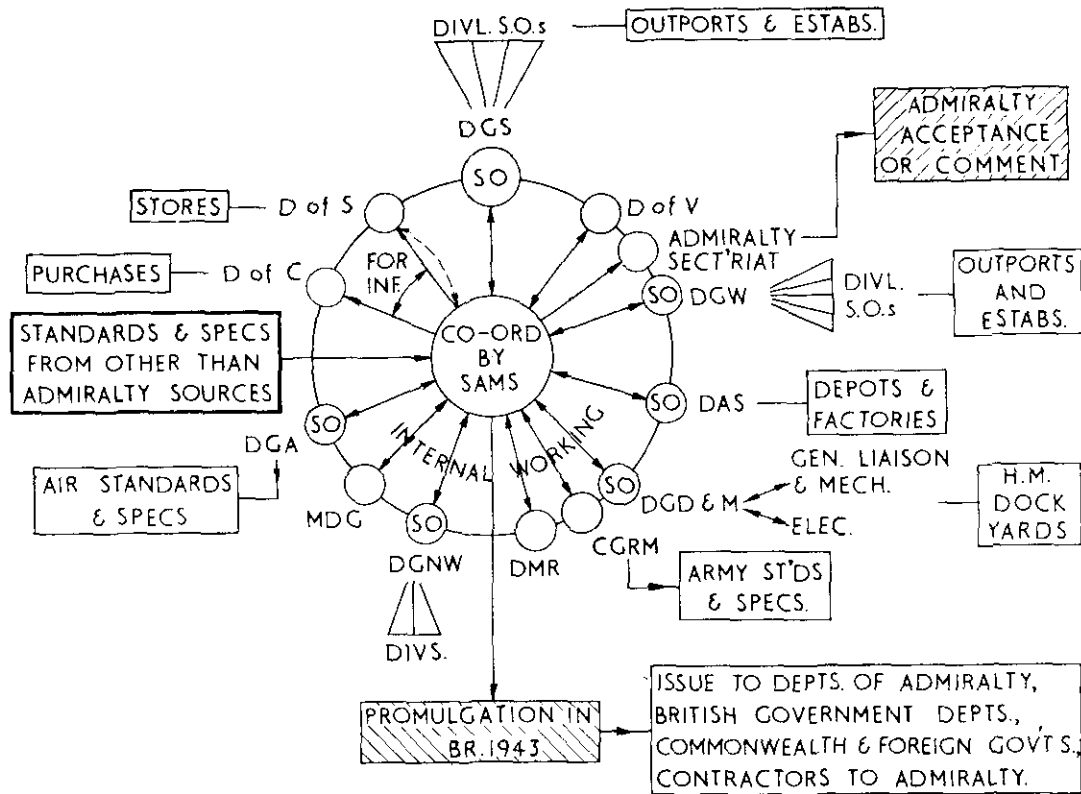


FIG. 2—ADMIRALTY ORGANIZATION FOR STANDARDIZATION

the medium of departmental standardization officers where these have been appointed. In other cases, correspondence is with departments as such. A 'two-way traffic' is set up and meetings convened as necessary until agreement is reached, or until it becomes clear that the project cannot be pursued to a successful conclusion. When other Admiralty authorities are concerned, S.A.M.S. supplies the co-ordinated technical substance of a suitable reply to the Secretariat for the official outletter. S.A.M.S. approves agreements on behalf of the Board, and has them promulgated in B.R.1943.

Correspondence with departmental standardization officers is passed by them to divisions, establishments and outstations as may be necessary. Replies from standardization officers reflect combined departmental, divisional and establishment views so that agreed standards and specifications are as fully representative as they can be.

It is noteworthy that D.G.A. and C.G.R.M. maintain effective liaison with the Ministry of Aviation and War Office respectively, thereby ensuring that standards and specifications in their particular fields are co-ordinated with the other Service requirements.

S.A.M.S. informs D. of S. and D. of C. of agreed standards and specifications to enable them to be quoted in subsequent requisitions and purchases.

A diagrammatic representation of internal procedure is shown in FIG. 2.

STANDARDIZATION FOR TODAY

All will agree that standardization in principle is a good thing. Some may doubt its value to their own particular work, but most will agree that it is desirable even if not applicable to them. The examples given below are selected to lay emphasis on the present-day needs.

B.S.308—Drawing Practice

A very great deal of lip service is paid to this standard. Its principles of geometric tolerancing are not widely understood and less widely practised. How many know the implied concentricity of a stepped shaft with only toleranced dimensions on the diameters ; or how to dimension a cone so that it may vary in size with more strict control on permissible rate of taper? The recommendations of this standard need to be applied to more drawings prepared by and for the Admiralty, if those drawings are to be capable of precise interpretation.

DEF.33—Drawing Procedure

This specification has been quite widely used in and for the Admiralty, but the entire success or failure of the revision which is now almost ready for issue will depend upon its adoption without supplements, guides, interpretations or changes of any sort. Industry has made it clear that they will use the specification for all military purposes provided departments will not request local variations. There have been many such variations from the original specification, perhaps because of its deficiencies, but there is little excuse for a contract issued on behalf of a department in late 1961 for drawings to be prepared to an 'Admiralty guide' declared obsolete in 1956.

Pressure Gauges

Admiralty acceptance of standards for pressure gauges began in about 1946. About 1950 it was decreed that a range of direct-mounted gauges would be adopted as standard, and comprehensive ranges of sizes and pressure scales were added to the *Rate Book*. At a later date, opinion changed and a range of edgewise gauges was added to the *Rate Book*. The direct-mounted gauges were not pruned, as required for replacement purposes. Later still, edgewise gauges lost favour and surface-mounted gauges became the order of the day. These in turn have given way to flush mounted gauges. The *Rate Book* now lists full ranges of sizes and pressures of pressure gauges of most types ever invented by man. A promise has now been made to prune types which can be dispensed with, but it will be a long and costly procedure which should not have become necessary. Again, late in 1961, sizes declared obsolescent in 1946 were requisitioned for current purposes. Adspec 1001-A should be used for all future requirements of pressure gauges.

Ventilators

Insofar as is known, the Admiralty does not subscribe to any standard for ventilators for ship purposes. S.A.M.S. has been informed that upon any breakdown it is impossible to obtain spares or replacements except by special order which takes so long to fulfil.

Ball and Roller Bearings

Admiralty has maintained four separate stores of ball and roller bearings for different purposes, many of the bearings being identical. They have been inadequately described for recognition and identified in different number systems. It has been possible for a ship to go out of commission for want of a bearing, when several have been carried on board as spares for something else. Contractors have now been engaged to sort out this matter, as the size of the task is beyond Admiralty undertaking. The cost of this one exercise will be of the order of £15,000, and future annual savings resulting from standardization and single storekeeping of this item will then be of the order of £4,000. These should be figures of convincing value to those who doubt if standardization is really worth while.

Vee Belts

There are 250 types and sizes of Vee belts in naval stores. Are they all necessary? Will more be required? Can rationalization take place? Who will undertake the task? And will new designs employ standard Vee belts if a standard is devised? These are pertinent questions of no small effect on costs.

Limits and Fits

B.S.1916 was adopted for Admiralty purposes in 1953. Since that time a large number of drawings have been seen which demand the application of systematic limits and fits. Up to now, no drawings have yet been seen by S.A.M.S. using B.S.1916 limits. This standard can save large sums of money in the cost of tools and gauges for Admiralty equipment both at manufacturers' works and in inspection. It deserves implementation and it is hoped that the system may yet come to be used for Admiralty purposes.

Limit Gauge Principles and Practice

B.S.919 and B.S.969 for plain limit and screw gauges have been prepared with great care and attention to international standards in order that acceptable products of one country may not be rejected by the gauges of another. Many Admiralty specifications stipulate gauges without reference to these important standards.

Friction Type Nuts

The Admiralty uses a fairly wide range of proprietary brands of friction type nuts. It is doubtful if all the types used are essential for the purposes for which they are specified. If a preferred type or types could be decided upon, store holdings would be considerably reduced. Even if rationalization of types is not entirely practical, rationalization within types is distinctly possible. As an example, it can be quoted that present storeholdings of the insert type nuts are with fibre and nylon inserts, each with two grades of steel nut body, each in two thread forms and each in two pitch series. Each type of insert nut is also held in a variety of plated finishes and unplated. The result is a permutation exceeding the wildest dreams of a football pool enthusiast. An endeavour is about to be made to rationalize on 'Nyloc' in one, or perhaps two steels, with pitches of unified thread and one protective treatment for all new designs. It is hoped that departments will be receptive to this worthy objective. It may be possible to go beyond this and to standardize on an all-metal type friction nut which is now available, but this will be subject to investigation by the specialist departments concerned.

CONCLUSION

Standardization can be 'as dry as dust' or it can be of engrossing interest, according to the type of mind which is brought to bear on the subject. One is left with the very sobering thought that, unless the standards which are agreed are also implemented, the money and effort being expended to achieve standards is being wasted.

It is hoped that this paper will stimulate interest. The subject matter has been spread over such a wide field that it has been impossible to deal with any matters of detail. The staff of the Superintendent, Admiralty Material Standardization, of which the Author is a member, will be very pleased, on receipt of a request, to go into full detail on any matters of standardization.