CORRESPONDENCE

SIR,

Standardization

I refer to your January issue, which I have just read, and the article ' The Future of the Spare Parts Distribution Centres ' by Commander M. J. Hodgson, as I am naturally interested in the comment contained in the concluding paragraphs. Standardization is no exception to the fact that. like most things in this world, the amount we get out of it is a measure of the effort we put in ; at some time lip service must cease and action commence.

Some of us are now discovering that identical parts are in stores with differing identification numbers, which is an excellent way of wasting the effort put into standardization and for making fleet maintenance more difficult ; it is also a contributory cause for causing S.P.D.C. to be ' almost bursting at the seams with spares '.

The reason for lack of common identification must be due to the several manufacturers of standardized machinery being allowed to apply their own private part numbers to the components, and therefore, to the spare parts.

If full advantage is to be taken of standardization, it is essential that the contract should stipulate that spare parts, no matter by whom they are made, should bear common identifying numbers, and the responsible authority should see that this is done, for until this problem is tackled at the source the difficulty will be always with us. It is better to spend the effort on co-ordination during the design and production stages, than on clearing up the mess afterwards.

It is normal practice for spares and their quantities to be determined during the concluding period in the design stage, and it is then that Admiralty Pattern Numbers or the equivalent should be allocated. And if the drawings are prepared in accordance with Specification DEF33, control of the Contractors in this respect will be easier.

(*Sgd.*) F. C. FUKE,

Superintendent, Admiralty Material Standardization.

Reply by D.M.E.

Since the material was collected for writing the article in question the space problem at Eaglescliffe has virtually disappeared owing to disposal of obsolete stocks, much improved storage arrangements introduced by naval stores staff and recognition of identical items previously held under differing part numbers.

Nevertheless, S.A.M.S. remarks are most pertinent and every effort is already being made, with the limited staff available, to ensure that the identity of all parts are recognized and numbers allocated at an early stage before the ' hardware ' leaves the manufacturer.

So far as standardized machinery made by several manufacturers (e.g. A.S.R.1 engines) is concerned, it is already the practice for all manufacturers to use a common part description and numbering system.

Unfortunately, from the spare gear aspect, the majority of engineering equipments are not standard. Most equipments are made to a specification which leaves the individual designer free to incorporate his own design features within the limits of the various specifications dealing with performance, weight, materials, etc. Thus, except for standard parts identified by a widely recognized code such as that issued by B.S.I. for certain ranges of ball bearings, the

manufacturer and designer can only allocate his own ' domestic ' part numbers.

Many types of engineering equipment are only produced in very limited numbers before the design is ' improved ' and redrawn. Some difficulty has arisen in ensuring that identical parts repeated in a later design retain the same maker's part number, but firms are endeavouring to meet this requirement which is a relatively new one as, before the S.P.D.C. organization started to get into its stride some ten years ago, spare parts used to be ordered off the equipment drawings and made one or two at a time as required by the ship, bulk stocks ashore being non-existent.

DEF33, it is hoped, will assist the solution of the problem but is not necessarily the complete answer because it is the Drawing No. or Part No. allocated which is so important, also the majority of common user standard parts are usually ' not drawn ' items.

It must be mentioned that the laudable efforts of ' standardizers ' does not always assist the storing organizations. The standardization on unified threads has resulted in a further range of threaded items, not only fasteners but parts with a tapped hole or threaded portion, having to be stocked in addition to the existing range for many decades until all existing equipment goes out of service.

Occasionally it is asked why S.P.D.C. cannot use ' good ' manufacturers' part numbers instead of Admiralty catalogue numbers. With the introduction of a punched card accounting system, now approved for Eaglescliffe, all part numbers must conform to a fixed style with differing items having different numbers and items which the cataloguing team recognize as being identical having common numbers. Part numbers allocated by manufacturers clearly cannot conform to this requirement.

SIR,

Automatic Control and the Mechanical Engineer

I have the permission of the Institution of Mechanical Engineers and of the Authors, Professor R. E. D. Bishop, M.A., PH.D., D.SC.(ENG.), A.M.I.MECH.E., of University College, London, and Dr. G. D. S. MacLellan, M.A., PH.D., A.M.I.MECH.E., of Pembroke College, Cambridge, to quote a portion of a report made by them in connection with the recent formation of the British Conference on Automation and Computation, and published in the Institution's Journal, *The Chartered Mechanical Engineer*, of April, 1958.

I quote it in the belief that it will be stimulating to many of your readers. The Authors say :—

> ' In recent months it has become increasingly clear to the writers that there is considerable support for the view that mechanical engineers in this country have not paid sufficient attention to automatic control and its engineering implications. . . .
>
> . . . . . .
>
> 'There appears to be a widespread belief that the theory and design of automatic control systems are best regarded as a branch of electrical engineering. This has doubtless come about because :
>
> (i) Electrical circuits, valves and machines are convenient and efficient components of many control systems, and
>
> (ii) The mathematics of circuit theory and feedback amplifiers is readily adapted to control theory.

' However, the basic principles underlying the operation of automatic control systems are not necessarily electrical, nor indeed mechanical, but involve wider and more fundamental concepts than can be satisfactorily defined within the limits of any one existing branch of engineering.

' Automatic control implies, in very general terms, the achievement of some desired behaviour in an isolated physical system ; it involves :

(i) Measurement
(ii) The transmission of information, and
(iii) The controlled transfer of power.

Its successful accomplishment in diverse types of system, ranging from guided missiles and nuclear power plants to oil refineries and rolling mills, has been found to require knowledge of a variety of mathematical techniques, of physical and chemical phenomena, and of the dynamics and thermodynamics of closed systems—in the widest sense of these terms.

' The early development of the concepts required in the analysis and synthesis of closed-loop systems obviously owes much to electrical engineers. But the writers believe that it is no exaggeration to state that further development in the effective design and application of automatic control systems is slow because mechanical engineers, with their necessarily broader outlook and greater awareness of dynamical and thermodynamical principles, have taken insufficient interest in the subject. As steps to remedy this situation the writers would urge that :

(i) Every College and University department concerned with the training of mechanical engineers should develop the teaching of the fundamental principles of automatic control, and
(ii) Greater efforts should be made to have published in journals seen by mechanical engineers developments in control theory and achievements in the practical design of automatic control systems.

In addition, they hope that this communication will stimulate further thought and discussion concerning the promotion of activities within the Institution in this wide and important field.'

Incidentally, in giving me his permission, Professor Bishop referred to himself as ' a product of Keyham (although I played with amateur status, having been in the R.N.V.R.).'

(*Sgd.*) J. SIDGWICK,
Commander, R.N.

SIR,

Aeration of Lubrication Oil

Lieutenant-Commander W. H. Bawden, in his letter headed ' Main Circulating Systems ', published in Vol. 11, No. 2, described a problem in oil aeration and the method of its solution.

Without detailed knowledge of the test rig described it is difficult to be certain, but I would venture to question the validity of his explanation for the re-appearance of air after the header tank had been suddenly pressurized to 10 lb/sq in. In this it was assumed that the oil absorbed sufficient air to become saturated in a period of some fifteen minutes. Research on the solubility of air in oil has shown that solution is extremely slow unless fresh oil surfaces are constantly being exposed to air by violent agitation.

It has also revealed a curious fact about the behaviour of oil flowing in a circuit which may not be generally known. This is that the oil may be saturated, unsaturated or supersaturated with air dependent upon the rates of change of pressure and the amount of agitation to which it has been subjected.

Thus, if the test rig constituted a closed circuit in which the oil was throttled after discharge from the pump, air would reappear, even in the absence of any absorption process, due to the rapid reduction in pressure across the throttling device. Under steady conditions, the volume of free air present in the pump suction would gradually increase to an equilibrium value during a time interval corresponding to complete circulation of the charge through the throttle.

The effect of entrained air upon pump performance was the subject of a number of tests upon a complete main lubrication system at Pametrada. Results from these pointed to the density of the air/oil mixture entering the pump as the dominant factor affecting performance. For a mixture containing a constant mass of free air the density can be varied by variation of the static pressure, which causes expansion or compression of the bubbles. Performance improves as the density increases and this can be effected either by pressurizing the tank or reducing suction line losses, as was demonstrated by the type test results.

Conditions in present day designs of main lubricating systems are such that oil is constantly being mixed with air, this process being counteracted by separation in the drain line and tank.

It is my belief that due to the presence of sub-atmospheric pressure zones in journal and thrust bearing clearances, the rate of air entry is largely dependent upon the number of bearings served by the system and the rotational speeds of the primary shafts. If this is correct, then the present trend in main engine design which involves complex gear sets and high rotational speeds must introduce higher aerating tendencies which cannot be dealt with if the demands for reduced weight and space are reflected in the designs of main drain tanks and pumps.

The subject is, therefore, of immediate interest and the problems of reducing air entry and enhancing air rejection are ones which may well tax the ingenuity and skill of the designer and the development engineer in the foreseeable future.

(*Sgd.*) A. J. R. SMITH,
Lieutenant-Commander, R.N.

SIR,

Spare Gear is Valuable

An unusual accident occurred recently in H.M.S. *Birmingham* while proceeding on a special courtesy visit abroad. During this visit, pomp and circumstance were to be of prime importance, the more so since the affair was to be of an international flavour, and even the smallest details had to be perfect.

The accident in question was the crushing of the Royal Marine Bandmaster's mace, previous shoreside strengthening and work being of no avail. No spare was available since the ship had sailed.

All, however, was well. One in number ball float (4¾ in. copper) to fit a 3 in. Drysdale Centrex Patent Overflow Tank Pump was drawn from spare gear and work commenced. The original Malacca stave and silver bellneck were salvaged and the ball float was fixed to them by a central securing wire. A Royal Marine helmet badge was soldered to the side of the ball float and the traditional Britannia (now grasping a replacement trident to make good a previous disaster) was mounted on the peak. The whole was then given a

THE BANDMASTER'S MACE AFTER REPAIR

liberal treatment of Nu-silver and suitably buffed up.

After a successful and stirring week of march pasts and Beat Retreats the Bandmaster reported full satisfaction with the work carried out. In fact, he added that he had no intention of altering the mace in any way on return to the U.K., and that the balance of the present article is superior to the ' old model '.

(*Sgd.*) A. C. BLOFIELD,
Sub-Lieutenant, R.N.

Note: The visit in question was *Birmingham's* attendance in Canada for the 350th anniversary of the Founding of the City of Quebec.

SIR,

Shrubs for Manadon

In the October, 1957, issue of the *Journal of Naval Engineering* I appealed for contributions to the Manadon Grounds Improvement Fund. The response has been excellent and over £400 has been received, and last winter we were able to plant :—

500	Quickthorn	Perimeter Screen
650	Myrobolan Plum	
250	Beech	
100	Spanish Chestnuts	
48	Large Beech	
100	Cornus Sanquinea	
64	Willows (various)	
100	Specimen trees including conifers	
72	Maples	
12	Standard Apples	
90	Flowering Shrubs	
50	Rhododendrons	
50	Azaleas	
12	Camelias	

I would like to thank all those who contributed so generously to the fund and can assure them that as a result of their gifts the grounds were looking reasonably attractive for the official opening of the Mess by Prince Philip on 29th July.

The Fund will be remaining open for ever !

(*Sgd.*) J. S. W. WALSHAM,
Captain, R.N.

SIR,

Nuclear Propulsion—Courses for Older Officers

We now seem to be getting on well training the young and intelligent about nuclear propulsion. But very soon we shall have to start on the old and stupid, like myself.

The overwhelming advantages of nuclear propulsion for all warships—vast range without tankers and no need for air—are drawing the Navy into a new era. We must as soon as we can have a nuclear powered Navy, not just one show-piece.

All officers must be prepared for this and we must learn to think of nuclear power plants with the familiarity we had for ' Marine E ' at Keyham.

One to two-month courses, to be done between appointments, should be started as soon as possible and should be available to all officers.

An objection that might be raised is that a month is too short. I am convinced that the ordinary officer can get great value out of it. What he needs to know is :—

(i) Enough reactor design to understand the stability and control of marine reactors

(ii) A general view of a marine nuclear power plant

(iii) Construction of the main parts of the plant in sufficient detail to appreciate the task of manufacture

(iv) A general knowledge of the materials required, particularly the metallurgy which seems rather strange and exotic to the simple ' plumber '

(v) Most important—an outline of the economic and production problems involved.

Where do the instructors come from ? We must now put a few more officers through ' the long course ' for this purpose.

We must all join in the vital task of making a nuclear navy an economic reality. And we must hurry. Other nations are in the race and going well.

(*Sgd.*) K. S. J. DUNLOP,
Commander, R.N.

Reply by R.A.N.P.

The whole subject of training naval officers and Admiralty civilians is under consideration by the Board at the present time with a view to forming a central training organization for the Royal Navy.

In the meantime, A.F.O. 2022/58 gives details of a fortnight's course being held at H.M.S. *Collingwood* which is given to all officers of the Fleet.

Training of senior officers is carried out on a requirement basis and, so far, some twenty-six electrical and marine engineering specialist officers of the rank of commander and above have undergone courses of various lengths ranging from one week to six months.

SIR,

Some Thoughts on Engineer's Office Organization

During my experience as Engineer Officer's Writer in the battleship *Anson*, the cruisers *Mauritius*, *Bermuda*, *Kenya*, *Swiftsure* and *Birmingham*, the submarine depot ship *Forth* and Reserve Fleet depot ship *Berry Head*, it has seemed to me that the Engineer's Office is usually run to one particular individual's liking, and rarely, if ever, laid out in a standard manner as any organization should be.

May I be allowed to put forward some of my ideas on the layout of an efficient office for the average ship, so that it might well be made standard throughout the Fleet—surely a requirement in these days of planned maintenance, work study, and a pressing need for economy in a modern Fleet.

I feel that during building, large modernization, or even a refit, some time and thought should be given to the layout of the office and its equipment ; in older ships it could be treated as an Alteration and Addition, a reasonable grade of modern metal office furniture, racks, planned maintenance boxes, cupboards for orders and A.F.O.s, being provided.

During a commission, the lack of such a plan or standard layout, a change of the Engineer Officer and/or the Senior Engineer may well cause the office to be changed round at least twice or perhaps three times, thereby wasting time, money, and a lot of effort which has gone into its organization during the present or past commission.

Correspondence

I would suggest a standard filing index produced by the Engineer-in-Chief's Department in the form of loose-leaf filing, packed away in a four-drawer type

cabinet. Any standard filing system already in existence could be adapted and made applicable to all ships ; one which I have used with success is as follows :—

ENGINEERING CARD FILING INDEX

1.	Main Engines	(i) Turbines
		(ii) Propellers and Shafting
2.	Boilers	(i) General Correspondence
		(ii) Forms S.356, S.355, S.353
3.	Auxiliary Machinery	(i) Pumps. All
		(ii) Fans. All
		(iii) Turbo Generators
		(iv) Diesel Generators
		(v) Evaporators
		and so on
4.	Motor Boats	(i) Perkins
		(ii) Dorman
5.	Laundry Machinery	(i) Ironing Machine
		(ii) Jaxon Press
		(iii) Amazon Drier
6.	Galley Machinery	(i) Potato Peeler
		(ii) Mincing Machine
7.	Air-Conditioning Plants	
8.	Personnel	(i) Officers
		(ii) Ratings
		(iii) Training : Officers
		(iv) Training : Ratings
		(v) Examinations

and so on. (A complete list can be supplied). A similar card index could be given for Diesel ships and aircraft carriers.

When Engineer Officers of ships then write to the Admiralty, Engineer-in-Chief of the Fleet, F.E.O.s, Engineer Officers of other ships or even to Admiral Superintendents of H.M. Dockyards, they can quote the reference number on the card filing index diagram thus :—

The Engineer Officer,
H.M.S. .....
at Chatham
Date .....

Ref. No. E 3/V/58

Evaporators

It would thus ease the paper work of the Administrative Authorities and if any other ship had written about evaporators, the correspondence could be filed away under its filing system in the same manner. It would also make the task easier when replying, and might even shorten the lengthy period of waiting before acknowledgment is made or action is taken ! The Captain's Office could also use these numbers.

Planned Maintenance

Planned maintenance, which is the most recent addition to the Fleet and engineers' offices, should be properly catered for when planning the office, not by having a random number of one, two or four-drawer cabinets, but rather to have a standard cabinet having a fixed number of drawers and fitting into the office. One cabinet, two or four-drawer, may never get fitted at all and might be tucked away in some odd corner.

Drawings and Makers' Handbooks

Drawings and makers' handbooks have never been successfully stowed in any ship (except for one battleship) in which I have served but have usually been stowed away in a cupboard or drawer outside the office. In my opinion, they should be stowed in or adjacent to the office in a suitable locker large enough for a drawing to be laid out on the top and containing drawers marked with the drawing index numbers. Handbooks could be kept in the same locker. In this way, drawings and handbooks would be better looked after and easier to muster.

A.F.O.s and A.F.O. Diagrams

A suitable rack could be installed to hold at least two years' A.F.O.s with a locked compartment for C.A.F.O.s and another compartment for A.F.O. Diagrams.

Once a case has been made for an established, well-planned office, avoiding waste of space and material, I feel that we shall have gone a long way towards improving the efficiency of the organization of the Engineering Department as a whole.

(*Sgd.*) C. S. BEARD,
Chief Engineering Mechanic.

Reply by D.M.E.

It is agreed that a standard filing system is an ideal at which to aim. A Working Party on Office Accommodation, after extensive investigation, decided that the use of standard furniture was wasteful of space and that fitted furniture, though possibly more expensive, would make the best use of the available space.

For new construction ships, the provision of a viewer is under consideration, using films in lieu of drawings. The viewer is of table-top design and the films can be stowed inside. This would reduce the drawings stowage problem but there may still be a need for reduced scale drawings, and there is still a need for easy-to-hand stowage of A.F.O.s, makers' and machinery handbooks, etc.