CORRESPONDENCE

A GENERAL VIEW OF THE OPERATION

SIR,

Machining an 'A' Bracket

I enclose some photographs and a short note describing a small machining operation carried out on the A-bracket of H.M.S. *Flamingo* in dry dock at Colombo, in the hope that it may be of interest to your readers.

May, 1955.

The after face of *Flamingo's* port A-bracket was severely corroded and this allowed a leakage of lubricating oil from the joint between the face and the mechanical oil seal, these frigates being fitted with oil-lubricated whitemetal shaft bearings.

Previous efforts to stop the leaks had not been successful and it was therefore decided to machine the face of the A-bracket to make a good jointing surface. The photographs show clearly the method of attack. The work was carried out by Messrs. Hoares, Ltd., of Colombo, who also kindly supplied the photographs.

A CLOSE-UP OF THE TOOL CARRIER WORKING. DIAMETRICALLY OPPOSITE IS A BALANCE WEIGHT

The tool carrier was split so that it could be assembled round the shaft and used at either end of the A-bracket. It was mounted on a collar with double thrust shoulders secured to the shaft and the bearing surfaces were grease-lubricated.

The 3 h.p. compound-wound D.C. motor ran at 1,100 r.p.m. off the dock 110 volt supply and drove the tool carrier through a David Brown Radicon 35 to 1 reduction gear box and a 3-in manila rope drive. The maximum speed of the tool carrier was 23 r.p.m. and the average cutting speed 50 f.p.m.

This method machined the face normal to the shaft line obtaining at that point with the propeller removed. A check showed however that this was little different from the datum line of the original facing, and the oil seal can, of course, accommodate quite large shaft angularities.

The work proceeded without snags and was completed in a few hours.

(*Sgd.*) A. S. C. SANDERSON,
Commander, R.N.

SIR,

H.M.S. 'Warrior'—Turbo Driven F.L. Pumps

The mysterious failures of discharge pressure of the forward turbo-driven F.L. pump in H.M.S. *Warrior*, reported in 'Notes from Sea' in the July *Journal*, might conceivably have been caused by the formation of vortices at the pump suction.

As far as I remember, this occurred in some of the *King George V* Class battleships, and was cured by fitting baffles in the drain tanks. In the *Duke of York* there was never any suspicion of trouble until the engines were at or near full power, when the engineer officer in the power control room would suffer the rather alarming experience of seeing the F.L. discharge pressure gauge of one unit (usually 'B') fall suddenly to about zero and then rise again as the motor driven pump cut in. Mercifully it always did cut in, and no damage was ever done.

(*Sgd.*) C. P. G. WALKER,
Captain, R.N.

SIR,

The Royal Naval Reserve

In the last two years, while I have been Liaison Officer in Liverpool, I have met many engineers in the Merchant Navy. Many have been invited to civic functions and have visited warships and I am sure that it would be greatly appreciated if there was a stronger liaison between officers of the Royal and Merchant Navies.

The Royal Naval Reserve is short of certificated engineers, and a greater knowledge of, and contact with, the Royal Navy might well tend to fill the gap. Any who show interest could be directed to the Liaison Officers in Liverpool, London, Southampton and Glasgow.

(*Sgd.*) MARK THORNTON,
Commander.

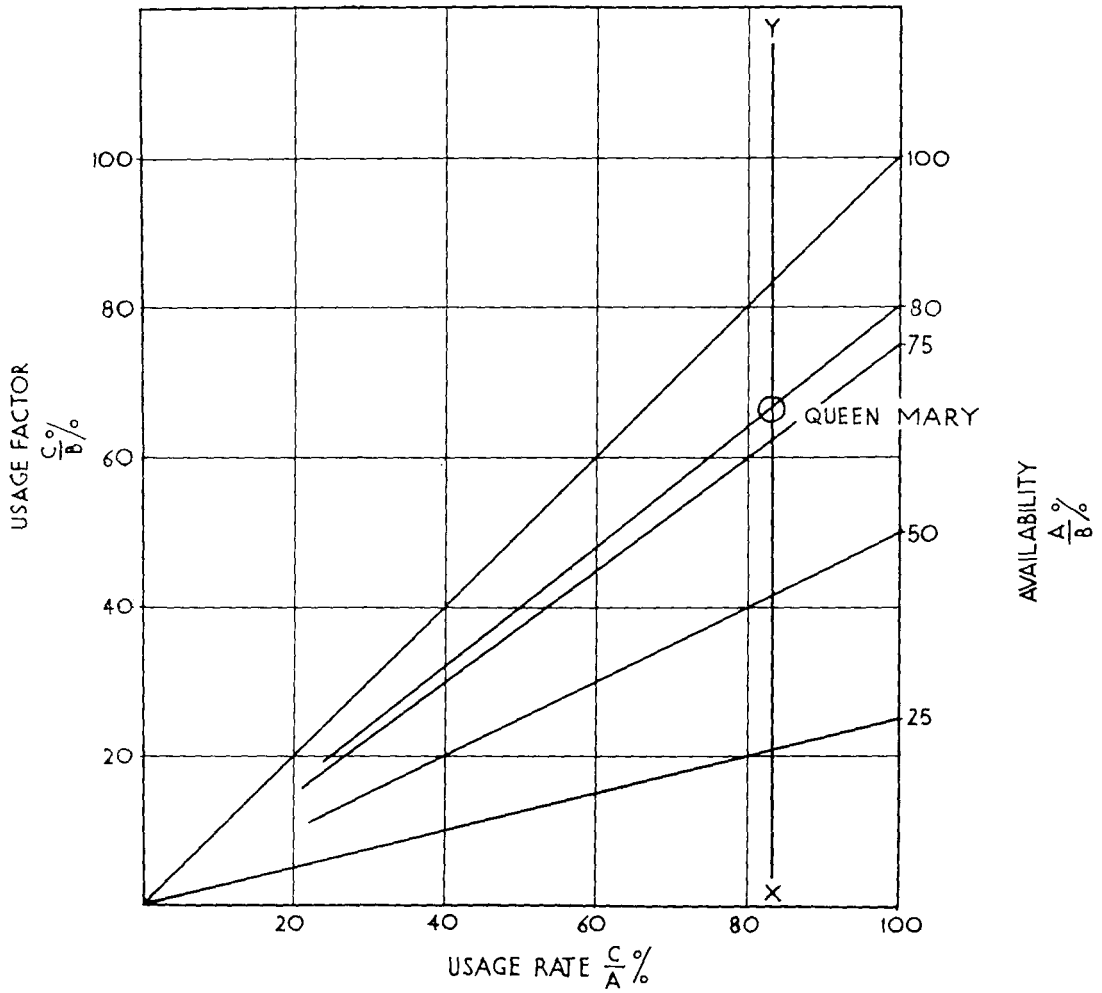
SIR,

Ship Upkeep

With reference to Captain Hoare's article 'Reflections on Ship Upkeep' published in Volume 8 No. 2 of the *Journal* and in particular to the section devoted to The Usage-Upkeep Pattern of Ships, surely we, in fact, have as much information as we need to guide operators in the amount of usage they can safely expect from any ship, from the limits clearly defined in the attached graph.

This graph is devised by plotting percentage usage factors against percentage usage rates showing curves percentage availabilities, the definition of these terms, as used in this instance, being shown on the graph. If we now plot the figures for the *Queen Mary* given in Captain Hoare's article, we find that a usage rate of 82·5 per cent is not exceeded. If this limit, or perhaps a limit of 75 per cent for warships, as designed at present, is accepted, then ships must operate at a usage factor, depending on availability which gives a usage rate that falls on the left hand side of a limit line X Y.

This graph can be used to determine usage factor limits in either long or short term planning. In the case of a short term plan, say a ship will be at 100 per cent availability for one month, from this graph we can see that the usage factor for that month should not exceed 82·5 per cent, i.e. about 24 days, which gives the 6 days stand off a month arrived at empirically during the Korean war operation.



$$\text{AVAILABILITY} = \frac{\text{Days out of Dockyard Hands (A)}}{\text{Total Days in Planning Period (B)}} \text{ per cent}$$

$$\text{USABLE FACTOR} = \frac{\text{Days with Steam on Main Engines (C)}}{\text{Total Days in Planning Period (B)}} \text{ per cent}$$

$$\text{USAGE RATE} = \frac{\text{Days with Steam on Main Engines (C)}}{\text{Days out of Dockyard Hands (A)}} \text{ per cent}$$

I suggest that, if the cases where ships have failed to keep up to their operational requirements were examined on this graph, it would be found that a reason for failure was that their usage rate over a given period had been above 80 per cent, or, in other words, the usage factor had been too high for the given availability.

(*Sgd.*) M. J. GOULD,
Commander, R.N.

DEPARTMENTAL COMMENT

Commander Gould has used definitions for availability and usage other than those used by Captain Hoare. This very interesting graph is based on his definitions and cannot therefore be properly related to Captain Hoare's remarks. A decision on what definitions should be adopted for general Naval use is clearly needed and is being sought.

Definitions apart, the reasons why a cruiser may run better with six days stand off once per month, instead of twice the stand off once per two months remain obscure and are unlikely to be revealed by a simple graph. Many E.O.s could hazard guesses, some correctly, but the need remains for a complete and detailed analysis of maintenance and repair for each class of ship, if we are to be sure of achieving the best usage and availability, however defined. The arbitrary assumption for H.M. ships of a usage rate of 75 per cent as suggested by Commander Gould, or indeed any other figure, hardly seems justifiable at present.

SIR,

The Battle of the Boilers

The extremely interesting article on the introduction of the Belville Boiler into the British Navy, after its successful use in French ships for several years, does not mention what modifications were made, if any, to the French designs, and, in particular, where the drawings, which must have been made by the British manufacturers, were made.

Perhaps no records or recollections survive, but it would be interesting to know.

(*Sgd.*) HUGH CLAUSEN.

Author's Reply :—

SIR,

I much regret that I have no records or recollections of any alterations to the original French design of the Belville boiler. I came home early in 1901 after three years of 100 lb per sq in pressure, horizontal engines and masts and yards, and asked for a Belville ship. I was plunged into a ' Belleville ' atmosphere. Orders had already been placed with the shipbuilders and, if there were any modifications, they would already have been included in the drawings. Beyond Gaudin's fight for the proper Belville packing, and the later adoption of the Weir feed pump, I do not recall any allusion to departure from French practice.

(*Sgd.*) W. SCOTT HILL,
Rear Admiral.

SIR,

Fundamentals

Lt. Cdr. Bower's concept of ' two different types of force ' which he introduces into his ' Review of Fundamentals ' (Vol. 8 No. 4 p. 467) is one which, I fear, is likely to confuse most engineers, and I think he does rather a disservice to his laudable campaign for a better understanding of fundamentals by introducing it.

He knows as well as I do that the deeper one delves into the fundamentals of Newtonian mechanics, the more unsubstantial these fundamentals become, but providing Newton's concepts of the existence of a force of gravity and the existence of matter in Euclidean space and independent time are acceptable,* then the concept of ' two different types of force ' is unnecessary to the understanding and application of Newtonian mechanics.

A marine engineer need go no further than Newton's second law :—

$$\text{Force} \propto \text{mass} \times \text{acceleration},$$

to appreciate the fundamental difference between force and mass.

From this derives, as a special case of the general law, the definition of a unit force :—

$$1 \text{ Lb.wt.} = 1 \text{ lb. mass} \times 32{\cdot}1725 \text{ ft./sec.}^2$$

or

$$\left(\frac{1 \text{ Lb. wt. sec.}^2}{1 \text{ lb. mass} \times 32{\cdot}1725 \text{ ft}}\right) = 1{\cdot}0$$

This latter is far from misleading providing we do not confuse ' 1 Lb.wt. ', which is a unit of force and ipso facto constant, with ' the weight of a 1 lb. mass', which varies with the strength of the local gravitational field (g), and only equals ' 1 Lb.wt. ' when g = 32·1725 ft/sec.^{2}, as above.

I would suggest that there is another fundamental, without which the engineer will undoubtedly lose his way on the long journey from fundamentals to particular cases (if indeed he can ever start),—the science of logic, whereby he may determine that each step of his journey is permissible and safe, and which will enable him to detect a false argument or an unwarranted deduction.

It is regrettable that this subject is seldom taught formally to engineers, since a proper appreciation and application of logic can make the difference between success and failure in the solution of engineering problems.

* These concepts were not acceptable to Einstein, and their rejection led him to the formulation of his Special Theory of Relativity.

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

H.M.S. ' ROYAL SOVEREIGN '

It has long been the custom for foreign ships, repaired in the Philadelphia Naval Shipyard in the United States, to present a plaque of the ship's crest to the shipyard museum. The *Royal Sovereign* berthed in the shipyard in 1943 for repairs but, under pressure of war, failed to leave her calling card. In 1944 she was transferred to the U.S.S.R. and was renamed *Archangel.* She was returned to the Royal Navy in 1949 and was then scrapped.

The Engineer-in-Chief, Vice Admiral Sir Frank T. Mason, has however repaired this unavoidable breach by forwarding a plaque through the British Joint Services Mission in Washington, which has now been presented by Commander P. D. Tatton-Brown to the Shipyard Commander, Captain Allan L. Dunning of the United States Navy.
