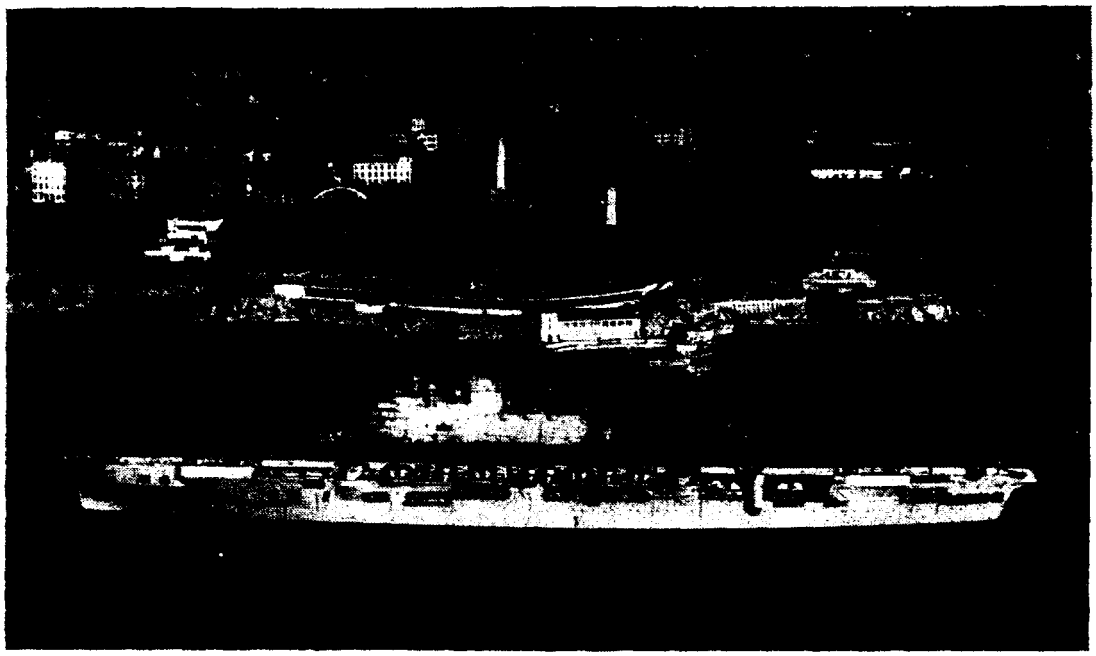

H.M.S. "EAGLE" PASSING PLYMOUTH HOE

# NOTES FROM SEA

The following are extracts from letters received from Engineer Officers of sea-going ships, together with remarks by the Engineer-in-Chief's Department, where appropriate.

**Initial Experience—H.M.S. "Eagle"**

During the first quarter of 1952 the ship steamed 4,380 miles and spent 35 days or part days at sea. The normal routine has been for the ship to go to sea every day from Monday till Friday. The weekend has usually been a busy time for the duty watch of the engine-room department as there were many minor and sometimes a few major defects to be put right before midnight Sunday.

*Main Engines*

These were satisfactory except that the ahead throttles are very sensitive and are also very difficult to keep steam tight, the necessity to use a great deal of force every time they are closed is most disagreeable and is likely to cause rapid wear in the control gear.

The special equipment fitted to reduce vibration on the inner main thrust blocks has been most successful. It is easily operated and so far has been very reliable.

It is noticeable that the electric cirscales which are "dead beat" are more convenient, more reliable. and better in every way than the mechanically-operated Chadburns

*Boilers*

The boilers are difficult to clean externally but the major worry has been brickwork. As the result of extensive rebricking by Devonport Dockyard and frequent patching by the ship's staff there has been an improvement in the reliability of the brickwork but the situation is far from satisfactory.

Readings taken with the Kilner-Gray test set show an average of 0.3% water which would seem to indicate that the fuel cannot be blamed for all the brickwork troubles.

The automatic smoke indicators have proved more successful than was expected. It is a great advantage to know which of the eight boilers is producing black smoke. These indicators show in the controlling engine-room and the boiler room whether the uptake is clear (green), has a slight haze (amber) or contains black smoke (red). This device has the effect of making the chief stokers very smoke conscious, and makes them quick to correct any mistakes that have been made in their boiler room so as to avoid a public reprimand on the machinery intercom.

*Auxiliary Machinery*

The drain coolers have been a frequent source of worry, one of the coolers had to be retubed by the ship's staff. Other coolers have often produced a cloud for long periods. The initial cause of the cloud has usually been the failure of the electrically-driven salt water pump which results in "boiling up" the drain cooler and the stoker mechanic leaving the compartment because it was full of steam.

The Arcton refrigerators for the main cool rooms have been most satisfactory, they are far superior to the old $CO_2$ machines, most of which had very temperamental glands.

*Auxiliary Machinery—Flight Deck*

All four H.P. air compressors manufactured by Messrs. Fullerton Hodgart and Barclay Ltd., were unsatisfactory at first. The oil became heavily contaminated and emulsified after about 10 hours running. This was cured by the makers eventually raising the lub. oil pump suction pipe so that the pump was supplied with good oil, the water was allowed to settle in the sump and was drained off at frequent intervals.

The Worthington Simpson hydraulic pumps became very noisy and frequent failures occurred on the suction and the discharge pipes.

Many modifications to the valve settings were tried but eventually the ship's staff in conjunction with Brown Bros. and Devonport Dockyard fitted a far larger suction strainer and larger suction pipe. The lead of the discharge pipes was also modified but it is considered likely that the major improvement was due to alteration in the suction line, the size being increased from 5 in. to 7 in.

*Flight Deck Machinery*

There were many "teething troubles" with the catapults and the barrier arms. There were also a few troubles with the arrester gear, but in general nearly all these troubles have been cured.

*Training*

It was foreseen that with an Engine Room complement of nearly 400, training would be a major problem. One Lieutenant (E) and a small staff was given this task as a full-time responsibility, the only other duties of the

training officer were routine watchkeeping, messdecks and divisional work. One of the D.C. Bases provided a suitable office and the results have been most satisfactory.

**Comment**

From an observation of the brickwork there is a strong indication that the water content of the F.F.O. is considerably greater than that given by the Kilner-Gray apparatus. It is possible that the high water content is intermittent and at times larger quantities are passed with the fuel in the form of emulsion.

**Jury Steering Gear—H.M.A.S. "Labuan"**

In the summer of 1950, H.M.A.S. "*Labuan*" (previously L.S.T. *3501*) operated by the Royal Australian Navy was detailed to carry out the annual journey into the Sub-Antarctic regions to relieve personnel and replenish the stores of the various meteorological stations. Shortly after leaving Albany, W.A., the vessel encountered heavy seas with waves reaching 40 ft. high. The pounding taken affected the efficiency of the machinery and finally a complete failure of the steam engine working the steering gear occurred.

As the repair of the steam engine was beyond the resources of the ship's staff, working with the limited facilities carried on board, an alternative means of working the steering gear had to be devised. To obtain this a 4.7 H.P. mess deck supply fan motor was fitted up to drive the Hele Shaw hydraulic steering gear pump.

The fan motor was fitted on the mess deck above the tiller flat and a section of plating was removed from the mess deck to enable two laminated "V" belts to be run from the motor to the pump coupling beneath. The pump was parted from the steam engine by the removal of the flexible coupling, and the pump coupling was built up to take the "V" belts by the fabrication of a double "V" pulley which was tack-welded into position.

With the fan motor running at half speed satisfactory pressures were obtained, and this rig proved adequate for operating the steering gear on the return to Australia.

**Comment**

This is an interesting illustration of the Electricity Authority's slogan "Electricity your servant", and reflects credit upon the initiative of those responsible. Details of the defects which developed in the steam steering engine have been asked for, with a view to strengthening the design of such engines.

**B.R.16(50)**—*Engineering Manual for Her Majesty's Fleet*—
**H.M.S. "Illustrious"**

The first series of amendments to the new "*Engineering Manual*" were a disappointment to all. It was understood that loose leaf manuals would be amended by reprinting a whole page and inserting this in place of the original page. This of course is unnecessary where only a word or figure requires alteration, but becomes impossible if several articles from different parts of the manual are included on each page of amendments. If shortage of paper is the reason for issuing amendments in this way it is recommended that each series of amendments, other than single words and figures, should be printed in a continuous loose leaf pamphlet, using both sides of the paper, and including all previous amendments since the publication of

the manual. These amendments could then be filed together at the back of the manual, referred to when consulting the manual and discarded when the next series of amendments is issued. Article numbers should be in heavy type.

**Comment**

The method of amending B.R.16(50) must follow the general Admiralty policy for amending all B.Rs.

However, stocks of B.R.16(50), and other technical books for which the Engineer-in-Chief is responsible, will be ordered in future to meet demands for approximately two years instead of for longer periods. When stocks run low the B.R. will then be reprinted to include all amendments issued to date of reprint. This procedure will overcome the trials of the past when a B.R. was issued together with a whole series of amendments which had to be made good by new recipients.

Thus, the first reprint of B.R.16(50), which will be ready for issue in October 1952, will have Amendments Nos. 1 and 2 included in the text. Holders of older editions will similarly be able to replace them when worn in service by modern editions.

Considerable investigation into book production has now shown that it would be uneconomical to reprint less than a whole Section for issue as an amendment when it becomes heavily corrected by previous amendments.

Justifiable complaints have also been received with regard to having to resort to "gumming in wretched bits of flapping paper". A proposal for modernizing the method of amending B.Rs. has already been forwarded to the responsible Departments, but with the present financial stringency, any advance in this direction must be considered to be in the balance.

**Boilers—H.M.S. "Illustrious"**

During long periods of steady steaming the Patt.25A sprayers fitted with No. 6 caps proved to be much less severe on brickwork than Patt.13 sprayers and this at 85% of full power of the boilers in use. The next best burning conditions were experienced using Patt.13 sprayers with 3 in. extension pieces and radiation shields, as advised by A.F.E.S. Haslar during the recent circulation trials.

**Comment**

Investigations are proceeding at A.F.E.S., Haslar to improve burning conditions on the lines of extending the combustion tubes $3\frac{1}{2}$ in. further into the furnaces.

**Water Washing of Boilers—H.M.S. "Glasgow"**

All boilers have operated satisfactorily with only average routine maintenance, there being no leakage of superheater or generator tubes to report.

Superheaters were due for retubing and the 'A'-'D' rows were cut away for the retubing operation.

In two boilers a few 'F' row tubes at the front end were found to have wasted externally, owing to the fact that any leaks from the many drain cocks etc. on the front of the steam drum saturated the soot collecting around the bottom ends of these tubes.

The few tubes affected were those in the area of the foremost length of the superheater angle iron foot support. This angle iron allows soot to pile up above it, in a place not swept by the soot-blowers.

It is recommended that this 12 in. length of angle iron be removed as it comes into use only for the last foot of superheater withdrawal—a method of superheater retubing or examination now seldom used for the Admiralty type superheaters.

**Comment**

The present method of external cleaning of boilers, which unavoidably leaves large deposits of soot, will we hope soon fall into the background with the introduction of the water washing method, recent trials of which have proved very successful. The removal of the 12 in. length of angle iron referred to is therefore considered unnecessary.

**Furnace Fuel Oil Tank Cleaning—H.M.S. "Glasgow"**

It was long foreseen that all Oil Fuel Tanks would have to be cleaned during the refit and hence it was decided to progress this work on the passage home. The four small wing tanks X7, 8, 2 and 4 were used first in that order and as each was emptied it was flushed through with sea-water. The tank was then filled 95% with sea-water with the addition of Teepol added through the filling funnel in the recommended quantity and this mixture was heated to 100° F. for 48 hours before pumping overboard. It is noteworthy that the pump was able to take the tank down to 1 in. from the bottom and no unpumpable sludge remained. The sullage was removed using the spare evaporator starch pump running on compressed air. By this method all four tanks were completed during the 10 day passage by a party of 1 P.O.S.M. and six hands working daywork, and from this it will be seen that the use of a minute quantity of Teepol, of the order of one gallon, is very amply repaid in labour saved. In this connection however it must be borne in mind that an ocean passage is essential in order to dispose of the large quantity of oily water. The large A and Y groups were treated similarly but trouble was experienced in disposal of the sullage at Chatham Yard owing to the extremely limited sullage lighter facilities. The same remarkable results in ease of pumping were achieved and the method was improved upon by connecting a lead from the donkey boiler to the tank testing connection and steaming all tanks not being worked in. This broke up any heavy oil film adhering to the tank sides and frames to such an extent that they could be wiped almost clean with one stroke of a squeegee. The other two starch pumps were put into use, and, although slow, were effective because they could be left running all day and all night without attention.

This method, or one similar, is highly recommended on account of the saving in man-power and time. None of the old fashioned scraping out and bucketing of sludge is necessary and examination revealed that no damage was done to any pumps used, i.e. portable pumps by sludge and oil or the Archimedean type 80-ton pumps by water.

During a recent visit to Admiralty Fuel Experimental Station, Haslar, mention was made of the above procedure, and the methods employed were strongly endorsed by those concerned.

A commercial tank-cleaning vessel cleaned all F.F.O. tanks not already cleaned by ship's staff and one was much impressed by the speed and efficiency of the method employed.

**Comment**

It is presumed the commercial tank cleaning vessel referred to was of

the *Tulipfield* Class. These are understood to use salt or fresh water only for washing down tanks. Three in No. Admiralty "T.C.V.s" are in service which are similar to the *Tulipfield,* but use Teepol detergent mixture. A fourth vessel is being converted and should be completed within the next eighteen months.

**Diesel Fire Pumps—H.M.S. "Sheffield"**

The new diesel fire pumps supplied in January 1951 have given trouble due to the flimsy scantlings of the water tanks. Both have split and have been repaired but have since failed again. It is intended to make new tanks of stronger material ($\frac{1}{16}$ in. thick copper sheet). The pumps started easily enough in warm weather (above 60° F.) and in the intermediate range from 48° to 60° F. if fitted with a large and determined stoker capable of turning the pumps on full compression for approximately 10 minutes. Below 48° F. however a form of power starting is imperative and it is thought that consideration should be given to fitting some sort of cartridge starter.

**Comment**

Starting difficulties are not usually experienced with these pumps and the troubles described point to either poor mechanical condition or maladjustment.

Providing cylinder compression is reasonable, and injectors and fuel system in general are up to standard, the engine should start easily in all climates.

**300 kW Diesel Generators—H.M.S. "Sheffield"**

Although both engines have run for slightly less than 500 hours since their last top overhaul, it was decided to carry out another top overhaul on one of them before proceeding to the A. & W.I. Station. This has now been done, the general condition of the engine being very satisfactory, apart from the condition of the main bearings which appear to have been remetalled with a rather inferior type of white metal. Four of the bearings were in a very bad state, the whitemetal being in a condition rather like crazy paving due to numerous tiny cracks. Adjacent to the oil grooves the whitemetal had completely broken away. These bearings were renewed.

No excess carbon deposits were found round the exhaust ports or in the exhaust manifold, this being attributed to the new valves fitted in the "oil to sleeves" pipe. The only troubles experienced whilst running are entirely due to vibration, which in turn is due to the rigid resilient mountings. This vibration has resulted in studs on the circulating water system breaking, and exhaust thermometers becoming defective with monotonous regularity, apart from numerous oil leaks all over the engine. Apart from removing the resilient mountings, there seems no method of overcoming this difficulty.

**Comment**

The question of inferior bearing metal is being investigated as a result of other reports. It is thought that the trouble is due to repeatedly using the same metal. If this can be established, necessary instructions will be issued to Yards.

**Sounding Tubes, F.F.O. Tanks—H.M.S. "Sheffield"**

Obtaining accurate dips of F.F.O. tanks containing oil of 3,000 Redwood

viscosity is complicated by small bore sounding tubes reaching to the bottom of the tank.

After the initial dip, the side of the sounding tube is smeared with thick viscous oil, which gives false and sometimes alarming readings on the dip tape.

Moreover should any water separate out in a tank after filling, it is very difficult to determine the interface level, since the interface in the sounding tube often bears little or no relation to that in the tank itself.

On a large number of tanks, a sounding tube reaching to the bottom of the tank seems completely pointless, merely causing unnecessary inconvenience when filling. In addition to the difficulty of obtaining accurate soundings mentioned above, it has been observed that if the oil is very think it will rise faster in the tank than in the tube. Of the results of this phenomenon the least said the better.

The position of the sounding tubes on at least five tanks is such that only a professional contortionist can take more than half a dozen dips without becoming completely muscle-bound.

It is suggested that sounding tubes should not be continued into the tank. It would then be possible to allow oil on the bob of the tape to drain off before pulling it up through the sounding tube. The other difficulties mentioned above would also be eliminated.

**Comment**

This is the only complaint of this nature so far brought to the notice of D.N.C. In the event that others are made, action will be taken to rectify the matter. With regard to the final paragraph above, this suggestion would destroy the purpose of the tube, of ensuring reliable and accurate soundings.

**Harbour Service De-Aerating Plant—H.M.S. "Mauritius"**

It was decided to have a conclusive test to prove whether or not the de-aerator could cope with the supply of feed water to the boiler in the normal auxiliary conditions. The auxiliary machinery in use at the time of the test was:—1 set of evaporators, 1 F.F.O. pump, 2 T/Gs, 2 boiler room fans, 1 harbour service feed pump and such other small auxiliaries as were necessary. The D.A. plant was run at maximum output with the feed pump feeding the boiler at first with suction from the main feed tank and D.A. wide open. The main feed tank suction was then gradually closed but it was found that the water level in the D.A. could only be maintained by keeping the pump suction from main feed tank $1\frac{3}{4}$ turns open. As on this station both sets of evaporators have to be run together for the majority of the time, it would appear that the existing D.A. plant is of little use to the ship at the present time except for pumping up boilers.

**Comment**

These plants in general fall below auxiliary requirements for which they were intended and in new construction ships feed heating de-aeraters are being fitted.

**Boats—H.M.S. "Euryalus"**

The 32 ft. Motor Cutter, powered by Dorman 4.D.S.M. engine, has continued to demonstrate the superior reliability of this type of boat—round

bilge, comparatively slow running engine, and Kitchen Rudder Gear—for the Naval Service.

The 16 ft. Fast Motor Dinghy has, as usual, being petrol driven, proved quite useless during the ship's present service, since insufficient petrol for its operation can be carried on board with safety. A diesel driven dinghy would have solved many problems.

**Comment**

It is the policy to re-engine all 16 ft. Fast Motor Dinghies with diesel machinery eventually, but it will be a considerable time before suitable engines become available.

**Fire-fighting—H.M.S. "Euryalus"**

With reference to A.F.O.2404/51, pale cream is considered to be a most inappropriate colour for Foam Extinguishers, since it blends indistinguishably with most backgrounds. Red has for years been universally recognised as the standard colour for all Fire-Fighting gear, and the reason for changing to a different artificial colour standardization is not at all apparent.

**Comment**

The change in colour from red to cream for foam extinguishers (Patt. 4726) has been decided in agreement with the other Services and Government Departments in order that standardization in the colouring of Portable Fire Extinguishers be achieved. In addition, under normal circumstances this colour makes the foam extinguisher easily distinguishable from the gas/water extinguisher (Patt. 7272) which is coloured red, and this will assist ratings in the rapid selection of the correct extinguisher for a particular incident. In cases where confusion may exist the background could be painted black.

**Automatic Crown Valves—H.M.S. "Belfast"**

Difficulty regarding disposal of the Closed Exhaust when manoeuvring has persisted as previously reported. This is now considered to be due to the internal steam pipes in the condenser, through which the exhaust is distributed, having insufficient area of slits and causing back pressure.

The automatic crown valves have been unsatisfactory in that with the control valve at one fixed setting, the main valves will close at about 5 in vacuum in the exhaust range and will not be full open at 25 lb./sq. in. pressure. As the working parts of the valves are in good order, the design was assumed to be wrong and springs of reduced stiffness were fitted; this resulted in improvement and it is intended to fit springs of even lesser stiffness.

**Comment**

We have no records of other ships of the Class experiencing difficulty in disposing of exhaust, but it is known that these valves tend to be erratic, particularly when manoeuvring. Cockburns are experimenting with a valve at their works, the results of which it is hoped will provide the answer.

**Boats—H.M.S. "Belfast"**

Every failure of a boat engine in which any delay is involved is investigated to finality and a remedy to prevent recurrence, if possible, proposed. There has so far only been one repetition failure which is that of the flexible drive for the dynamo and water pump of the Perkins P.6.M. A number of small failures have resulted in amendments to the maintenance schedule and it is

hoped that after a year or two this will pay a dividend in boat reliability. There have been two major engine failures, an externally cracked cylinder block on a Perkins P.6.M. and a broken exhaust valve on a Dorman 4 D.S.M.

The reliability of Perkins engines is well below the Dorman due to the lower standard of design of the installation items, in particular the circulating water system.

**Comment**

Various modifications, including a fresh water cooling system, are being introduced to improve the reliability of P.6.M. engines.

**Fire and Bilge Pumps—H.M.S. "Belfast"**

Troubles of various sorts have been experienced, usually in connection with the air pumps. In many cases, the joints between the air pump lower sleeve inside the air pump hollow shaft and the casings leak, and although these are not wearing parts they are difficult joints to make watertight. If they do leak, the water runs out of the float chamber.

In two pumps the casings have been found badly eroded in the way of the impeller wearing rings, causing leakage at the back of the rings and allowing the rings to tilt ; causing rapid and abnormal wear on the faces as well.

**Comment**

Erosion of the nature described has occurred in other ships fitted with Drysdale pumps, and subsequent correspondence with the firm has indicated that the thickness of joints should be carefully selected in order to ensure that the sealing rings are tightly clamped between the housings when assembled.

*Belfast's* pumps are believed to have a face to face joint which therefore requires even greater care in fitting the rings, seeing that no provision is made for adjustment by varying the thickness of joint as above.

With regard to water leaking from the float chamber via the air pump sleeve, this again should be rectified by careful fitting, together with the addition of a suitable compound.

It is appreciated that in these pumps, due to their design, it is not easy to obtain a tight joint without fouling the rotating members.

The Fire and Bilge pump is not a suitable pump for day to day use on the bilges of machinery compartments. A pump of this type, if it is to be efficient, must not be used as a normal practice on dirty bilge water, nor in any case is it necessary to have such a large pump for normal bilge use. It is considered that these pumps are suitable for normal discharge to the Firemain and emergency use on the bilges and that small bilge pumps designed for use with bilge water should be supplied, or that water ejectors for use with the Firemain should be fitted for normal clearing of bilges.

**Comment**

These remarks are fully concurred in. The present scheme is to enlarge the fire and bilge pump well in the inner bottom to $\frac{1}{4}$-$\frac{1}{2}$ ton sumps and to instal a small motor driven pump taking suction from each sump. Unfortunately at present, only ships undergoing large repairs on modernization are able to have this work undertaken.