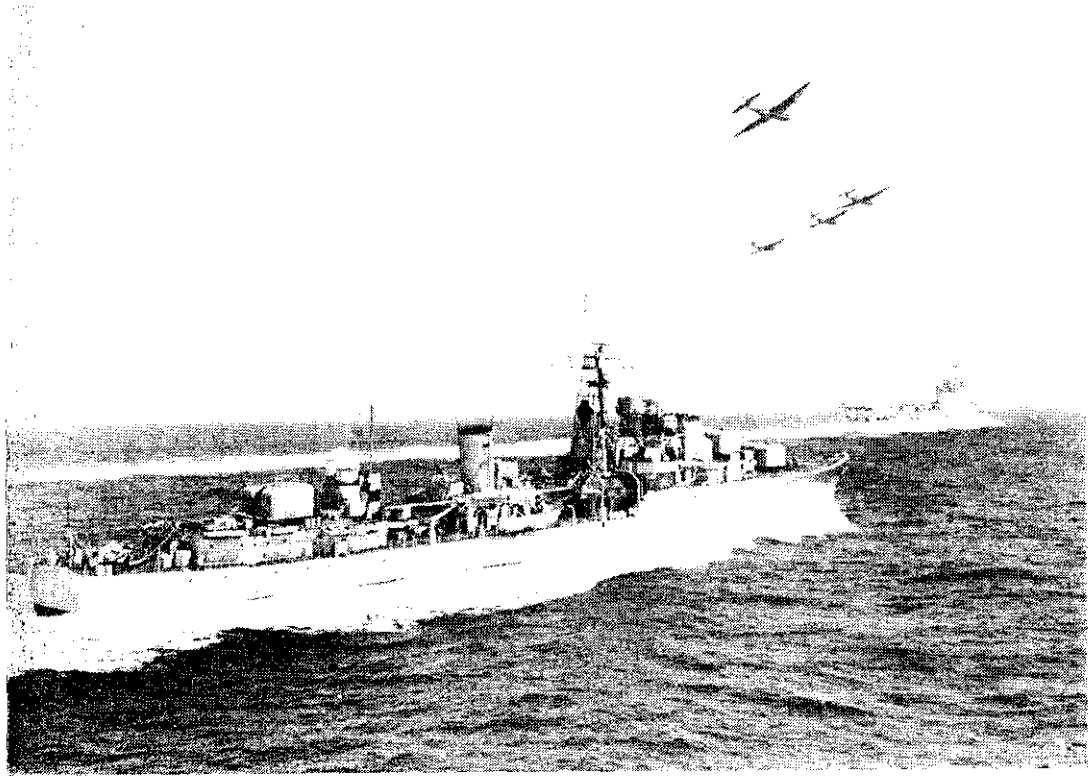

SEARCHING FOR THE LOST COMET AIRLINER OFF STROMBOLI

NOTES FROM SEA

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

The extracts from the letters and the replies sent to individual ships are not always in a form suitable for publication in the *Journal*. In some cases, therefore, the extracts have been slightly altered in form but not in substance, and the comments have been amended and amplified.

Readers are invited to comment in the correspondence columns of the *Journal* on the extracts and replies.

Contamination of Forced Lubrication System—H.M.S. 'Indefatigable'

The salt water contamination in 'X' forced lubrication system had been greatly reduced by the beginning of January. Cleansing followed the procedure tabulated below :—

(*a*) Add distilled water in accordance with B.R.16 (50) Art. 59 (a).

(*b*) Circulate the mixture until a steady salinity reading is obtained. (This took about 24 hours in harbour or about 8 hours when steaming.)

(*c*) Drain the system back to the drain tank ; drain pockets in oil coolers, filters, thrust block, etc. ; remove bulk of water by separation.

(*d*) Circulate the oil and then repeat (*c*) until water content reduced to or below 0·5 per cent.

The peculiar result obtained, repeated some eight out of the total of eleven times that a new charge of water was added, was that during the separation process, the salinity of the water extracted increased slowly at first and then rapidly. Typical salinity readings were :—

Before adding the water	10·0 grains/gallon
After adding the water and circulating until salinity steady	4·0 grains/gallon
At start of separation	4·0 grains/gallon
After 48 hours separation	4·8 grains/gallon
After 96 hours separation	6·8 grains/gallon
After 108 hours separation when water content 0·1 per cent	22·0 grains/gallon

It was not worth while to reduce the water content below about 0·5 per cent, as at this stage separation was extremely slow.

Water flushing was repeated eleven times to reduce the salinity from 29·0 to 4·0 grains/gallon (both readings for 0·5 per cent water content). The separator was then run for 60 hours at sea and 8 hours in harbour to remove the last of the water. At the end of this time the oil had a dirty yellow milky appearance, though the water content was negligible (less than 0·1 per cent). Shortly afterwards the oil suddenly went quite clear while main steaming. Previously the oil in ' A ' system, which had been similarly treated for a lesser contamination, cleared in the same sudden fashion.

Comment

Previous reports on this matter have not mentioned any rise of salinity during centrifuging, and the report is noted with much interest. This effect may be the result of any, or all, of the following :—

(*a*) Before adding distilled water, the oil contains very small drops of emulsified saline water. When distilled water is added, some of the small drops are broken down and diluted by the distilled water. These large drops are removed first by the separator, leaving the smaller more saline drops to be removed last.

(*b*) During centrifuging and running of the main engines evaporation may occur, further concentrating the water droplets.

(*c*) With circulation and centrifuging of the oil progressive reduction of the particle size of the free water takes place. The smaller particles having greater surface area for a given quantity of water, will be more efficient at dissolving salt from the oil.

As the water content of a cloudy oil is reduced, free water is removed until a point is reached when the only water remaining is dissolved in the oil. Oil containing dissolved water is clear, however, so that sudden clarifying of the oil occurs when all free water has been removed.

Salt Water Contamination of Furnace Fuel Oil—H.M.S. ' Indefatigable '

Free water got into some double bottom oil fuel tanks through leakage in the tank tops. Efforts to remove this water using an oily water separator resulted in oil : water emulsions with up to 15 per cent water content.

The oil : water emulsion was stowed in wing oil fuel tanks and, with the valuable assistance of Mr. Taylor from A.F.E.S., was successfully treated. The method used was to spray the surface of the oil with Teepol from a Nuswift fire extinguisher. Teepol was used in the proportion of 0·2 to 0·3 per cent of the estimated total water present. Immediately after adding the Teepol, the tank was quickly heated to approximately 110 degrees F. and then allowed to settle. The time for satisfactory separation varied from 24 hours to 14 days. Different types of oil and different amounts of water were involved. After separation the bottom layers of water and oil were removed by the sullage system. Oil treated in this way had a water content of about 1 to 1·5 per cent average.

Layering is quite common, and the principal difficulty was in obtaining samples of oil to determine the water content at different depths in the tank. A sampling device was made to pass down a filling funnel, but it was only partially successful. There is a definite need for an efficient sampler, small enough to pass through a manhole test plug, with sufficient capacity for a sample for a ' Kilner-Gray ' test.

In testing the oil fuel tanks for leaks, a great deal of additional time and work was involved because the air escape pipes often marry with others from a number of tanks. The air escape pipes invariably run in inaccessible positions so that they could not be disconnected to insert a blank. It was necessary to empty suspect tanks and insert wooden plugs at the bottom of the air escape pipes. The test did not then reveal perforations in the air escape pipes where they passed through the bilge of machinery spaces above the tank.

Comment

The description of the method used to separate water from the emulsions is noted with interest. The variation in the time required for separation was probably due, not only to the different types of oil and different amounts of water, but also to the difficulty in getting the Teepol diffused throughout the emulsions.

An efficient sampling device, having an outside diameter of 5 in is already available, but this, of course, can only be used through a manhole. The design of a sampler to pass through a test plug will be put in hand, but it may be difficult to achieve a satisfactory device of sufficient capacity.

Condenser Corrosion Plates H.M.S. ' Newcastle '

A.F.O.3621/52, which consolidates Admiralty instructions concerning condensers and heat exchangers, omits the instructions contained in A.F.O. 3033/50 paragraph 3 (c) concerning the fitting of protection plates edge on to the water flow at the inlet end and their omission from the outlet end. Confirmation is requested that these instructions are still in force. On the last occasion of examination the outlet end plates were removed, but the stay nuts have not yet been modified to enable the inlet end protectors to be mounted end on to the water flow.

Comment

It is confirmed that instructions contained in A.F.O.3033/50, paragraph 3 (c), are still in force. Where protectors are fitted they should be mounted edge on to the flow.

Strictly speaking, promulgation of replies to queries which concern A.F.Os. or other official instructions are not appropriate to the *Journal*, but this unorthodox method is used, in this instance, to save issuing a separate A.F.O.

Turbometers (Chadburn's)—H.M.S. 'Newcastle'

Neither ship's staff nor naval dockyards have had much success in getting these instruments to work for long, and a request has been made that they should be examined and reconditioned by the manufacturers while the ship is in the United Kingdom. As an emergency measure the electrical revolution indicators have been transferred from H.Q.2 and connected up at the throttle watchkeeping positions. These instruments have been positive, accurate and trouble-free. As they are naval store items, replacements can be obtained through ordinary survey procedure. It should be possible to wire two repeaters from one transmitter, in which case one transmitter would suffice to operate the watchkeeper's and the H.Q.2 repeater for one shaft. A mechanically driven engine direction indicator and revolution counter would still be required, even if clockwork turbometers were abolished.

Comment

It is the present policy to fit mechanical turbometers independent of electrical power supply in the engine rooms. The latest design Chadburn Mark II turbometer, which is being fitted in new construction, is direct reading with few moving parts and consequently should require much less attention than the horometer. Although this design cannot yet be supplied to ships in service, it is anticipated that it will supplant the horometer in due course.

Furnace Fuel Oil at Full Power—H.M.S. 'Gambia'

The problem of inability to reach full power referred to previously was solved by the accidental discovery that an increase of an average of 5 lb/sq in in oil fuel pressures above those shown in A.F.O. Diagram 177/47 should be applied, for each 10° rise in oil temperature above 175° F to achieve the same output through the sprayer. No statement to this effect has been found in writing anywhere, nor has any official intimation been received on board, but it has now been applied twice at full power with gratifying results. No comment has been made in reply to the Full Power Trial Report so it is presumed that the practice is more or less in line with Admiralty requirements.

The mathematics of the thing do not in fact work out so simply. It is found that the increase in power recorded is far in excess of the 1 per cent per 10° of fuel temperature which is the theoretical compensation applied. It is timidly suggested therefore that perhaps increase of fuel temperature causes an increase in fuel flow rather than a decrease and that the resistance to flow of modern fuels is greater than supposed.

Comment

The curves shown in A.F.O. Drawing 177/47 have now been adjusted to suit the various fittings in different ships and will be issued as an amendment to B.R.1988. *Fiji* Class Cruisers with Pattern 25A sprayers and size 6 cap, are shown to require a F.F.O. pressure of 175 lb/sq in for a temperature of 200° F. to obtain a forcing rate of 55 lb/hour. The above figures hold within the limits of a F.F.O. temperature of 170°–230° F., specific gravity of 0·943 at 60° F. and 0·891 at 200° F., taking into account that sprayer cap calibrations are ± 5 per cent.

It is confirmed that a decrease in temperature does cause an increase of output with a swirl type atomiser. The effect is, however, small ; for a No. 6 cap the output decreases about 1½ per cent if the temperature is increased from 170° F. to 200° F. It is considered that the increase in power was brought about by the increase in temperature, giving better atomization with a resulting improvement in boiler efficiency. Tip plate registers in general benefit from the higher F.F.O. temperatures.

Boiler Casings—H.M.S. ' Gambia '

Before a full power trial, boiler casings were tested for leaks with a velometer and many were found on bolted and hinged casings. A number of these were eliminated by the replacement of missing cotters and the refitting of clips on the hinged doors. A large number of leaks, however, still persisted due to distorted panels and badly fitting clips. As time and labour were at a minimum, it was decided to stop up these leaks with lagging. Leaks were marked off with chalk, lagging mixed in the form of plaster and applied by trowel and hand, the result being reasonable tight boiler casings. It is intended to leave the bolted casings plastered over permanently as, since the adoption of water washing, they are never now disturbed.

Comment

The action taken is commendable, and must have produced beneficial results.

It is intended in the near future to make available a high temperature putty or sealing compound for such purposes, and some ships have already been supplied with two different types for trial. Pending its supply, the method adopted by *Gambia* might well be copied by others.

Auxiliary Feed Pump Glands—H.M.S. ' Gambia '

Although the packing rings are fitted to a former in the approved fashion and great care is taken to follow up each ring, Allenite Leafoil does not seem to be a suitable packing. Other packings, such as Alpha, have been tried with no improvement. It is realised that this is an old story but there does not seem to be the resilience in the packing material that there used to be. It is hoped that, in new construction, provision will be made to collect the water which must leak from the glands.

Comment

Pattern Nos. 7600–7603 (A.F.O. 2065/52) are ' Packing for High Speed Pumps —Graphited Asbestos' and Patterns 7610–7613 are ' Packing for High Speed Pumps– Metal Foil'. These correspond to Alpha and Leafoil respectively, but by A.F.O. 3989/49 they are now supplied by various makers, and it is possible that some is of inferior quality, since it is not made under inspection or to specification.

A series of trials of Rate Book packings is being held at the A.E.L. to form a basic standard from which to assess packing and eventually prepare a specification. This is expected to take a considerable time, and in order to accelerate the findings of a suitable manufacture, it is suggested that any packings considered substandard be returned to D. of S. through the N.S.O. with a report.

A series of trials of a mechanical type gland seal for various pumps is also being carried out. So far these have shown considerable promise.

Diesel Generators—H.M.S. ' Defender '

All three generators are almost due for a 2,000 hour overhaul.

After 1,800 hours No. 1 Diesel generator circulating water pump was stripped because of leaking glands. The shaft was badly eroded in way of the gland packing, and was renewed together with the impeller, valve plates and impeller sealing ring. Similar treatment is required on Nos. 3 and 5 Diesels.

The siting of the instrument board opposite the salt water glands of the circulating water pump causes deterioration of the instruments. This is assisted by vibration from the engine itself. Resilient mountings would reduce the effects of the latter, and siting above the starting panel would overcome the former. It is realised however that, from the watchkeeping aspect, this position is not as good as the present.

Comment

It is assumed that the pump referred to is the sea-water circulating pump.

The spindle of these pumps is made of stainless steel, and it is difficult to think of a more suitable material.

The question of alternative packing will be investigated, but in the meantime it is recommended that care is taken not to tighten the glands unduly. Attention should be paid to A.F.O.2412/54 on the subject of impeller erosion in these pumps. This would also have a bearing on shaft erosion, owing to the probable need for overtightening the glands if high pressures are developed within the pump. The matter is being taken up with the makers and if further instances occur, ships should report officially, forwarding defective parts.

Proposals for better positions for instrument panels are always welcome.

Firefighting and Damage Control—H.M.S. ' Defender '

Exercises were carried out during heeling trials which proved of value to all. The fitting of wheels to the Diesel hull and fire pump has now made it portable. Closing down trials, with tear gas bombs alongside the ship, proved irritating to the exposed portions of the body, in the humid atmosphere of the machinery compartments. It was found necessary to wear respirators in the boiler rooms for 2 hours after clearing the area, to prevent watering of the eyes.

During Damage Control exercises, the uselessness of ' A ' Engine Room as D.C.H.Q. due to the noise, was appreciated by the staff. It is impossible to use the same telephone cabinet for D.C.H.Q. and Machinery Control as only one person can be accommodated in the acoustic booth at a time. As a temporary expedient, and until a firm policy on the siting of D.C.H.Q. has been promulgated, it is intended to use the for'd switchboard. An official report will be made.

Comment

Details of the wheels fitted to the portable pump should be forwarded, together with comments on experience gained with this arrangement.

Methods of clearing pockets of gas in machinery spaces are being investigated, and any information on the location of the bad spots would be appreciated.

The resiting of D.C.H.Q. in *Daring* class is already being considered and proposals would be welcomed.

Spare Gear—H.M.S. ' Defender '

At least 80 per cent of the demands for spare gear for *Defender*, placed on S.P.D.C. in the F.E.S., are passed to the United Kingdom for direct supply, either through S.P.D.C. (U.K.) or D. of D. The flood of paper, contract notes, advice notes, packing notes and shipping notes which precedes the arrival of the item, does little towards tracing the original demand, since on very few occasions is there any reference to the ship's original demand serial number.

The following remark was made by F.E.O., F.E.S. in his covering letter :—

'This complaint has been voiced by other ships. It should be axiomatic that the ship's demand serial number is quoted on all documents.'

Comment

Each demand on receipt by the supplying authority, is allocated a registered number, and this is noted on all 4 copies of forms S.134. It is used in all correspondence relating to that demand. Any further correspondence with the ship, concerning the demand, is made on Form D.479A (Stores Demand Observation) or D.479 (Stores Demand Rejection Note). These forms quote both the ship's demand serial number and the registered number.

Where advice and shipping notes are concerned, the ship receives an advance copy of the D.71 (Packing Note) which includes details of package number, demand registered number and ship's serial number. Where items are shipped through S.N.S.O. Park Royal, the ship will also receive a shipping note from Park Royal. This note will indicate the package number, which will enable the consignment to be identified with the relevant form D.71. Forms D.67B, hastening receipts, can be identified with the appropriate D.71 by the reference to the demand registered number and the bundle date. The latter should give an indication of the date packed as shown on form D.71.

Provided that the procedure outlined above is correctly followed, the difficulties referred to in *Defender's* report should not arise. Specific examples of failure to observe the procedure are always welcome so that the cause may be traced.

Distorted Boiler Tubes—H.M.S. ' Duchess '

On opening up the saturated furnace of ' A ' boiler in Oslo, a slight sagging of the water wall tubes was noticed. When re-examined on return to Portsmouth four weeks later, serious malformation of several of the tubes in the vertical and horizontal planes was observed. All the distorted tubes were at the back of the boiler, and four tubes were touching out of the rear six. After examination by the experts, it was decided to renew seven tubes. Two theories were put forward: one that distortion occurs when the boiler is banked or at very low powers, when very little circulation occurs through the back wall tubes; the other, that it occurs when the blow downs are used at the bottom of the water wall at reasonably high powers, so upsetting the circulation.

Comment

The causes of this distortion are being examined. Both the above theories are possible.

Auxiliary Feed Pumps—H.M.S. ' Duchess '

On shutting down at Gibraltar, a curious defect occurred to the inboard pump in ' A ' boiler room. The pump piston would go up, but was very reluctant to come down. After being surprised to find the Glissard valve in good condition, we found the fault was that the liner had moved about 1/5 of a turn in a clockwise direction, almost blanking the top steam port. Every method was tried to move the liner back into its correct position, and then to take it out altogether, to no avail. Eventually the liner was cut away to clear the port in the casting by means of an electric welding set operating at the maximum amperage. The pump worked perfectly for about ten days, when the same symptoms recurred. The liner was found to have moved another 1/5 turn in a clockwise direction. It was again immovable, so more was cut away, and the liner was then spot welded to the casting. It is now being turned out by the dockyard and a new one is to be fitted. On this pump, there was no sign of a securing bolt and on the other three, although the securing bolts were in place, there was obviously a strong tendency to move in a clockwise direction. In ' B ' the liners had moved up to 1/32 and 1/16 with the securing bolts still in place. The covers have always been tightened down and show no leak, and although greater expansion of the casting than the liner would account for the liners being loose when hot, it is not understood why they have such a strong tendency to turn clockwise (looking from the top).

S.E.O. (Flotillas) comments :—

' The mystery of the clockwise turning of the liner of " A " boiler room inboard pump has not been solved. A visit to the southern hemisphere might alter the direction of rotation.'

Comment

This matter is being pursued with the makers.

The Australian Navy Board is being kept informed on *Daring* problems.

Extraction Pumps (Weirs 1-9-2 Turbines)—H.M.S. ' Battleaxe '

A report on the excessive maintenance required by this type of auxiliary turbine is being prepared by Portsmouth Dockyard. During a recent leave period another thrust block in the forward extraction pump in *Battleaxe* was found to be wiped. It is thought that the cause of this is that the thrust collar and shoe assembly is housed in a pocket which :—

(*a*) may be starved of oil if the level is not kept well above the mark, or

(*b*) serves as a water trap and holds contaminated oil.

A drain plug is being fitted, experimentally, to the bottom cover plate of this housing. Tests will be taken to see if, in fact, it does accumulate water.

It would be interesting to know the details of the recent A. and A. to the *Daring* class extraction pumps to prevent contamination of the lubricating oil. The pumps have the same number, 1-9-2, as those in the *Weapons* and the alteration may apply to them also.

The following remarks were made by S.E.O. :—

' A copy of a report on the 1-9-2 and 1-12-3 turbines fitted in *Delight* has just been received from F.O.2. That the contamination of the lubricating oil in the auxiliary turbines of *Delight* has been cured, may indicate that similar measures should be adopted in all other *Darings* and *Weapons*, fitted with like

machinery. As the modifications made are not specified in detail, it is not known whether they could be equally applied to these other ships. In view of the persistent troubles experienced, it would appear to be expedient to pursue the matter further. It is suggested that full particulars of *Delight's* modifications be sent to the Engineer Officer concerned.'

Comment

Daring class 1-9-2 turbines have different turbine gland arrangements from *Weapon* class and in addition higher steam conditions pertain. The modifications do not therefore entirely apply.

Fitting a drain plug in the housing cover plate is concurred in, but great care must be taken that the lower bearing housing is refilled with oil after this plug has been used. These turbines are in general use in Emergency Class and have, so far, given very little trouble.

Distiller Condensers, Weir 40 ton/day Evaporators—Sixth Destroyer Squadron

There appears to be a weakness in design of these condensers at the rivetted joint of the annular vapour box and end flange rings. *Battleaxe* and *Crossbow* have both experienced severe air leakage, causing priming through these joints, which are lightly rivetted and sealed with lead or soft solder. *Battleaxe* is at present operating with sick bay bandages and Bostik 'C' wrapped round the joints, and it will be necessary to remove and dismantle both distillers in the very near future.

It is interesting to note in the *Journal* that similar trouble has been reported with the larger condensers of the same make.

Comment

Individual cases of this failure do occur from time to time in distillers of various makes. The cause of the failure has been, in most cases, the method of support of the distiller, which has put a great strain on the joint in question. This possibility should be investigated. A plumber's patch of soft solder usually provides an effective repair. It is not intended to continue this method of securing the flange to the shell in future design.

Turbo Generator Lubricating Oil Pump Drives—H.M.S. 'Battleaxe'

Both drives in *Battleaxe* were examined during a recent leave period, after six months' service.

The driving wheels on the forward T.G. were in good condition, but those on the after machine were found to be badly worn.These wheels were renewed at the previous examination, the driven wheel by a new spare, and the driver by a second-hand spare which was in reasonable condition.

It is considered that the rapid wear has three possible causes :—

(*a*) bad meshing of the teeth between the new wheel and part-worn wheel

(*b*) oil contamination by fresh water caused by a heavy gland blow for a period during the cruise

(*c*) poor metal used in manufacture.

The oil pumps are quite heavily loaded, discharging at 60 lb/sq in and it is felt that these driving wheels are just satisfactory if all conditions are perfect, but there may be a case for strengthening them to give a larger safety margin.

Comment

Cause (*a*) is most likely. Drive and driven wheels should be replaced together. The question of the suitability of the metal used is being taken up with the makers.

Fire Fighting and Damage Control—Sixth Destroyer Squadron

On each occasion of exercising Damage Control, a short indoctrination lecture on atomic warfare has been given to the Damage Control Parties. These have been received with surprising interest, and have gone a long way toward dispelling the 'all is lost' attitude which existed.

Comment

A short lecture before an exercise is an excellent idea, as this attitude is entirely wrong. In fact, at sea, the tactical use of the bomb is a major problem. The national effort to produce the weapon is so great that it cannot be expended in the same liberal manner as ordinary bombs. A well dispersed fleet is therefore an unattractive target, and the limit of total destruction is very clearly defined —inside it—finish; outside it—99·9 per cent chance of complete survival.

Domestic Automatic Refrigerators—Sixth Destroyer Squadron

Seven of these are provided in *Battleaxe* and it is astonishing to note, after a year's experience, that they are practically unused by the ship's company. Officers, who have recently come from the Mediterranean, say that the same state of affairs exists in destroyers there. In ships on general messing there is nothing which the ship's company can keep in the D.A.R.s except a small ready use supply of butter, and one wonders if the space, which is at a premium on the messdecks, taken up by these expensive amenities could not be better used.

The following comment was made by S.E.O. :—

'I am, in company with Engineer Officer Sixth Destroyer Squadron, astonished at his remarks on domestic refrigerators, and to see that they apply to the Mediterranean Station as well. It would appear that under the general messing system they are redundant and, if this is fully substantiated, the removal of at least the majority of them, would certainly give sadly needed extra space and achieve considerable saving in weight.'

Comment

This is most interesting. D. of V. and D.N.C. are being consulted with a view to arriving at a revised estimate of requirements. The absence of adverse comment on the performance of these refrigerators is very comforting.

Corrosion Pieces—Sixth Destroyer Squadron

Replacement of steel corrosion pieces by copper-nickel-iron is being progressed as the steel corrosion pieces fail. It is not clear, however, what material should be used to replace the steel sandwich pieces in the auxiliary circulating water system and advice on this point is needed.

Comment

When a sandwich piece is between a gunmetal casting and a copper pipe, the copper pipe should be cut back to allow a copper-nickel-iron closing length to be fitted, or the copper pipe must be renewed in copper-nickel-iron. When it

is fitted between a gunmetal casting and a copper-nickel-iron pipe the sandwich piece can be replaced in gunmetal.

Auxiliary Machinery—Fifth Frigate Squadron

The maintenance problem presented by the 150 kW. 12 R.P.H. Paxman oil driven generators is extremely difficult. Up to date it has been possible to keep pace with the requirement for 1,000 hour and 2,000 hour routine overhauls but, while it is obviously a tremendous advantage always to be able to die out in harbour, it is in fact very doubtful whether it is worth the heavy maintenance effort involved. So acute is the problem that consideration is being given to reducing the use of the machines.

Apart from general routine work, two problems have arisen :—

(*a*) Piston grooves wear, while the rings do not, and in the absence of oversize rings all pistons will need renewal every 3,000 to 4,000 hours.

(*b*) Failure of valve gear lubrication has occurred in *Roebuck* and *Wrangler*, resulting in excessive wear of push rod caps and several cases of bent or broken push rods.

The following comment was made by S.E.O. (Flotillas) :—

'*Whirlwind* had one 150 kW Paxman 12 R.P.H. out of action for five months while ship's staff tackled a major overhaul during normal running periods. This is typical of the situation in other ships. Not only does such work take a large bite out of maintenance elsewhere, but it multiplies the running hours of the remaining oil driven generators by 3 : 2.'

Comment

General experience of these engines has led to revision of the maintenance schedule, with a relaxation of the 1,000 hours routine to 2,000 hours, which will shortly be promulgated.

Consideration is being given to the provision of oversize piston rings.

United States Packing—H.M.S. 'Cardigan Bay'

The United States rotary gland packing gives endless trouble due to failure of one or more of the springs, which leads to eccentric running and leakage. Consideration has been given to deepening the gland of the one turn of emergency soft packing, and just relying on more turns of water packing. This modification has not been tried yet, owing to the likelihood of running into worse trouble due to scoring and necking the impeller shaft. The springs are of tempered steel and it is considered that failures are due to corrosion. It is now proposed to try and fit either phosphor bronze springs if adequate stiffness can be obtained, or possibly some form of plated steel spring.

Comment

It is considered that a phosphor bronze or monel spring would be the most suitable. If it is decided to use packing, Sturntite or Pathan as used for stern glands is recommended ; there should be little chance of scoring.

Boilers—Fourth Minesweeping Flotilla

Since first reports of combustion difficulties about one year ago, extensive work has been carried out in the squadron to improve combustion by ensuring that the registers are correctly assembled and fitted with gaiters and sprayer

extension pieces in accordance with A.F.O. diagram 154/44. This work has taken some time to complete because in some cases it has required dockyard work to alter the registers to the correct design. This work is now complete in all ships (except *Rinaldo* fitted with Pattern 25A sprayers) and combustion is now reported as reasonably satisfactory. On receipt of instructions contained in E.-in-C.'s letter, the gaiters and extension pieces were removed from one boiler in *Bramble* and this boiler was steamed for one week in this condition. The result was most unsatisfactory, as a very heavy carbon deposit formed on the combustion tube and brick cone. This boiler was then steamed for a second week with sprayer extension pieces replaced but gaiters still not fitted. A slight improvement in combustion was achieved but the build up of carbon on the combustion tube and brick cone was still excessive. Compared with the other steaming boiler which still had extension pieces and gaiters fitted, there was sufficient evidence to show that the experiment of removing extension pieces and gaiters does not give improved combustion.

It is still evident that Pattern 25A sprayers and modified registers give the most satisfactory combustion results, and in view of the experiment carried out in *Bramble*, it is not intended to remove extension pieces and gaiters from other ships in the squadron. It is proposed, therefore, that no further action be taken until Pattern 25A sprayers can be fitted to all boilers.

Comment

This report does not agree with the burning troubles reported for *Cheerful*, where no gaiters or extension pieces are fitted. An A. and A. item is being raised by E.-in-C. to fit Pattern 6300 sprayers and improved Pattern 6308 tip plates, with an improved type sprayer carriage.

Boilers—Sixth Frigate Squadron

In *Venus*, chronic smoke-making was much reduced by attention to sprayer alignment and position. With the Mark I large A.E. deep air box registers fitted, it was found impossible to have sprayer, combustion tube and brick quarl in co-axial alignment. Alignment was finally chosen between sprayer and quarl. This does not, however, always give a complete primary flame, although that may, in the case of wing sprayers for instance, be due to uneven air distribution. An attempt was made to use radiation shields, but it proved possible to use these only when the sprayers were fully advanced, because the radiation shield is too big to retract through the hole between the chopper and spectacle plates. This fully advanced position is shown in A.F.O. diagram 37/54 as the correct burning position. In fact, it was impossible to keep the primary flame alight in this position. Radiation shields have had to be removed, and it has been found that the best sprayer position for burning seems to be very well retracted. As the Mark I large A.E. register is a rather crude design, particularly in respect of the uncertain air distribution it invites, it is suggested that a modification to the Mark III type (Pattern 25A sprayer body with tip-plate, etc.) would be a simple and worthwhile move. Up to the time of writing, *Venus*' best speed with a clear funnel was 27 knots, but the appearance of smoke above this speed was almost certainly due in part to a low oil temperature at No. 2 boiler. This was 150° F., and incidentally, the maximum achieved during the post-conversion large repair full power trial, or in any subsequent full power trial. The cause has since been traced to an oil heater steam valve box which had a thin sheet of metal all but blanking off the steam outlet immediately downstream of the valve itself. This has been drilled out and the heater appears now to be fully effective, but opportunity to try it at full power has not yet arisen.

Vigilant has had trouble with the main feed check valve, No. 1 boiler, due to sticking, especially in the shut position. The cause is believed to have been lack of co-axial alignment of the valve seat with the lower cylinder, and with the upper cylinder and cover. During the summer leave period, the dockyard did considerable work on this valve, with particular attention to the alignment. The brief experience since then has been one of trouble-free operation.

Comment

Radiation shields are strongly recommended, to reduce the incidence of sprayer cap cleaning. The holes through the chopper plates and the front plate should be enlarged to allow the sprayer to be retracted to its best working position, the work being carried out by ship's staff with depot ship assistance if required.

Attempts have been made to replace the Mark I large A.E. register by the Mark III, in some cases with remarkable success, whilst in others it proved a dismal failure. Consideration is being given to fitting a Mark IV with modified sprayer and carriage, but with swirlers instead of tip plates.

Laundry Equipment—Sixth Frigate Squadron

Vigilant is equipped with reasonable laundry machinery and a good service is reported therefrom. In *Venus* and *Virago*, however, the equipment consists of three Bendix washing machines. These machines are of small capacity, and are quite ineffective in dealing with white clothes and fast coloured materials. This ineffectiveness is caused by the lack of boiling and wringing facilities. In consequence shore laundries are used as much as possible, the ship's laundry being something to fall back on. It is suggested that a domestic washing machine with electric boiling element and hand operated agitator and wringer, costing about one third of the Bendix machine, would be far more suitable. Its output would be at least as great, and it would get clothes really clean. The Bendix certainly does not do so. The Electrical Department reports that the maintenance effort now required by the Bendix machines had become very serious. This is not surprising when one considers that since they were installed they have served the equivalent of 25 years' normal domestic (i.e. private home) service, and must now be in need of replacement.

Comment

The shortcomings of Bendix washing machines for naval service are fully appreciated. It is, however, considered unlikely that any domestic type machine would be successful under service conditions. E.-in-C. has accordingly developed small traditional type equipment for small ships, the first set of which was delivered in time for installation in *Vigilant*. It is hoped to replace the Bendix washing machines, in earlier ships of this class, as soon as possible.