



H.M.S. 'SCORPION' REFUELLING FROM H.M.S. 'EAGLE' IN A HEAVY SEA

## NOTES FROM SEA

The following notes are compiled, usually with comment, from letters and other information by those Admiralty Departments which deal with matters that fall within the purview of the Engineering Branch. The original phraseology is sometimes altered or amplified, but the original sense and substance is unchanged.

Readers are invited to discuss either the extracts or the comments in the correspondence section of the *Journal*.

### MARINE ENGINEERING

*Comments by E.-in-C.*

#### **Leaking F.F.O. Tanks—H.M.S. 'Newcastle'**

There are many small leaks from F.F.O. tanks with a very high nuisance and fouling-up value. They are caulked at each refit and start again as soon as the ship works in a seaway. Clean bilges in the machinery compartments and shaft passages are a pipe-dream.

#### **Comment**

Leaks in these tanks are a feature of all riveted ships, especially when they are approaching the end of their useful life. It is agreed that repeated caulking will do little to improve the position after the ship has returned to sea for a few hours.

**Spare Gear—H.M.S. ‘ Newcastle ’**

Replenishment of spare gear has been handicapped by difficulty in identifying and nominating items which may enjoy different names in the S.P.D.C. and on the drawings. The *Interim Admiralty Catalogue of Steam Machinery Spares Lists* are a boon but, unfortunately, at present they are held on board for only a small proportion of spare gear carried.

**Comment**

The identification difficulty is appreciated. Production of the catalogue and Parts Identification Lists is proceeding as quickly as circumstances permit, but it will be some time before the majority of machinery in the Fleet is covered by these lists. It is gratifying to hear that the Interim Steam Catalogues, which will eventually extend to 14 volumes, are of value to the Fleet.

**Planned Maintenance—H.M.S. ‘ Newcastle ’**

A system of planned maintenance had been set up using locally printed forms for weekly and daily inspections and servicing. The longer interval items, the master schedule and remarks, information and dimensions are recorded on forms S.1151(e), (f), (g) and (h) in S.1151 covers (all slightly adapted). A Master Display Board is kept on view in the Engineer's Office. The periodicity of almost all items has been adjusted to suit the 18-month foreign service commission. The intervals between are :—

Daily  
Weekly  
Quarterly  
Nine-monthly  
Eighteen-monthly  
Three-yearly.

The system is still in its infancy and many changes, particularly to schedules, are to be expected but it is undoubtedly a great advance on the previous system (or lack thereof) and will prove well worth the work involved in getting it going.

**Comment**

It is noted that there are now five cruisers running their own system of planned maintenance in the Engineering Department based on locally produced maintenance schedules. A.F.O.s 240, 241 and 242/57 have now been issued introducing the Admiralty scheme for documentation which includes a system for planned maintenance, together with associated forms and equipment. No objection is seen to ships, such as the existing cruisers, using the Admiralty scheme although they are unlikely to be adopted by a Class Authority. The A.F.O. will provide for such ships being supplied with ‘ S ’ forms, such as maintenance and repair cards, on request.

**Evaporators—H.M.S. ‘ Birmingham ’**

The new type float controllers in the Caird and Rayner 100 ton per day twin shell evaporators are very reliable after some 800 hours running, though it took some time to obtain confident watchkeeping. Consumption of water for the ships company of 750 settles at about 100 tons per day, though the first day or two out of harbour is about 130. This usually coincides with a heavy feed consumption of 50 tons or more and soon makes life a little trying if the three evaporators do not hit the maximum output of 170 tons. The feed consumption settles to about 50 tons per day on two shafts at 14 knots.

The output has suffered from reduced steam pressure caused both by economy and a large drop in pressure along the line from forward to aft. The orifices of one set have been removed, giving an improvement. The hole size is 0.632 in. but sufficient 'boffins' do not exist on board to check the size without the help of the *Journal of Naval Engineering* (no copy available) containing the details—a pity B.R.1333 does not help.

#### **Furnace Fuel Hose Stowage—H.M.S. 'Birmingham'**

If these hoses are to be stowed with nice easy bends and no kinks, proper stowage should be built in all ships.

#### **Condensers—Third Frigate Squadron**

An interpretation of B.R.1988, Art. 0542, is that mild steel corrosion pieces should not be fitted and that no paint should be applied. The end doors in all ships are gunmetal. Confirmation of this would be helpful.

#### **Comment**

For new construction ships (i.e. post-*Darings*), mild steel corrosion pieces will not be fitted, tube-plates will not be painted and the doors will be sprayed with mild steel.

In older ships, mild steel corrosion pieces should continue to be fitted to the inlet-end water spaces. Painting of tube-plates is only necessary if dezincification starts. As long as the corrosion pieces are performing properly there will be no tube-plate dezincification and, therefore, it is a waste of time and effort to paint the plates. If, due to any strange reason, dezincification should occur in spite of the mild steel corrosion pieces, then coating with the approved paints will provide a satisfactory answer.

#### **Shafting—Third Frigate Squadron**

A heavy leakage of oil from the inner end stern tube U.S. metallic packing was eventually cured as follows:—It was found that the cup-ring was practically solid on the shaft, and quite unable to adjust itself to any misalignment. A  $\frac{1}{16}$  in. permanite joint between it and its follower was fitted, which reduced the compression on the rubber sealing rings just enough to allow the whole assembly to slide. No leakage has taken place since. No information is available on the recommended way of running these glands, i.e. whether to keep a pressure pumped up in them, or leave the supply from a return to the gravity tank, about 5 ft above the W.L., open.

Examination of *Modeste* and *Opossum's* outer stern tubes and 'A' frame journals in accordance with A.F.O. 3054/55 has been carried out and all journals have been found to be in perfect condition. It is submitted that, for ships with metallic packing, the interval for this examination could be extended, to, say, 3 years, unless it is known that water has entered.

#### **Comment**

It is considered that the fitting of the permanite joint is not the correct remedy for the defect, and that the components of the metallic packing should be examined and dimensions checked at the next available opportunity.

It should not be necessary to pump up a pressure in the stern tubes. They are normally expected to run under the head from the gravity tanks only.

In ships fitted with oil lubricated bushes and metallic packing, provided the oil seals are efficient, sea water will be kept out of the bearings. Thus there is no necessity in these ships for periodic withdrawal of the bushes provided the results of the wear-down readings and tests of the oil seals are satisfactory. An amendment to A.F.O. 3054/55 to cover these ships will be promulgated shortly.

### **Main Engines—Third Frigate Squadron**

The main steam pipe to the main engines ends in a vertical length of about 4 feet, with the ahead throttle valve about  $1\frac{1}{2}$  feet from the bottom, and the astern throttle about 6 in. from the bottom. There is no continuous drain from this leg, and unless it is remembered to drain it by the cock fitted before manoeuvring, damage to the astern blades could be caused. A steam separator and steam trap is already fitted on the main steam pipe in the engine room, and it is suggested that this leg could drain continuously into the trap.

#### **Comment**

The reported separator and trap fitted to the main steam pipe is not shown on E.-in-C.'s drawings, but it is noted that A. and A. 543 covers the fitting of a separator and trap to the auxiliary steam line in the engine room. It is agreed that a continuous drain to a trap is most desirable. A proposed A. and A. to cover this requirement should, therefore, be forwarded.

### **Evaporators—Third Frigate Squadron**

It is impossible, under normal running conditions, to get an accurate estimate of the evaporator output. An estimate of make-up feed losses is guess-work to within 2 tons either way. A reliable flow meter would be a boon on these plants, and would also indicate any fall-off in output.

#### **Comment**

A proposed A. and A. to cover this requirement should be forwarded.

### **Weir's Shuttle Valves—Third Frigate Squadron**

There are two types of auxiliary valves for these. One is rectangular, as shown in Weir's *Handbook on Reciprocating Pumps*, No. 46/3, page 13, FIG. VII, dated November, 1941. The other is similar in all respects except that it has an extension of about  $\frac{1}{4}$  in  $\times$   $1\frac{1}{2}$  in on the top and bottom which alters the cut-off. A demand on an S.P.D.C. for a spare auxiliary valve produced the latter type. This is further complicated by the fact that the square on the auxiliary valve spindle is different for each type of valve. It is suggested that an A.F.O. on the lines of the feed regulator A.F.O.'s could well be produced for these fittings.

#### *Comment by F.E.O.*

This is to be investigated by the S.P.D.C., Singapore.

#### **Comment**

The results of the investigation into the two types of auxiliary valves would be appreciated by E.-in-C. It is not considered necessary to issue an A.F.O. giving instructions for refitting and resetting shuttle valves. This information is contained in the Weir's handbook.

### **Spare Gear—Third Frigate Squadron**

The spare gear organization has proved excellent, and no trouble has been experienced in obtaining gear. It is not known whether it is S.P.D.C.'s policy to carry a complete range of on-board spares for ships on the Station. This is not so at the present moment on this Station, and, while it has not caused any trouble to date, it could easily prove embarrassing.

#### **Comment**

This compliment to the Spare Gear organization is much appreciated. It is confirmed that it is S.P.D.C. policy for main S.P.D.C.s to hold complete coverage for all on-board spares for ships on the Station, so far as S.P.D.C. is committed to supply those spares. Certain on-board spares will not be covered and these are:—

- (a) Maintenance items, which are not, nor ever will be, S.P.D.C.'s commitment, for which limited backing is provided in Admiralty Machinery Depots, under Admiralty control, for issue when it becomes defective and beyond repair.
- (b) Spare parts for equipments which are not yet S.P.D.C.'s commitments (i.e. those not detailed in A.F.O. 248/56).

Information concerning on-board spares not held by S.P.D.C.s would be welcomed by the S.P.D.C. concerned if the anticipated future usage rate of each item covered can also be furnished.

### **Main Engine Throttle—H.M. Yacht 'Britannia'**

In January, 1956, owing to corrosion on the port ahead and astern throttle valve spindles in way of the stuffing boxes, the spindles were renewed in En. 57 steel (maker's specification), the glands being repacked with mica lubricated packing. On examination in July, 1956, the spindles were again found to be corroded and the dockyard have now renewed them in chromium plated En. 57 steel. Plain asbestos steam packing has been used for repacking the glands. While these valves were in the factory, modification in accordance with A.F.O. Diagram 21/56 and B.R. 1988, Art. 0437, were carried out.

#### **Comment**

The corrosion rate experienced is surprising ; it is presumed that the following points have been checked :—

- (a) That the spindle was En. 57 steel
- (b) That the packing was mica lubricated asbestos
- (c) That no extraneous causes were present, e.g. salt water leaks from other equipment.

It is known that stainless steels generally are inherently susceptible to differential aeration. This means that if a part of the surface is denied access to oxygen, the adjacent part in contact with the atmosphere becomes cathodic and pitting can take place in the masked area. It follows therefore that, no matter what packing is used, this attack could take place and that when a lubricant such as graphite is used, attack will be accelerated because graphite is a powerful cathode in itself. The purpose of using mica as a lubricant is to ensure freer working of the spindle in the packing and to coat the spindle surface with a neutral envelope. Theoretically, the use of dry asbestos should not improve matters because it is a poor bearing material and because it is hygroscopic. Occasional reports from sea have, however, indicated that dry asbestos improved matters ; the explanation of this is not readily discernible.

A series of laboratory tests have been started to try to solve some of the problems met with soft packing ; the results from these are unlikely to be available for some time. It would be of interest to know :—

- (a) How serious the corrosion was when the spindles were renewed (i.e. in extent and depth)
- (b) Is the gland adequately drained ?
- (c) Progress of the present spindles at intervals of about six months.

#### **Jabsco Water Pumps—H.M. Yacht ‘ Britannia ’**

These have been fitted to all engines installed in the boats by Messrs. Perkins at their own expense. They are considered an excellent design as they will run either way without modification and the impellers, being of hard rubber, are not affected by sand or mud.

The makers' maximum continuous figures for water and oil temperatures are 165 degrees F. and 200 degrees F. respectively. The figures obtained in temperate waters are 170 degrees and 180 degrees. It is intended to remove the thermostatic bellows pieces and blank the hot water returns to the water pump before operating in tropical waters. In order to maintain the present figures in the boats fitted with keel controls, it is necessary to keep the latter well polished, and it is felt that the cooling area may well prove inadequate in the tropics.

#### **Comment**

The very favourable report on the Jabsco pump has been noted with interest. Action to fit ‘ gagging ’ sleeves to the thermostats of the engine F.W. cooling has been found necessary in other boats, and trials have shown that the high water temperatures are due to the sluggish operation of the thermostats, and not to an insufficient area of keel cooling.

A report on the experiences obtained in tropical waters with the modified cooling system would be of value.

For information, the suppliers recommend that the Jabsco pump should not be used with water of temperatures above 180 degrees F.

#### **Diesel Generators—H.M.S. ‘ Decoy ’**

Numbers 1 and 5 Diesels have just completed major overhauls and 440 items of ships spare gear were used. Fortunately S.P.D.C. (U.K.) co-operated extremely well in supplying many items at short notice, but it is felt that the responsibility for the supply of the necessary spare gear, during a major overhaul, should be borne by the dockyard and not by the ship. The ships staff would then have more chance of leaving port at the end of a refit with a full set of spare gear on board.

Gauging during the overhauls showed that the items with the largest wear were the cams themselves which had been worn as much as 1/32 in. This may be attributed to the fact that in H.M.S. *Decoy* two Diesels are run, usually at full load, to save running the third. At the time of the major overhaul both Diesels had only just completed 3,000 hours and No. 1 machine, in particular, had been running rough. It would appear that if the machines are run continuously at ‘ near full load ’ particular attention should be paid to this point at major inspections.

Since completion of the major overhaul on No. 5 Diesel, the cylinder head gasket has blown on both heads of one bank (130 hours running) despite following up the cylinder head nuts. The lubricating oil gear-wheel pump

developed excessive wear on the idler gear-wheel bearings with consequent damage to the gear-wheel teeth and the pump casing. A new pump unit was fitted complete ; this defect occurred after 165 hours running since the major overhaul.

### **Comment**

It is not agreed that the dockyards should supply spare gear ; the administrative and accounting procedure involved would be too unwieldy.

The question of cam wear has been referred to the engine makers who report that they have adopted a surface hardened steel cam shaft and roller followers which, as far as they are aware, are satisfactory.

### **Boats—H.M.S. ‘ Delight ’**

The 25-ft motor cutters are engined with Enfield H.O. 2 Mk. I and Mk. II respectively. As far as the engine goes both are satisfactory and the absence of cooling water complications is a great help. In a Mediterranean summer, however, they do tend to overheat after prolonged running, and the hot air exhaust is uncomfortable, even with the canopy removed.

The Mk. II engine, fitted with the Enfield gearbox is much superior to the Mk. I/Parsons combination and standardization on the former type would reduce the amount of spares carried and increase the availability of boats.

The 16-ft motor dinghy is considered a gross waste of money. It is understood that the cost of boat, engine and spares, is approximately £2,000. Previous experience shows that the normal life of a K.F. 4 engine rarely exceeds 100 hours and is expensive in maintenance effort. The vast majority of engines are returned for line overhaul because of defects and not running-hours. In home waters at least, these boats are very rarely used. In these ships where space and skilled labour are at a premium, it is suggested that disposal of these boats would effect a considerable economy.

### **Comment**

Consideration will be given in new construction boats to extending the exhaust air trunking to a position outside the canopy. In existing craft, every effort should be made to ensure an adequate and uninterrupted air supply and to avoid the possibility of recirculating exhaust air.

The future of ‘ skimmers ’ is under consideration ; it is appreciated that they are of doubtful value. The troubles experienced were known to exist in the Type 178 engines, but it was thought that they had been overcome in the Type 178 Modified and 178/1. It would be of interest to know further details.

### **Refrigerators—H.M.S. ‘ Defender ’**

The main refrigerating and air conditioning compressors were examined during the refit and found to be in very good condition. According to ship's records, this was the first examination since the machinery was installed 3½ years ago. This low maintenance requirement, coupled with the reliable operation of both plants, represents a major advance over previous designs. Unfortunately, the good mechanical design of the main refrigerating plant is not matched by the layout of the system which, as far as accessibility is concerned, is possibly the worst ever produced. This general lack of accessibility is particularly serious in the case of the condenser and covers. These can just be removed, but examination of the tube plates requires the services of a man with a head 3 in. wide, who would presumably not have the intelligence to know

what he was looking for ! Efforts have been made to do the job with mirrors but without much success.

An additional short-coming of both main refrigerating and air conditioning plants is the poor quality of the lagging. Before the refit, the deck of the main refrigerating compartment was permanently awash with condensate. About 30 per cent of the lagging was renewed by Malta Dockyard, and this, aided by the lower ambient temperature, has improved matters.

### **Comment**

Examination of the 'as fitted' drawing does not substantiate the claim for general lack of accessibility, although it is agreed that the accessibility of the inboard end covers of the condenser on one of the plants is not good. It appears from the drawing that it is possible to improve matters by moving this condenser slightly outboard.

There have been several complaints of late about poor lagging on refrigerating machinery. Efforts are being made to ensure a better quality in future contracts.

### **Evaporators—H.M.S. 'Defender'**

An improvement in output followed the removal of the orifice plates in the coil steam supply. It has always been considered that orifice control is undesirable, since it not only destroys the initiative of the watchkeeper, but also prevents evaporator output being increased above that at which a cloud begins to form. This automatically rules out the use of a high output while on ships tanks, which unfortunately is so often necessary in times of water shortage. During a recent water crisis, catastrophe was only averted by 'distilling to taste'.

### **Comment**

Removal of orifice plates is contrary to accepted methods of running distilling plants and the original idea in fitting the orifice plates was to meet, in part, requirements that are still being voiced—that of making the plant as automatic as possible and dispensing with watchkeeping. No objection is seen to removal of the orifice plate ; it is merely reversion to old practice by controlling the steam inlet valve and re-employing a watchkeeper (who regains his initiative !)

These plants should produce an output well above 2 tons per hour without producing a cloud. The high output referred to must be really high, and it would be interesting to know what is accepted as a limit and what is the method of controlling at that point.

### **Distilling Plant—H.M.S. 'Delight'**

The arrangement whereby the ejector condenser is cooled by the evaporator feed causes overheating and scaling due to erratic feeding.

Both ejector condensers require retubing. More frequent examination and manual cleaning is needed and will be done quarterly until more experience is gained.

### **Comment**

It is agreed that this is a fault both with the ejector condenser and the coil drain cooler, particularly when starting up when no feed is flowing through the tubes. Present design tendency is for the feed heater to be incorporated in the distiller and for a large quantity of circulating water to pass through the coolers.



It is suggested than an A. and A. be raised to fit an additional lead to circulate distiller circulating water through the ejector condenser and to confine the feed line to the coil drain cooler.

### **Fire Fighting and Damage Control—H.M.S. ‘ Defender ’**

Several minor exercises and one full-scale exercise, incorporating thunder-flashes and smoke bombs, have been carried out. Until recently, a major weakness was the lack of ship knowledge, including systems, on the part of the junior ratings, and the training effort has been mainly directed towards overcoming this.

In a ship of this size, it is difficult to set realistic exercises without repeating previous incidents. Some degree of realism can, however, be obtained provided the P.O.M.(E)s are informed of the intended incidents beforehand, so that they can expand and elaborate on them as the situation requires.

### **Comment**

The importance of ship knowledge cannot be over-emphasized and concentration on this aspect before attempting elaborate exercises is entirely correct. It is believed that considerable value can still be obtained from repetitive exercises, by changing round, or making casualties of ‘ supervisory ’ ratings.

### **Miscellaneous—H.M.S. ‘ Defender ’**

#### *Divisional Book*

Would it not be possible to provide a standard divisional book or Cardex system ?

#### *Fair Refrigerator Log*

Is it really necessary to keep a fair log now that engine-room registers have become so much more realistic ?

### **Comment**

The provision of a standard divisional book is, at present, under investigation.

The fair refrigerator log will be cancelled on the introduction of the new documentation.

### **Main Engines. Valve Gear Lubricating Oil Supply—H.M.S. ‘ Vidal ’**

The modified control valves for lubricating oil supply to the valve gear are proving a boon as far as wear-and-tear of the valve gear is concerned. Two problems are associated with these valves, however :—

- (a) The stiffness and short length of the supply pipes to and from the valve make exact fitting essential to prevent leakage at the valve and casing joint. Even then, continued running, causing vibration between valve and camshaft drive cover, leaves its mark in the form of a thin trail of oil from the joint.
- (b) The bleed-hole through the valve does not seem to be large enough to supply the necessary quantity of oil under slow running conditions. All valves are left cracked  $\frac{1}{2}$  turn open to overcome this.

### **Comment**

Consideration will be given to modifications to overcome the points raised.

### **Diesel Generators. Noise and Vibration Mountings—H.M.S. ' Vidal '**

The A.R.L. type mountings fitted to the generators are deteriorating much more rapidly than the strip type mountings fitted to main engines. The former are all suffering from increased creep and many pads are being renewed by ships staff. All will require changing during the next refit and it is hoped that the opportunity may be taken to fit strip type mountings as planned.

#### **Comment**

It is hoped to complete A. and A. Item 55—to mount all oil driven generating sets on Admiralty Type P. 7D (3,400 lb) mountings—during the refit.

### **Survey Motor Boats, 29-ft—H.M.S. ' Vidal '**

The original type of circulating water pump fitted to the P4M engine has given reasonable service but suffers from the usual problem of all water pumps, i.e. rapid wear of the internal rotating parts. Two new design pumps with formed rubber impellers have been provided to complete spare gear demands. Both of these have already failed—one from a split impeller (45 hours) and the other from the impeller breaking away from the centre driving bush (200 hours). This necessitated urgent action for replace impellers since, on opening up, the spare impellers were found to be of larger outside diameter and fitted with an entirely different centre drive bush. The pump impellers have a splined type driving bush and the spare impellers a keyed drive. The two defective impellers are being sent to the Engineer-in-Chief's Department, I.C.E. Design Section.

#### **Comment**

The original type of pump fitted to the Perkins P4M engine was the Langdon Fraser which incorporated loaded rubber or ' woodite ' rollers. The pump proved unsatisfactory in service and was replaced by the Perkins copy of the Jabsco pump, with a neoprene rubber impeller. This also proved unsatisfactory in that failures of the type referred to occurred. It is now being replaced by the genuine Jabsco pump.

The impellers in both the latter pumps are similar in appearance and it would appear that Jabsco impellers were supplied as replacements for Perkins neoprene impellers.

When the two defective impellers have been received, a further investigation into the matter will be made.

### **Usage and Availability—Sixth Frigate Squadron**

New Year's Day, 1956, found the entire Sixth Frigate Squadron patrolling off Cyprus having left Malta at short notice on Boxing Day morning. Cyprus has coloured our lives ever since, to the detriment of working up, Fleet exercises and, perhaps most important, maintenance of machinery. (See Table)

With regard to ' Total miles steamed ', Cyprus and Levant operational patrols accounted for 75 per cent, or more, of this mileage.

#### **Comment**

In due course, details of defects attributable to lack of maintenance will be of interest.

<i>Service</i>	<i>Undine</i>	<i>Ulysses</i>	<i>Ursa</i>	<i>Urania</i>
<i>Total days in period</i> ..	112	112	112	112
<i>Total miles steamed</i> ..	13,736	15,574	15,358	9,876
<i>No. of days with steam on main engines</i> .. ..	66	69	71	49
<i>Dates of official self maintenance</i> .. ..	6/1 to 21/1	13/2 to 25/2	7/1 to 20/1	9/1 to 21/1
<i>No. of days at more than eight hours' notice</i> .. ..	5	4	12	27
<i>Usage factor for period (percentage)</i> .. ..	59	62	63	44
<i>Availability factor for period (percentage)</i> .. ..	82	86	78	77

### **Auxiliary Machinery—Sixth Frigate Squadron**

Generally satisfactory with the except of refrigerating machinery circulating water pumps (Mono pumps). Stripping is necessary on each occasion of renewing the driving shaft and associated couplings or coupling pins.

*Chaplet* has forwarded the recommendation that a complete search of condenser tubes, by means of the Probolog device should be carried out at refits. Experience gained in *Vigilant* at Devonport shows that this device would do much to lessen the likelihood of condensitis.

### **Comment**

With regard to the unsatisfactory Mono pumps, similar trouble has been experienced in C.A. Class destroyers and all rotating parts are now manufactured in 18/8 stainless steel and pins and holes in the coupling rod are stelled. S.P.D.C. stocks are of this material.

Instruments of the Probolog type are still being developed by Messrs. I.C.I. When they are developed fully it is expected that D. of D. will purchase one for each home dockyard.

### **Safety Valves—First Destroyer Squadron**

Pilot valves of main safety valves cause persistent trouble by 'feathering' within a few hours of refit. One cause is the difficulty, and in some cases impossibility, of removing the 'removable seat' without causing damage.

### **Comment**

The discs (lids) are shown as of Delta metal and the seats of stainless steel. An improvement in the light life of the valves could be obtained by changing the disc to 13 per cent chrome steel hardened to 350–400 Brinell. An article is being prepared for B.R. 1988 with reference to the materials, etc., to be used.

### **Spare Gear—First Destroyer Squadron**

While the supply of spare gear from the S.P.D.C., Malta, is generally good and quick, there are still a number of items for which demands have to be made to U.K. Examples are :—

Steam parts for Weir's extraction pumps  
 Spares for Enfield H.O.2 engines  
 „ „ Allen's main circulators  
 „ „ main refrigerators  
 „ „ capstan  
 „ „ fresh water pumps.

It is recommended that, if the ' CH ' Class destroyers are to continue serving in the Mediterranean, a more complete stock of spares should be held at the S.P.D.C., Malta.

*Comment by S.E.O.(F), Med.*

The stocks of spare gear in the S.P.D.C., Malta, continue to improve as the requirements of the ships become known. The availability of steam spares improves as the supply of the various items becomes a commitment of the S.P.D.C. and as catalogue numbers are allocated. In the last year, 61 per cent of steam spares demanded have been supplied from local stocks.

### **Comment**

It is impracticable to hold complete coverage for all types of spares, unless the space allocated to S.P.D.C.s abroad is to approach that of the S.P.D.C., Eaglescliffe. The figure of 61 per cent quoted by S.E.O.(F), Med., is considered fair and reasonable and it will be difficult to improve greatly upon it. Air freight from U.K. enables most items, if they are available at Eaglescliffe, to reach Malta within a week of the requirement arising.

Another aspect which may account for some delay is that S.P.D.C.s cannot always foresee the receipt of a large number of demands for the same item simultaneously, and this may result in the clearance of stocks, especially at a time when replenishment is in hand.

### **Do You Suffer from Goffa Tins in Your Waste Steam pipes?—H.M.S. ' Undine '**

While painting the top of *Undine's* funnel, an able seaman achieved the distinction of dropping a goffa tin containing electrical black varnish down the right hand safety valve waste steam pipe from No. 1 Boiler.

External diameter of average goffa tin:	6 $\frac{1}{8}$ inches.
Internal diameter of waste steam pipe:	7 $\frac{1}{4}$ inches.

Investigation with pieces of wire indicated that the goffa tin had fallen to the bottom of the waste steam pipe.

On the next occasion of lighting up No. 1 Boiler, the hand-casing gear was operated when the steam pressure reached 35 lb/sq in. This proved sufficient to eject it to a height of six inches above the outlet from the waste steam pipe where the goffa tin remained poised, like a ping pong ball on a water fountain. On shutting off steam, the tin and its contents fell to the flag deck.

For those who wish to eject goffa tins clean over the side, a boiler pressure of 102 lb/sq in is recommended.

### **Comment**

There seems little evidence to support the ' over-side ' ejection figure. Surely such factors as fair wind and weather must be considered.

## ORDNANCE ENGINEERING

*Comments by D.N.O.***Failure of a G.R.U. Stabilizer Mark 3—H.M.S. 'Cavendish'**

It was reported that the upper gyro unit of the G.R.U. Stabilizer Mark 3 toppled three times in four hours. Examination showed that the air leveller system was not functioning. By disconnecting the air supply pipe to the levellers, it was found that no air was flowing. The components were cleaned with carbon tetrachloride and on reassembly the whole air system was flushed with C.T.C. After this the upper gyro unit still toppled and both the upper and the lower gyro units were found to be stiff in the airborne gimbal bearings, from which some dirt exuded. It was ultimately necessary to fit replacement upper and lower gyro units.

**Comment**

The ship was carrying out existing instructions by flushing the air system with C.T.C. It is now apparent that this only serves to force all the dirt in the system into the air bearing and levellers. Instructions have now been issued to stop C.T.C. flushing being used. The apparatus will ultimately be removed altogether. Meanwhile, it has been removed from stabilizers being manufactured.

Evidence shows that the cause of failure was air starvation of the cross-level air leveller. An intermittent fault in the leveller amplifier may also have been a contributory factor.

The quality of air supplied with the present cleaning and drying system is under investigation.

**Flexible Mountings for V.S.G. Bedplates 4·5-inch Mark 6RP.41 Turrets—H.M.S. 'Decoy'**

H.M.S. *Decoy* reported that in the 4·5 in. Mark 6 turret the layer's pedestal is bolted direct to the turret structure although the elevating V.S.G. unit its controls is resiliently mounted. Relative movements of up to half an inch occurred with the resultant strain tending to jam the interconnecting bevel drive and fracturing the flexible discs.

**Comment**

*Darings* were asked to report on this failure and *Duchess* and *Diamond* confirmed. Tests on the samples of resilient mountings forwarded revealed that the oil resisting synthetic rubber forming the block was much too soft when compared with E.-in-C.'s specifications for similar equipments and a natural rubber of 50 degree Shore hardness treated with an oil resisting compound ('Necol' Lacquer Red A.P. 7051) has now been specified as a replacement. *Darings* will be issued with the new mounts in due course.

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