



H.M.S. 'WAKEFUL' TOWING AN AMERICAN AMPHIBIAN RESCUE AIRCRAFT, ABANDONED AFTER A RESCUE ATTEMPT AT SEA

NOTES FROM SEA

The following are extracts from letters received by the Engineer-in-Chief's Department from Engineer Officers of seagoing 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.

Vacuum Refrigeration Plant—H.M.S. 'Centaur'

Recently, all pumps stopped owing to an electrical failure, causing the condenser to overheat. It was found later that both tube-plate joints had partially failed. To avoid retubing, the joint was sealed with Bostik in the circulating water chamber, and fed with Detel Red externally when under vacuum, the whole then being covered with tape externally. The performance has, if anything, improved. To guard against a recurrence, the 2 in. Auld's reducing valve, which has been found to be unnecessary, has been converted to shut off if the condenser vacuum falls to 12 in.

Comment

The ship's staff is to be congratulated on a novel repair and in providing such a simple method of shutting down, should a loss of vacuum occur. An A. and A. will be issued to provide for automatic shutting down and to give an indication of salt water contamination.

Arresting Gear—H.M.S. 'Centaur'

Leaks have been frequent from joints in the hydraulic system. A more resilient material is required in place of the fibre or copper joints fitted.

Comment

It is understood that, in future, D.N.C. will fit the standard 'O' seal flange used in new construction. It is probable, also, that Dowty seals could be used with advantage in the screwed union joints, provided the difference in the diameter of the pipe bore and the outside diameter of the appropriate size Dowty seal is allowed for. Care would be necessary to ensure that the seal is held centrally in the joint.

Catapults—H.M.S. 'Eagle'

A recurring defect has been the failure of the bonding on the rollers of the positioner mat.

Comment

A new design has been developed by M.E.D. Chatham, after investigation of the problem. Replacement roller couplings, to the new design, will be supplied.

Accelerometers—H.M.S. 'Eagle'

There is a requirement for aircraft to be so equipped that a simple maximum reading 'g' recorder can be installed. The ability, on occasions, to check acceleration, deceleration, end-speeds and launching valve displacement with reasonable accuracy would enable the Engineer Officer to check and diagnose faults quickly and so advise operationally.

Comment

A maximum reading accelerometer is being developed. These instruments will be issued to ships in due course.

Manœuvring Valves—H.M.S. 'Eagle'

All manœuvring valves leak, two so badly that, at the end of a cruise, the shafts were turning at 15 or 20 r.p.m. ahead with the ship stopped, under full vacuum, and the valves shut normally tight. The only answer was a 'two-man' jamb, with free use of astern steam when manœuvring, and to reduce vacuum as soon as possible.

Comment

A report on the condition of the valve seats, lids, flexible discs, etc., when opened up for examination, would be a great help in seeking a remedy. Points of importance are, whether the distance between seats and lids give correct disc deflection, and if there is any indication of seat distortion.

Turbo Blowers—‘Daring’s Group A

Some brief notes on turbo blowers :—

- (a) Three impellers were renewed with base spares, five impellers were sent to Messrs. Allens for reblading and/or reanodizing as required, and two machines were completely examined and balanced. A requirement for a new blade material seems to exist.
- (b) Several bearings have been examined since completion of the refit. To make this job easier in future, the outer acoustic casing of one blower was left off for experiment, and it is considered that the degree of noise is unaffected.
- (c) Self-closing shutter gear box covers have been removed and stowed in an air space. Their absence is in no way missed, and the shutter gear is now in all respects properly maintained and free.
- (d) Mono pumps have been working at very poor efficiency, and the fire main has been used to boost circulating water. Recent examination of two of these revealed very little rubber stator left in either. Having fitted both sets of spares, there is little point in bothering about the other six just now, but eight sets of spares have been demanded.

Comment

The blades of a group of blowers in H.M.S. *Daring* have failed due to corrosion fatigue and the search for a new material continues. Fatigue and vibration tests have been carried out at the maker’s works and graphs have been issued to indicate the danger area, which is the region of low Q and high H. Outside this area, the blade life is considerable. New blades are being protected against corrosion with Rockhard enamel coating.

It is considered unlikely that the removal of the outer acoustic casings has not affected the full power blower noise level. Watchkeepers must wear ear plugs if exposed to a noise level of above 107 dB for any length of time.

The short life of Mono pumps is being discussed with the makers.

Paxman 6.R.P.H. Generator—H.M.S. ‘Daring’

The forward Diesel generator engine (Paxman 6 R.P.H.) recently began to boil in a very short time. The complete answer is not known at present. One of the heads shows every visual likelihood of being cracked in way of one of two slots, cut in it at some time in the past as an approved modification to increase flexibility. This will be W.P. tested. The head and block jackets are fouled to an extent bound to affect cooling water temperature, and the header tank is very dirty. This is probably attributable to the fact that, in *Daring*, it is very easy for a watchkeeper to top up No. 1 Diesel header tank with ship’s (Maltese ?) water. It is impossible to put ship’s water in either of the other engines. Steps will be taken to blank the pipe concerned.

The following remark was made by S.E.O. (F) H.F. :—

It is also noteworthy that, when salt water cooling failed in No. 3 machine and a crankcase explosion occurred, the time margin available before the fresh-water boiled was much shorter than was expected. It might be helpful to give some guidance on this, in case the automatic watchkeeper fails to shut down the machine before the water boils.

Comment

This type of engine has no known weakness which would cause overheating, and the case quoted is almost certainly due to one or more of many factors concerned with the mechanical condition of the engine—defective circulating

water pump, choked passages, retarded timing, leaking valves, etc. which are matters for rectification by ship's staff. The time taken to boil, when sea circulating water is cut off, can be found by a fairly simple calculation based on the overall efficiency of the engine and its heat balance, the capacity of the fresh water system and its normal running temperature, but is, of course, inversely proportional to the load on the machine at the time. The heat rejected to the circulating water can be taken as approximately equivalent to the power being developed (or about $\frac{1}{3}$ of the calorific value of the fuel being consumed).

Fuelling at Sea—H.M.S. 'Delight'

When fuelling at sea with one 6-in hose, a rate of 340 tons per hour has been achieved. Using a second hose aft, there was little or no increase in rate. It is not considered that any small saving in time of pumping is balanced by the added complication of the two hose method, or the extra time taken in rigging for this.

The following remark was made by S.E.O. (F) H.F. :—

From quite extensive previous experience I disagree ; with good drill, two hoses can be handled almost as quickly as one and the second hose should put up the overall fuelling rate by about 50 per cent.

Comment

The fuelling rate achieved with one 6-in hose is noted, but comment upon the merits of two-hose abeam fuelling is reserved until reports on the two hose method have been analysed.

Sharples Lubricating Oil Separators—H.M.S. 'Delight'

The arrangement whereby the motor drives the pump direct, and the centrifuge by a belt, is the wrong way round. If a belt fails, then lubricating oil is pumped to bilge. A watchkeeper is therefore required.

Comment

This will be borne in mind when arranging future supplies of separators. No action is proposed for *Darings*'.

Aeration of Lubricating Oil—H.M.S. 'Delight'

Considerable aeration of the lubricating oil takes place at about 240 r.p.m. and above in 'A' unit and above about 100 r.p.m. in 'B'. This aeration completely alters the appearance of the oil temporarily and at times has given rise to thoughts that the water contamination of last year was recurring. Bearing vent cocks discharge a fair proportion of air at high speeds and, unless the cocks are kept well open, bearing temperatures tend to rise. Reduction in revs. immediately returns the appearance of the oil to normal.

The suction side of the oil system has been thoroughly checked for leaks and it appears that aeration must be caused by churning in the gears, the increased rake of 'B' unit accounting for the greater tendency to aerate there. The quantity of oil in the drain tanks has been kept within the upper and lower limits specified, and it appears that less aeration occurs if the oil is kept topped up to the upper limit.

Comment

The report on the aeration of the lub. oil is interesting. This problem is one that has been investigated but the only methods of overcoming it are either by

re-design of the lubricating oil system to allow more time for the circulating oil to release its entrained air, or a reduction in the viscosity of the oil.

Turbine Glands—H.M.S. ‘ Delight ’

‘ B ’ main engine glands, which always showed signs of leakage, requiring high inner pocket pressures to maintain vacuum and were erected with larger clearances than in ‘ A ’ unit, have recently been forming good seals with much reduced gland steam pressures. This is quite unaccountable, but is coincidental with carrying out the modification described below :—

Main Engine Gland Steam Controllers (J. S. White Design)

Although these controllers have been generally satisfactory, there were occasional fluctuations causing loss of vacuum under certain conditions, usually when altering speed. Examination showed that this coincided with changes of extraction pump discharge pressure. A direct connection from the extraction pump discharge forms the ‘ additional ’ cooling water supply to the condenser unit and joins the leak-off from the control needle valve which forms the ‘ primary ’ cooling water. A high extraction pump discharge pressure tended to back up the control pressure and vice versa causing fluctuations of gland steam supply.

The cooling system has now been modified so that the control valve leak-off is led direct to the pigs-ear and the original ‘ additional ’ cooling water connection now supplies the only cooling water to the condenser unit. This modification has been a complete success and absolutely steady gland steam pressures are held under all conditions.

Comment

Noted with interest. The augmented water supply to condenser was fitted because the original idea of packing the turbine glands with saturated steam, was changed to a superheated scheme. It is assumed that *Duchess* and *Diamond*, who have the same system, will also make this modification.

Boiler Cleaning—H.M.S. ‘ Delight ’

It is perfectly easy to carry out a full boiler clean without removing the cyclone baffles, which are the most difficult items to replace correctly. This means that only a very small area of drum surface is inaccessible for wire scrubbing. This procedure is followed in the American version of these boilers and their written orders specify that the cyclones must never be removed except when absolutely necessary, and cleaning is to be carried out with them in position. It is proposed to follow this procedure in future, cyclones only being removed for boiler cleaning during a main refit and for wear and waste test.

Comment

The proposal to clean boilers internally without removing cyclones is fully agreed with. The cyclones must however be removed at wear and waste tests and main refits.

Diesel Generators—H.M.S. ‘ Delight ’

With return to a colder climate, starting difficulties are again being experienced. Discharging an ether bulb through an inlet manifold plug before starting has been tried with success, when all else has failed.

Comment

In the *Daring* Class, the Paxman 6RPHXZ Diesel generators are to be modified to incorporate air start motors instead of direct air starting when the mechanical superchargers are replaced by turbochargers. This should effect a marked improvement.

Centre Pressure Relief Valves—H.M.S. 'Delight'

These have given repeated trouble with leakage past the valve face—the springs are not now being affected by the steam temperature. Malta Dockyard made great efforts to solve this problem and there are now five different valve lid designs fitted in the six valves in the ship. The design that appears to be doing best has a 45° mitre face and seat.

Comment

These experiments are noted with interest. It should, however, be borne in mind that re-design of relief valves may increase the relieving pressure so much that increased pressure is needed to open the main valve.

Mumford Steadiflow Feed Regulators—Mediterranean Flotillas

Nine different ships have served in the squadron in two years. All have had a lot of regulator trouble. Some ships have had to hand feed for long periods. If the gear is refitted carefully, and all clearances brought back to design figures, the regulator generally works, though it is not as steady as hand feed. Some 370 A's and A's have been brought out for this class of ship during their 10 years existence: very few have been concerned with the main propulsive machinery. It is felt that an A. and A. to fit a more reliable regulator might be justified, even in these times of financial stringency.

Comment

The feasibility of fitting an alternative feed regulator is being considered, but actual boiler-room arrangements and the present doubts upon the complete reliability of any design of feed regulator, make it probable that it will be better to maintain existing regulators correctly, in which event their reliability is not beyond acceptable standards.

A.F.O.s 2293/55 and 2220/55, showing design clearances and giving comprehensive instructions for Steadiflow and Robot feed regulators, have been issued.

Main Gearing—H.M.S. 'Chevron'

Chevron's starboard main gearing had for some months been making a nasty thump as the ship decelerated. This thump normally appeared at about 80 r.p.m. and died away below 50 r.p.m. During refit, the flexible couplings were examined. Although apparently free, the tops and bottoms of the teeth were covered with red rust, which was removed. The noise is now greatly reduced, but not entirely eliminated.

Comment

The first order torsional critical occurs in this speed range. The low torque being transmitted is not sufficient to prevent loss of tooth contact, resulting in the hammering of the gears. The noise is objectionable, but danger of gear damage is unlikely. It is advisable, however, to avoid this speed as far as practicable.

Turbo Generator—H.M.S. 'Comet'

Comet's port turbo generator gearing continues to be unacceptably noisy. Everything else having been checked and found correct, it now appears definite that the new set of gears must have been badly cut originally. A significant point in support of this is that, on the after helix of the pinion, bright wear marks appeared at both ends after only 24 hours running. The middle portions of the teeth hardly seemed to be touching.

The following remark was made by S.E.O. (F) Med. :—

No. 1 turbo generator gearing has so far failed to respond to delicate adjustment. It would appear that the fault lies in the manufacture of the gears—the whole machine will be re-checked during the forthcoming refit at Gibraltar.

Comment

It is agreed that the manufacture of the gears is at fault. Examination of the machine on which they were re-conditioned has revealed errors. This matter is being dealt with officially.

Boats—Mediterranean Flotillas

Generally satisfactory. An annoying feature of the Fowler 2 DY fitted in *Wrangler's* and *Roebuck's* motor cutter is the inaccessibility of the electric starter motor. It is fitted so low down that it is practically in the bilge, and to change it involves lifting the whole engine.

Comment

The Fowler 2 DY is classed as obsolescent for this reason and should be replaced by an Enfield H.O.2 when due for overhaul in accordance with A.F.O. 1789/54.

Boilers—4th Frigate Squadron

These boilers are normally free from pulsation, but it does happen occasionally due to bad watchkeeping. The easiest way to cause it is by forgetting the steam to heater on coming down suddenly from a high power. Pulsation is then inevitable on starting up again. A minor pulsation, which is common to all the ships of this class that have been observed, occurs in the side casings, especially when steaming on three sprayers. No adjustments to setting will cure it and the only ill effects are lost cotters and an occasional joint falling out.

Comment

A more detailed report listing the remedies tried to eliminate the minor pulsation would be appreciated.

Feed Pumps—4th Frigate Squadron

The auxiliary valve rods of the feed pumps have failed on seven occasions in the ships of this squadron. The fractures all appear to have been caused by fatigue and the bending of the rods is thought to have been caused by allowing insufficient play in the auxiliary valve. When these valves are adjusted to give the right feel on the shuttle when cold, they tend to tighten up when hot. Then, if the auxiliary valve face on the shuttle is dished or not true in any way, bending and eventual failure of the rod is inevitable. One failure was attributed to tightness in the knuckle of the valve rod which also caused cyclic bending.

Comment

Position of failure in the rod, number of cycles before failure (approx) and a sample would be of value in determining the exact cause.

Domestic Boilers—4th Frigate Squadron

The fitting of Selectos combustion equipment was warmly welcomed in this squadron as being the answer to two most aggravating problems—the manufacture of large quantities of soot coupled with a paltry supply of hot water. It was a great disappointment to hear, halfway through *Cardigan Bay's* and *St. Brides Bay's* refit that the equipment will not be available for another year, despite early demanding and hastening action by H.M. Dockyard, Singapore.

Comment

Delay in delivery of the Selectos combustion equipment was caused by the necessary redesign of the electrical control. Delivery is expected to start early in 1956 and equipment should be available in time for fitting during ships' next normal refits.

Steam Valve Maintenance—H.M.S. 'Virago'

There has been an unduly large expenditure of labour on the refitting of small steam valves, which have given repeated trouble. These valves are all non-ferrous, are in places where drainage is likely to be inadequate, and have suffered drastic erosion of valve lids and seats. The remedies would seem to be the replacement of the erosion-susceptible non-ferrous valve by erosion-resistant valves and fitting improved drainage in the associated steam lines.

Typical of the offending valves are :—

Capstan master valve

Capstan drain cocks

Syren master valves

Syren valves

Auxiliary feed pump steam and exhaust valves

Engine room F.F.O. pump steam valve

F.F.O. heater steam valves

Fire extinguisher steam valve

Bilge ejector steam valves

Air compressor steam and exhaust valves.

Comment

E.-in-C. is investigating these proposals, which are agreed with. It is suggested that, in the meantime, defective valve seats should be repaired where possible by screwing in seats of monel or other hard, stainless material and replacing valve lids in the same material. Capstan drain systems are already under review.

Lubricating Oil—H.M.S. 'Urchin'

In *Urchin* during basin trials in March 1954, before commissioning, it was noted that the lubricating oil became very 'muddy' in appearance, despite the fact that the lubricating oil separator was run as often as possible. Samples were sent to the Chief Scientist, Admiralty Oil Laboratory, who reported them to be satisfactory, and suggested that the emulsification was due to rust and other impurities left in the lubricating oil system after refit. He advised separating the oil as hot as possible. After about six months steaming, the oil eventually became clear.

In December 1954, the drain tanks were emptied in order to repair the drain tank levelling valve. The old oil was returned to S.N.S.O. and the tanks refilled with new O.M. 100. Once again the oil has taken on a muddy appearance which the separator fails to remove. An explanation of this would be appreciated, as it is felt that turbine oil should normally remain clear.

Comment

The tendency of O.M.100 to retain small amounts of water and thereby remain clouded is well known to E.-in-C. It is due to the additives which are included in O.M.100 to improve its anti-rust, anti-foam and anti-oxidation properties. In the case of the oil embarked after the refit, the factors mentioned by A.O.I. would undoubtedly contribute.

An oil will not appear clear unless all free water is removed, but the amounts of water which will be held by O.M.100, if the centrifugal separators are operated in accordance with B.R.16(50) article 58, are very small and will not affect its lubricating properties. It is fully appreciated that once an oil has become cloudy there is at present no means of assessing any increase in the water content of the oil, and efforts are therefore being made to find a simple apparatus to issue to ships, to enable them to estimate the water content of their oils.

Turbo Generators—Third Training Squadron

In *Relentless* one T/G has had a recent history of bent pinion shafts. In *Urchin*, the overspeed trip has been very erratic on one machine. Lately a ridge was found to have been worn in way of the spring washer which was restricting movement. Faulty governing has on several occasions been traced to bent governor valve pilot springs. A locating hole has now been drilled in the pilot valve sleeve to steady the free end of the spring. *Relentless* had encouraging results with the setting of the overspeed trip gear by checking the force required just to move the trip ring against the action of its spring. This was done by connecting a spring balance to a strop around the ring. The washers were then adjusted to give a pull-off figure known to be related to a given tripping speed from previous experience.

An incident did occur on *Volage* which has Fraser Chalmers T/Gs. During particularly heavy weather, some dirt in the oil sump was disturbed and choked the Auto Kleen strainer supplying bearing oil. Unfortunately the relay oil strainer, and hence the pressure, were unaffected and the machine continued to run with detrimental effect to the bearings. A low bearing oil pressure trip is a deficiency in an otherwise well designed and reliable machine.

Comment

A B.R.1988 article, based on M.E.D. Rosyth's memo No. 2/54—*Setting of Brotherhoods Overspeed Trip Gear*—is being prepared.

The absence of a low bearing oil pressure trip on G.E.C. T/G's will be borne in mind for new construction sets.

Fire Fighting and Damage Control—Third Training Squadron

Exercises, during inspections, held over the past year, have shown that junior ratings know how to handle the equipment but that senior ratings want to use the equipment themselves, rather than direct operations and organize parties to determine flooding and fire boundaries.

It is a continual battle to prevent A.B.C. markings being painted over. A more permanent tally is required rather on the lines of the 'XYZ' and 1950

markings. The stud welding, securing the latter frequently breaks. Drawings showing A.B.C. markings would be a great assistance.

The quick acting wedges provided on ventilation covers are most unsatisfactory. Being secured to the mushroom head by a light chain only, they soon break off and become lost. In addition, to secure the cover sufficiently firmly to exclude gas, it is necessary to drive the wedge in with a hammer. This often results in the clip breaking off. It is suggested that the type of dog provided on R.U. ammunition lockers would be very much more suitable.

In *Urchin* it has been found that the telephone communications to the D.C. sections are inadequate. It is suggested that they could be considerably improved by providing a plug-in socket in each watertight section and making portable one of the two telephones provided. The section leader would then have a telephone available close to the scene of the damage. It is also suggested that a direct telephone is required from H.Q.1 to the bridge.

Comment

The search for a better method of tallying A.B.C. markings continues unabated. The latest and most promising is a stick on type, whose stick appears to be impervious to heat, cold, wet (salt and fresh) and dry conditions. These are now being tried out in selected ships.

Other points are being taken up with D.N.C. and D.N.E.

Boats (Enfield Diesels)—Third Training Squadron

The position of the starting handle on these engines makes starting difficult, especially in cold weather, even with other assistance. Although very little experience has yet been gained, a motor boat engine with neither circulating water nor ignition should prove a great asset.

Comment

Modified starting handles are being investigated and an improved starting aid is being introduced.

Condensers—H.M.S. 'Loch Veyatie'

One main inlet pipe started to leak. Upon investigation severe pitting was found near a flange. The other pipe was examined and found to be in a similar state. One has been renewed. Renewal of the other has been deferred until docking because of the difficulty found in removing it. A distinct bulge for about half the diameter of the pipe at the roots of one flange seemed to suggest that at some time, there had been a movement of the hull.

Comment

Drawings show the pipes to be copper. The pitting appears to be corrosion-erosion, if it is on the downstream side of the flange and adjacent to a gunmetal fitting, which will be slightly cathodic to it and thus stimulate corrosion. Renewals should be in copper-nickel iron and care should be taken to see the flanges mate properly internally and that jointing, if any, does not protrude into pipe, where it will set up eddies.

Automatic Gland Steam Arrangements—H.M.S. 'Urchin'

It has been found that although the deadweight valves are very reliable, the minimum pressure which can be maintained in the gland steam system is about $1\frac{1}{2}$ lb/sq in. As the ship is not fitted with gland evacuation arrangements, this

causes unnecessary leakage at the turbine glands, and it is therefore found to be better to use the old manual control for gland steam.

Comment

The controlled pressure can be adjusted by the weights on the valves. Stickiness of the leak off valves may be responsible for lack of sensitivity of control, but this fault usually results in violent pressure fluctuations in addition to high pressure.

Oil Fuel Heater Observation Tanks—Third Training Squadron

Considerable quantities of water are wasted from these tanks by boiling over. This is due to the necessity to leave oil fuel heater drains partly open and to control the fuel temperature by varying the steam supply. Controlling the fuel temperature in the normal manner is not practicable during A/S exercises, as the heater is unable to keep up with the rapid fluctuations in output. It is suggested that this could be largely overcome by fitting a suitable steam trap to the F.F.O. heater drains, with a by-pass in case of failure or inadequate fuel heating.

Comment

The suggestion is agreed with and is used in new construction.

Capstan Machinery—Third Training Squadron

Wizard, *Relentless* and *Urchin* have had trouble with excessive condensation in the capstan flats. This matter is still under investigation while the arcticization and drainage arrangements for these ships are being checked, to find whether they conform to the original specifications.

Comment

A different heating system is being tried and, if satisfactory, will be adopted. Flanges and valves will be used instead of unions and cocks.

Lubricating Oil Consumption—H.M.S. 'Loch Alvie'

Lubricating oil consumption has averaged 4.2 miles per gallon. Shell Nautilus 72 was in use but was restricted to the mechanical lubricators, as its emulsification properties are inferior to O.C.160. Reversion to the use of O.C.160 only in November and December gave consumption figures of 4.4 and 4.7 miles per gallon which compared with the June figure of 4.6 miles per gallon when Shell Nautilus 72 was first used. Ambient temperatures for June, November and December are similar. It is now thought that, although no bearings troubles have been experienced and only 4 in number crankheads had to be adjusted during the period, it had little to do with the type of oil used.

Comment

By making a comparison with the previous report on the matter, it appears that training of personnel, rather than the oil, is responsible for the improved consumption.
