



H.M.S. 'DIAMOND'

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

Comment by D.E.M.R.

An Interesting Phenomenon—H.M.S. 'Diamond'

On passage from Naples to Toulon, a small leak was noticed in the joint between the superheater outlet pipe and the safety valve on 'A' boiler. On lighting up again, four days later, the leak became very bad. When the boiler was at 650 lb/sq in and the steam temperature at 500 degrees F., it was connected to the auxiliary range and the leak was again examined. A most peculiar phenomenon was noticed. Where the steam issued from the flange there was a

bluish-violet light, about 1/10th inch in diameter, which extended round the flange for about $\frac{1}{4}$ inch. It remained in exactly the same position unless physically disturbed. When touched with the tang of a file the light could be moved round the flange from one to two inches, when it became so attenuated that it disappeared. Immediately the file was withdrawn, the light reappeared in its accustomed place.

The light was very similar to a small intense blue flame, but a pencil held against it did not char.

It was necessary, for other reasons, to shut down the boiler and the light disappeared when the steam pressure had fallen to between 550 and 450 lb/sq in after an interval of between fifteen minutes and one hour. The boiler was flashed up again after three hours and was connected to the auxiliary range at 650 lb/sq in and 520 degrees F., when the light reappeared. It continued to be noticeable until the steam temperature was increased to 650–700 degrees F., while warming through main engines, when it became smaller and intermittent. It finally disappeared when main engines were turned under steam and the steam temperature was about 800 degrees F.

It is not considered likely that the light was reflected from any other source because it was carefully shaded, at various times, from all outside sources. The observations recorded here were made by a number of reliable witnesses.

It is thought possible that this phenomenon may have been caused by hot dry steam, issuing from the leak at high velocity, striking a cool wet atmosphere, from an adjacent steam leak, and setting up an electro-static field of sufficient intensity to cause a glow of this nature.

Comment

It is known that water vapour, escaping in the manner witnessed in the leaking main steam joint, can become frictionally ionized. The re-combination of the ions after escape from the gland would give the blue 'flame' or glow provided the concentration of ions was great enough. In this case, it would appear that this was so when starting up and for some time afterwards, but with increasing temperature (and presumably pressure) the ions became sufficiently scattered for the blue glow not to be seen, although the re-combination would be taking place continuously. The period of intermittent light would be consistent with this explanation, as this would naturally occur as the critical velocity was approached. The blue 'flame' associated with ionic combination would be associated with low temperature so that it would not be expected to char wood.

Experimental equipment was set up at the Admiralty Materials Laboratory in an attempt to reproduce the conditions in *Diamond*. Various experiments, however, were unsuccessful and it is thought that, though the steam conditions could be reproduced, it was impossible to simulate completely the nature of the crack and the thermal environment of the ship's steam pipes.

Nevertheless, the probable explanation of the phenomenon is an electro-static discharge caused by a combination of steam pressure, temperature and nature of crack.

COMMENTS BY E.-IN.-C.

Turbometers—H.M.S. 'Vigo'

During the past year a great deal of trouble has been experienced with turbometers supplied by Messrs. Chadburns Ltd. Each has had to be returned

to the M.E.D. Factory, Portsmouth, on two separate occasions when it could ill be spared in view of the ship's programme, and both are now being repaired for the third time. It is felt that the needless complication of these instruments does not suit them to use in destroyers.

Comment by S.E.O.

Personal experience, while serving in the S.P.D.C., Hong Kong, showed that constant trouble was experienced with these turbometers by ships of the 8th Destroyer Squadron. They appear to become unreliable after considerable use and repairs frequently fail to give lasting satisfactory service.

Comment -

It is realized from previous reports that the Chadburn turbometer becomes a source of trouble after considerable use. In new construction vessels, such as Types 12 and 14 Frigates, an Admiralty Mk. II turbometer, of improved design, is being fitted. These instruments are robust but extremely sensitive, and require to be driven through a carefully matched transmission.

It is not the intention to replace Chadburn turbometers in existing ships.

Evaporators—H.M.S. 'Vigo'

It is considered that the standard of watchkeeping and the quality of water made would be greatly improved by replacing the present warning arrangements, red lamp burning at 0.5 grains per gallon, with a Crockatt salinometer which gives a continuous graphical record of the salinity of output. No actual salinity reading is possible at present, and each set could quite easily be distilling water, fit only for ship's tanks, to a reserve feed tank.

Comment by S.E.O.

It is agreed that a continuous graphical recording salinometer would provide an additional safeguard against production of bad water. A duplicate instrument mounted, where practical, at a main engine or boiler control position, would provide still further protection.

Comment

A recording type salinometer would be a great improvement over the existing warning-light system. An A. and A. should be raised to cover this item.

Habitability of Machinery Spaces—H.M.S. 'Vigo'

With unlagged deckheads, *Vigo's* machinery spaces become drenched on each occasion of lighting up, with the result that rusting occurs to such an extent that it gets out of hand and heavy corrosion occurs. It is hoped to get each deckhead cork-cemented during the present refit but it is felt that this will only alleviate the problem to a slight extent. A good deal of condensation could be avoided by replacing the present open pig's ear with a closed drain system and Yarway impulse traps, thus preventing condensation at source.

Comment by S.E.O.

Concur in the suggestion that a closed drain system should be fitted and consider that some form of deckhead lagging should also be applied to avoid condensation from miscellaneous steam leaks.

Comment

It is agreed that vapour suppression at source would improve atmospheric conditions and would be an advantage under closed-down conditions. It is, however, doubtful whether it can be justified except in ships due for modernization or conversion.

The observation tanks, to which the F.F.O. heater drains are led, are one of the main contributors, with their occasional 'boiling', to the boiler room sweating. To reduce this boiling, together with reduction in feed water consumption and the watchkeeping task, action has been initiated to fit steam traps to the F.F.O. heater drains for trial in *Zest* and *Grenville*.

There is some danger that lagging the deckheads may merely mean that corrosion will occur unnoticed.

External Boiler Cleaning—H.M.S. 'Redpole'

Both boilers were cleaned externally by water washing and on removing the casings after steaming for about 20 hours at light load, to dry out, a fine black powdery deposit was found generally throughout the boilers. This deposit did not appear to be soot, and it is thought that it might have been due to the burning of the Box Filling Compound, Grade A, which is specified in A.F.O.2511/55 for sealing the brickwork before washing.

The supply of water washing gear from S.N.S.O. is not yet complete, the lances and header being outstanding. Apparently these items have not yet been supplied by the manufacturer but demands will be met as soon as the items are available.

Comment by S.E.O.

It is considered highly probable that the black deposit emanated from the Box Filling Compound.

Comment

The supply of water washing gear is progressing, but ships must be patient as this is rather a big undertaking.

External Boiler Cleaning Periods—H.M.S. 'Redpole'

The period between external cleaning of boilers seems to require review. For example, a ship may clean boilers on going for refit, which in some cases is 10 or 12 weeks. During this period no steaming is done, but the boilers are again due for external cleaning after very little steaming. There are also large differences in the numbers of hours steamed by ships in a 3-month period, and it would appear that external cleaning after a given number of hours steaming would give a more regular and efficient routine.

Comment by S.E.O.

External cleaning on 'hours steamed' would form a more realistic basis. When boilers are externally cleaned before refit, care must be taken to ensure that the funnel cover is sound and correctly placed in position; also, depending on the probable weather and duration of refit, consideration might be given to a mild form of preservative being applied to the external surfaces to avoid corrosion.

Comment

Examinations of the external surfaces should be carried out at regular and

frequent intervals, the extreme limit being three months. B.R.16, Engineering Manual, Art. 200 refers.

In view of the varying conditions of steaming a boiler, deposits of soot, etc., may not be in proportion to the hours steamed, and cleanings at the discretion of the E.O. should result in a more efficient boiler than stipulating a definite number of hours steaming between external cleanings.

It cannot be stressed too much that it is of great importance, both from considerations of fuel economy and for the efficient preservation of a boiler, that the external surfaces are kept free from moisture, accumulations of soot, etc., and that uptake rain-water catchments and drains are examined frequently, to ensure a satisfactory state of cleanliness at all times.

Portable Pumps—H.M.S. ‘ Fleetwood ’

A suggestion was made that Ingersoll Rand portable air-driven pumps should be supplied for damage control, because of their greater convenience in handling. However, the Victor Cub Diesel-driven pump at present supplied could, with comparatively little modification, be made much more portable. The pump is driven through a coupling of the driving stud type and can be disengaged simply by removing the pump holding-down bolts (4 in No.) and pulling clear of the driving studs of the coupling. There is also a circulating water pipe from the pump discharge to the driving end. This could be of the flexible quick-release type (such as the foam pipe from a knapsack container to its foam-making branch-pipe). With a simple box-frame base, dowelled for correct and accurate alignment of the pump and engine, and omission of the tubular frame now provided for handling and protection of the combined unit, many of the difficulties of transporting this cumbersome assembly would disappear. It would only be necessary for the base and pump (the two lightest units) and finally the heavier engine unit to be transported quickly and easily and reassembled. With regard to the air-driven type pump, it must be borne in mind that many ships have no suitable air supply to enable them to be used.

Comment

In addition to the gas turbine pump, which is unlikely to be available for a considerable time, trials are in progress of a light weight Diesel pump of similar performance to the existing one but with an all-up weight of about 400 lb. It is much smaller and more compact than the present pump. If final trials are successful this pump will be available considerably sooner than the gas turbine pump and will, complete, weigh only a few pounds more than the heaviest component of the Victor Cub unit.

Diesel Driven Auxiliary Generators—H.M.S. ‘ Rampart ’

A recurring defect in the Paxman 4 R.Q. has been the sticking of the fuel injector pintle valve in a set position. This is presumed due to long periods of running with no appreciable change of load. In future it is proposed to clean and test these injectors at 25-hour intervals instead of 50-hour, as laid down in S.1195.

Comment

Other possible, and probably more likely, causes of this defect are :—

- (a) Dirty fuel
- (b) Corrosion of the injectors in store.

More modern engines have recommendations of 500 to 1,200 hours running before attention is given to the injectors.

With reference to (b), if fuel is used for testing injectors and they are subsequently kept for a period, it is possible that the sulphur content may cause slight corrosion causing a tendency to stick. Use of Patt. 1168 preservative oil (PX4, C.S.1663) is suggested as an alternative for testing, pending the introduction of a new preservative oil which is being investigated. Should the defect persist, E.-in-C. would be interested to see a sample defective injector (uncleaned) as taken from the engine (addressed to E.-in-C., M/ICE).

The S.P.D.C. Organization—H.M.S. ‘Vigo’

Although it is appreciated that the present S.P.D.C. organization is still in its infancy, three major drawbacks have been noted :—

- (a) The delay between order and delivery is too great.
- (b) Decentralization is poor, i.e. there are no sub-bases, other than Naval Stores, if these can be classed as such.
- (c) Documentation seems to be of too low a standard to render the S.P.D.C. idea a workable one.

Enlarging on the above, it is felt that (a) and (c) may to some extent be complementary. Thus an unskilled man may spend days, even weeks, trying to identify an item. The mere mention of the item should be sufficient for a complete recognition from Stat files, books of reference or machinery drawings, and thumbing through a weak collection of sub-standard makers' handbooks and dog-eared prints should be unnecessary. Each class of ship should have a D.320 giving complete identification details (i.e. Drawing No., Item No. or N.S. Patt. No.).

Sub-depots should be established in each dockyard. At present I await delivery of items ordered well over 12 months ago.

Comment

Documentation is being carried out by the issue of Parts Identification Lists in accordance with A.F.O.2666/55, which should remove any difficulties of identification in spare parts. The process is, however, slow and it will be some time before every ship has a P.I.L. to cover every type of equipment. New ships will get a D.787 of which the D.787J pages will give complete identification details. Application to existing ships is under consideration, the main difficulty is to find a competent authority who is sufficiently under-loaded to undertake the work of compiling the form.

Sub-depots have not been established in dockyards for a variety of reasons, not the least being difficulties in finding the necessary personnel and the large spaces that would be required. They are, however, being borne in mind as a possible future requirement.

The criticism of delay between order and delivery conflicts with the general opinion among other ships. Full details should be forwarded to E.-in-C. for investigation, particularly in the case of items still awaited after 12 months.

Spare Gear—H.M.S. ‘Redpole’

Several items of spare gear supplied have been found to be of incorrect size or pattern. As these items have been preserved when received and distinctly marked ‘Do not open until required for use’, it is distressing to find that when required they do not fit. It also tends to destroy the scheme of preservation

and packaging, because the consequent natural tendency is to open spare gear on receipt to check that it is the item demanded. Examples of this are :—

- (a) Air pump plunger rings
- (b) Steering engine governor valve
- (c) Kinghorn valve plates for air pump paragon valves.

Comment

In cases where the S.134 is made out correctly in every detail, the supply of wrong sized spare parts can only be attributed to a mistake on the part of the S.P.D.C. or a contractor, which must be regretted. Details of errors discovered should be fully reported.

Spare Gear—H.M.S. ' Lysander '

No difficulty has been experienced in obtaining standard items of spare gear, and the organization seems to be basically sound except in the case of certain non-standard items. Spares for piston and valve rod gland packing and wiper gland packing for the ship's main generators have been on order since September, 1955. The piston and valve rods have been machined in the past to non-standard sizes and any spares have to be ordered from the manufacturers by separate contract. Even so, the delay is considered excessive. The required delivery date was December, 1955.

Comment

It is impracticable to cater for non-standard spares throughout the entire range stocked by S.P.D.C.s. Delays due to separate contracts having to be placed must be accepted. Manufacturers can be hastened up to a point, but the priority they set for Admiralty work must depend on their other commitments, e.g. industry, export, etc.

The S.P.D.C. Organization—H.M.S. ' Fleetwood '

The S.P.D.C. organization works efficiently and there have been no difficulties in obtaining the more usual type of demand. In cases where the wrong procedure has been followed in making the demand, the required items have been supplied where available, as well as helpful information as to the correct procedure.

A useful suggestion which has previously been made is that the S.P.D.C.s should be established locally, where one could literally go ' shopping ' with a book of S.134's. This is almost the system used in the Far East.

Certain items requiring fairly frequent renewal, e.g. combustion equipment of main boilers, can be quite difficult to obtain in practice. A demand through Naval Stores involved a lengthy exchange of signals with S.N.S.O. and M.E.D., numerous telephone calls, and finally reference to A.F.O.4845/46 which still happens to be available on board. The outcome is that the items have to be specially manufactured by contractors, although, according to the A.F.O., stocks are maintained in all dockyards. It seems likely that the S.P.D.C. organization is more familiar with the nature of the items they deal with than S.N.S.O. in this type of transaction, and consequently have a more urgent interest in maintaining stocks. Briefly, is it possible for S.P.D.C. to take on responsibility for the supply of Engineers Special Stores ?

Comment

Complimentary remarks are much appreciated.

The question of Engineers Special Stores is under consideration, but it is

probable that Special Stores Lists will be abolished and all items will either be patternized or become items of Spare Gear.

Boilers—H.M.S. ‘ St. Bride’s Bay ’

While the boilers were being examined, it was found that the internal feed pipes were fitted with the discharge perforations facing downwards instead of upwards. They have been fitted in this way for at least two years. It seems desirable that the flanges on such fittings should be so designed that incorrect assembly is impossible.

Comment

It is agreed that this should be arranged, but careful replacement should normally prevent such a mistake. Later design arrangements are such that incorrect assembly is not possible.

Compound for Boilers—Fourth Frigate Squadron

Dampier reports difficulty in accurately dosing boilers with compound through the auxiliary feed pump suction because it lodges in the pump valve chest. This trouble has not occurred in *Cardigan Bay* or *St. Bride’s Bay*, possibly because they use a weaker solution. However, the fitting of dosing pots would definitely be a convenience.

Comment

The use of a weaker solution is undoubtedly the answer. Dosing pots are not considered necessary.

Boats—H.M.S. ‘ Dampier ’

The coupling on the fuel pump drive shaft of a Dorman 4 DSM has worked loose. This coupling is secured by a tapered cotter pin and a Woodruff key. It appears that the key prevents the cotter pin from fitting accurately. As a temporary measure the key has been removed, the cotter pin only being used to secure the coupling. This has so far been successful.

Comment

No previous complaints of this nature have been received so it would appear that the design is basically sound. There is every possibility, however, that during refit the cotter and/or key were damaged or distorted, so preventing them from bedding in properly when used together.

There are two ways in which the key can prevent the cotter from fitting : it can be lifting the coupling on the shaft or it can cause malalignment of the reamed hole in which the cotter fits, by moving the coupling rotationally. In either case, simple fitting should cure the trouble.

Fire Fighting and Damage Control—Fourth Frigate Squadron

The work of maintaining markings continues to be a problem. It is felt that the 1950 marking system barely repays the effort spent on painting in these small ships, some compartments are invariably referred to by name, and known by all the ships company.

Comment

It is realized that in small ships the use of A.B.C.D. markings instead of

well known popular names is probably superfluous, but it is considered that by this means men will become familiar with the principle of these markings, which will stand them in good stead when they find themselves in a large ship.

Lighting up Arrangements—H.M.S. 'Contest'

Lighting up arrangements, consisting of a 'U' tube with retarder, are inadequate. Class A and A, item 264 (classified 'B') authorizes the fitting of improved arrangements. There appears to be no common policy in this matter—some ships having a Diesel oil bottle with a 'W' tube. In view of the unpopularity of smoke, it is considered that the provision of smokeless lighting up equipment deserves high priority.

Comment

The development of a portable lighting up device is in hand for all ships of pre-*Daring* design. In the meantime, a device, which was the subject of a recent award, suitable for Admiralty enclosed registers, with deep air box, is shortly to be promulgated by A.F.O.

Boiler Feed Regulators—H.M.S. 'Comet'

One feed regulator started feeding erratically and application of A.F.O. 2293/55 indicated excessive feed check valve clearance. An oversize valve, from S.P.D.C., was turned to size on board and since fitting has given satisfactory service. It was noted that the new valve differed from the original in that it was of monel metal instead of gunmetal and the skirt guide had been omitted.

Comment

The gunmetal 'winged' valve has been superseded by the monel or stainless steel 'unwinged' type. The wings were thought to increase the rotation rate, and consequently the wear rate, of the valve.

On the next opening, careful check should be made to ensure that there is a small but definite 'seat' for the button of the valve spindle on the head of the feed valve, a sharp edge to the balance hole may lead to abrading of the metal and seizure in the top skirt, when on hand feed.

Boiler Feed Regulators—Third Destroyer Squadron

All Improved 'Steamflow' Steadiflow feed regulators have given trouble. In *St. Kitts* there is a general lack of confidence in the feed regulators by the petty officers who change over to hand feed at the slightest excuse. In *Saintes*, the trouble has been traced and rectified. Examination and gauging of the feed check valves showed the maximum clearance of 0.004 in between either the top or bottom skirt and their respective liners. The top skirts on each were found to be scored and on one occasion the skirt was slightly seized in its liner. This was found to be due to small particles of metal torn from the button of the check spindle when it was closed by hand. The button comes into contact with the feed pressure supply hole to the top piston. This hole is tapped to take a withdrawing bolt.

With feed pump pressure on the check, it was found that the main feed checks did not govern the flow of water but followed the check valve spindle as it was opened. The sealing of the leakage hole and the tearing of the metal from the spindle button could easily be prevented by a small modification.

Comment

The tendency of the feed regulating valve to follow the hand feeding spindle as it is lifted is common to all designs of Improved Steadiflow regulators. The shut-off action of the spindle in the head of the regulating valve is a necessary feature to give tight shut-off to the feed check. (A.F.O.2293/55, para. 9 (1), refers.)

In order to reduce the tendency for the spindle button and/or valve head to abrade, a small but definite seat should be formed on the head of the regulating valve.

Steering Gear—H.M.S. 'Saintes'

The port steering gear motor and pump unit have been found to be out of alignment to the extent of over 0.04 in. The flexible coupling washers (leather and fibre) have failed to accommodate this malalignment after four months running. The gear is J. Hastie & Son, Type H.P.9. The pump is positioned by fitted bolts and the motor with bolts with no arrangements for re-alignment. A bad design feature is that the coupling bolts cannot be withdrawn without clearing away the motor (a large one ton weight in the restricted space of the tiller flat). It is unfortunate that such expendable items as spare washers for the flexible coupling are not allowed in the establishment of spares carried on board.

Comment

It is agreed that no special arrangements are made for re-alignment but it is considered that the motor could be lined up to the pump without much difficulty.

No real difficulty would appear to exist in removing the coupling bolts which withdraw towards the pump. Reference to the necessity to remove the motor is not fully understood unless it is the intention to remove the pump coupling which does not seem necessary.

The coupling washers referred to are included on List of Spare Gear Drawing No. C.2776. Quantities as follows :—

Pawl Coupling Leather Washers	..	18 in No.
Pawl Coupling Red Fibre Washers	..	12 in No.

Pipe Systems and Valves—Mediterranean Flotilla

The time spent on refitting, rejoining and repacking on systems and valves is undoubtedly the largest single item on which available man-hours are expended.

The most common defects are :—

1. Aged packing and worn valve lids
2. Leaking drain cocks and valves
3. Leaking steam and water valves
4. Corroded nuts and studs
5. Corroded valve spindles
6. Damaged threads
7. Broken studs
8. Cracks, pinholes, faulty welds, etc.
9. Over-tightened nipples.

It is realized that such defects have always been with us, and no general recommendations can be made to prevent them. It appears, however, from

very good knowledge of the schemes drawn up for the planned maintenance of small ships, that there is a danger that insufficient allowance for such unplanned items may be made by the planners.

Comment

Class Authorities fully appreciate that defects on pipes, valves and systems take up the majority of man-hours devoted to break-down maintenance. When estimating the total upkeep required for machinery, a figure of 25 per cent of the preventative maintenance is used as an estimate of the break-down maintenance to be expected from ships running on planned maintenance. There is no evidence as yet that ships can in fact achieve a figure as low as 25 per cent, but this figure is considered realistic for a ship which starts off with no defects and all preventive maintenance up to date.

This 25 per cent is only intended to cover the inevitable stupidities which must always be there—the man who actually does drop a spanner in the works, etc.—the maintenance schedule which is not quite right or the genuine accident. It is not intended to permit the continued existence of stupid defects. These must be removed by modification.

Action is in hand to :—

- (a) Investigate packing materials to find one which does not age or cause spindle corrosion.
- (b) Develop a new design of nipple coupling.
- (c) Promulgate improved repair methods for non-ferrous valves and seats.
- (d) Replace cocks by modern screw-down valves.
- (e) Prepare guidance notes on use of correct materials.