MARINE ENGINEER OFFICERS' CONFERENCE, 1970

The fifth Marine Engineer Officers' Conference was held in the Trident Hall, Royal Naval College, Greenwich, on 24th April, 1970. The theme of the conference was 'The Management of Material'.

The Chairman, Vice-Admiral R. G. Raper, said in his opening address that he hoped the main value of the conference would be to provide an opportunity for a good cross-section of the ME officers of the Fleet to air the problems which beset them. The conference would not provide solutions but was a communication aid to identify and explore persistent problems. Constructive comment was required from the floor in dusting off these problems and efforts must be aimed at devising possible solutions and identifying requirements for the future.

Captain J. R. Llewellyn introduced Commander T. Jefferis who gave a talk on his experience of one year's operation of gas turbines in H.M.S. *Exmouth*. After overcoming an initial set-back requiring the fitting of a cascade bend in the intake, the Olympus gas turbine has run 2200 hours virtually trouble free. There were a number of detailed improvements to the installation concerning water exclusion modifications being incorporated during the present period at Chatham.

Comments from the floor included a reminder from Commander Harris that had *Exmouth* been under evaluation in the air engineering world, the instrumentation for trials would have been more sophisticated. The speaker was also invited to comment on Bridge Control of engines, and gave the opinion that had controls been fitted in the bridge wings, more use would have been made of them particularly when coming alongside. The ship did not spend much time in bridge control as the requirement had not arisen. In reply to a question on the use of non-destructive testing techniques, the speaker felt that the vibration analysis and monitoring arrangements were good and that there was much scope for non-destructive techniques in gas turbine ships of the future.

Captain Llewellyn closed this session saying that *Exmouth* would run for a further two years to build up more experience of gas turbine propulsion plants ahead of the Tyne/Olympus installations being fitted in new ships.

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Commander J. C. Judge, the MEO of H.M.S. *Juno*, followed with an interesting talk on the management of a refit from the MEO's point of view. He said that his idea was to throw a few pebbles into the pool concerning refits with the object of stimulating ideas and discussion from the floor. His talk was chiefly about a frigate refit and therefore only partially applicable to the problems of carriers and G.M.D.s. He also noted that the four dockyards, because they appear to work differently, tend to throw up different problems—apart from their own geographical differences. A condensed version of the text of his talk is given below.

MANAGING A REFIT—AN MEO's VIEWPOINT

The broad-brush headings of a refit may be divided up into the following:—

(*a*) Alterations and Additions

(*b*) Pre-refit trials and WFTS pre-refit inspection

(*c*) Defect list production

(*d*) Planning and co-ordinating dockyard and ships staff work

(*e*) Living conditions

(*f*) HATs and SATs.

Before contemplating a refit nowadays, it is wise to consult Fleet Technical Orders well in advance, particularly if one has never before been responsible for a refit. It also helps in finding out the latest fashion concerning timing and conduct.

Alterations and Additions

With regard to As and As, things have improved; the ship is now allowed officially to have a small say in which As and As are to be undertaken by submitting their 'top twenty' to the SCRUTIT meeting. *Juno* was very pleased that they were able to get a high percentage of their list done at this time. A persistent difficulty is that the ship is never given sufficient details in advance about the As and As once it has been decided what is going to be undertaken. Such early information would help planning and possibly affect the defect list. *Juno* had one particular ventilation A and A which entailed much more of an upheaval than was envisaged.

W.F.T.S. Pre-Refit Inspection and Trials

These are a very necessary evil; they do ensure that the defect list is comprehensive but they can be a nuisance as far as the ship's programme is concerned. *Juno* happened to be in the Far East having an Annual Inspection when these pre-refit trials were due. Without careful planning this can produce a clash of organizations, in this case almost an eyeball to eyeball confrontation between COMFEF and C-in-C WF over who should inspect what and when. The poor old ship was the meat in the sandwich and in fact the visit programme had to be altered to fit in with the movements and commitments of the inspection teams. The resistance to the visit was due to the availability of qualified staff on the spot, who had already carried out most of the inspection and trials required, and also to save extra work for the ships staff.

Defect List Production—Is a Defect List Required?

If one has to produce a defect list there is no better place to do it than on Beira Patrol—there are no interference factors. It is certain, however, that some of this nugatory work could be reduced if we tried to streamline this chore. Looking at the subject in more detail we have:—

(*i*) *Composition of Defect Lists*

All the routine items are covered by master plans and maintenance schedules. However, it would be much easier if there was, say, a standard docking and defect list for a normal refit of a *Leander*. The ship's officers need only add their list of job cards and any variation of the routine maintenance items as a result of the master plan. This could readily be done in the Type Yards.

(*ii*) *Defect Items/Job Orders*

In some Yards a job order is made out to cover from one up to as many as four different list items, and that job number is the only number recognized by the inspector/chargeman and below. This tends to make

the defect list redundant. Any planning information returned to the ship such as job orders and work schedule is always a great help, especially if it is before the refit conference.

Planning and Co-ordinating Dockyard and Ships Staff Work

When planning, *Juno* had one big problem: the length of the refit was not stated until one week before arrival back in the United Kingdom.

In FTOs there is a recommendation that the ship should appoint one officer, preferably not one of the technical officers, as the Refit Officer. In *Juno* the obvious choice was the Supply Officer — his assistant was the P.O. Caterer, an excellent and conscientious petty officer. It was their task to try to co-ordinate the monitoring of progress of the two technical departments. The mobile refit office was used for this task, each department updating their progress charts weekly — dockyard progress meetings normally being monthly. *Juno* used a simple progress chart based on the dockyard schedule. The welding sentry organization, another necessary chore, was also run from the mobile refit office. This worked reasonably well using all departments and only occasionally broke down through bad communications. The Chief M(E) was in charge of this operation while the Master Gunner became the Fire Prevention Officer.

Commander Judge considered that the success of a refit depended very largely on how closely the ships staff are able to monitor dockyard progress, provide continuity and have an amicable working relationship with the Yard at all levels.

There are three main interference factors:—

(*a*) Leave

(*b*) Courses

(*c*) Ships staff work

Leave

In a General Service Commission it is essential that the ships company do not start off with a backlog of leave and certainly one department should not suffer, compared with the remainder. One suggestion was to have two technical crews, Red and Gold, or to be 30 per cent over-complemented with senior rates for the period of the refit.

Courses

It was essential to persuade the Captain and seaman officers to do their Command Team Training and P.C.T.s early on in the refit, which means early booking, so that it is not left to two or three technical officers and the Pusser to cope with duties, defaulters and operational programmes at a critical period. This was where the private ship with fewer officers suffered most. These ships should, however, have the wisdom and advice of W.F.T.S. or their local representatives, who are able to assess early on any danger signals concerning the ship's programme. If this programme slips beyond retrieval it is important to persuade the dockyard to put the date out early rather than at the last moment, and so prevent any catastrophe due to skimped finish or unsatisfactory setting to work.

Ships Staff Work

The amount of ships staff work can be eased tremendously by the help of the Fleet Maintenance Group. This allows the ships staff to be more closely concerned with monitoring dockyard progress. *Juno* monitored progress for the

ship, F.M.G., and Dockyard, which made for easy cross-reference between dockyard and ships staff work. Liaison with the dockyard varied from ship to ship and depended in many cases on personalities. It is a fruitful area for ships staff to develop good communications at all levels.

Living Conditions

The question may arise whether the ships company should live on board or not. In the case of a GMD one ships company lived on board during the whole of their refit. In the case of frigates it is essential to live ashore. There will be less incentive to live ashore in barracks now that the sailor has to pay for his accommodation — it is free on board.

Duty Watches

Juno found the minimum numbers needed were: 2 senior rates (1 ME, 1 WE) plus 14, and one duty officer. All duties done on board were done by the technical departments, and the seaman and S and S ratings contributed to the barrack duties. Except for leave periods, this meant that all junior rates were 1 in 6. However, in order to achieve satisfactory conditions for the watch on board, it was essential that there was an improvement in the standard of dockyard heads and bathrooms plus all the other ancillary services, which badly need modernization.

Harbour and Sea Acceptance Trials and Post-Refit Trials

Setting to work and completion was a subject in itself, but the FTOs are a very good guide. Here, one needs a certain amount of flexibility and a considerable amount of patience in the face of the inevitable interference factors.

In the final programme it was also essential to feed in early the maximum number of safety drills in order to avoid 'crumbles' at this critical time with a new ships staff prior to work-up.

Some random thoughts by Commander Judge in conclusion were:—

(*i*) He was against prolonged refits — the Yard and the customer lose interest.

(*ii*) Having only one 'Chippy' for a refit was a grave disadvantage.

(*iii*) The latest fashion, R by R, he was convinced stood for Repair by Robbery!

(*iv*) Cleanliness was still a headache when machinery spaces were open to the sky. Perhaps there should be some larger hatchways to machinery spaces for R by R items.

(*v*) Ships officers should be more cost concious, or more involved in the cost of a refit.

(*vi*) The MEO must have a fully qualified deputy while on leave.

Discussion

Commander Harris, the MEO of H.M.S. *Danae*, informed the conference that the current refit of H.M.S. *Danae* was a special minimum time exercise with reduced documentation. There was no defect list as such and the work package of defects, planned maintenance, As and As and modifications was wholly contained in the Job Order Book. Ships staff had some problems at first in assessing the state of progress of work due to unfamiliarity with the dockyard paper work system. The Fleet Maintenance Group had provided considerable assistance but with limited time available, the ships staff found it difficult to cater for all the refit, training and leave requirements.

Lieutenant Morrison (H.M.S. *Intrepid*) thought there was little evidence in refits of computer analysis and schedule control.

Commander Waters (Portsmouth Dockyard) presented part of the dockyard refitting picture and pointed out that there could be little change from at least 14 weeks for a *Leander* refit as there was a physical limit to the numbers of men who could be usefully employed simultaneously in their machinery spaces.

A minority view from the floor felt that network planning and computer programming were not suited to the jobbing task of a refit. A larger view was that weekly monitoring and print-out should be possible and would result in greater efficiency, particularly in detecting areas showing a serious departure from the plan, albeit possibly not in enough detail to allow management to assess the true lateness.

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The next speaker, Commander G. V. Buxton, (M.O.D.), was introduced by Captain E. J. Horlick and gave a description of the Dockside Test Organization as used in the building and refitting of nuclear submarines.

Immediate interest from the floor was concerned with the possible use of the DTO in the building and refitting of surface ships. Commander Collis (N.E.O. Barrow) stated that a simplified version of the DTO was being used on the Type 42 being built at Vickers in Barrow.

Captain Spickernell pointed out that in the case of the Surface Test Team the shipbuilder retained responsibility, unlike the submarine arrangement, following completion of tests by the DTO the systems were not handed over to ships staff until acceptance of the entire ship, when her company takes over. The complete submarine DTO was possibly not economical for the surface ship.

Questioned about the extensive documentation which is required to achieve full adherence to all procedures, Commander Buxton commented that he had heard it said that a NASA project was not considered adequately documented if the weight of the records did not exceed the lift-off weight of the vehicle.

It is hoped to publish an article on Dockside Test Organization in the next issue of the *Journal.*

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Captain H. D. Nixon, the Director of Fleet Maintenance, then introduced Commander C. D. Marsh and Commander T. L. Cladingbowl who presented a present and future look at Fleet Support. Commander Marsh spoke about the current level of fleet maintenance group support and stressed the inadequate facilities at present bases. Commander Cladingbowl gave a glimpse of the Fleet Bases of the near future in which all facilities were to be provided to ensure the complete support of the Fleet. An abbreviated version of his talk is reproduced below.

FLEET MAINTENANCE BASES

Commander Marsh has discussed the deficiencies that exist in the present arrangements for Fleet Upkeep outside dockyard upkeep periods. Most of us have suffered — and survived them. However, the increasing pressures on resources and the demands on our ships and the ships companies are such that we cannot risk the penalties that these inadequacies will exact in the future.

Complexities which accompany the increased capability are such that every unit of the Fleet now requires external support at regular intervals to meet its maintenance bill; yet the total of external resources are shrinking with our withdrawal from overseas bases. Those which remain must therefore be of maximum efficiency.

To meet the Navy's commitments and show ourselves as viable and effective, requires intensive usage and a maximum of availability; but with smaller ships companies manning more complex ships there is a concomitant greater demand for external support or time in which to provide it.

We are planning for longer refitting and docking cycles — but if the dockyards are to achieve improved productivity with dwindling labour forces, and guarantee refit programme dates, the Fleet must minimize demands for random unprogrammed assistance by the dockyards. We must therefore ensure that we can meet as much as possible of the preventive or corrective maintenance task as it becomes due, or arises, during Fleet time, in the prescribed Fleet upkeep periods, by the use of the available uniformed manpower.

Minimizing the Task

You will be aware of the enormous effort being put into reduction of the maintenance task:

(*a*) Firstly, the reduction in its magnitude by the emphasis on reliability and maintainability in new design;

(*b*) Secondly, a minimizing of downtime by the development of a 'repair by replacement' approach to Fleet upkeep, backed by adequate and reliable logistic support and associated line repair facilities.

However, the major essential resource required for upkeep is trained manpower. Manpower is expensive and in short supply and, perhaps of more concern, not employed as effectively as it could be. For example, the effective man-hours of work achieved by a UK based FMU has been of the order of 16 to 18 a week.

It is Board policy therefore to adopt a 'capital intensive' approach to upkeep, rather than the traditional 'labour intensive' approach. This will be achieved by the development of a specially structured environment for ship upkeep activities, enabling the most effective use of the manpower available. For the dockyards, this means refit complexes shaped to a particular class, e.g., a *Leander* complex at Devonport, and the Polaris submarine complex at Rosyth. For the Fleet, this means Fleet Maintenance Bases designed primarily for the support of the ships normally typed to that base port for refit. The aim of the bases is to maximize the effectiveness of assisted maintenance periods.

Fleet Maintenance Bases

These bases will comprise the specially designated assisted maintenance berths and the adjacent real estate required to contain the necessary supporting facilities. The bases will be designed to meet the many needs of the Fleet as follows:—

(*a*) *Overside Services* — The aim is full overside services, i.e., power, steam, chilled water, firemain, HP and LP air, etc., to enable the ships plants to be shut down — so reducing wear-out, providing access for upkeep, and releasing watchkeepers for upkeep activities.

In addition there will be all the other requisite jetty services, e.g., cranage, fresh water, sullage disposal, stores areas, etc.

(*b*) *Fleet Maintenance Group Support* — FMGs will operate from a custom built complex containing offices, simple workshop and EMR facilities, stores, usual domestic arrangements, etc.

The FGM complement will be assessed on the whole base task, including the requirements to support ships in refit, craft group tasks, etc., instead of being a multiple of FMUs. Within the Groups however

it will be possible to identify normal 'units' allowed for the support of specific classes of ship.

(*c*) *Logistic Support* — Retail outlets for naval and victualling stores will be available, with transit storage for the assembly of stores, spares, and any other material awaiting movement inboard or from the ship to the base or dockyard. A limited number of lay-apart stores will also be provided specifically for ships in AMP.

(*d*) *Other Services* — Not necessarily within the Fleet Maintenance Base, but certainly within reasonable access will be training facilities, medical facilities, car parking, recreational facilities, etc. Much of this, of course, already exists under the control of the Commodore of the Barracks. These other services will, however, be carefully scrutinized to ensure that they provide with maximum effectiveness the necessary support for maintenance ratings both in the ship and ashore.

Summary

We will therefore be providing an environment in which the ship can be in the most favourable position for upkeep: i.e., shut down; all necessary services available; adjacent to the FMG building with its offices, planning facilities, workshops and manpower; and, not least, the ship will be in its own base port surrounded by familiar faces and familiar facilities.

Conduct of an Assisted Maintenance Period

As mentioned earlier, the need for bases in which upkeep activities could be optimized was esential to meet the growing need for more external support for the Fleet. In the future, this support will embrace such activities as changing main propulsion gas generators or other 'lifed' equipments whose time runs out between programmed dockyard upkeep periods.

The increasing and proportionately large involvement of the Fleet Maintenance Group in the AMP must, as with submarines, generate the need for more detailed planning of the activity, and a greater involvement of the staff of the FMG in setting up and monitoring the upkeep plan for the AMP.

Except when deployed overseas, it is the aim that all AMPs will be undertaken in the typed base. This must lead to greater familiarity and mutual confidence between the ship and the groups concerned. Indeed, it must be expected that the FMG will largely be composed of men who have served in the ships based on that port, and now enjoying their period of shore service.

The expertise and understanding this must create will make it easier for the FMG to assume an active, indeed a leading part in generating the upkeep plan. The management of the upkeep process, especially for new frigates, will therefore reflect much more the pattern of, for example, submarine upkeep in the Faslane base.

The Task

The development of Fleet Maintenance Bases, and the advent of future new construction impose a concomitant change in the work to be undertaken by Fleet Maintenance Groups. The changing of 'lifed' equipment has already been mentioned, but there is another aspect of equal importance. If we are able to avoid random and unprogrammed demands on dockyard resources, the corrective maintenance load must be contained by the FMG and ships company as it arises — subject ,of course, to the task being within their skill and capability. Recourse to dockyard assistance for defect rectification must as far as possible be limited to workshop support (or that requiring some other

special facility), or to meet the demands of a special skill or expertise not available to the FMG or the ship.

This considerable expansion of the FMG task must be achieved with a minimal increase in the total size of the groups. It is essential therefore:

(*a*) To use the available manpower, ships staff, FMG or dockyard as efficiently and effectively as possible.

(*b*) To minimize the task to be undertaken on board by achieving greater reliability and maintainability, and a maximum of repair by replacement.

Division of the Task

The division of the work to be done between the dockyard personnel and uniformed personnel does not so much depend on different basic skills of the manpower concerned, as on different components of the maintenance task for each system or equipment. The division of the task will be shown in the Maintenance Schedules and will depend on the type of support period, and the facilities and resources provided to carry out the upkeep work. By and large this will in no way alter the more traditional demarcation between dockyard and uniformed activities, but will be developed to encompass the new equipments coming into the Service and to meet the requirements of a repair or refit by replacement of 'lifed' components between dockyard upkeep periods.

When

We have sat in front of many speakers through the years and listened to them declaim on the 'jam' they were offering tomorrow. The 'jam' we have been discussing, however, is indeed already on the market, albeit thinly dispersed. The FMGs are becoming increasingly stable in complement and therefore more effective. Portsmouth at last now inhabit a temporary building which will form an embryonic Fleet Maintenance Base. H.M.S. *Tyne* will be relieved by H.M.S. *Forth* in due course and continue the present support role in Devonport including surface ships, craft and submarines.

The shape of the new bases should be very apparent during the next few years and by 1974/5 we expect to have completed a major part of the Fleet Maintenance Bases in Devonport, Portsmouth and Rosyth. For the latter years of the decade it is approved in principle to develop the remaining tidal water front at these ports to provide a Fleet base in which ships can find a secure berth, and very full supporting services whenever they are in harbour.

Discussion

Comments from the floor showed that most ships considered they received good service from the FMGs. The view was also expressed that the level of minor decision making within ships tended to be too high; in consequence management was overloaded. More delegation of responsibility and authority to chief petty officers and junior officers would allow senior officers to do a better job of overall management of AMPs and refits.

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This was followed by a talk on Communications in which Commander J. P. Hollis (DFWMS) invited comments from the floor to assist him in his task of reviewing the many publications and instructions now weighing us all down.

The general feeling was one of hope that perhaps the volume of paper might be reduced, particularly if more selectively issued. We appear to have moved from an era of too few BRs to one of too many.

Microfilm was a means of simple storage but amendment was impossible and could only be carried out by re-issue.

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There followed a discussion on the Conference, from which a general view was voiced that future conferences should be annual and on alternate years discuss:

(*i*) Material and management

(*ii*) Personnel and training

and that each subject discussed might be pursued from three points of view:

(*a*) The ship

(*b*) The Administrative Authority (or Dockyard)

(*c*) The Ministry of Defence (N).

Admiral Raper closed the conference, giving Admiral Turner's apologies for his absence, and stressed in particular that contributions from the submarine and air specialists were most welcome and that at the interface the surface ship specialists had much to learn from the purists operating in air or water.