

# A WSM'S-EYE VIEW OF OPERATION GRANBY

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## ABSTRACT

The Weapon System Manager (WSM) for the Type 22 frigate reviews some of the demands placed upon the warship project during Operation GRANBY and highlights the main problems faced.

## Introduction

Unexpectedly Operation Granby required a significant package of special enhancements in those ships deploying to the Gulf. The problems faced by the warship project community in defining the installation guidance for such enhancements were exacerbated by the severe lack of time available. As seems to be the case in times of tension or conflict, those involved, especially at the coal-face, rose swiftly and effectively to the challenge.

There were three distinct groups of ships deployed: destroyers and frigates, MCMVs, and RFAs. Each group is the responsibility of a different ship project within Director General Surface Ships (DGSS), and each had a mixture of common and unique problems associated with their enhancements for the operation. This article deals with the destroyer/frigate enhancement problems and is written from the perspective of the Type 22 frigate Weapon System Manager (WSM) and team. It reviews some of the issues arising during the six months or so from August 1990.

The article does not describe the detailed engineering problems faced; generally these were of fairly low order but there were many of them to be addressed concurrently. Instead the article addresses the environment and constraints within which engineering staffs operated. It is perhaps unfortunate that security restrictions prevent more than a cursory reference to the operational requirements for the enhancements. Indeed in some cases even the warship project didn't know!

Whereas the article is based upon the experiences of the Type 22 project, many of the points are equally applicable to other ship groups. The views expressed are personal and not to be regarded as an official statement.

## Background

### *Armilla—The Pre-cursor*

Since the start of the Armilla Patrol, ships deploying to the Gulf have been specially fitted with a package of weapon and sensor enhancements required for their role 'in theatre'.

In order to save on the high procurement and support costs associated with permanent equipment fits to all ships involved, the principle was adopted of making ships 'Fit to Receive' (FTR) their enhancements as required from a common pool. This meant that full provision was to be made for the installation of the main equipment in terms of such things as cabling, pipework, connectors and mountings. In addition, the installation was to be proven to be compatible with the needs of the main equipment.



FIG. 1—HMS 'BRILLIANT', ONE OF THE BATCH I TYPE 22 FRIGATES DEPLOYED TO THE GULF DURING OPERATION GRANBY

In advance of its first deployment, each ship was fitted out at a special pre-deployment Assisted Maintenance Period (AMP). On return from the Gulf, the main equipment was removed and the ship left in its defined FTR state. The process of re-installing and setting to work the main equipment for a subsequent deployment was then relatively speedy and inexpensive.

Ships so enhanced included the Type 22 frigates, Batches I and II; the Type 42 destroyers, Batches I, II and III; and most Batch III LEANDER Class frigates.

In engineering terms, most of the individual installations were relatively straightforward. However, the cumulative impact of the overall package imposed significant strain on both the power distribution system and space in already congested weapons electronic compartments.

Because many of the early, and some later, enhancements were organized and engineered in very short timescales, a number of installation shortcomings resulted. Ships have been systematically surveyed by warship project staff to identify the reworking required and individual 'Armillar Re-work' As & As (Additions and Alterations) have been produced. The process of implementing such As & As has been protracted due to dependence upon inclusion in Refit or Docking and Essential Defects (DED) periods.

#### *The Transition to Granby*

With the invasion of Kuwait by Iraq in August 1990, 'The Armilla Patrol' became 'Operation Granby', the impact of which on the warship project community was initially unclear. From a ship enhancement viewpoint, one might have been forgiven for thinking that with a large pool of ships able to be swiftly prepared for Armilla, the demands of Granby would be relatively minor. After all what had changed?

What was not apparent were the many additional requirements brought about by significant changes to the operational scenario: firstly, the need for command, control and communications interoperability; secondly, the change in threat associated with possible transition to conflict; and finally to maximize deconfliction—that's the jargon for avoiding the 'Blue on Blue' situation, or as some of our Western allies might say—'making sure you don't shoot down the good guys'.

What did become clear very quickly was the marked increase in pace of activity required to satisfy the new and urgent operational demands of C-in-C Fleet and the Naval Staff. Despite the difficulties caused by this increase in workload, all of those involved worked hard to get the ships to sea, on time and properly equipped for their task. However, several problem areas frustrated the path to success.

Some of the 'old hands' had 'seen it all before' in the early stages of Armilla, but most people in the various contributing organizations had changed. The problems were therefore tackled as new ones.

### *Enhancements Overview*

As stated in the Introduction, within the security classification of this paper it is not possible to detail the operational requirements for the overall package of enhancements. It may however be of interest to the reader to know that roughly half of the 20 or so Granby enhancements provided new facilities for communication within the force in all three environments, sea, land and air. Improved facilities were provided for the presentation of the tactical picture and high accuracy navigation. New sensor capabilities were introduced for Electronic Warfare and environmental monitoring. And finally an extensive recording package was installed to assist in the post-deployment analysis task.

### *FTR Philosophy*

It was decided very early on that the Fit To Receive principle utilized for Armilla enhancements should be maintained during Granby and extended to encompass the new enhancements required.

## **The Engineering Issues**

### *Guidance Information*

Whenever a new equipment is to be fitted to a warship it is done so as an A & A. Information is required from the Equipment Project Manager (EPM) of its physical characteristics, needs for ship's services such as electrical power, and interfaces with other equipments. The basic needs (often many) of the equipment have to be translated by the warship project into an overall engineering package to enable it to be satisfactorily installed and integrated into the warship environment. This package is known as the A & A Guidance Information.

Except in trivial cases an A & A is carried out at a refit or docking period and there is generally ample time to produce the Guidance Information (GI) and ensure the availability of necessary equipments and components for the FTR. Whilst in the past, now dim and distant, the warship project defined the last nut and bolt required, the level of detail is now one known as Level 3. This provides broad but sufficient information to enable the Refitting Contractor to produce the fine details required, tailored for a particular ship. It was clear that time would not be available for such a refinement process for GRANBY enhancement work. Depending on the availability of information therefore, guidance was made as detailed as possible by warship project staff.

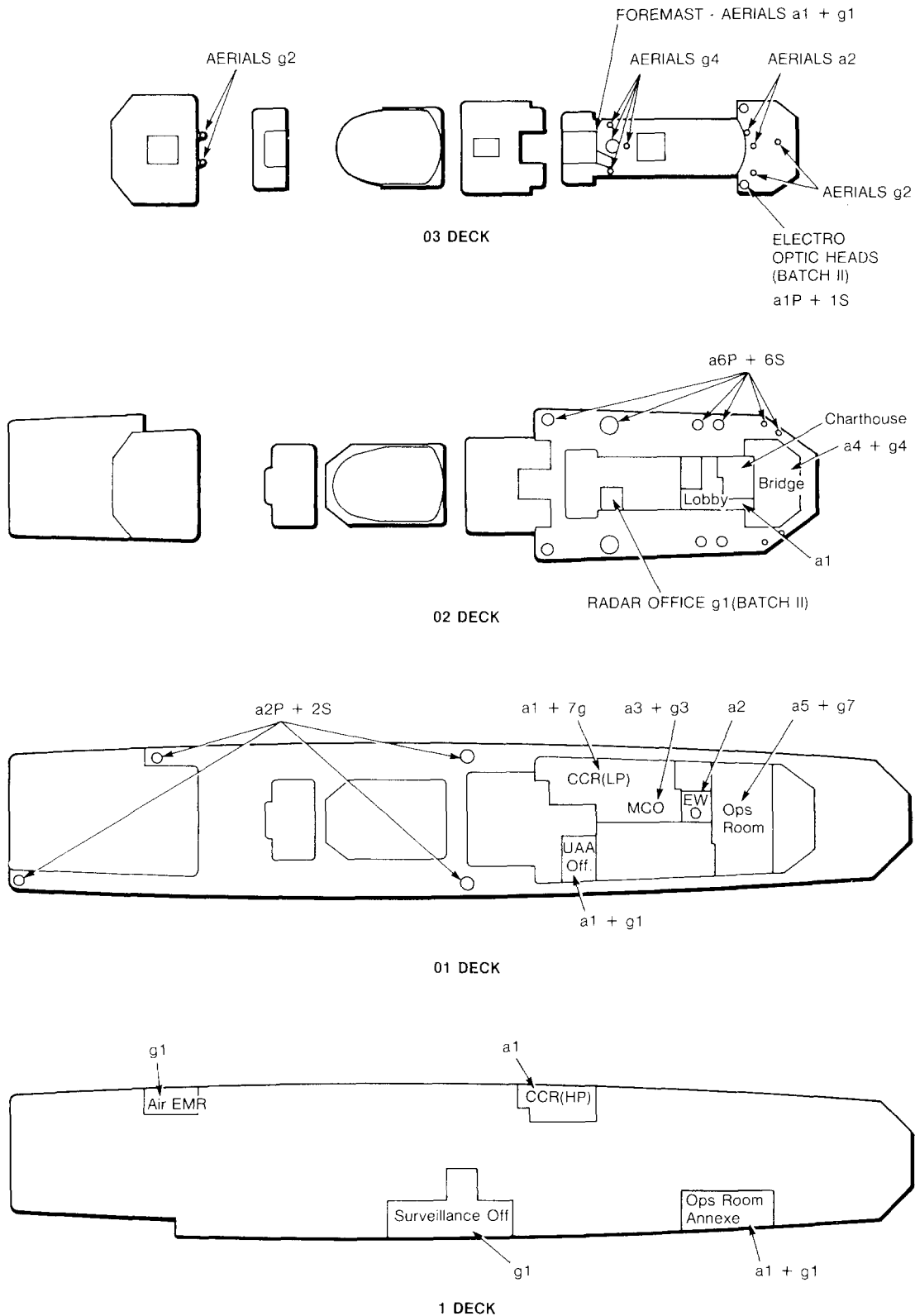


FIG. 2—TYPE 22 BATCH I DECK PLANS SHOWING WHERE THE ARMILLA (a) AND GRANBY (g) ENHANCEMENTS WERE FITTED

- a: fitted for Armilla
- CCR(HP): Composite Communications Room (High Power)
- CCR(LP): Composite Communications Room (Low Power)
- EMR: Electronic Maintenance Room
- EWO: Electronic Warfare Office
- g: fitted for GRANBY (in addition to any for Armilla)
- MCO: Main Communications Office
- P: port
- S: starboard

Several equipments were commercial and the installation specification details required by the warship project were not readily available. These equipments had to be inspected and judgements made by the warship and equipment project teams as to how best to achieve the fit. Generally, sufficient information was eventually obtained, even if for the early ship fits it was somewhat sketchy.

Fortunately, some equipments were well suited to the maritime environment and well documented; for example, the marine GPS Navstar navigation equipment, which came complete with fitting kit, including aerial brackets and screws. Guidance for this was produced in a few days and fitting took just three hours.

By contrast, the fit of the Inmarsat communications system, used in merchant navies, imposed significant demands on warship project and installer alike. Firstly, the appropriate installation requirements were not easily obtainable; secondly, the system was not designed for the wide separation of equipments that was required in the warship fit; and finally the equipments themselves imposed significant burdens on already congested sites.

#### *Electromagnetic Interference*

There was often concern over the suitability of the position chosen for the operation of sensor and radiating equipments, especially in the congested upper deck regions. Urgent investigations into possible electromagnetic interference problems became a regular demand on the specialist team in DGSS.

Whilst it was not strictly necessary for those designing the new equipments into the ship to know why they were being fitted, it was important to be aware of their mode of operation, for example: would the equipment sense or transmit; at what frequencies and at what power level or sensitivity? Getting answers to the questions was not always easy, but was essential to enable physical security and electromagnetic concerns to be properly addressed.

#### *Ship Impact*

As with Armilla there was generally a low engineering complexity of individual fits, but there were many of them, and their cumulative effect was significant. This compounded on top of the impact of the Armilla fits and exacerbated the demands on power and space. It became clear that it would not always be possible to achieve full installation standards, a fact of life accepted as such by C-in-C Fleet who were informed when significant installation shortcomings were inevitable.

Captain Weapons Trials and Acceptance (CWTA), the watchdog for such matters, was also aware of the problems and informed of 'the reasons why' where possible in advance of his inspections. In fact the whole exercise engendered close working contact between those involved, a refreshing and healthy change from the post-inspection paper dialogues that normally take place.

Considering briefly which areas of the ship were affected, FIG. 2 indicates on a Batch 1 ship deck plan where both Armilla and Granby enhancements were fitted. As can be seen the area of greatest impact was the forward part of 01 deck.

The congestion that resulted on the forward superstructure shown in FIG. 3 illustrates the problems faced in finding suitable sites for the multitude of additional antennas.

#### *Long Lead Items*

Obtaining certain specialized components needed to engineer some of the Fits to Receive became a very frustrating and time-consuming problem. The main difficulties lay with multi-pin connectors whose back-shells had to be of special construction to constrain electro-magnetic emission. The cause of the problem

was twofold. Firstly some of the items were unpatternized and therefore not held in Naval Stores. For others, only limited stocks were normally held and these were rapidly exhausted. Secondly, whilst initiatives were made to purchase components, there was an incompatibility between the order time (typically 12 to 15 weeks) and the much shorter demands of the fitting programme.

Considerable effort was expended to find the most acceptable alternatives by staff of the Fitting Authority (HMS *Defiance* at Devonport), their contractor (DML), and the warship and equipment projects. Two things were done to try and prevent this problem from recurring: firstly, C-in-C Fleet was urged to organize early approval for purchase of such items, and secondly, lists were compiled to give DGST(N) early warning of how many patternized items would be required in the future.

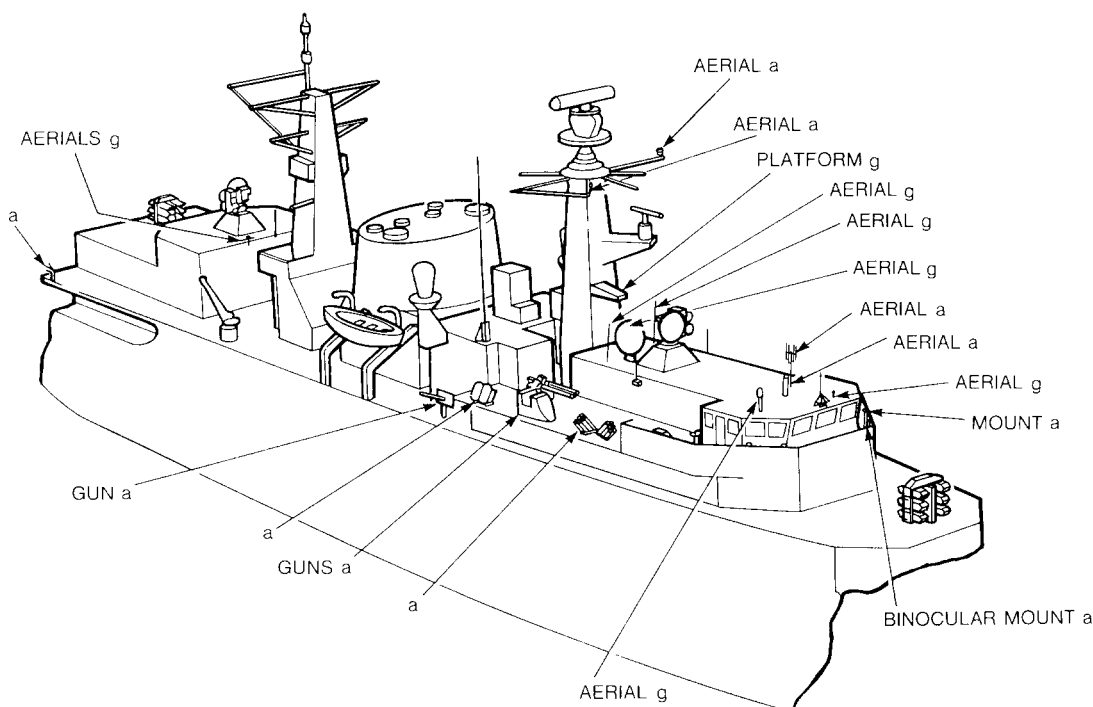


FIG. 3—ISOMETRIC VIEW OF THE FORWARD SUPERSTRUCTURE OF A BATCH I TYPE 22 SHOWING LOCATION OF SOME OF THE ARMILLA (a) AND GRANBY (g) ANTENNAS AND MOUNTINGS FITTED

GPMG: General Purpose Machine Gun  
Rx: receiver

### Time and Money

Our task was sometimes made more difficult by the lack of time available and the overall requirement to justify properly requests for additional expenditure.

### Programme Demands

Normally the equipment or warship project manager has the freedom to programme his work and set reasonable objectives and targets. Not so for Granby. Even when things seemed to have stabilized for a while, additional demands were placed and often at the least convenient times. It was wryly observed by one of the warship project team that requirements needing little design effort were approved on Mondays and those that required extensive work were approved on Fridays (when of course the answer was needed on the following Monday).

The procedure for approving Urgent Operational Requirements (UORs), as enhancements were known, was designed to ensure that all additional expenditure on Granby was fully justified. This reflected both the difficult financial position the MOD was in at the start of the Operation and the need to satisfy the Treasury that a proper control was being kept on expenditure if we hoped to obtain extra money to cover the Granby costs. Requirements were raised by C-in-C Fleet and endorsed by the Naval Staff's Naval Advisory Group (NAG), which met throughout the Operation. The Director of Operational Requirements (Sea) then prepared a formal UOR detailing the justification for the requirement and procurement details for scrutiny by Resources and Programmes (Navy), part of the Office of Management and Budget, who bore final responsibility for ensuring all additional expenditure was fully justified. RP(Navy) approved the requirement and requested the Vote Manager in the SSC to release funds to cover the cost. Inevitably this process took time, and approvals never seemed to come as early as we wanted them. There were also some problems in communicating approvals to those who were waiting to act on them.

But returning to the start of Granby, once it was known what initial enhancements were required, the immediate problem was to achieve them in the ship in-theatre (in the case of the Type 22s, HMS *Battleaxe*), and in the two ships about to deploy (HMS *London* and HMS *Brazen*).

In anticipation of formal approval but in the light of very short timescales, warship project staff urgently undertook preparatory work to produce whatever guidance information was possible. This was produced virtually continuously during the three week period prior to deployment, with pages being faxed to *Defiance* 'hot off the press'. Where there were particular ship-fitting concerns, guidance was taken to Devonport and vetted against the ship. There were just two weekends to effect in *London* and *Brazen* all of the FTR installations. Available equipments were fitted before sailing with the remainder being installed in theatre.

Guidance was faxed to *Battleaxe* and all her enhancements were carried out in the Gulf as well as possible. The work was undertaken by Naval Party 1600, Ship's Staff and a number of equipment contractors.

For the early ships there were exceptional programming problems but even for follow-on deployments the enhancement AMPs lasted only about four weeks. It is significant that the quantity of effort expended by the fitting contractor during such AMPs was greater (albeit marginally) than that normally undertaken on weapons and electrical A & As during a ship's 12 week DED period.

### *The Financial Situation*

C-in-C Fleet's staff expected design tasks in support of Granby to be undertaken promptly by warship projects. Often this entailed contracting the work to industry but, because of the difficult financial situation the MOD was in, projects had to continue to operate under the burden of constraints on financial commitment and the associated procedures this necessitated. This entailed the production of formal submissions seeking approval for release of even minor sums for funding contractor effort.

The warship projects received no separate funding to cover the unprogrammed demands of Granby work. Contractor support had therefore to be paid for out of existing LTC allocations. All work contracted out was related to weapons enhancements and was charged to tasking contracts already in being. The longer term impact of this on the funding and programme of scheduled work is currently being assessed.

An exception to the 'one ship at a time' approach alluded to earlier was the approval from RP(N) to make a bulk purchase of enhancement equipments. The decision had been made that equipment fitting and removal was only to be done during AMP in UK. Numbers of equipments procured had therefore to be sufficient to provide for ships fitting out, in transit, in theatre and defitting. This was satisfied by equipments sufficient for three ship groups.

Funding of support for the equipments was another problem. Provision of maintenance spares and documentation suitable for ship use was in many cases not possible due to the commercial nature of the equipment. Reliance was often placed upon the manufacturer's user handbook and whatever spares, if any, that could be obtained. Admittedly, it was an issue that received the lower priority attention when the focus was on the urgency of procurement and fitting, but a proper funding arrangement is needed to support Granby equipments in the future.

### **Efficiency and the Organization**

The time and money factors and a number of organizational and management issues placed significant constraints on efficiency and to some extent on effectiveness. The overall feeling was one of frustration, although we were effective by sheer hard work from quite early on, efficiency came more slowly.

There was not a great deal we could do about changing the fundamental issues of timescale and finance and it was a case of trying to do better within the constraints set. The main focus of attention fell on ways of improving procedures within the organization.

#### *Responsibilities*

It was clear that there were incompatibilities between the demands of the warship enhancement task and the overall organization faced with the problem.

On one hand there were C-in-C Fleet and *Defiance* geared up for normal AMP tasks, and on the other, Sea Systems Controllerate (SSC) attuned to the demands of the refit situation. Several months elapsed before it was properly clear what detailed responsibilities were whose and how all parties should operate together in an effective and efficient way.

Initially, there were fundamental questions, the answers to which would have been quite clear in normal working towards either refit or AMP. For example: what enhancements were required, who had authority to give approval for expenditure, where was the money coming from, and who was managing the delivery of equipments to ships for fitting?

The main players (C-in-C Fleet, *Defiance*, DGSS, DGSW and DGST(N)) were effective in the initial stages thanks to the hard work of a number of key individuals, often involved in 'fire brigade' or recovery type activities. As time advanced the situation improved slowly with personnel at all levels trying to apply the lessons learned from one ship's activities to the next. By the end of the conflict it was clear that efficiency had improved significantly.

#### *In-House Capability*

One positive and major factor that contributed significantly to the success achieved was the expertise of the warship project team which enabled a significant proportion of the guidance information to be produced in house. Deliberately not contracting out tasks in the early stages ensured they were available on time. On numerous occasions the guidance was taken by the project team to the ship and there discussed with both ship's staff and fitting authority. Essential modifications to guidance were sometimes produced then and there.



### *Communication*

In many ways communication was good or at any rate became so. But initially there were problems with signal messages not always well directed to achieve a speedy response from warship and equipment projects. The change of signal address for the Procurement Executive to 'MODUK PE' part way through the Operation served only to cause more confusion as the change was not well promulgated to all those involved. It was difficult for many to draw together all the necessary threads of what was going on until there was some corporate experience and learning of the task and its problems. It was a learning curve that we had to go up but which was not really expected.

There became intensive daily contact by Fax (how did we ever manage before?) and telephone. The latter in particular had the benefit of creating a team-like relationship between the various organizations involved. There were plenty of early warnings of what was coming next, and helpful prompts or reminders from one organization to another.

### *AMP Planning Meetings*

For each ship due to deploy to the Gulf, the warship project set up early planning meetings run along lines similar to a ship refit *Scrutit*. The key aims were to identify the required enhancement package, programme milestone dates, the availability of guidance information, any key problems and finally to confirm management responsibilities.

The aim was to hold the meetings about two months in advance of the start of the AMP. The AMP Project Manager in *Defiance* held a follow-up meeting at the start of the AMP and thereafter weekly progress and technical reviews most of which were attended by Warship project staff.

### *Enhancement Equipment Management*

There was confusion over who was organizing the allocation and delivery of equipments to particular ships. This was the root cause of some enhancement equipments arriving late for fitting.

A 'cell' was set up jointly between C-in-C Fleet WE staff and SSC DGSW to establish and progressively monitor the whereabouts of the enhancement equipments—a process that was known as 'asset-tracking'. The cell was responsible to C-in-C Fleet and required to make recommendations for the allocation of equipments to be fitted to particular ships. This avoided individual Warship Project Managers 'chasing' the same equipment for fitting to different ships. C-in-C Fleet staff retained control of the movement of equipments from ship to ship and SSC agreed, exceptionally, to manage the delivery of all other equipment.

### *AMP Attendance*

Despite the endeavours to produce sufficiently definitive guidance, there remained concern over its interpretation in individual ships.

For the project weapons section, Plymouth became a second home with substantial attendance at the offices of *Defiance* and on board ship during the AMP periods. It seemed to be the universal view that there were significant benefits from this. Engineering and logistics problems were often sorted out then and there, often with on-site discussion of problems with installation fitters as work proceeded.

It was in addition good for raising the profile and visibility of the warship project.

**Epilogue**

With the cessation of conflict everyone of course breathed a sigh of relief.

All involved have learned something from the experience and perhaps the organization as a whole will function even better should there be another GRANBY-type situation. Certainly there has been no shortage of people saying where things might have been improved, the problem is whether the lessons learned can be acted upon now in a way that will be of benefit in the future, when, as is likely, people will have changed even if the organization has not.

And now we return to a large semblance of normality, perhaps with a tinge of regret for there was after all something rather invigorating and rewarding about it all.

**Acknowledgment**

Particular thanks to Richard Wootton the leader of the Type 22 project staff based at Portsmouth who was right at 'the coal face' and has made many contributions to this article. Thanks also for helpful comments to Project Manager Type 22, and members of RP(Navy), RP(Systems) and Sec Pol Studies.