THE NAVAL ENGINEER
Richard Stokes joined the Royal Navy in 1981 and graduated in engineering from the Royal Naval Engineering College, Manadon. He trained as a Submarine Weapon Engineer Officer and had a wide range of submarine, staff and command jobs including: Tactical Weapons Engineer Officer, HMS Resolution(Port); Weapon Engineer Officer, HMS/Ms Ocelot and Torbay; Flag Officer Sea Training – WE Sea Rider; Squadron Weapon Engineer, SM1; MOD Naval Plans – Logistics & Sustainability; Career Manager, RN Engineer Officers.

Promoted to Captain in 2005, he served in the MOD Equipment Planning directorate, managing the £6Bn/year defence equipment budget. He moved to Navy Command in 2008 to manage the careers of the 13,000 officers and ratings in the Royal Navy’s engineering branch, before moving on in 2011 to study at the Royal College of Defence Studies.

Promoted to Commodore in July 2011, he spent 10 months as the Programme Director for Royal Navy Defence Reform Implementation – the programme to reduce the Navy’s Non-Front Line manning by 20%, before returning to the MOD in June 2012 to take up the post of Head of Nuclear Capabilities. Here he was responsible for planning the future submarine programme, with particular responsibility for delivering the Astute class into Service; steering the Successor SSBN towards its Main Gate investment decision in Spring 2016; and for initiating pre-concept work on the replacement for the Astute Class.

Rear Admiral Stokes is a Chartered Engineer, a Fellow of the Institution of Engineering and Technology, a graduate of the Acquisition Leadership Development Scheme and of the Royal College of Defence Studies. He lives in Havant, Hampshire, with his wife Claire. Richard is interested in all aspects of winter sports – especially skiing – and has spent a total of nine years as Chairman of Royal Navy and Combined Services Winter Sports. He also enjoys sailing, photography and most types of music.
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* The cover: An F-35B Lightning II hovers over on the flight deck of USS Wasp during Operational Testing in May 2015. Marine Aircraft Wing. (Marine Corps photo by Cpl Anne K. Henry USMC)
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The Naval Engineer

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On 19 May, in HMS Collingwood, the Chief Naval Engineering Officer, Vice Admiral Simon Lister hosted a gathering of three hundred and thirty naval engineers at the Annual CNEO Conference to discuss progress in naval engineering. The conference spent the morning addressing the near-term challenges before considering future aspects ranging from training to cyber-operations in the afternoon, with a keynote speech on Warfare in the Information Age.

The conference was organised by Lieutenant Paul Procter. This article gives a synopsis of the presentations and discussion.

INTRODUCTION

is CNEO’s business, the Naval Engineering Board’s (NEB’s) business and the business of those in the audience – leadership at all levels in the engineering enterprise must be the golden thread.

He encouraged the audience to engage with speakers and each other during the Conference, to recalibrate their understanding of what we have achieved so far and to make the most of the opportunity to increase their understanding of their role in the changes which need to be achieved in the future.

THE FORENOON WATCH

CNEO gave the opening address, giving three recent examples from the front line demonstrating engineering excellence at work in providing and maintaining capability to the Command under challenging circumstances – some of these will be discussed further in future TNE articles. These examples showcased the ability to maintain, operate, diagnose and repair equipments in a variety of platforms, showing that much change has been implemented, but that much more change is needed. Amongst other challenges, he referred to the lack of trained personnel, spares shortages and the need for accurate technical information, quoting Wildcat as an example of where such information is accurate, however highlighting other platforms where it is NOT, such as new platforms entering service with “as designed” drawings rather than “as fitted” drawings. Good news, he stated, was the significant capital investment in progress on platforms and systems, counterbalanced by the poor performance in recruiting and retention.

He ended by reiterating DCNEO’s message on leadership, and listed six key requirements:

- Resilience and persistence.
- Be bold, and drive for change.
- Lead every individual.
- Drive for new standards.
- Pull together to achieve the vision.
- Rediscover the joy and pride in naval engineering.
He was followed by Captain Marshall, leading the Faraday and SIP team in giving a summary of what has been achieved since the last Conference, and further work under way. His analogy of Pilgrim’s Progress (see box below) gave a good perspective on our progress to date, and the way ahead. The team covered WE/CIS integration, WE and ME training, including course redesign and the (re)introduction of the RNR Engineering Branch, before discussing Faraday Phase 2, which will continue the work of Phase 1, embed that into “normal business” and address the so-called “Faraday for Engineering Officers” study.

The team then covered the Support Improvement Programme (SIP), looked at from perspectives including NCHQ, DE&S and the Waterfront, discussing how the Ship Support (Alliance) Team within the Ships OC intends to provide support to complex Royal Navy warships over the next two decades, envisaging (subject to further analysis) a convergence towards a common support model for legacy and future platforms. Speakers discussed the Progress, Success and Frustrations of SIP Phase 1 and the ‘call to arms’ of SIP Phase 2. Medium to Long-Term Enterprise-wide initiatives are addressing root causes to Fleet resilience, but stated that immediate Fleet resilience issues require emergency measures aimed at preventing further failures and introduced short-term, very focussed interventions to improve Fleet resilience by the 2015 Summer Term, with more enduring programmes to deliver effect by December 2016. The audience were reminded that the ET, LET and POET level is where engineering really happens, not in Abbey Wood. DCNEO summed up this section of the presentation, remarking that SIP is a Team Event needing Awareness, Engagement and Communication.

CPO Peterson, from HMS Iron Duke, gave his views from the front line on the impact of present challenges and measures in place or in hand to address them – a daunting prospect with so much gold braid in the audience! He reported seeing some improvement as a result of the Faraday and SIP work, but that we are not out of the woods yet. He stated that, having spoken to ETS and Leading Rates in his division, and other engineers, who intend to leave the Service, the reasons given for departure did...
not centre on engineering as such, but on pressures brought about by gapping posts in the front line.

More detail of Faraday and SIP appears in the article on Page 7 of this issue.

POST-LUNCH PRESENTATIONS

Second Sea Lord, Vice Admiral Woodcock, then spoke to the Conference about his role, now widened to encompass the delivery to the Fleet Commander of all the capabilities he needs to fight and win, both now and in the future, explaining that naval engineering formed a key element of the role. He was then joined by the other members of the NEB for a frank Q&A session which explored, in more detail, several of the topics addressed earlier – and a range of other subjects. This discussion included the exhortation to remember where engineering takes place – namely at the PO, leading hand and able rate level.

The keynote address, entitled “Warfare in the Information Age”, was given by Commander, Joint Forces Command, General Sir Richard Barrons. He stated that the future will be different to the present, and discussed why this would be an opportunity, noting that, at present, there are three major deficits, namely strategic, financial and resilience. He asked whether, as the threat to the UK, its interests and our forces changes, we are able to deal with it, pointing out that there are three key roles for UK defence: to protect and deter, to shape and influence and to respond. To do so, we need information and understanding, and thus “big data” and open source information are becoming more important. He then discussed a number of topics which will come to the fore shortly, including new Joint C2, increased emphasis on non-kinetic effects and robotics.

This was followed by presentations on Cyber and the RN1 and an example of a Critical Vulnerability Investigation, which, since TNE is releasable to the Internet, will not be covered here.

Captain Rose, from the Defence Engineering Champion Team, then briefed the audience on the team’s remit, reminding us that the UK still has insufficient engineers to meet its needs, and therefore Defence must make the utmost efforts to recruit and retain engineers to meet the specific needs – the gap between future needs and current (and forecast) bearing remains substantial, and there are some critical skill shortfalls.

The last presentation of the day was given by the Commandant of the Defence College of Technical Training, Commodore Elford, who described the future of technical training, noting the imminent move of REME training to the new facilities at Lyneham, and other ongoing activity. This was followed by another NEB Q&A session before DCNEO drew the proceedings to a close.

THE DOG-WATCHES

After a suitable pause, most delegates moved on to pastures new, namely HMS Sultan’s Wardroom, where pre-dinner excitement of the Technical Challenge 2014 was to occur. The scene offered a strange contrast – Engineers’ Dinner guests in Number 2B (Mess Undress, for those less familiar with this sort of numbers!) or dinner jackets examining a range of linked devices (systems of systems?) of varying degrees of sophistication (or otherwise) designed to (eventually) ring a dinner gong by remote operation. After some false starts, and interference, the judges were able to note a definite winner – the ME GS team.

1. For those who wish to know more on this subject, an article in the 2015 edition of Warfare Officers’ Newsletter covers much of what was discussed.
A hundred years ago, the UK was in the midst of global war – the Great War was in its second year, and the RN had been in action across the globe. The Gallipoli campaign, ultimately destined to be a complete failure, had stalled after the first landings. Attempts were made to capture the small but strongly-defended village of Krithia near the tip of the Gallipoli Peninsula – amongst the force involved in the second such attempt, on 4 June 1915, was the Collingwood Battalion of 900 sailors, fighting as soldiers. A mere 30 minutes after the Collingwoods had begun their attack, it was all over. The Turks counterattacked, and regained their own frontline trenches. The Collingwood Battalion had lost over 500 men; out of 26 officers, two survived unhurt, 16 had died, and the others lay wounded, somewhere on the battlefield or back in their own lines. The decimated Collingwood Battalion was never to see action again, being disbanded two days later.

Those Collingwood sailors who gave their lives for their country in that far-off place are remembered near Blandford Camp in Dorset, where they trained before setting off to fight. Beside the Salisbury to Blandford Forum road (the A354), at a junction known as Collingwood Corner, is a memorial to the battalion; a service of commemoration is held there every June. For the centenary of the action, Her Royal Highness the Princess Royal was the guest of honour at the service, which was attended by the present CO of HMS Collingwood and other dignitaries, including representatives from ANZAC forces. HMS Collingwood provided a Royal Guard – see the photos below – and the Band of Her Majesty’s Royal Marines.

Recently we have again had RN sailors and Royal Marines fighting ashore as part of a joint campaign – and many of the sailors will have worn a Collingwood cap tally! The circumstances differed, but the ethos remained. HMS Collingwood’s motto, “Ferar unus et idem” (“I will be sustained unchanged”) remains as relevant now as it would have done then.
CIS & WE INTEGRATION

Vesting Day

April 1st was Vesting Day for the formal integration of the Warfare CIS Branch into the Weapon Engineering Branch. To mark the occasion Vice Admiral Simon Lister (Chief Naval Engineer Officer) welcomed all Warfare CIS and CISSM branch ratings into the Engineering Branch, quite appropriately, by sending a formal signal. He concluded by saying he was “confident that as the CIS stream embeds it will provide our network engineers of the future: engineers with the skills necessary to ensure the information warfare requirements of the command are satisfied now and into the future”

Vesting day is the start of a transition which will see growth in common skills and employment as we move towards the end state of a fully integrated stream. A key milestone in the history of the WE and Comms Sub-Branches and as we integrate the two specialisations we will create a strong capability that reflects modern technology and is well placed both to support the fleet, offering a rewarding and challenging career.

Individual units were encouraged to mark the occasion in their own way, where possible presenting the new branch badge to CIS stream personnel. The Maritime C5ISR Support Unit (MCSU) marked the occasion with a presentation from their CO in the spring sunshine on the top of Portsdown Hill overlooking Portsmouth Harbour.

Wearing their new badge, the CIS stream will see ETs from both source branches bring an amalgamation of warfare and technical skills and experience which will combine further through future common training. Vesting Day was a seminal moment, marking a significant milestone in realising the benefits that Faraday aims to deliver.

FArADAy PHAse 1 – WHAT FARAADY HAS DELIVERED SO FAR

As we reach the final stages of what is now termed Faraday Phase 1, it is a timely moment to review what has been achieved over the last 18 months: explaining the successes, what has been learnt, the challenges that have been faced and what needs to be done to move forward into Phase 2. The Faraday programme so far has contained a number of complex initiatives however there is a golden thread...
throughout them all: the importance of getting the right solution – quality first – time second.

The first of the new re-designed career courses is up and running with the ETICC for Marine Engineers. Graduates from the first course joined the Fleet at the end of January 2015 and feedback from sea is extremely positive: early indications are that the up-skilled ET(ME) is a significant improvement.

The CPO to WO Provisional Exam (PE) was rolled out in June last year and was used at the last CPO to WO Promotion Board. It was recognised by the board that PEs proved a great way to demonstrate merit. The key message is: for those who want to get on and present evidence to the board the PE is exactly the way to do it, and it works.

The Engineer General Service branch was streamed in December 2014 with the submariners following in January 2015. The roll out of a new branch badge for all is almost complete and they will be worn by all WE and ME personnel, including those who have transferred from the Warfare branch, by September 2015.

The Fast Track scheme is fully up and running, two selection boards have sat since March 2014 and there are now more than 300 people on the scheme.

Rolling out and successfully implementing the Individual Competence Framework (ICF) into the employment space is a major challenge. Evidence of competence is recorded in a Career Development Journal (CDJ) and the trail blazer for this is HMS Queen Elizabeth where these form the basis of their equipment training. The first set of CDJs have been appearing in the Fleet, we are beginning to learn how these can be used effectively, the key point being how we set a standard for evidence.

The Warrant Officer transition is midway through with promotion boards reflecting this. Re-design of the career courses for both WO and CPO is well underway. It remains the aim to deliver these newly designed courses ready for implementing from April 2016.

As mentioned earlier in this article, formal integration of the WE and CIS branch has taken place. This was enabled through much behind-the-scenes policy work completed by the Faraday team, including detail on how legacy personnel will be trained and integrated, so that Branch and Career Management responsibility could be handed over from Warfare to the Engineers.

Finally, the RNR Engineering Branch has been established and is now growing as a stand-alone entity within the wider Maritime Reserves.

Whilst you have read, and will have heard, about the successes of Faraday, there have also been “issues” along the way. This is not surprising though when considering the scale of what is being achieved. If you look at all of those involved in delivering the vast array of initiatives ranging from the team that are standing up the reserves, the contractors employed re-designing all the career courses and the uniformed personnel delivering the policy we are easily talking about 80 plus people working towards delivering Faraday. Faraday is a very significant investment which will cost £20 million over four years. There will continue to be challenges implementing the initiatives the team will work relentlessly to ensure quality over “quick wins”.

The Faraday initiatives are establishing the foundations to improve training and careers and the benefits will only truly be felt over the next three to five years, so we are very much at the start of the journey. The critical people in realising the success of Faraday are our personnel. Collectively, if we are to succeed we must take this work and start to embed it; that will only be achieved through us collectively as a Branch understanding the policy, how Faraday fits together and starting to use the initiatives. The SO2/SO3 and WO community need to champion these initiatives and support our Senior Rates who are the key cadre that can implement this work.

Faraday has been more than just rolling out a set of new branch badges and has put in a huge amount of work to lay the foundations for improving the training and careers of our technicians. It is vital for the whole Engineering Branch to engage in taking this work forward and anchoring it into our culture.

This embedding work extends beyond the original planned conclusion of Faraday in August 2015 and has led, in part, to the extension of the Faraday programme for the next three years. Other factors that have led
to continuation of the Faraday Programme have been the changes to the manpower landscape since Faraday was launched in October 2013 and the need to progress further the conclusions following a study into Engineer Officers, which included a survey across the engineer SO2/SO3 cadre.

INTRODUCING FARADAY PHASE 2

As described earlier in this article, since its launch in October 2013, Faraday Phase 1 has successfully initiated some major changes to the Engineering Branch in some ambitious timescales. However, this is only the start and the hard work of embedding the changes into our culture is only just beginning. Add to this the need to complete some Faraday Phase 1 workstreams, the need to focus on officers and the ongoing challenge of achieving engineering manpower recovery and the decision was taken to extend both the Faraday programme and its remit into Faraday Phase 2.

Qualitative improvement has always been at the heart of everything Faraday has striven to achieve and this will continue as we move into the next phase but, significantly, the scope of Faraday will now broaden to consider how to best support quantitative recovery. With that in mind, the vision statement for Faraday Phase 2 is:

“To focus relentlessly on cohering, completing and embedding the change initiatives and other work necessary to achieve enduring engineering manpower recovery”

The immediate challenge is how to resolve gaps at POET level. Faraday Phase 2 will bring together opportunities such as ETS (Engineering Training Squadrons), Fast Track and a trial of Petty Officer Direct Entry Technician as well as the current Phase 1 workstreams to give a coherent picture of all engineering manpower initiatives. It will also take account of the impact of the Support Improvement Programme, New Employment Model and Future Navy Campaign Plan to understand how all of these affect our engineers and, ultimately, target resolution of those manpower shortfalls.

To-date, Faraday has primarily focused on the Ratings cadre. The immediate challenge is how all of these affect our engineers and, ultimately, target resolution of those manpower shortfalls.

Following recognition of a problem with the engineer officer sustainability, the Engineer Officer’s scoping study was carried out in 2014. The main outcomes assessed five areas: requirement versus supply, VO and retention, career structure, training and from a survey of Engineer SO2s and SO3s. It identified a number of issues for further investigation including manpower challenges in engineer officers from 2020, the diminishing UK talent pool and UK shortage of engineers, ethos and training. The study has led to development of an Engineer Officer Blueprint, which is enabling identification of specific engineer officer work streams to be taken forward as part of Faraday Phase 2.

The current UK engineering climate is challenging and this generation’s career expectations are evolving, but it is by no means an entirely bleak picture and the Faraday team is encouraged by the willingness of the engineering community to embrace the cultural changes which Faraday aims to achieve. Support from the branch is not only appreciated, it is essential if the enduring effects of Faraday are to be fully realised.

SUPPORT IMPROVEMENT PROGRAMME

SUPPORT IMPROVEMENT PROGRAMME PHASE 2

As reported in the Spring 2015 edition of TNE, SIP Phase 2 is a combined DE&S and NCHQ approach to target efforts on solving our most pressing support issues1. SIP Phase 2 is working to surge approximately 100 personnel into DE&S (including 60 RN personnel) from April 2015 and to date we have managed to augment approximately 40 RN personnel (Engineers and Logisticians), to be joined by up to 40 contractors, on a short-term basis to provide DE&S some much needed support in a number of critical areas to the benefit of the GS and SM community. DE&S has work ongoing to then recruit civilian staff into the required areas on an enduring basis.

Seventeen of the RN personnel augmented by SIP Phase 2 are logistics staff that have formed the backbone of the Maritime Support Chain Improvement Programme (MSCIP) headed by Captain Willis RN. The MSCIP team has been tasked to undertake the support chain professional improvement tools needed to meet the requirements of the Royal Navy, improving DE&S maritime support chain performance and delivery. This will be achieved through six work-streams that focus on Governance and Performance Reporting, Customer, Suppliers, Demand Planning, Inventory Optimisation and Data Integrity and People. For the MSCIP to be effective it will also require the customer (ie front-line units) to play an active role in supporting its work; be it through feedback and liaison with Inventory Managers or ensuring behaviours adhere to mandated policy and processes. Guidance on this has gone out to Logistic Staff in the last month.

From a direct engineering perspective Focussed Intervention Teams (FITs) have now been mobilised, led by an RN Engineering commander based in Abbey Wood. There are four FITs with associated Team Leaders now in place at the waterfront. The teams have been tasked to look at the critical support issues for Chilled Water Plants, Flexible Hoses, Internal Comms and Davits to improve overall equipment availability and sustainability. FITs aim to provide practical assistance to submarines and ships and
throughout the support chain with a mix of Naval Engineers, DE&S Equipment Teams and, where necessary, industry and OEM participation. Next steps are to secure the initial industry augmentation while increasing RN resources. Although early in post, team leaders are already beginning to capture and prioritise issues and develop delivery mechanisms.

WATERFRONT ENGINEERING

The previously reported Devonport Ships Engineering Support Team (SEST) trial\(^2\) has now completed, having delivered measurable success with over 6000 man-hours of support to ships alongside Devonport with a throughput of approximately 60 JR engineering personnel since July 2014. The support teams now form an integral part of the support model at the Devonport waterfront and will continue to evolve. Portsmouth have followed up this work with a similar support model:\(^3\) both of these initiatives are complemented by the establishment of waterfront workshops and retail stores within the geographical locations, aiming to better support our front-line engineers.

The initial Deep Technical Specialist (DTS) trial that commenced in September 2014\(^4\) has grown to include a further two POET(WE) who joined Thales from January 2015 for DTS training on other sonar systems. We have also seen the first of two maintainers now placed within Babcock to undertake Phalanx DTS training, helping to build the mounts for HMS Queen Elizabeth.

The development of the concept for a Devonport Type 23 Refit Support Group (RSG) has been endorsed by ACOS(ES). Work is now in hand to engage with key stakeholders to develop the structure of the Type 23 RSG with an aspiration to stand up at Initial Operating Capability through summer 2015. The aim is to optimise RN engineering personnel within current S-Role provisions in support of future, concurrent Type 23 Upkeeps, with opportunities for development of skills and knowledge and a keen eye on the retention of personnel whilst offering high quality employment. Portsmouth already has a Type 45 RSG Team which is in an early stage of development.

Within Devonport, focussed effort is looking to deliver some noticeable changes to the way FTSPs are planned, supported and delivered, through a number of pilots/trials\(^5\) focussing on improving the stores demand and management process and the transition from and back to operational tempo.

TOOLS, TEST AND DIAGNOSTIC EQUIPMENT

Work continues within DE&S to improve the supply of hand tools. As the MOD moves towards signing a new hand tools contract, a briefing by the MOD to all the prospective framework suppliers was held in May 2015. This included a ship visit to HMS Diamond to enable the maritime domain to emphasise the importance of hand tools to the RN and also provide some context for the prospective suppliers. In parallel with this activity the SIP is looking to deliver a targeted improvement within a specific hand tools/RATS area; your engagement is vital to making this venture a success. As repeatedly stated GPC use as interim mitigation may be appropriate for the procurement of urgent tool requirements (RNTM 99/14) – please discuss this option with your Stores Department onboard. Any platforms resorting to GPC purchases are requested to inform DES Maritime Ops-Logs-WOSC so that mitigating activity can be tracked.

Beyond hand tools, work is ongoing to address the reported issues with onboard tools, test and diagnostic equipment, with some success in isolated areas. The Maritime Tools Summit held on 4 June in Abbey Wood drew representation from Director Ships, Director Submarines, NCHQ ES Div, Flotilla and Director Land Equipments OSP-OIP area; its aim was to review the current tools policy, support and supply arrangements in order to improve the customer/supplier relationships between the maritime and land domains. The event confirmed that whilst there may be an inferred need for ownership and a management process for onboard tools (within the policy references) there is no agreed and mandated process within the maritime support areas to collectively manage, control and co-ordinate the provision of onboard tools. A draft process was drawn up at the event for the stakeholders across NCHQ and DE&S to endorse and agree.

3. COMPORFLOT Temporary Memorandum 05/05 – Engineering Support Teams.
5. HMS Ambush Demand Planning Minor Trial, HMS Torbay FTSP and HMS Bulwark FTSP (post Cougar 14).

YOU'RE THE THIRD ONE THIS MORNING. NEXT ONE GETS ALL MY DIGITS!
ownership, required actions and holding to account to ensure that the RN has the ability to supply the right tools for the job. Our efforts in this area to date demonstrate that collective ‘support improvements’ will not happen by default, onboard engineers are encouraged to utilise the S2022 process to support the continued drive to enable maintainers to deliver the required OMDR functions. In sum, much completed, much in play and lots more to be done. More information is available from the SIP team located in Navy Command within the Engineering Support Division.

SUMMARY

FORMATION OF THE ENGINEERING SUPPORT DIVISION

Regular readers will remember that in the Spring 2015 edition we introduced the Engineering Support Division of NCHQ which, under Commodore Graeme Little as ACOS (Engineering Support), has subsumed both the Faraday and Support Improvement Programmes. The organisation around the delivery of Programme Faraday and the Support Improvement Programme (SIP) has changed. The Engineering Support Division has been established within NCHQ with the 1* position, ACOS(Eng Spt), filling the supporting role to Senior Responsible Officers and interaction at a 1* level to encourage mutually supporting relationships between Engineering Support, Logistics & Infrastructure, and Ships & Submarine areas, on supply, manpower and engineering issues. The focus will be around CNEO’s strategy and how the delivery of this will be achieved. It is clear that it will perform a distinct strategic function that will straddle all platform focussed areas with the remit to focus on all cross-cutting engineering issues that are not specific to one capability management area eg strategy, doctrine, policy, LTRP, and to provide engineering SME input into Navy Command future support solutions.

This work will include close liaison with ACOS(L&I) to ensure coherence between the logistics and engineering functions within NC including: the alignment of support priorities where appropriate; SME advice on performance monitoring and support solutions; and work on the relationship with DE&S and NC to ensure that our engineers are getting the support they require to meet operational engineering requirements.

The Programme Faraday team has transitioned into the Human Capabilities pillar of Engineering Support. The Human Capabilities team will continue to deliver the Faraday programme with no change to daily business or output at the same time it has taken on a number of pan branch roles such as mentor scheme lead. The SIP and Policy and Doctrine teams have moved to 4th Floor in NCHQ however Human Capabilities will continue to work out of Walcheren Building, HMS Excellent and produce the same briefs/information flow to stakeholders as they did when known as the Faraday team.

CHIEF NAVAL ENGINEER OFFICER (CNEO) CONFERENCE (19 MAY 2015)

CNEO’s Conference1 provided an opportunity for the Engineering Support Division to provide a wide ranging update on Programme Faraday and the Support Improvement Programme plus an overview of the wider improvements being undertaken in driving forward with improving the way we employ, train, support and value the engineers in the Royal Navy. For those that did not get the chance to attend the presentations can be accessed via the Chief Naval Engineering Officer Intranet page.

COMMUNICATION

As mentioned in previous articles, effective internal communications are vital. Our use of traditional methods, both formal through RNTMs, and informal with the likes of the monthly rolling brief, the Intranet page and regular Navy News update, will continue with the programmes now under the Engineering Support Division.

LAST WORD

Benefits delivered by the Faraday and SIP programmes are starting to become apparent ‘down on the ground’. However there are some initiatives, particularly relating to training and career development, which will take many years to propagate through the system. The request to all in the engineering branch is to understand what the different initiatives are and how they will affect you, both directly (eg your attendance on new career courses) and indirectly (eg better prepared ETs working in your sections/departments). Understanding ‘what’s in it for me’ will help you to look ahead to the benefits these programmes bring you further down the line and will enable them to become part of the culture of the Engineering Branch.

WANT TO KNOW MORE?

The Engineering Support Division is located on the Fourth Floor of Leach Building, with a small element of the Human Capability Pillar remaining in Room 13 on the First Floor of Walcheren Building (No. 33), HMS Excellent. Further information, including contact details, can be found on the Faraday Intranet website:

http://defenceintranet.diif.r.mil.uk/Organisations/Orgs/Navy/Organisations/Orgs/ACNS(Spt)/ACOS_EngSup/Pages/Faraday.aspx

1. See article on Page 3 of this issue.
INTrODuCTION

Maritime Force Capability Assurance (MFCA) is an initiative endorsed by COMOPS and ACNS(CAP) to provide the Commanding Officer and his team with a clearer understanding of the capabilities of their platform at any given time and support Navy Command’s assurance process.

Reference A also discussed the requirement for Maritime Force Capability Assurance (MFCA) and specifically the mechanisms being developed to deliver future Combat System assurance on major warships. Although widely accepted as a key enabler to the future Operational Capability (OC) of RN platforms the current pressure on platforms to meet their operational commitments has put increased strain on preserving the slots identified within ships’ programmes for MFCA events.

The existing MFCA framework is detailed in BRd9463 and comprises a range of serials which are applicable to the Surface Flotilla, the majority of which involve support by external authorities. All require direction from ships’ management teams to ensure compliance and cohesion. MFCA elements include: Combat System Maintenance Management System (MMS) serials, Ship Performance Assessments (SPA), Mid-Fleet Time NATO Forces Weapon and Sensor 1. BRd9463 – MCTA Trials Guide Chapter 8.

UK OPERATIONAL CAPABILITY CONFIDENCE CHECK AUGMENTS CURRENT SUITE OF MFCA ASSURANCE PROCESSES

By Lieutenant Commander Darren Reynolds RN
MCTA FORACs Liaison and MFCA Lead, and
Lieutenant Adrian Botham RN
MCTA MFCA System Engineer

INTRODUCTION

Accuracy Check Sites (FORACS) Ranging; Operational Capability Confidence Checks (OCCC) and Task Group Assessments (TGA).

Overall policy for MFCA is laid down by NC, with the responsibility for delivery lying with Force Generating Authorities (FGA), as promulgated within the Fleet Operating Schedule (FOS). Currently the MFCA process for FF/DD platforms comprises two main elements:

Ship Performance Assessment (SPA). A dedicated period of engineering and OC serials conducted by MCTA over three days. SPA serials aim to give ships’ Command Teams confidence that systems are working correctly and that the Tactics, Techniques and Procedures (TTP) utilised are able to counter generic air, surface and sub surface threats. SPA serials also aim to fulfil many of the mandated CS MMS serials.

Operational Capability Confidence Check (OCCC). The OCCC is a derivative of the SPA that has been tailored for deploying units. The venue for the OCCC should ideally match the environmental conditions expected in theatre. For units deploying East of Suez (EoS) this is normally conducted at the NATO FORACS range in Souda Bay, Crete (NFG). In conjunction with the OCCC, FORACS ranging is also normally undertaken.

The MFCA process for MPH platforms also comprises the above listed assurance serials, with the addition of a Combat System Confidence Check (CSCC) for vessels of the UKMCM Force stationed in Bahrain. This is included within the Pre-Relief-in-Place Material Assessment (PRiMA) conducted in advance (normally six to eight weeks) of a crew rotation.

Although only completed infrequently, MFCA is just as relevant to Capital Ships where System Performance Checks (SPAs) have previously been conducted and can be tailored to meet Ship and NC requirements.

ISSUE

Currently the final presentation of platform Operational Capability (OC), in Op Kipion units only, is demonstrated during an OCCC conducted at NFG. Units fulfilling the remaining UK operational commitments (eg APT(N)/(S)) undergo no formal MFCA activity prior to deployment.

Due to the geographical location of NFG, this comprehensive OC assurance event is not conducted until late in the platforms’ regeneration cycles. As a result, it has become increasingly evident that significant deficiencies in platform OC are being identified at a time when entry to the Joint
Operational Area (JOA) and commencement of operational tasking is imminent.

Following its inception every OCCC conducted in front-line deploying platforms has identified several operational deficiencies affecting OC. The impact of subsequent remedial action upon alternative platform programmes is significant. Using data from 16 platforms conducting an OCCC throughout the last 36 months, 71 recommendations have been made with respect to their Combat Systems, ranging from major operational deficiencies to observations with respect to specific equipment performance. A summary of the recommendations by broad capability grouping can be seen in Table 1 below.

It is estimated that approximately 73% of the issues above could have been identified earlier in the regeneration process had a UKOCCC facility been available. The impact resulting from subsequent remedial action causes significant risk to Navy Command (NC) when delivering capability to operational commanders and increased programming pressures upon operational commitments.

In order to de-risk the timely delivery of effective OC assurance and facilitate regeneration programming flexibility for all deploying platforms, the UKOCCC facility has been established (Ref B).

DEVELOPING THE UKOCCC

A comprehensive business case was put forward by MCTA to allow the concept of the UKOCCC to be realised.

Single Statement of User Need.

There is a need to dynamically evaluate platform OC, with Freedom of Action, to enable the early identification of deficiencies requiring remedial action; therefore ensuring the timely delivery of OC assurance and command confidence in all surface platforms and scheduling flexibility within platform regeneration programmes.

A number of options were considered, ranging from making use of existing NATO ranges and other facilities closer to the UK, to utilising the British Underwater Test and Evaluation Centre facilities (BUTEC), Scotland. Following analysis of all the proposed Options, it was decided that due to existing centrally managed test and evaluation facilities, contractual support agreements and proximity to base port, the reproduction of a subset of NFG capabilities, could be used to establish a UKOCCC facility at Portland. This would provide a cost effective, operationally beneficial OCCC capability that would significantly enhance the delivery of OC assurance and enable programming flexibility.

PROCUREMENT STRATEGY

The MOD’s Test and Evaluation Strategy encourages the use of centrally managed services and the Long Term Partnering Agreement (LTPA) to ensure financial efficiency and the provision of a cohesive service; subsequently ensuring that the utilisation of a UKOCCC evaluation capability is optimised.

Further investigation of the preferred option, to address current OC deficiency trends, identified that the majority of the facilities required are already provided within existing Naval Combat System Integration Support Service (NCSISS) and LTPA contracts; as such the UKOCCC capability would comprise a combination of existing test and evaluation facilities with some enhancement. This enhancement was procured and the service managed through NCSISS and LTPA contracts as a single source project. The service would be managed by QinetiQ through the LTPA.

Following final project acceptance, MCTA assumed responsibility for conducting UKOCCC assessments in order to ensure timely operational and engineering assurance is delivered to NC and Force Generation Authorities. Regular forums for stakeholders are also used to continually review UKOCCC facility services and where necessary propose future range improvement for consideration from NC.

OPERATIONAL BENEFITS

A UKOCCC facility and assessment package provides immediate operational benefit due to an improved ability to measure and optimise OC in UK waterspace close to base port support, without foreign Host Nation Support (HNS).

Although not exhaustive, the following key operational benefits supported the drive towards the development of the UKOCCC:

- The ability to schedule the delivery of OC assurance activities earlier in platform regeneration programmes, thereby increasing command confidence ideally prior to conducting pre-deployment Operational Sea Training.

Table 1

<table>
<thead>
<tr>
<th>Capability</th>
<th>Number of Recommendations</th>
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<tbody>
<tr>
<td>ESM</td>
<td>13</td>
</tr>
<tr>
<td>Radar</td>
<td>43</td>
</tr>
<tr>
<td>Communications</td>
<td>39</td>
</tr>
<tr>
<td>Data Links</td>
<td>22</td>
</tr>
<tr>
<td>Guided Weapons</td>
<td>13</td>
</tr>
<tr>
<td>Gunnery</td>
<td>9</td>
</tr>
<tr>
<td>Optical</td>
<td>5</td>
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<tr>
<td>Sonar</td>
<td>4</td>
</tr>
<tr>
<td>Gyro</td>
<td>8</td>
</tr>
<tr>
<td>Navigation</td>
<td>18</td>
</tr>
<tr>
<td>IFF</td>
<td>15</td>
</tr>
</tbody>
</table>


7. NCSISS Contracts MCS/004/MCS/007, dated April 2012.

8. LTPA Contract CB/FT/001, dated 1 April 2003.

9. QinetiQ 05/13 – Operational Stealth Services – Planning & Scheduling.
The ability to deliver OC assurance testing and subsequent analysis to all surface platforms regardless of operational tasking and commitment.

The capability to provide bespoke OC assessment and subsequent analysis, whether planned or unscheduled, within short notice readiness.

Reduced OC regeneration risk due to OCC programming flexibility within current regeneration programmes.

The ability to conduct dynamic pre/post upkeep material assessment and defect rectification trials; reducing the risk to post upkeep Fleet Dates.

The ability to test Mission Tasking Equipment (MTE) performance if required.

The development of OC deficiency trend analysis for systemic evaluation.

**UKOCCC DELIVERY**

**Organisational Structure and Facilities**

The aim of the UKOCCC in its embryonic state is to provide the best level of assurance achievable through the current assets. The organisational diagram below reflects this with a combination of stakeholders from MCTA and Portsdown Technology Park (PTP) under NCSISS and LTPA. This partnership ensures the appropriate level of assurance can be provided by SQEP Combat System Engineers (CSE) with access to further analysis facilities if required.

As previously outlined, the UKOCCC sea phase is centred around the existing Qinetiq Calibration Facility (CALFAC) site at Portland Bill (opposite). This facility is predominantly used for Electronic Warfare equipment calibrations however during a UKOCCC the facility is augmented to allow Antenna Radiation Pattern (ARP) testing and as a base for the mobile Link Test Facility, if required.

**Planning**

All platforms nominated on the LTOS to conduct a UKOCCC will be contacted by formal letter six to eight weeks prior to trial commencement, however informal liaison between MCTA MFCA Trials Officers and ships’ teams will have commenced prior to this. The trial letter will include detailed requirements to complete all prerequisites and conduct the UKOCCC successfully. Associated with the letter are a number of Tech Notes to assist in a deeper understanding of the specific prerequisites and trial conduct.

On receiving the trial letter and in consultation with the MCTA MFCA team, ships’ command teams should contact the Central Booking Cell (CBC) to instigate asset and area booking. [Within the original specification of the UKOCCC was the aspiration not to add to the already heavy loading on Ships’ Staff with respect to the planning of assets and areas]. The CBC’s remit is to complete all initial bookings before handing control to

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**Table 2**

| MCTA CDR WE | UKOCCC Professional Lead |
| MCTA SO2 | Signatory of final report, I/C compilation of final report, SO2 CSE liaison/interaction, Direct trials teams as required |
| MCS SO2 | CSE Coordination/allocation/planning/delegation, Compilation/provision of analysis to MCTA for inclusion in final report, Coordination of contractor services/equipment (QQ/TDL) |
| MCTA WAR SO2 | I/C deployed team, CMD liaison, Lead UKOCCC planner (programme/areas/logistics), NC liaison (programming) |
| MCTA ENG SO3 | Onboard technical lead/liaison, Data collection/collation, Report author, Trial execution |
| MCTA ENG CPO | Data collection/collation, Assistant UKOCCC planner, Assistant report author, Security issues (data transfer/documentation) |
| MCTA Analysts | Provide Gunnery/GWS data analysis |
| Qinetiq | Lead CS performance assessment, Trial execution, CS data collection, Trial data analysis |

**Qinetiq**: Central Booking Cell, ARP (equipment provision and operation)
the platform seven days prior to the start date.

**Generic UKOCCC Programme**

Currently the UKOCCC consists of a three-day package (Table 3) however it is envisaged that as the process matures and with the aspiration of further investment in trials equipment, this may grow to a full five-day evolution. The programme was constructed around the Crete OCCC model however this was modified to overcome the reduced levels of specific test hardware available at the UK range. The majority of serials included are those conducted routinely by operational platforms and require no further explanation in this article. Their inclusion within the UKOCCC allows for MCTA and CSE cover with the enhanced analysis available via these organisations.

The following paragraphs detail equipment and serials introduced in support of the UKOCCC.

**Positional Accuracy**

The CODA Octopus is a Differential Global Positioning System (DGPS), which is assembled and secured in a suitable position on the upper deck to allow for unbroken satellite coverage. Using recorded data for the period of the UKOCCC and specific manoeuvring serials, the track data produced from Octopus can be overlaid with that data recovered from the ship systems to establish if there are any constant errors or intermittent excursions from true position.

**Radar/Sonar Alignment**

For UKOCCC serials commencing in Devonport it is convenient to utilise the Tri-plane Buoy (Fowey No.5) for the Radar/Sonar Alignment serial in similar fashion to the FOST MASC serial. For platforms sailing from Portsmouth, MCTA holds an instrumented buoy which is being assessed to verify its potential for use as a suitable target.

An active radar enhancer is fitted to provide a strong radar target on the ship’s navigational radar displays. Identification and visual tracking of the buoy is also aided by the inclusion of a laser strobe which automatically operates in reduced light conditions. The sonar target

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
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<tbody>
<tr>
<td>Harbour</td>
<td>Sea</td>
<td>Sea</td>
</tr>
<tr>
<td>SOCS and Combat System Functionality check</td>
<td>SOCS</td>
<td>Gunnery (4.5” NFS Direct and Indirect/ ASCG)</td>
</tr>
<tr>
<td>E/F Radar Testing</td>
<td>STDL</td>
<td>Tracking Radar Checks</td>
</tr>
<tr>
<td>Commence Link 11 Test</td>
<td>CACREX</td>
<td>Transit/Detach (Hot Wash-up/ Missed Serials)</td>
</tr>
<tr>
<td>Heading Accuracy Test</td>
<td>Seaboat Xeres/ Bowman Checks</td>
<td></td>
</tr>
<tr>
<td>Static GPS Testing</td>
<td>HF/VHF/UHF ARP Checks</td>
<td></td>
</tr>
<tr>
<td><strong>Sea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static Object Alignment Check</td>
<td>FIAC Tracking Runs</td>
<td></td>
</tr>
<tr>
<td>Radar/Sonar Alignment</td>
<td></td>
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<tr>
<td>Gyro Response/ Dynamic GPS Testing</td>
<td></td>
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<tr>
<td>COMAL</td>
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</tbody>
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*Table 3*
is provided by a passive sonar reflector which is secured below the buoy's flotation assembly by a lanyard available in four lengths (5m, 10m, 20m and 30m). The target strength of the reflector is designed to be -5dB (+/- 0.5dB). All necessary power requirements are provided by an electronics pack fitted to the flotation assembly, which requires charging prior to deployment.

Antenna Radiation Pattern
A test routinely conducted at NFG which has not previously been achievable in the UK was the Antenna Radiation Pattern (ARP) assessment. The purpose of this serial is to provide the ship with an assessment of her transmitter and antenna performance.

For an ARP test to be conducted, the ship positions herself approximately 4 Nm from the Portland CALFAC and performs a 360° constant turn whilst transmitting on a number of frequencies from its communications antennas (up to 10 concurrently). These frequencies are monitored at the range building and their power levels captured (equipment as shown) enabling polar plots to be produced. These plots reveal any 'wooded' areas or antennas with reduced power output.

UKOCCC Records
The serials within the UKOCCC are conducted to allow the maximum opportunity to assess all areas of the CS. Key to this assessment process is the capture of accurate data and complete records. Where possible these are taken directly from the ship's CS via TACS, however some equipment and positions require the use of standalone or manual records.

THE FUTURE
It will be clear to those who have undergone the UK SPA process that the UKOCCC as it stands does not include any Marine Engineering elements. From reading this article it will hopefully be clear why the UKOCCC was proposed and that it was built around the OCCC currently delivered in Crete, which does not include any ME assessment. Given the pressure on achieving programme time for engineering trials across the board it would
see appropriate to strive towards the inclusion of ME trials within the UKOCCC as it matures.

At present the serials within the UKOCCC are heavily weighted to the above water sphere. This is a result of the requirement to utilise existing facilities and support organisations within the RN to deliver the trials package. Portland does not have an underwater transducer array as installed on the NATO FORACS ranges therefore cannot deliver 'like-for-like' assessment of the underwater elements of the Combat System. Alternative methods of testing within this area are being investigated to allow their inclusion in future UKOCCCs.

The intention is for continued discussions with the relevant authorities (NC/FGA/MWC) to ensure the content of the UKOCCC remains relevant to future operational requirements and provides the appropriate level of assurance.

**REFERENCES**

A. MFCA – A New Vision by Lt Tumilty RN (TNE Autumn 2013).
B. RNTM 108-14.

**CONCLUSION**

Platform Operational Capability is assessed and assured during an OCC. Increasing evidence suggested there was an excessive level of OC deficiency in deploying units. Consequently, it was considered highly probable that a comparable level of deficiency was potentially unidentified in other operational surface platforms regardless of operational tasking.

In order to de-risk the timely delivery of effective OC assurance and facilitate regeneration programming flexibility, the UKOCCC assurance package was established. The creation of a UKOCCC facility is not intended to replace NFG but would enable the Freedom of Action to deliver the OC assessment, assurance and command confidence required to deploy all operational platforms; further enabling programming flexibility within increasingly pressurised platform regeneration timescales.

ACOS(Warfare)'s statement to COs undertaking UKOCCC says it all:

“The UK OCC should not be approached as an engineering serial; it is designed to assess key components of your warfighting OC. It is an opportunity to critically assess sensor, weapon and integrated system performance using your warfare and engineering teams, with assistance from MCTA Trials Officers and Maritime Combat System Engineers. It also provides an opportunity for your teams to consolidate their operator skills and system knowledge. You should ensure that both your warfare and engineering teams work together to get the most out of this Maritime Force Capability Assurance event.”
It is well known that the Engineering Branches are experiencing a significant amount of change and many challenges. A part of this is alteration of our seagoing manpower model and the empowering of the Leading Hand as a maintainer. Like many other seagoing departments, the Weapon Engineering Department in HMS Argyll conducts a Command Leadership and Management training programme.

As we built towards our APT(N) deployment I wanted to give the department’s Junior Rates a challenge beyond a presentation or paperwork exercise that would broaden their knowledge and skills. Three teams were given a project to complete, detailed below, and it is hoped that this article will inspire similar projects and let others learn from our experience so that funding, approval and benefits are more easily realised.

**BENEFITS**

It is assessed that the completion of projects by three teams of ABs gave the following benefits:

- An increased awareness of the challenge of integrating systems.
- An insight into the need for and the benefits of research and assessment.
- A greater knowledge of the approvals and change management systems in the Royal Navy.
- The opportunity to show leadership (two team leaders were selected for fast track and their project leadership was a factor in their assessment).
- Empowerment of the ABs as they realise what they can achieve and better preparation for the responsibility of equipment maintenance as a Leading Hand.
- A palpable sense of achievement for the ABs when projects are realised (it is rare for ABs to thank management for the opportunity to, effectively, conduct extra work).

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**INTRODUCTION**

*By Lieutenant Commander Ian Bailey RN, Weapon Engineer Officer, HMS Argyll*

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Photos courtesy LPhot Davies

An ET Project team presents their progress to the WE management
**RECOMMENDATIONS**

HMS Argyll’s projects tried to effect change to the ship, especially the two projects that required equipment installation onboard. The following recommendations should increase the chance of project realisation within a deployment timeline:

(a) **Provide a clear project scope and timeline.**

(b) **Limit the scope of the project to require minimum permission or work for external authorities.** For example, prove the system in model form but then make the recommendation to implement as a final act. HMS Argyll sought to implement a project using the S1182 and Fleet Minor Trial process and this greatly extended the timeline of the project. The flip side of this is that making a change to how you work on board gives a greater sense of achievement.

(c) **Ensure the project timeline requires an early design solution to allow equipment purchase.**

(d) **Liaise with MWS with respect to bidding for Skills Funding Agency (SFA) funding to support the project.** SFA funding is provided to the Naval Service in order to deliver its Apprenticeship Programme and is available.

(e) **Ensure the recommendation is presented in the form of a Business Case or similar which helps with (d).**

(f) **Appoint a balanced team of three or four personnel and give the opportunity of project leader to an appropriate individual.**

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**PROJECT PLANNING AND EXECUTION**

*By CPO Simon Howlett, Command Information Group Head, HMS Argyll*

**AIM**

During a recent deployment, HMS Argyll’s ET(WE)s and AB(CIS)s (as was) were given a series of projects to kindle their interest and enjoyment of engineering with a simple outcome: to deliver a device that, by research, design, procurement and finally production, will provide an engineering solution to a specific problem or task considered current and relevant. The three tasks were:

- Produce a CCTV system internal to the foremast (to be used when rounds are impracticable).
- Provide Wi-Fi to the ships company in key locations in the ship when away from UK ports.
- Produce an autonomous boat to travel around the ship to capture video and environmental data.

**CCTV**

Internal to the foremast on a Type 23 frigate there are two sets of WE equipment that require rounds to be conducted regularly. Adverse weather conditions, rough sea state or operations could prevent these inspections from taking place. The team was tasked to implement a CCTV system to constantly monitor the equipment indications at a remote operating position. Several readily available commercial off the equipment (COTS) CCTV systems were available, and the team investigated a variety, comparing cost, ease of use, practicalities of installation, security implications, RN acceptance process and funding.

The team delivered a well-researched presentation with a clear winning product. Investigating the acceptance process, previously unknown to the ETs, guidance was given by their mentors to submit an S1182 (Proposal Form for Alterations and Additions) to Fleet HQ. The equipment was purchased and the ETs demonstrated it. As part of the final demonstration, the group considered many other engineering requirements. They had surveyed the foremast for mounting positions using fire-resistant standard RN

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fitting arrangements, utilising spare through-deck connectors to minimise installation cost. All things considered, the team could be installed the system within a few days, commissioned and ready to use from the Radar Office. However, as approval has not presently been granted several months after submission of the proposal, installation has not yet commenced (see recommendations).

**Wi-Fi**

The modern sailor expects many more comforts away from home than previous generations, even if they are not afforded them at sea. One modern luxury considered vital is Internet connectivity; at sea we have access to the Internet over satellite communications but restrictions prevent civilian email and the most coveted of services, social media. However, when a ship is alongside in a foreign port, the ever-sought-out free Wi-Fi is sometimes unreliable in a foreign port, the ever-sought-out free Wi-Fi is sometimes unreliable in a foreign port, the ever-sought-out free Wi-Fi is sometimes unreliable in a foreign port, the ever-sought-out free Wi-Fi is sometimes unreliable in a foreign port, the ever-sought-out free Wi-Fi is sometimes unreliable.

A team was selected from the WE(CIS) ratings with mentorship from the ship’s IS maintainer. The team’s mandate was to investigate supplying Wi-Fi, initially, to a few key locations within the ship, with scalability to messing areas and mess decks. The team, again, investigated and delivered a sound presentation proposing to install either a 3G Router on the ship with a central Switch within the ship, enabling Wi-Fi Access Points to be placed in dining halls and mess decks, or a Internet Service Provider demarcation point at the ships gangway and Switch and AP within the ship. With hard wired connectivity an uncertainty even at cruise liner ports, it was deemed that 3G availability was more likely so the team opted for this route. As a trial, the ship was also hiring a 3G Wireless Router, deploying it in a central position for exclusive use of the ship’s duty watch. This proved successful, with considerable take-up from ship’s staff adding empirical evidence to the team’s choice of Wi-Fi delivery. The team recommended running Fibre Optic cable through the ship to enable AP at various locations, however also considering was the possibility of utilising the ship’s computer network using Virtual Local Area Network (VLAN) techniques on the existing Switches; enquiries, however, proved that utilising this system was not permissible.

Training currently supplied by MWS Collingwood is now covering CISCO CCNA coursework which would allow full administration of the whole system using ships staff. Costing of the system showed an initial outlay would be well under a thousand pounds, considerably less if existing infrastructure was used. However, an additional allowance at each port to purchase 3G or other data is not funded at this time, with some data costs considerably more than the UK. A DLI was raised and it is understood that NCHQ is sponsoring an alternative solution for Wi-Fi provision.

**Autonomous Boat**

This team was given the task to design a small boat that under its own control (and using a Raspberry Pi computer) is lowered into the water adjacent to the ship and then controls itself navigating around the ship taking photographs and recording sea temperature to transmit them back to ‘mother’. This project was probably the most ambitious for the young engineer to tackle yet the team investigated it thoroughly, researching Pi applications, additional hardware and sample software readily available. Although understanding and programming a Pi is intended to be relatively easy, with no programming background and with the day-to-day commitments of the ETs making the boat autonomous and able to navigate its way around a ship it was considered too challenging. The Pi control element was scaled down with the Pi taking sea surface temperature recording and transmitting the images back to the controller.

Following a preliminary presentation, the team opted for a remote control boat designed to house a waterproof camera, waterproofing the Pi and recording the temperature. Funding was proved by MWS using Skills Funding Agency money. All components, despite the relatively high cost, were delivered to Argyll promptly. The boat wastrialled and the capability to meet the full requirement of the task gradually built upon to deliver a hull survey and temperature monitoring system and a significant sense of achievement for the project team.

**CONCLUSION**

Projects such as those described above will help develop ETs interest in engineering and their knowledge of how and why things work. All team members showed an improved understanding of their subject area and engineering in a naval context. To quote ET(WE) Shaun Murray, one of the team leaders, “I found it a really interesting project. Engineering is about coming up with solutions and problem-solving so this really played to our strengths. It was challenging when looking at these projects in a naval environment, with security and safety major factors that we had to consider and I am really proud of our progress so far.” The more progress the projects made the more enthusiastic the teams became – we have talented individuals throughout the branch and this is one way to engage them and enhance their technical ability.
Lieutenant Commander Mike Pearce joined the Royal Navy in 1954 as an artificer apprentice at HMS Fisgard. He has served in HM Ships Sheffield (Shiney), Teazer, Tamar, Belfast, Bulwark, Leopard and Sheffield (T42). He was rated chief ordnance artificer in 1965 and promoted to sub-lieutenant in 1969. His shore appointments have been on the staffs of Commander-in-Chief Fleet, HMS Collingwood, and the Director of Naval Recruiting at the MOD. He returned to the staff of Commander-in-Chief Fleet in late 1983 as the Staff Explosives Officer.

INTRODUCTION

On the evening of 3 September 1988 HMS Southampton was in collision with the 34,000 ton P&O container ship MV Torbay. The collision happened in darkness during preparations for a transit accompaniment through the Strait of Hormuz in the Gulf area.

The impact occurred on the port side of HMS Southampton’s forecastle (figure 1) in the vicinity of the ship’s Seadart magazine and resulted in considerable damage and flooding to the forward sections of the ship. There was also considerable damage to the ship’s outfit of Seadart missiles and complete flooding of both the Seadart and the 4.5 magazines.

This article broadly describes the explosive ordnance disposal (EOD) and explosive recovery operations conducted in respect of the damaged Seadart missiles, the explosive stores in the flooded 4.5 magazine, as well as the remainder of the ship’s explosive outfit; it does not describe the ‘ship’ salvage operation, other than for those aspects where both considerations are closely related. It must be recognized that this was a warship salvage operation, within which the safe completion of the EOD activity and the recovery of all other explosive stores were principal early considerations in that overall operation.

THE ALERT

On receipt of HMS Southampton’s first immediate signal concerning the subject of explosive safety, CinC Fleet (WE)’s duty staff called out the fleet explosives officer (FEO) and staff explosives officer (SEO) at approximately 0200 on the morning of Sunday 4 September. It was somewhat ironic that this call out procedure had only just been formulated and practised only twice as desk top exercises in the preceding few months. Some readers will be aware of the July 1988 S2022a distributed block amendment to BR 862 Chapter 9. This covers the reporting procedures for such incidents, involving conventional explosive stores.

As it happened fleet explosives staff had to re-route and re-format the signal information in order to alert the appropriate MOD directorate. Although this delay did not affect the outcome of this particular serious incident (SI) that had, in the event, quickly stabilized, the importance of following the signal format that incorporates a dedicated subject indicator code (SIC), cannot be
overstressed. Without encouraging complacency, readers can also take some reassurance in the fact that no explosive event occurred, and this, in turn, must also give readers confidence in the general safety standard and acceptance procedures for explosive stores brought into naval service.

After signal re-routing and consultation with the staffs of the deputy directorate engineering and weapon support (chief inspector of naval ordnance) (DDEWS (CINO)), a signal response to HMS Southampton was sent approximately three-and-a-half hours after receipt of their first. This response in effect endorsed the view that the damaged (flooded) explosive stores were not perceived to be an immediate high risk consideration for the ship. As a consequence of numerous telephone calls throughout that night and the following morning, the following representatives were en route to join HMS Southampton by mid afternoon of Sunday 4 September in order to assess, advise and institute, in conjunction with senior naval officer Middle East (SNOME) staff, NP1600 staff and ship’s staff, the recovery and disposal operations necessary for the explosive stores held by the ship; the fleet naval ordnance inspecting officer (FNOIO), a PPTO chemical and am munition expert from DDEWS (CINO) staff, two explosive ordnance disposal (EOD) warrant officers from the superintendent of diving’s (S of D) staff and CinCFleet’s staff explosives officer.

THE ASSESSMENT

After the collision HMS Southampton had made her way, under her own power, to the port of Fujayrah which is situated in the United Arab Emirates (UAE) but outside the Gulf. In Fujayrah she was berthed alongside with a bow down trim and with RFA Diligence outboard and bow to stern, in order to facilitate the use of Diligence’s crane. She remained there for six days, from the 5 to 10 September.

During this period, from visual inspection, underwater videos and camera stills, the following assessment was made:

Seadart. The bow of the MV Torbay had cut through the port Seadart spray compartment and damaged the spray compartment and magazine bulkhead. The level of water in the Seadart magazine was in the vicinity of the missiles’ ‘polyrod’ aerials. Access for the divers was relatively simple; through the ship’s side or via the blow-off trunk. The exploration, underwater video and photographic ‘stills’ revealed that some missiles were intact, some had broken forward of the control ring and some had separated at the boost junction beam (figure 2). There was also considerable debris in the port after corner of the magazine, including part of the spray tank and a jumble of the magazine missile indexing gear. Underneath this was a live boost motor (figures 3 and 4). The forebody of one missile was jammed against deckhead trunking (figure 5). Some missiles were at odd angles and one of the drill missiles was broken off at the control ring of the boost junction beam interface and was upside down! Opportunity was taken to ‘swim’ this missile, whose negative buoyancy was not very great, out through the ship’s side and remove it using Diligence’s crane. It became apparent that some, if not all of the boost motors would be flooded and it was also possible that some other explosive components in the missiles would have suffered damage and been subjected to penetration of water. It was clear that little if any missile material could be re-used after the prolonged immersion. The team recommended that:
The bow down trim should be maintained, to keep the explosive compartments underwater until the contents were removed,

- The missile material should be written off,
- The missile material should be removed from the magazine, kept wetted and disposed of,
- And the security implications of disposing of the missiles should be investigated further.

The first recommendation was followed by ship’s staff and the remainder were considered by CinCFleet and CINO staff.

While the extent of the damage to the Seadart handling system was not fully appreciated at this stage the following general details made it easier to visualise the situation:

- The magazine part of the Seadart hoists had broken off.
- The port rail system had been shunted forward, piercing the double bulkhead between the Seadart magazine and 4.5 magazine (figure 6).
- The two forward missiles on the port rail were closer together than any of the others, the foremost being impacted against the forward bulkhead.

- Some missile trolleys were off their rails.
- Some boost motors had been displaced within the trolleys.

4.5 Magazine. The magazine contained a near complete outfit of 4.5 ammunition, 4.5 clearing charges, Phalanx ammunition and Super R Boc. All were still in their approved containers or boxes in normal stowages, except that some of the 4.5 rounds had been displaced on impact. The boxes of Phalanx ammunition were situated in their approved stowage positions, below the deck plates of the magazine.

A sample of each type was removed by the divers for preliminary examination, to determine the extent of water penetration. At this stage there was evidence of some water penetration into a few of the 4.5 N36 containers. It was recommended and accepted that:

- The displaced 4.5 rounds would be adequately protected by their containers and could be handled safely,
- The magazine should be cleared by divers and that every round should be inspected to determine whether it should be returned or disposed of.

PREPARATIONS

Initial

During the period 5 to 10 September numerous interrelated ship and explosive recovery options were discussed until a way ahead was formulated and agreed. The problem of the movement of any explosive stores in the commercial port of Fujayrah, and indeed later at Dubai and Jebel Ali, was an ever present politically sensitive issue.

Negotiations between SNOME, senior liaison officer Middle East (SLOME) and the senior transport officer navy (Middle East) (STO(N) (ME)), indicated that permission to clear the ship would be given at the port of Jebel Ali, a vast man-made complex within the Gulf in the Dubai Emirate of the UAE (figure 7).

In preparation for the necessary transit and in order to ensure safety of the loose missiles, a matrix of wooden...
battens, shores and lashings was arranged by divers around the missiles. In addition, strengthening beams had been welded to the ship’s forecastle. The 4.5 Mk 8 mounting and Seadart launcher rotating structures were also removed and transferred to RFA Diligence.

The tow alongside Diligence through the Strait of Hormuz was accomplished successfully on the 10 and 11 September, despite some (unforecast) poor weather. However, permission to use Jebel Ali for the explosive recovery operation was not immediately forthcoming and the ships anchored (still alongside) in international waters off Dubai, until diplomatic clearance was obtained.

4.5 Magazine Contents

CinCFleet explosive staff had approved the use of the ship’s hangar as a temporary weather deck magazine stowage under the provision of BR 862 Chapter 14. While off Dubai, the contents of the flooded magazine were removed by divers and taken to the flight deck where an awning had been rigged. (The shade temperature rose each day into the high 90s and relative humidity approached 100 percent). This operation took approximately 48 hours to complete. Inspection of each individual round recovered was carried out by ship’s staff to the requirements of, and the oversight of FNOIO, as well as the advice of the explosive chemist DDEWS (CINO) representative.

Twelve 4.5 rounds showed signs of extensive corrosion and one SRBOC container was completely full of water, such that the round would almost certainly have been pressurised. These rounds were marked for subsequent disposal. All remaining 4.5 and SRBOC, which had been wetted by sea water, were washed in fresh water. The containers were also washed in fresh water and both were dried, as effectively as possible in the prevailing climatic conditions, using rags, low pressure air and sunshine. These rounds were then returned to their N36 containers and labelled for future RNAD inspection.

Most Phalanx boxes had remained watertight. Four boxes, however, were found jammed under the distorted after bulkhead of the magazine, beneath the deck plates, and their removal required some judicious persuasion from a crow-bar! These boxes were damaged and their contents wetted. All wetted rounds exhibited white corrosion products on the plastic sabots. These rounds were handled using rubber gloves and samples of the corrosion products were taken for future analysis. The rounds and containers were washed, dried and repacked. Two Phalanx rounds had been damaged; one had minor damage to its plastic sabot (protective cover), the other had suffered distortion of the cartridge, but without any fissure or displacement of the projectile from where the cartridge and shell join. (cannelure).

Although shipment of Phalanx rounds by RFA had not been authorised previously, DDEWS (CINO) had made specific arrangements, in this instance, for these to be ‘Back RAS’d,’ as the Oslo Convention, (ie an international agreement), debars the dumping or disposal of Phalanx material, however slight, at sea.

SEADART MAGAZINE

While awaiting diplomatic clearance for Jebel Ali, (not obtained until 28 September), a number of preparatory activities continued. It was during this period that the ships were allowed into Port Zayed (figure 7) for seven days.

Because all normal missile removal facilities were either damaged or completely non-operational, other methods for their removal had to be devised. It was decided, eventually, that the safest way was by cutting away a large section of the forecastle deck, and a comparable area of 2 deck cross passage, both areas being immediately above the magazine. Before this could commence the removal of all deck, deckhead fittings and cabling had to be completed. HMS Southampton’s ships company worked for seven days removing such equipment and delagging deckheads. At the same time the EOD team removed the Seadart magazine deck fittings and produced a scale plan of the magazine showing the positions of the top and base of each missile relative to the forward bulkhead. From this it was possible to establish the position of each missile relative to 2 deck.

Other local preparatory measures included:

- Designing and manufacturing longitudinal lifting strops for a complete missile, (one for each missile).
- Designing and manufacturing shorter lifting strops for smaller items.
- Purchasing clamping strops to secure the missile longitudinal lifting strops.
- Designing and manufacturing canvas hammocks with sewn in lifting strops, for lifting the missiles from the forecastle to the barge, in a horizontal configuration (one for each missile).
- Designing and building a lifting gantry to cover the entire area of the Seadart magazine (figure 8). This gantry projected over the side of ship, such that it could plumb the set of missile ‘coffins’ on the barge adjacent to the ship’s side. The gantry configuration incorporated four hoists running on travellers, Two of the travellers had power operated hoists with inching control, power being supplied from a portable generator on the quay.

![Figure 8. Missile lifting gantry.](image)

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Jump to Contents
• Contractors cut away 1 deck, over the forward part of the magazine, and added one stiffening beam to the upper deck.

• The EOD team cut away 2 deck (magazine deckhead) and associated longitudinal strengtheners using hydraulically operated cutting equipment. The cutting away of both decks was completed in three days, two less than was estimated (figure 9).

• A 100 ft X 40 ft flattop barge (figures 10 and 11) was purchased and fitted with:
  o A closeable sounding tube or vent and lockable flood valve for each of its ten watertight compartments.
  o A pump.
  o In addition open-topped steel coffins, 6 ft deep, capable of receiving one horizontal Seadart missile or parts thereof were constructed and fitted to the deck of the barge (figures 10 and 11). A layer of sandbags was placed in the bottom of each coffin. The coffins were filled with sea water and the missiles were given further protection by additional sand-bags.

In The United Kingdom

• RNAO Gosport briefed divers allocated to the EOD task on the Seadart missile’s construction. In addition they prepared sets of tools likely to be useful; designed and manufactured additional lifting bands and strops, as well as a lifting device that bolted direct on to boost motors in place of the boost junction beam.

• DST(AS) officers prepared a drawing of the missile and procedures for parting the missile, including a procedure for cutting the missile body, if necessary.

• DST(AS) headquarters officers were briefed on the situation in detail.

• CinCFleet (WE) and CINO established that the security authorities would not require recovery and/or destruction by countermining of classified missile components.

• CINO staff established that the disposal of all other missile arisings was acceptable.

On the 26 September HMS Southampton was secured alongside a “sanitized” berth in Jebel Ali port. On 2 October the EOD task commenced.
EOD TASK

Seadart

To say that the facilities at Jebel Ali were rudimentary is perhaps an understatement. There was no shore power, other than from a portable generator hired for the purpose, and daytime accommodation consisted of two dusty portakabins on the desert sand, approximately 100 yards from the ship (figure 12). During each and every EOD activity the ship was cleared of all personnel, other than the EOD team and an HQ1 watchkeeper. The latter provided the communications link, by telephone, to the ships command and control position, in one of the portakabins.

Figure 12. The berth at Jebel Ali.

Although each missile EOD and explosive recovery operation was unique, the general procedure, however, was as follows:

• Two 12 metre braided nylon strops were passed around the base of the boost motor and butt hitched twice up the length of the missile body. Five or six mechanical strops were then secured around the missile body spaced at one metre intervals. After the slack had been taken up on the low powered electric winch, the four missile unlatching mechanisms were operated, releasing the four locking bolts. The missile was then hoisted, approximately 2 metres, until clear of its trolley. At this point the hoist was stopped and the four flip out fins removed, a further two mechanical strops were secured to the boost motor and the missile then hoisted clear of the water, to drain. This stropping method was devised to prevent the boost motor from breaking away at the launch beam, the weakest point (figures 13 and 14)

• The missile was then lifted clear of the decks, tilted and then lowered horizontally into a specially designed hammock. With the aid of a spreader bar the missile was then hoisted in the hammock and lowered into one of the coffins on the barge. The coffin contained a layer of sandbags and the missile was fully immersed in water.

• This method of removal was used on 40 per cent of the missile outfit. Removal of a missile from the magazine to the barge took approximately two hours. Some exceptions to the foregoing procedures were:

• Boost motors on their own were nearly all removed using the lifting device manufactured at RNAD Gosport, which bolted directly on to the boost motor, in place of the boost junction beam.

Figure 13. A missile clearing the flooded magazine.

Figure 14. A missile clear of the forecastle, which shows the method of stropping.
One missile had been pushed into the forward bulkhead by the impact of the collision. This was freed by cutting away the bulkhead fittings, which were entangled around the missile body, with hydraulically operated cutting discs. Once freed the eight bolts holding the launch frame to the boost motor were removed and the boost percussion link pipe and the launch electrical leads were then cut. The body of the missile was then stopped in a similar method to previous missiles and lifted clear of the magazine. The boost motor had been crimped into the trolley by the trolley support arms bending inwards. By pushing these aside with a hydraulic ram (ENAPAC) the boost motor was stopped and hoisted clear. This task alone took six hours to complete.

Another had been partially separated from the boost motor at the control ring. This was tackled by first removing the launch beam securing bolts, then carefully stropping the upper section of the missile body. After cutting away the boost percussion link pipe and launch electrical leads the upper section was gently hoisted on chain hoists at the same angle. Because of the damaged separation bolts, which contained explosives, the body was hoisted without putting any strain onto these items. The boost motor was stopped and lifted clear separately.

A further missile had been sheared from its boost motor and was embedded in the deckhead fan trunking. It was obvious that the warhead had experienced considerable shock. Because one part of the arming sequence was electro-mechanical it was considered that partial arming of the warhead could have occurred. As no precise drawings of the warhead were available the task of removing this missile was executed on the very detailed advice of the CINO representatives. Divers commenced by stropping the upper part of the body, to prevent it falling when released from the deckhead. They then removed the part of the fan trunking that the warhead had entered, at the same time removing a large piece of heavy piping that was also jamming the missile warhead. This rather delicate operation took three hours to complete.

On 9 October the final task was to remove the last live boost motor remaining in the magazine. Divers commenced work to clear the debris from around it. The main problem was that the spray tank was “sitting” on top of the boost motor and would have to be lifted to allow the boost motor to be pulled clear. Six two ton chain hoists were positioned in areas around the tank and wire strops were attached to the base. This enabled the tank to be hoisted some 20 cms only above the boost motor. This small gain did, however, allow a more detailed inspection of the damaged boost motor, which revealed a large area of damage where the outer casing had been impacted, apparently exposing the explosive filling. After four hours work it was decided to continue the task on the following day, as the light was failing.

The next day divers entered the water with a fresh approach to this difficult task. It was during this difficult operation that the only injury was incurred, when a falling chain block pinned one of the divers to the deck of the magazine. A gash to the diver’s leg required five stitches. At midday divers again returned to the task, using hydraulic rams and cutting gear, but again, at the close of the day, the boost motor was still entombed. On 11 October the divers were still cutting away debris, and by this time the water within the magazine was becoming heavily contaminated with hydraulic fluid from the raft assembly. At 1510 that day the boost motor was eventually pulled clear and hoisted to the surface, where CINO representatives inspected it before it was lowered into the barge. The removal of this boost motor had taken twenty-two hours and certainly demonstrated the determination and resolution of the EOD team.

4.5 Magazine Contents

A number of items recovered from the flooded 4.5 magazine had been declared unsafe for return and ‘Back RAS’. There were also other items of the ship’s outfit, such as detonators, that could not be returned via the RFA. All of these items were placed in a spare coffin on the barge for eventual disposal.

On 16 October MV Stella, with HMS Boxer in company, escorted the barge and contents to their final resting place in deep water (figure 15).

De-Ammunitioning

RFA Regent arrived on station on Friday 14 October. From a meeting that same day between CinCFleet’s staff explosives officer, STO(N) of RFA Regent and HMS Southampton’s delegated officer (DWO) arrangements were made for a final survey and the repacking of a considerable amount of the remaining explosive stores. This task was completed over the weekend of 15 and 16 October. As there was still evidence of oxidized deposits on some of the Phalanx ammunition, much of the above was completed using protective clothing and gloves.

Because permission had not been obtained to move any items of naval armament stores along the jetty, (including non-explosive items such as the small arms), the remaining outfit of ship’s explosives stores certified safe for ‘Back RAS’ were all transferred from HMS Southampton’s flight deck to RFA Regent’s forecastle area using a high-lift dockside mobile crane hired for that purpose. (Regent was, because of the over-hanging missile gantry on Southampton’s forecastle, berthed bow to Southampton stern).

The above evolution was conducted and completed, as planned, without mishap, over the period 17 and 18 October.

SUMMARY

As a consequence of a very sad event I have been fortunate (or unfortunate as the case may be; my leave had been interrupted yet again) to witness and partake in a major and unique EOD and explosive recovery operation for which, because of many other inter-related considerations, there were few clear guidelines. There was of course the odd difference of opinion as to approach but, as ever, these were all eventually resolved such that this difficult operation was efficiently and safely completed in just over six weeks.
A large number of people were involved in this operation, both in the UK and locally. From my observations on site I can, without reservation, say that I now take considerable reassurance from the professionalism and dedication of those involved, whether from the MOD, the RFA Service or the RN. I was particularly impressed by the younger generation, by their good cheer, resolution and fortitude throughout, often in very trying circumstances.

POSTSCRIPT: BY FWEO

This article has dealt with just one facet of the collision between HMS Southampton and MV Torbay – the EOD and explosive recovery task – and I hope has given readers an interesting insight into this very professionally managed and entirely successful operation. That said, as with all such unusual (we hope!) operations, lessons have been learned. In this case the almost instant flooding of the two major magazines and other compartments in the vicinity of the collision was certainly a major factor in preventing fire compounding the immediate problems faced by ship’s staff. Another ship, on another occasion, might not be so lucky; in which case the immediate safety of the ship and its staff will rest entirely in the hands of the latter and their training, because no outside authority can help in the first few vital moments of an emergency at sea. However, once any immediate crisis is overcome and the situation has stabilized there is always the danger of management overkill – with well-intentioned, but poorly co-ordinated Headquarters advice pouring in from all directions.

Clearly, for incidents such as the Southampton EOD task, which involve risk to life or the ship and have to be undertaken at a remote location, this must be avoided. Because, in the case of Southampton, we were fortunate in having the luxury of being able to draw breath between the collision and the EOD task such problems were largely avoided. However, had the situation demanded a more immediate reaction, it is clear, with the benefit of hindsight, that we lacked the procedures to a void at least some element of confusion in who was responsible for what. To fill this gap an addition to BR 862 will be issued shortly indicating the policies, procedures and responsibilities which can be invoked to deal with any future serious peacetime incidents involving conventional explosives that, because of their nature, require a local incident commander and the co-ordination of a wide and diverse range of operational, engineering, support and, possibly, political authorities. I say “can be invoked” because it is always dangerous to be too specific in how to deal with what, by definition, will be an unusual and unexpected event.

However, perhaps the main lesson to be learned, or re-learned, from the Southampton collision is that the unexpected can and occasionally does happen. While the majority of those on board can do little to lessen the immediate results of such an incident, every member of a ship’s company can play a part in containing the situation that then faces them; and each and every one will be better prepared to play their part if they have given a little thought, at some stage during their time on board, to: “what would I do if ...”

Figure 15. The barge under tow, HMS Boxer silhouetted in the background.
RN ENGINEERS
HELPING TO BEAT EBOLA!
1 ASSAULT GROUP ROYAL MARINES:
OP GRITROCK – OCTOBER 2014 – APRIL 2015

By Lieutenant Paul Phillips IEng IMarEng MIMarEST RN
Marine Engineer Officer – 1 Assault Group Royal Marines

Title photo: 539 ASRM posing following a Remembrance Day service; CPOET(ME)s Harry Chadwick, Jack Hawkins and CPOET(WE) Nick Stacey are all pictured on the middle row.

PLANNING
Op Gritrock was borne out of the British military response to combat the Ebola epidemic crisis emerging in West African nations including Liberia, Guinea and Sierra Leone. The latter would serve as the base of operations for the efforts to wrest control of a situation where the death toll had spiralled exponentially through the early months of 2014. The British response to the situation was swift and units received four days’ notice to move on receipt of official tasking, this required a concerted effort by many units and organisations including:

BACKGROUND
539 Assault Squadron Royal Marines comprise the deployable amphibious warfare unit within 1 Assault Group Royal Marines, based at the newly established RM Tamar within HMNB Devonport, Plymouth.

The squadron remains at an R2 state of readiness (five days’ notice to move) utilising dedicated Royal Marine Coxswains and Royal Navy engineers from the Log Sqn within 1 AGRM to support an array of operational craft. These craft include the very capable Landing Craft Vehicle Personnel (LCVP Mk 5B), Landing Craft Air Cushion (LCAC(L)); more commonly known as hovercraft, Offshore Raiding Craft (ORC) and Inflatable Raiding Craft (IRC). These provide a range of amphibious capabilities dependant upon the tasking at hand, be it by establishing shore Forward Operating Bases (FOB's) or embarked at sea on platforms such as LPD, LPH or LSD(A).

Born and raised in Plymouth, Devon, Lieutenant Phillips joined HMS Raleigh as an Artificer Apprentice in 1996, continuing his apprenticeship at HMS Sultan and in HMS Beaver. He joined HMS Cumberland in 2000 and under Operation Enduring Freedom the ship deployed to The Gulf of Aden to conduct boarding operations in support of the allied invasion of Afghanistan in 2001. Promoted to Chief Petty Officer in 2003, he was assigned to Superintendent Fleet Maintenance, Devonport and in 2004 joined Naval Engineering Falkland Islands (NEFI) as the Chief Shipwright. In 2005 he joined HMS Chatham as the M3 Group Head. He then spent several months in HMS Cumberland in 2007 to bring the ship out of upkeep, before joining the Refrigeration Specialist Unit in Devonport, offering advice and assistance to fleet units. He completed another assignment to NEFI in 2008 as the Diesel and Boats Specialist. His last assignment as a CPOET was to 539 Assault Squadron Royal Marines in 2010 as the Landing Craft and Hovercraft Group Head. Extracted to the Officer Corps in 2011, he attended Britannia Royal Naval College, Dartmouth where he was promoted to Lieutenant before completing the Systems Engineering and Management Course at HMS Sultan. In January 2012 he joined HMS Ocean as the Propulsion Engineering Officer completing his formal MCQ in February 2013. In April 2013 he joined 1 Assault Group Royal Marines as the Marine Engineering Officer responsible for the formation of the newly established RM Tamar amphibious engineering facility, whilst completing challenging deployments to Somalia, Bahrain and Norway supporting 539 Assault Squadron Royal Marines. He is shortly returning to HMS Ocean as the Assault Systems Engineering Officer.
• RFA Argus, the MOD’s Primary Casualty Receiving Facility and multi-purpose vessel, with extensive flight deck services and an operational medical facility, including CAT scanner, operating theatre and 130 bed casualty ward.

• Three Merlin Mk 2 helicopters from 820 Naval Air Squadron, stationed at RNAS Culdrose, with a full supporting flight.

• A medical team of over 100 personnel, including civilian doctors and nurses and regular and reserve MOD medical personnel.

• 539 ASRM embarked with two LCVPs, three ORCs and six IRCs, along with the 22 supporting personnel of Landing Craft Coxswains from Raiding Troop and three RN CPOET Engineers.

• As a result of these additional personnel increased the ship’s company from 140 to 400; this brought with it the increased logistical problems of sustaining so many personnel.

EXECUTION

Argus deployed from Falmouth on 17 October 2014 and made a brief stop in Gibraltar (with personnel permitted only three hours of shore leave) before continuing the transit to Freetown, Sierra Leone, where she would remain on station throughout Op Gritrock.

With the arrival of Argus off the coast of Freetown at the end of October, her embarked assets were immediately put to use; initially with the delivery of vehicles and stores ashore at the Queen Elizabeth Dockyard, which would be the only time that the Argus would put alongside during the entirety of Op Gritrock.

For the vast majority of the operation, Argus maintained a patrol box in the coastal area of Cockerill Bay (except when water production demanded a move further from shore), where she launched her three Merlin helicopters and the various craft of 539 ASRM. These provided vital transport and supply links between Lungi Airport on the northern shore of the Sierra Leone River and the main HQ in Freetown, which, due to a lack of bridges over the wide river, would otherwise necessitate a four-hour road trip each way over difficult terrain.

The 1 AGRM Engineers quickly developed a good working relationship with Argus’s civilian engineers and deck crew; the latter having the never ending task of moving craft and stores around the confined flight deck, whilst ensuring flying operations remained uninterrupted. Large wooden blocks were used to support the weight of the LCVPs, while the ORCs were transferred to lightweight trailers, which permitted the craft to be moved around the deck more easily.

It quickly became apparent that, in order for at least one ORC to be available at a moment’s notice, one craft would be left secured by the deck crane outboard of the ship (on the hip). Due to the limited reach of the crane, there would have been the necessity to launch an LCVP (a much more labour intensive operation) every time that an ORC was required for tasking. Some of the early craning evolutions were not always successful, due to high sea and wind states; one LCVP suffered a badly damaged mast, which was removed and adapted to refit the navigation lights to the wheelhouse in order that it continued to meet Lloyds and MCA requirements.

The 1 AGRM Engineering team consisted of CPOET(ME)s Jack Hawkins and Harry Chadwick along with a CPOET(WE), Nick Stacey. The team quickly became accustomed to the more routine defects occurring on the various craft, more noticeably the largest quantities of man-made waterborne hazards in the form of gash that is routinely deposited into the river by the residents of Freetown. These foreign objects routinely blocked the water jet intakes of the craft, reducing performance and occasionally causing defects of a more serious nature. The tidal currents around the mouth of the Sierra Leone River channelled the debris into dense streams, through which the craft had to transit cautiously for fear of the water-jet intakes drawing in potential obstructions – a near impossible task especially for the high-speed ORCs; which required repeated operations of the water-jet’s back flushing system. Nevertheless, there were frequent occasions when items such as flip flops, mail and vegetable sacks, plastic bottles and, more often, ropes had to be recovered from the intakes either whilst still on the water or upon the craft’s return to Argus.

The initial tasking during the early weeks of the deployment required 539 ASRM to transport food supplies to many of the smaller islands in the Sierra Leone River. Engineering support was routinely deployed with the craft in the event of mechanical issues with the various craft due to the increased risk of debris ingress. Although the craft initially performed well, the high operational tempo started to have an impact on serviceability with all craft suffering...
both mechanical and structural defects. Servicing intervals occurred far more frequently than they would when deployed on ‘regular’ deployments and the craft fendering took significant damage from repeated nosing-on and berthing to ad-hoc jetties and during craning operations.

Finding time in the operational schedule to plan essential routine maintenance became extremely difficult; combined with the limited facilities available to complete servicing. The engineering team, who, due to the enforced full cover dress routine on the upper deck, endured long hours in a hot and humid climate with limited shelter from an unforgiving sun. All three engineers were becoming familiar with the others’ field of expertise, with the CPOET(WE) routinely conducting ME servicing and defect repair. This is the unique environment in which the RN Engineers within 1 AGRM find themselves. Deploying in small teams around the world, operating autonomously, with an array of craft and with limited facilities.

Further engineering issues emerged following the failure of a LCVP engine which needed to be replaced immediately. This proved all the more difficult, in that none of the engineering team had personally removed an LCVP engine, compounded by the limitations placed upon the team by the embarked flight as to when the deck crane or the mobile TEREX crane operated by the 820 NAS flight could be used. Nevertheless, the engineers were able to carry out the engine change successfully in less than 24 hours, returning the craft to full operational readiness. This timely rectification was all the more vital as the LCVP was required to transport a short wheel based Land Rover and trailer to collect critical helicopter spares that had arrived at Lungi airport.

As Christmas approached, two of the engineering team returned to the UK and were replaced by POET(ME) Will Atkinson, who had, a little over a month earlier, returned from Op Cougar. In early January CPO Stacey returned to the UK, and CPOET(ME) Luke Jones and LAPOET(ME) Aaron Long joined POET(ME) Atkinson to provide engineering support for the remainder of the task. There was precious little reduction in the operational tempo over the festive period; with the craft continuing to provide their role in transporting personnel and supplies, as well as investigating reports into potential Ebola cases being ferried across the river in remote locations and avoiding quarantine check points. Unfortunately, during the course of one of the investigative transits, one of the LCVPs suffered serious hull damage when it struck an unseen object and although there was no internal penetration or water ingress, upon returning to Argus it was clear that the structural damage to the keel was extensive and the craft was declared unserviceable. With the expected arrival of the Dutch amphibious vessel HNLMS Karel Doorman in the New Year, the damaged LCVP would return to the UK, along with the defective Argus seaboat, which the RN engineering team were unable to make serviceable. The returning LCVP donated its only operational engine prior to departure to ensure some redundancy for the sole remaining LCVP.

The first month of the New Year proved to be the busiest for both the Coxswains and Engineers. With only one remaining LCVP aboard Argus, it became critical that the craft was monitored closely to maintain Argus’s heavier lift capability. Due to the increased use of the remaining LCVP, the port engine began to run very noisily and seemed to indicate an issue with its timing. Despite the engineering teams efforts to re-set the timing of the engine, it continued to rattle
noisily and the decision was made to change the engine with the spare from the previously damaged craft, which returned to the UK. Once again this task was completed by the engineers who possessed little experience of LCVPs and endured 11 hours in full exposure to the 30º+ heat and humidity. Once again the team restored full operational capability in just under 24 hours.

For the remainder of the deployment, whenever the LCVP deployed, engineers rotated through accompanying the craft in order to maintain a level of engineering support to endure serviceability. The ORCs continued on to act as the workhorses of the fleet, maintaining more than double the speed of the LCVP, but they too were struggling under the strain and the deployed engineering stores were rapidly becoming depleted. One of the ORCs suffered a stripped internal thread to the main oil supply hose on one of its two engines and rendered the craft unserviceable. This craft became a donor craft for the remaining two, while a previous defective craft which had a defective turbocharger and heavily damaged port side fender was brought back to full operational readiness to restore the full fleet capability.

A major re-supply arrived aboard the MV Eddystone Point in mid-February, which included not only vital engine parts, a replacement fender but also two additional ORCs to supplement the already ailing ‘fleet’, most of which now sported old car tyres where their damaged nose fenders had previously been. Another vital piece of equipment that arrived in the replenishment was an ORC engine transport trolley, which made life considerably easier when working on a removed engine, essential when an engine on one of the newly arrived craft suffered a serious electrical issue that necessitated its removal. Proving to be one of the more frustrating defects, the entire engine wiring loom required investigating to identify the problem; testing all the team’s electrical engineering knowledge. With the defect identified and rectified, the craft continued to work well on their now established triangular transit route around the Sierra Leone River.

With Argus now confirmed to depart Sierra Leone on 27 March, alternative tasking was received for 539 ASRM. First was a forty-mile transit to the north of Freetown, from where British health workers were collected at the small settlement of Kychom and transported to an island just around the headland that was otherwise unreachable by road, where there were reported to be some potential Ebola cases. During this long transit the two accompanying engineers who had so far had an otherwise event-free morning, were faced with the challenge of both engines on one of the ORCs refusing to start prior to the transit back to Argus. The problem was caused by low voltage in both batteries and with no battery booster pack and without a means of jump-starting the boat, a battery was transferred from the still-running accompanying craft and was sufficient to start one engine and then to parallel its voltage across to the other diminished battery to enable the second engine to start.

The RN Engineering team not only conducted maintenance and repair of their own craft but were also required by the Department for International Development (DFID) to build four donated craft. These craft, once constructed, resembled ‘bath-tubs’ and, along with their respective four-stroke outboard engines, would provide the local Maritime Wing the ability to conduct waterborne transport of potential Ebola victims to health centres. The three RN Engineers led in the construction of the two-section craft (the two-sections allowing the crew to be isolated from any sick passengers) and initial run-in procedure for the outboard engines. A civilian engineer from DFID was on hand to provide initial guidance to the team as to the construction of the craft and the fitting of the engines’ steering/throttle auxiliaries, before allowing them to continue...
with establishing a new mini fleet. The ‘bath-tubs’ also provided an additional benefit by way of sleeping quarters for the engineering personnel when required to remain with the craft overnight during prolonged tasking, who otherwise would have been crammed on the LCVP and ORC.

CONCLUSIONS

Prior to Argus’s withdrawal from Freetown, the ship and her crew were given a farewell address by Brigadier Andrew Hughes MBE, who had been in overall command of Op Gritrock, during which three of the six engineers from 1 AGRM were presented with Task Force Commander’s Certificates of Commendation for ‘outstanding service in support of Op Gritrock’, with the remainder receiving 1 AGRM Commanding Officer’s Commendations following their return to the UK.

The ability for 1 AGRM engineers to deploy with minimal notice, operating fully autonomously, without the support of the unit and the ability to adapt to the ever changing craft manifest; is a credit to the engineering and management training that is received in the Royal Navy. With this training and the individual commitment and pro-active approach of these engineers, 539 ASRM never failed to meet a tasking required of them. 1 AGRM is one of only a few units which operate in this manner and as a result many of the engineers who have served often return wanting to continue challenging their knowledge and themselves. Over the last 12 months the units’ engineers have been required to conduct repairs to craft in some of the most challenging environments available, ranging from the extreme cold of Norway to the heat and humidity of the West African Jungle.

Argus returned to a hero’s welcome in Falmouth on 7 April 2015, having completed her vital role in aiding the effort to combat the Ebola virus with cases dropping from 500 per week to only 33 by the time she left Sierra Leone.

[Image of CPOET(ME) Luke Jones, LAPOET(ME)s Will Atkinson and Aaron Long receiving their Theatre Commander’s Commendations. All six 1 AGRM engineers who deployed on Op Gritrock received Commendations.]

[Image of Operational, not decorative – battered and bruised but still fully operational, the common problem of berthing ORC against rural jetties.]

[Image of The crowded and busy flight deck of the RFA Argus, the unusual sight of flight and amphibious operations being conducted concurrently.]
Lieutenant Sally Dalton joined HMS Protector in the South Atlantic for a three-week ice patrol in order to conduct a Training Evaluation and recommend to the Project Team in the UK where they might best be able to invest their money to improve the training. The views were spectacular and interviews of the ship’s company took place against the backdrop of icebergs, penguins, seals and even some whale sightings … but the critical finding of the training evaluation conducted in this cold but permanently light environment highlighted the unquestionable link between the Personnel (P) and the Training (T) Lines of Development (LoDs). In this time of Engineering Training change under Programme Faraday and the introduction of the Queen Elizabeth Class, the River Class Offshore Patrol Vessel Batch II and later the Type 26 frigates, this training evaluation highlights not only the changes required to support Protector but some important lessons for the P and TLoDs that will assure our future capabilities – a key to Operational Capability and mission success will be the resolution of both P and TLoDs together.

By Lieutenant Sally Dalton RN
Maritime Training Acquisition Organisation

The Maritime Training Acquisition Organisation (MTAO) is a small team of Engineering Training Managers ((E)TMs) based at Abbey Wood. Their role is to work across the maritime projects, providing advice and consultancy on the Training Line of Development (TLoD) to project teams (PTs). These PTs are responsible for providing new or upgraded capabilities to the front line and supporting them through life – without sufficient training, these new capabilities will never be fully realised.

As part of its remit, MTAO provides advice and consultancy to the Ice Patrol Ship Project Team (PT). HMS Protector, the Royal Navy’s current Ice Patrol Ship, is a symbol of the Royal Navy’s global reach, operational flexibility and the Service’s ability to sustain operations wherever and whenever that presence is required. She provides a UK sovereign presence in the British Antarctic Territory, South Georgia and the South Sandwich Islands and their surrounding maritime areas, to underpin their security and good governance; and meet the UK treaty obligations and exercise rights under the Antarctic Treaty System through inspections, hydrographic charting and support to scientific research. As with all our ships, Protector works in an inhospitable environment, but the very nature of her role means that she is usually many hundreds of miles from land and therefore, support. In order to maintain her independence and achieve Operational Capability (OC) so far from second line Engineering support, Protector’s ship’s company must, more than ever, be suitably
qualified and experienced personnel with the confidence to work autonomously.

Protector was brought into Service in 2011. The initial training and manning requirement was determined from a Training Resource Estimate based upon HMS Endurance with the understanding that a TNA (Training Needs Analysis) would be required once the ship was in Service. Four years later, Protector and the PT were anxious that this analysis was actioned. Given that the Royal Navy is no longer resourced to provide equipment-based TNA “in house,” MTAO were asked to assist in outsourcing this work. However, defining what was required was not clear – exactly where were the perceived training deltas? What training was already being conducted and what would be done with the TNA’s recommendations?

Whilst MTAO could have outsourced a TNA, the team understood that given the platform’s unique nature, a “whole ship TNA” may not be the most effective use of the PT’s available funding. A TNA is labour intensive and is therefore necessarily resource-demanding and expensive. This is value for money when considering a range of similar platforms however, given that HMS Protector has a range of equipments unique to her role and a particular ship’s company, the outputs of a TNA were unlikely to be useful – the money for a “whole ship TNA” would be better spent on identifying specific equipments that were perceived as having a “training gap” and generally assuring current training.

As a result, Lieutenant Sally Dalton, from MTAO, conducted a three-week ship visit, where the Unit Establishment List, Terms of Reference, current training versus current equipments and current OEM training courses were reviewed in conjunction with the operators and maintainers.

A range of Personnel and Training recommendations were made across all the ship’s departments but given the amount of equipment on board, it was not surprising that the Marine and Weapon Engineering departments highlighted some significant issues.

The ME department was suffering from gapping – not a large number of personnel when considered in isolation, but with 14% of the posts gapped in a three-watch, lean-manned ship, this resulted in key roles being gapped for one or two watches out of three. In addition, across the ME and WE departments together, there were 82 different types of JPA “competence” that had not been attended by the individuals who required them and, in total, 179 individual competences were not held; this equated to 1071 man training days! The ME and WE departments carried 85% of the whole ship man training day shortfall. These numbers provide the data but the reality is that these numbers equate to watches where skills and qualifications required by two or three people are held by only one, putting undue pressure on the individual and providing little “depth” should this individual be unavailable for any reason.

In addition, the ME department had a range of equipments for which it was responsible, for which no formal training was provided at all. Equipments such as the PARAT Boiler directly affect the ship’s Operational Capability and, as such, operation, maintenance, diagnosis and repair of defects is critical. Why was there no training? On the WE side, V-Sat communications, provided by NAISIS, is not currently taught, despite its being fitted to other survey ships and equipment being held at HMS Collingwood for career course training. This seemed an obvious omission that could be relatively simply rectified. Other observations included the requirement for the Engineering Officers to attend the existing Bergen OEM course, a shortage of WECDIS maintainers and a requirement for HiPAP and Lightweight Taut Wire training.
On a positive note, Engineers spoke highly of a number of OEM delivered courses.

However, most significantly, the training evaluation highlighted the undisputable link between the “P” and the “T” Lines of Development; none of the training recommendations could improve ship’s OC if the Ship’s UEL was not agreed with competences being fixed. There remained confusion between the versions of the UEL that were current and endorsed and those changes that were recommended and under discussion. The most critical recommendation was therefore to agree and fix the UEL updated during the visit.

It was clear that personnel were not assigned with enough time to conduct the training needed for this platform; whilst finding time to conduct platform specific training courses is a common issue across the wider RN, in a unique platform with unique equipments such as Protector, there is less likely to be departmental experience and “corporate knowledge” and thus attendance on allocated, platform specific training, is even more essential. Whilst further courses can be recommended and the PT can fund the acquisition of further training, if personnel are not provided to undertake the training then the benefit can not be realised, it is then that the ship’s OC becomes compromised. The second most critical recommendation was therefore to ensure that all branches assign personnel with sufficient time for relevant training to be completed prior to joining the ship.

As a result of discussions and observations across the ship, a range of recommendations have been made across all departments including:

- Zero tolerance of gapping.
- Agreeing and locking of the UEL.
- Acquisition of specific OEM training courses where training does not exist.
- Assigning of individuals to the ship with enough time to complete the training required.
- Increasing existing training.

MTAO’s visit to Protector resulted in a report that summarised a range of issues across all departments and made recommendations to resolve them. It is unlikely that any of the issues presented were new information, however by presenting the facts in one document (with many annexes!) it has allowed a single version of the current situation to be summarised, logical recommendations to be made and for this to be distributed across different organisations. It has ensured that the PT has direction on where best to invest their funding, rather than simply following process and with whom they need to engage to resolve a variety of issues. The report has been formally accepted by the PT and recommendations are being actioned by members of the Training Steering Group, which is next due to meet in May. It has provided the evidence that, in fact, very few training issues exist but that key to OC and mission success will be the resolution of both P and TLoD together. Finally, this ETM work has highlighted the importance of the Branch speciality in support of its “Big Brother”, the Engineers.

1. After this article was written.
INTRODUCTION

Over the last few years, much has been reported on the introduction of the F-35 Lightning II fighter aircraft but it still seems something of myth and legend. RN and RAF pilots and technicians disappear across the Atlantic seemingly on one grand holiday, never to return. With the Harrier having retired from Service in 2010, and the first Lightning still not scheduled to arrive on UK soil until 2018, it can seem as if this 5th generation warfighting capability will never be delivered. However, I am happy to report that is not the case. It may come as a surprise, but UK-owned F-35B aircraft are being operated daily by UK pilots and maintained by RN and RAF technicians.

It is well known that the UK is purchasing the F-35B Lightning II, which is the short take off vertical landing (STOVL) variant. The aircraft will be introduced by a joint RN and RAF Lightning Force, to be based at RAF Marham from 2018. The aircraft will be deployed primarily on the aircraft carriers Queen Elizabeth and Prince of Wales but will also be used extensively for land operations depending on the UK’s strategic requirements.

UK AIRCRAFT AND PERSONNEL IN THE USA

Less well known, however, is that there are three UK-owned F-35B aircraft operating today within the USA. Two are located at 17(R) Squadron at Edward Air Force Base in California tasked by the JSF Operational Test Team. These aircraft are configured for operational testing, nominally known as orange wired aircraft. 17(R) Squadron is manned by approximately 70 UK personnel. The third aircraft, the first fully operational UK F-35B, known as BK3, is based at Marine Corps Air Station (MCAS) Beaufort, South Carolina and is my responsibility. Future UK F-35B aircraft will be delivered one every two to three months from 2016 onwards.

The United States Marine Corps (USMC) is also purchasing F-35B in significant numbers. As the USMC faces the same challenges of introducing this new aircraft into operational service, our Services have opted to engage in an unprecedented joint international program. We operate together to expediently train both USMC and UK pilots, technicians and other support trades in a single squadron VMFAT 501; the Warlords. The aircraft are operated and maintained in accordance with the US Navy NAVAIR regulations, and not the UK Military Regulatory Publication.

I was the first UK representative to arrive at MCAS Beaufort in May 2014. I was shortly
Simultaneously, VMFAT 501 was relocating from Eglin Air Force Base in Florida, where they had been operating for about 18 months, but under the guidance and oversight of the Lockheed Martin maintenance teams. VMFAT 501 is now all located at Beaufort, under full command of the USMC. It is a squadron of 13 F-35Bs (including BK3) and has approximately 250 USMC personnel. It currently operates 10-12 flying sorties per day to meet the current needs of the pilot training schedule. 10 conversion pilots have been trained at VMFAT 501 Beaufort to date.

There are 15 UK personnel at Beaufort; seven RAF (one pilot, six technicians and one administration sergeant) and seven RN (one engineer officer and six technicians). Over the next three years the number will grow to approximately 240 personnel and 13 UK aircraft. As the founding 15, our initial experiences are determining how best to integrate the UK personnel into the USMC squadron and informing how to best advance future UK personnel working with the Lightning aircraft. On return to the UK in August 2018, the team at Beaufort will become 617 Squadron. Initial Operating Capability will be achieved by December 2018.

UK AIRWORTHINESS OVERSIGHT

As the Senior UK Engineering Officer, my primary roles are to oversee the safe operation of BK3 and support the UK technicians on the Squadron. The UK aircraft and UK technicians are fully integrated into the USMC maintenance department, operating to USMC regulations. However, the UK’s Lightning Project Team (LPT) retains airworthiness responsibility for BK3 and all future UK aircraft. Occasionally, due to slight differences in airworthiness and liability laws between the UK and the USA, the LPT may wish to implement slightly different or more stringent maintenance policies. Acting as the conduit between the Squadron and the LPT, it is my responsibility to ensure the requirements are met and the material state of BK3 is maintained.

WORKING IN A USMC SQUADRON

It can appear that the USMC operates their squadrons in a very similar manner to a UK squadron, particularly from the pilot perspective. However, there are considerable differences in how the maintenance department is constructed and run:

• The maintenance trades are different; rather than UK Mechanical, Avionics and Weapons trades, the USMC Maintenance Divisions are Powerline, Airframes, Avionics, Seat Shop, Ordnance, Tools and Maintenance Administration.

• The flight line is solely operated by the Powerline Division, which also conducts most of the flight servicing.

• Rather than a Watch Chief, there is a whole division overseeing the serviceability of the aircraft: Maintenance Control.

• The Maintenance Department is headed by the Aircraft Maintenance Officer, who is a pilot. He is supported by seven other officers; two of whom are also pilots and five are ground maintenance officers. None are engineers in the traditional sense as they do not hold any engineering qualifications such as an engineering degree and none are accredited engineers.

• Quality Assurance (QA) is a separate division of 11 maintenance personnel, all qualified as Quality Assurance Representative (QAR). Their tasks include conducting traditional QA, managing technical publications,
conducting on-aircraft Quality Assurance tasks akin to independent inspections and managing local command procedures. The QA program is divided into 42 different programmes.

- The qualifications and authorisation process is completely different. Maintenance personnel achieve licences to use major pieces of GSE, and are awarded qualification for some maintenance evolutions such as changing tyres or towing aircraft.

- The concept of supervision and signatory levels is different; these responsibilities are held by maintenance personnel who have achieved the Collateral Duty Inspector (CDI) and later Collateral Duty Quality Assurance Representative qualifications. These are awarded on completion of an on-job training syllabus, QA test and interview but are not rank related. A corporal could be working as a CDI in a shop, under the direction of a staff sergeant, who has not achieved the qualification.

- No member of the maintenance department is granted the authority to deviate from the maintenance publication; the Joint Service Technical Documentation (JTD). If the aircraft is deemed unserviceable, no one is permitted to authorise an acceptable deferred fault, extend scheduled maintenance nor extend the life of a component. Any deviation from the publications must be referred to the Lighting Support Team (LST) based at the Lockheed Martin Factory in Fort Worth, Texas.

These differences have resulted in all UK personnel having to not only learn a new aircraft type and regulatory construct but also to re-qualify to meet the USMC qualifications. UK personnel also have to rotate between the maintenance divisions every few months to ensure they gain the best possible experience for all aircraft systems within their UK trades.

MAINTENANCE CHALLENGES

All UK personnel, regardless of rank and experience, arrive in the F-35 community with a steep learning curve ahead of them. When working with any new aircraft type there is a requirement to learn the construct of the new aircraft’s systems. Advances in technology have seen evolutions in traditional aircraft systems. For example, the flying control electro-hydrostatic actuators in the flap, tail and rudder; the flight control surface actuators are no longer powered by the main hydraulic system. Rather, the main hydraulic system’s primary role (in addition to traditional systems like the wheel brakes) is to power the door configuration and lift fan nozzles as the aircraft converts to the STOVL flight mode.

The aircraft was developed to meet the fighter and ground attack roles of a traditional single seat jet aircraft for three US military services and many international partner nations, all of whom historically have developed their own technical terminology, maintenance principles, concepts of safety and airworthiness and personnel training. The JSF programme aims to meet everyone’s requirement and therefore also seems unfamiliar to every service or nation. To put into context the challenge faced, there is a database available that lists over 5,500 abbreviations related to the aircraft systems and its operation that is used to understand the aircraft’s electronic technical publications and documentation.

A further evolution is the use of the fully computerised maintenance...
Part of the UK team and the UK’s aircraft BK3
TECHNICAL TRAINING IN THE 21ST CENTURY

By Lieutenant Commander Rob Driscoll BSc PGCE(QTS) RN
Head of Air Engineering Specialist Training

FOREWORD by OC RNAESS – Commander Jim McNair OBE MSc CEng FI MechE FCMI RN

Aviation in the Royal Navy is changing. Although we are all aware of and focussing on the new aircraft and aviation platforms being introduced, what can often be overlooked is that the people who maintain the aircraft are also changing. While I accept this last statement in part, I believe that the type of person that joins the Service is not really changing. New joiners could have chosen many easier routes/careers, but they chose ours; this attitude goes all the way up the rank structure. What has changed is that their expectations and aspirations are different; they demand and need more from their leaders and they demand more from their promotion and education systems. They have grown up with hand-use, open access technology, they do not confine their thought processes to what they can see in front of them, they do not take everything on face value, they can get access to what we know, often before we know it ourselves, and, more significantly they are willing to use this knowledge to challenge us.

To that end, the Air School is changing.

We are changing in the way that we deliver, store and provide access to the education we create. We are thinking about the new platforms coming in and working to make our training and training aids more relevant (put Sea King onto a CIETP\(^1\) and you have a training aid that will last for years). We are also working to the mantra that just because it is shiny and fashionable doesn’t make it useful or relevant; this is a benefit of the military (AE&TM) and Civil Servant mix. I remain a “tablet agnostic”, despite never being more than 50 metres away from my iPad. There is a huge morale (MCofOC) benefit to the student, but I know that we will never be able to prove that tablets alone make the student a better learner; it may all come down to cost and meeting the challenge of the DCTT Mission Statement of “modern and effective technical training”. On a final note: virtual learning does not mean synthetic learning. We are still going to teach the students to wire-lock with real wire and give them the experience of cutting themselves on real sharp edges! While I get it that we should utilise synthetic learning more to save money in Phase 2 training, just sitting someone in front of a virtual engine and telling them to remove a virtual component is virtually useless when it comes to doing it for real.


VIRTUAL LEARNING ENVIRONMENT

During the last 20 years, the pace of digital advancement has driven organisations to introduce Virtual Learning Environments (VLE) as a mechanism to deliver training and communicate with dispersed personnel. This led to the Defence Learning Portal (DLP) being set up for MOD personnel, although many of the people we talked to around Sultan this time last year had never heard of, let alone used the DLP. It was apparent that the lack of...
publicity, ease of accessibility and knowledge of the content (everyone thinks it is for the mandatory training courses that we all try and get out of), was a significant reason for lack of take up. It is a different story today; the Air School has fully embraced virtual learning to deliver training and is evolving to deliver training to the 21st Century learner.

In case you are not aware, the DLP has been superseded by the Defence Gateway which is the host for the new Defence Learning Environment (DLE); since its introduction in September 2014 the RNAESS has taken the opportunity to buy into DLE and a host of other technologies. By any commercial VLE standards, it is amongst the most capable of e-Learning systems available.

The RNAESS can be reached through Defence Gateway, which can be found at this link: https://www.defencegateway.mod.uk/. Once registered, using your Staff or Service Number, select the DLE icon and the RNAESS VLE will be found by following path: Schools>RAF>DCTT>DSAE>DSAE Gosport.

All RNAESS training delivery material is freely available in the DLE for which you can self-enrol. When we say training delivery material, we mean that every course, for every rank, has every PowerPoint, course note and ISpec on-line. From September 2015, only training material contained in the DLE will be used in the RNAESS, so for trainees, having access to it prior to arriving will aid the learning process during their time at the school.

The most significant benefit to Internet facing training is that students can access any material taught to them 24/7; this is particularly useful for those deployed. A good illustration of this is the assistance to RN personnel in the USA employed in the F-35 programme. During a recent visit by the RNAESS, the Lightning maintainers were made aware of the DLE’s existence and its content and in a very short space of time were able to access materials to assist them prepare for their POAET and CPOAET QCs upon return to the UK.

A further benefit to all DLE users is that students, past and present, can interact with training staff through the use of blogs and forums. Whilst still early days, we are introducing a Teaching and Learning Community, which will act as a forum to engage with the training team to discuss specific areas of technical content, eg aerodynamics, or emergent subjects such as composite materials, or the management of Low Observable coatings. While this is partial social and part professional networking, it is also another tool to enhance through-life learning.

Finally, another advantage of hosting the training in the DLE...
is that our training philosophy encourages access to media such as MIT, Kingston University, BBC and YouTube. This is stretching and encouraging our trainers to use every school in the world to train our people.

ADVANCEMENTS IN CLASSROOM TECHNOLOGY

In addition to the development of the DLE, the RNAESS is about to be one of the first recipients of Defence Business Internet (DBI). DBI offers free wireless Internet in all locations in Sultan, including; training spaces, hangars, recreational areas, crew rooms and accommodation. So the ongoing improvements to the accommodation recreational spaces by upgrading them with whiteboards and new furniture is soon to be complimented with Wi-Fi. Whilst DBI appears to be an IT security nightmare, a considerable amount of work has been done to keep the Wi-Fi as open as possible, only limiting access to Internet sites that are deemed inappropriate under the MOD Acceptable Use Policy (AUP). By accepting the terms of use when logging into DBI, the responsibility is now squarely on the shoulders of the user and not the establishment.

The RNAESS is also undertaking a Tablet Trial which aims to evaluate the benefit of using tablets as an integral part of training. The concept is that any student who joins a Career Course receives a tablet for the duration of their training and can use it to help them learn, communicate with staff and also to use it for their own personal use (noting the limits of the MOD AUP). Once a trainee completes their course, they will hand the tablet back to the school having downloaded all of their individual course notes and data on to a memory stick for their own use. Once established as a funded programme, it is intended to discontinue paper Technical Training Notes; all of the content will be available to the trainee in the DLE anyway. The procurement of tablets to aid training is not by any means a done deal, as the trial has to first determine whether there is measureable benefit to the investment. We have found no hard evidence from civilian education or the commercial sector that proves that the use of tablet computers alone adds direct benefit to a learner’s academic performance; that said, we would argue that exam results alone are not a direct measure of learning. So, whilst we may not see an increase in exam results, we anticipate that tablets and the ability to use their imagination to learn will make our students better learners.

Our tablets are issued loaded with many of the apps a student would wish to enable learning and to run their lives and we encourage them to teach us what it is they need from the machine; we will then push the app to every student. We see this as a huge morale win.

EQUIPMENT AND HUMAN CAPABILITY CHALLENGES

All members of the AE and SE specialisations are trained at the RNAESS by military and Civil Service staff. Whilst it is important to recognise that the two cohorts differ considerably, it is also worth noting that the students take benefit from training by each in a different way; operational currency from the Service personnel and learning stability and deep expertise from the Civil Servants.

Our staff Continuing Professional Development (CPD) programme is vital to enable both sets of staff to deliver training in a modern context; this CPD includes the demands of delivering from the DLE, introduction of tablets, Compound Interactive Electronic Technical Publications (CIETP), 21st Century learners, new aircraft and equipments such as Synthetic Air Marshalling Simulators and SMART Board technology. The CPD programme is far more than just improving teaching techniques, and extends to include currency in aviation matters and MOD-wide issues; this includes Divisional management, Flight Safety and Human Factors and Information Management. To manage our CPD at the individual level, the Air School has implemented the RNAESS Trainer Development Programme for which each member of staff owns an Individual Development Portfolio. This enables through-life career progression of our staff; the management can monitor and audit the competency of the trainer and the individual can plan and develop their own training needs.

To ensure that the best techniques are employed to deliver training, the RNAESS uses Evidence Based Teaching (EBT); the NHS and civilian education have applied these principles for about 25 years and use positive examples from real-life experience to apply back in the classroom and workplace.
Besides, teaching for eight hours a day using a didactic approach (standing up in front of a class behind a podium and transmitting) is very tiring for both trainee and trainer. EBT encourages activities such as guided experiential learning and facilitated group work to accelerate the learning process.

STUDENT AND TRAINING MANAGEMENT

Managing training information is an important and complex task. Even before trainees enter the gates of HMS Raleigh and BRNC, a huge amount of data is obtained and processed by Naval Recruitment to ensure that people are fed to the right training chains; this includes information such as RT scores, school qualifications and awards and previous work history. The system used to achieve this is the Defence Training Management Information System, known as TAFMIS. On joining, training information is gathered as a means to manage and track your training history, interacting with JPA to ensure that competencies are awarded at the right time. This powerful set of web-based applications enables us to plan and schedule training and manage our instructors contact time with trainees; it also allows us to manage examination papers and question banks and stores course feedback to enable us to improve training. Upon completion of training, it also provides us the means notify your Career Manager of your availability for assignment. The ‘so what’ to this, is that in future, all training information will combine with the content of the DLE in a single platform called the Defence Learning Management Capability. This will provide training organisations with a single web-based system which can then be used to understand the cost of training.

Last but not least – new equipment is in service now. Wildcat, Merlin Mk2 and Mk3 and F-35B are all here, or just around the corner. The impending arrival of QEC and the work to fuse the aircraft with the ship is all training we need to think about. The Air School must, at all costs, engage the trainee with the most recent available information on each of these platforms to maintain credibility. As you may suspect, there is a considerable amount of work being done to determine how to train the principles of CIETP so that individual platform types can further develop a student from the generic learning. Unlike the paper-based topic system, CIETP no longer has a ‘format’ which, as a training provider, gives us a few challenges in how we provide the overarching ‘one-size fits all’ theory. We are about to begin work with the OEM to put our training Sea Kings onto CIETP. Added to this is the change in material technologies that are now used in new aircraft types that we will need to repair in future, i.e. the migration from predominantly sheet-metal based repairs to low-observable composite and carbon based materials, also the integration of aircraft flying control systems has now moved from analogue to integrated, screen based displays. More work to be done!

CONCLUSION by OC RNAESS

Although OC of the RNAESS I do not consider myself SQEP to use the term "blended learning" outside of the Air School. What this article promotes is that the RNAESS is in some cases leading the way with both learning technology and modern teaching approaches, in some cases blatantly plagiarising from the RAF, DSMarE and civilian education and in quite a few cases experimenting, very carefully, with systems and techniques that may or may not work. No one thing or tool will make this school good/better, rather it will be a mixture (OK, blend) of all of the above and the willingness of the staff to keep trying. In 2016/17 the RNAESS, like the rest of HMS Sultan, will be at maximum student capacity so there is only so much change we can allow. These changes need to evolve into what we do rather than hit us all at once and my role is to ensure that our focus stays very firmly on the students and not on the amount of change we can squeeze in during a single appointment. Finally, while the RNAESS is fundamentally a "technical training school" we consider it our responsibility to further the Naval Core Values, enhance students’ leadership skills and continue to support the unique esprit de corps of the Royal Navy and Fleet Air Arm.
An SSN suffered significant defects rotating electrical machinery. Over 4,000 Ship’s Staff man-hours were expended on the investigation and subsequent work package that ultimately included a complete strip down and deep maintenance of the one machine while simultaneously changing a significant component on the other in extremely cramped conditions. The relatively inexperienced section, headed by a Leading Hand, enthusiastically accepted the responsibility for driving the programme. Their determination to overcome the constant hurdles was both a credit to the section and the submarine service as a whole and their performance has exceeded that which their experience and seniority would imply. Management of the project was exemplary, in particular the leadership and management shown by LET Brownley, but the entire section showed great resolve, working long hours in often uncomfortable conditions.

When the decision was taken to crew change an SSN early, two significant items of equipment were unavailable and the maintenance work package was mounting on an ageing platform. However, within 10 days both items were operational and a plan to draw back control of the maintenance work package was drawn up and delivered. This continued through a plethora of restrictive whole ship defects that challenged the success of a FOST training package and assessment. The engineering challenges continued to build during an eventful 12 week patrol, which was defined by a series of whole ship issues that challenged operational objectives against a demanding tactical picture. This was only possible due to the skill, experience and tenacity of the ME Department working with the remainder of the submarine on a whole ship basis.

An SSN was conducting an eight week maintenance package during a planned leave period following significant programme churn. Despite having been deployed for Easter leave and expecting to be away again over Christmas, SS accepted and met the challenge of a protracted repair that spanned four months. Demonstrating sustained ingenuity and perseverance of the maintainers and operators allowed the operational aims to be maintained.

An SSN suffered a significant novel defect on an item of equipment that removed all redundancy from a system essential to safe operation at sea. PO Walters provided a postulated cause of failure and proposed a means of restoring system integrity by providing several alternative means of repair/recovery to the DA and OEM. Whilst waiting for feedback, PO Walters took the initiative to make the most efficient use of equipment held onboard to facilitate a sustained recovery programme before arrival alongside. His work plan involved removal of major components of the equipment, and use of traditional skill-of-hand techniques that are often considered lost today. On return to base port, the OEM conducted a repair package, which was identical to the package proposed by PO Walters. Once complete, PO Walters led the re-commissioning programme and throughout remained the constant driving force behind this protracted repair that spanned four months.
commitment, his ability to assess this unique defect and identify real repair solutions, coupled with his unrelenting drive to restore equipment capability are testament to a POET at the top of his game.

An SSBN nomination recognised the innovation and resourcefulness of a small team in achieving a temporary repair to a pinhole steam leak on the outside of a bend of steam pipework, avoiding the requirement for restricting power to Command. The repair option selected was one of commendable ingenuity and demonstrated an excellent knowledge of the tools and equipment available. LET(MESM) Ramsey identified a small section of demister pipework, on the submarine’s high pressure air compressors (HPACs), of the same curvature as the bend on which the steam leak was situated. Its removal would not compromise HPAC performance. The area surrounding the steam leak was then covered with a thin layer of Furmanite resin and the demister pipe fitted over the bend, and clamped in place using metal banding. The leak remained sealed for the remainder of the patrol and during the plant’s cooldown prior to the maintenance period.

Submissions for the 2015 Fleet Engineering Excellence Award (Submarines) Trophy will be requested by RNTM and letter from CSO(E)SM in October.

The winner of this year’s award was PO Walters, who was awarded the SM Engineering Excellence trophy in April 2015.

Bravo Zulus

Congratulations to the RN Engineers who were awarded honours in the 2015 Birthday Honours List:

Officer of the Most Excellent Order of the British Empire (OBE)

Captain T.J. Gulley

Member of the Most Excellent Order of the British Empire (MBE)

Lieutenant Commander B. Kitchen  Commander K.L. Marmont
Warrant Officer 1st Class Marine Engineering Mechanic (MESM) G. Nicolson
Warrant Officer 1st Class Air Engineering Technician M. Plummer
Lieutenant Commander P.G. Simpson  Lieutenant Commander R.J.G. Tantam

Congratulations to the RN Engineers who have recently been awarded the Meritorious Service Medal (MSM):

Warrant Officer 1st Class Engineering Technician (WE) G.M. Bastow
Warrant Officer 1st Class (ME) G.S. Humphreys  CPO(CIS) D.R. Knight
Warrant Officer 1st Class Engineering Technician (WE) J.M. Lawson
Warrant Officer 1st Class Weapon Engineering Mechanic (O)(SM) A.J. McPhearson
Warrant Officer 1st Class Engineering Technician (WE) D.G. Reynolds
Warrant Officer 1st Class Engineering Technician (WESM) S. Salem

Congratulations to the RN Engineers who have recently been awarded Commander Joint Forces Commendations:

Lieutenant Commander N. Cripps  Leading Engineering Technician (ME) S.M. McVicar

Congratulations to the RN Engineer who has recently been awarded the Chief of the Air Staff Commendation:

Warrant Officer 1st Class Air Engineering Technician (M) J.L. Phillips
The Royal Navy has now formed affiliations with five UTCs – South Wiltshire, Bristol, Plymouth, Derby and Energy Coast (Workington, Cumbria). In a significant period of activity since June 2014 the RN project team has not only been at the forefront of the successful UTC Portsmouth bid but has enjoyed a number of key engagements with UTCs. The most recent events from March highlighted below.

A LIFE ON THE OCEAN WAVES

During March 2015 the inaugural RN-hosted UTC visits to Portsmouth took place. Students from Bristol, Plymouth and Energy Coast, in two separate age groups, spent a week each with the RN getting a taste of life in the Senior Service; a potential employer to add to their decision process when considering their future career options. The Year 10/11 and Sixth Form students were given a unique opportunity to learn more about the diverse roles available to an engineer in the RN, gain an understanding of the rich history of the RN and an insight into the leadership and management skills they will develop should they join.

The programme for the visit weeks was designed to maximise the naval experience for the students. On arrival at Whale Island the groups were escorted onboard HMS Bristol, the RN training ship permanently based in Portsmouth and affiliated the RN to others around the country. He is also DACOS Education within FOST.

Andy Cree joined the Royal Navy in September 1984 and completed a degree at RNEC Manadon. Later transferring TM, he completed a number of roles in training and returned to Manadon in 1993 to become Faculty Staff Officer and Electronics Lecturer whilst undertaking single pulse radar research. Roles as Commander T at HMS Sultan (where he completed his Deputy Headmaster qualification), Career Manager and CO of a tri-service Training Support unit based at RAF Halton have all provided an understanding of the RN education and training system which in part has prepared him for his current role as University Technical College programme lead securing circa £10m funding from the Department for Education to build a new technical college in Portsmouth and affiliate the RN to others around the country.

In June 2014 following discussions between the First Sea Lord (1SL), Admiral Sir George Zambellas, and the Rt. Hon Lord Baker of Dorking, Chairman of the Baker Dearing Educational Trust, 1SL directed that the RN established a UTC project team to support the development and promotion of University Technical Colleges. In a Navy wide letter 1SL wrote, ‘As a former apprentice I have been concerned about the lack of young people moving into Engineering and Science at school and we are seeing this play out in our challenge to recruit and retain Engineering Technicians and Engineer Officers. I have taken a view that we have a significant part to play in overcoming this, both to assist in our challenge but also for the good of the nation as a whole’. 

By Captain Andy Cree BEng MSc, MA, MIET, FCIPD, RN DACOS UTC Project
moored alongside on the Island; home for the next five days. Living in the environment of a ship in messdecks significantly added to the naval experience and set the tone for the week ahead.

In a high paced week the students experienced Marine and Air Engineering at HMS Sultan and Weapon Engineering at HMS Collingwood. They also had the opportunity to visit an operational Warship and undertake leadership training at the Royal Navy Leadership Academy. The week further included a guided Portsmouth Historic Dockyard Tour, visiting both HMS Victory and HMS Warrior.

The developments in maritime warfare through engineering innovation was evident to all, particularly when the Year 10/11s visited HMS Iron Duke and the Sixth Form group visited HMS Defender.

Owen McCartney, 16, from Energy Coast UTC said “It’s been a good week that has shown us the type of jobs that the Navy does and also how it all works. We all chose to come on this visit because each of us has an interest in maybe joining up and this week has given us a very real perspective on what to expect.”

Enjoying hands-on activities which focussed on the practical applications of Air Engineering, Survival Equipment, Gas and Diesel Engines and Electrical Engineering the students were really impressed by what they had seen. The final day at the RN Leadership Academy clearly demonstrated that the students from all over the country had bonded and learnt to work together as a team and support each other in the daily routines; from waking to the onboard pipe at 0630 of ‘call the hands’ and in true Naval tradition arriving as a group at muster points five minutes ahead of schedule, prepared and ready to go!

Jamie Davis, 16, from Bristol Technology and Engineering Academy said of his visit to HMS Sultan “Today’s visit has been really good, we have learnt about all sorts of different engines and electronics. I especially enjoyed electronics as it’s my favourite subject. I hope after completing my A Levels with the UTC that I will be able to consider a career within the Royal Navy as an option.”

The Principal of Energy Coast UTC, Gary Jones, who accompanied his Year 10/11 group, said “The visit has been great; the kids have really got a feel for all the different processes and the facilities that the RN operate. It’s also been an opportunity for them to compare the similarities between civilian and military applications within engineering.”

“We also wanted our trainees to experience team work and leadership and believe that the RN demonstrates these skills at the very high end of the spectrum. This is a great opportunity for the UTCs to interact and build relationships and one of the best things to come from the visit has been that the students want to work together electronically to share their experiences with each other.”

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“We also wanted our trainees to experience team work and leadership and believe that the RN demonstrates these skills at the very high end of the spectrum. This is a great opportunity for the UTCs to interact and build relationships and one of the best things to come from the visit has been that the students want to work together electronically to share their experiences with each other.”
Captain Andy Cree, leading the UTC project said “This is a new partnership for the Royal Navy so having these, the first colleges, come to visit has been an important milestone for us. We have been able to develop strong links with these talented young students, show them what the role of a Royal Navy engineer entails, and now they have gone away to consider whether this is the career for them.”

UTCS RISE TO DISASTER RELIEF CHALLENGE

To coincide with British Science Week on 13–22 March, HMS Sultan welcomed over 300 students aged 14 to 18 from across the country to take part in the Royal Navy UTC Young Engineers Challenge – Operation Tempest 2015. Held in partnership with Young Engineers and BAE Systems, the challenge aimed to encourage young people into Science, Technology, Engineering and Mathematics (STEM).

Themed around the Royal Navy’s role of providing disaster relief, the budding engineers had been tasked with designing and building a vessel that would be capable of clearing objects from the surface of water and the sea-bed of a harbour. Eager to test their engineering solutions the students were briefed on the challenge ahead:

• The scenario: a small tropical island has been severely hit by a hurricane and the only access route to the island was the harbour blocked with debris, preventing relief aid from being delivered.

• The task: provide safe passage for relief efforts by clearing the objects from the surface of the water and sea-bed of the harbour, allowing aid to reach the islanders.

The main competition was hosted in an area of the Establishment usually used by the Defence College of Technical Training to teach Airframe maintenance skills. Students also enjoyed a number of interactive displays around the main competition and were taken on tours of training facilities within the Defence School of Marine Engineering including RN Gas Turbines and Diesel Engines in motion.

Following the competition awards were presented by VIPs in the categories; most effective harbour clearance, best design & construction, best presentation, best valiant effort and best theme.

Amy Colley from team ‘Finding Nemo’ UTC Norfolk said “The competition has been a really good experience for us to learn the best ways of doing the best job. You hear about what the Navy do and to be able to do something similar, like this challenge, gives you the drive to do something positive and that makes me happy. I have wanted to join the Royal Navy for years, so the UTC course is the best option for me. I love boats, love water and I love engineering and it all adds together for me to be in the Navy.”

Among the VIPs in attendance were the newly appointed Second Sea Lord, Vice Admiral Jonathan Woodcock and the Chairman of the Baker Dearing Educational Trust, The Rt Hon Lord Baker of Dorking.
Vice Admiral Jonathan Woodcock said “The Royal Navy is a technologically advanced organisation and so we are delighted to be involved with the development of skills in young people. The Royal Navy UTC Engineering Challenge has brought together 28 teams from schools and colleges to help develop technical and engineering skills in their students at a time when the UK is suffering a shortage of engineers. It is important for the Royal Navy to work with young people and get them thinking about Science, Technology, Engineering and Mathematics as potential careers, as they will be the driving force behind our nation’s technological advances in future.”

Lord Baker said “I am delighted to be joining students from so many University Technical Colleges at the Royal Navy UTC Engineering Challenge today. The competition offers young people a wonderful opportunity to apply the skills and expertise that a UTC education offers. This country urgently needs more engineers and we welcome the support that the Royal Navy is giving to the UTC programme in helping to inspire the next generation.”

Throughout the challenges, visits and events conducted between the RN and UTCs the overriding impression is that the young engineering students have risen to the challenges with drive and enthusiasm and given their all; a genuine credit to their colleges.

It is clear the new education and employment opportunities the UTCs represent is a concept that works. If only half the students witnessed at these events carry on to be engineers, then the UK can look forward to a renaissance of young, world class engineers who will help fill the engineering skills gap we are already experiencing in the RN and UK industry as a whole.

**UTC PORTSMOUTH**

Nowhere else is a UTC more needed for the maritime defence industry than in Portsmouth itself, and as part of 1SL’s initial brief, the UTC Project Team headed up a consortium to submit a bid to open our own UTC. After much research and a gruelling interview with the Department for Education, we finally got the go ahead this March to set up UTC Portsmouth for the city. It will open in September 2017 and we are currently going through a feasibility study to check the chosen site in Hilsea will be suitable, as well as early design work.

**WANT TO KNOW MORE?**

For further information please visit www.UTCPortsmouth.org for details of the curriculum and admissions policy.

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**Bravo Zulus**

Lieutenant Laura Dietz was recently shortlisted in the 2015 First Women of Public Service Award following her nomination by the Naval Servicewomen’s Network. The First Women Awards is the UK’s premium awards programme focused on senior-level business women and professionals. Since conception in 2005, the awards have grown in influence and impact, and now enjoy the support of many of the UK’s leading businesses, business bodies and business leaders. Laura, an AEO, was nominated for her involvement in STEM Ambassador activities, particularly in the encouragement of females into Engineering. Over the last two years she has spoken at approximately 40 events across the United Kingdom including an event on HMS Queen Elizabeth; conferences in London; and across schools in the South and South-West. Laura is keen to open the doors to Engineering by breaking down the perceived barriers whilst providing examples of the role of Engineering within society but in particular within the Royal Navy and Defence. She continues to champion her hierarchy in understanding the shortage of engineers and the role that those currently employed can have on influencing the future generations.
"Everyone has ideas. They may be too busy or lack the confidence or technical ability to carry them out. But I want to carry them out. It is a matter of getting up and doing it," said James Dyson, engineer and entrepreneur. As serving engineers, you have all made the commitment to get up and do it, and now we want you to inspire others to follow in your footsteps.

The great news is that there is a whole new generation of potential engineers and technicians studying science, technology, engineering and maths (STEM) in the education system right now. Some are in University Technical Colleges (UTC), a 1SL directed and 2SL/CNEO supported initiative being led by Capt Andy Cree. Others have already committed to a Service career and are part of the Defence Technical Undergraduate Scheme (DTUS). All of them are eager to hear what you do for a living.

THAT SOUNDS GREAT – WHO CAN HELP OUT AND WHAT WILL THEY BE DOING?

We are looking for enthusiastic engineering Sub Lieutenants, Lieutenants, LETs and POETs to form a team of STEM Advocates who will, on behalf of the RN, support schoolchildren and university students studying at UTCs and DTUS squadrons. It could be lending practical support to UTC classroom engineering projects, or competitions like the Big Bang or F1 in Schools. It might be showing schoolchildren what it’s like to be a maintainer by putting engineering theory into practice on the same kind of equipment you help to maintain and repair on a daily basis. It may involve simply visiting squadron training evenings or classroom discussions to talk to the students about the roles you have undertaken as an RN engineer, what your professional training was like, even how to survive basic training! We will select a lead advocate for each DTUS squadron and each UTC with which we have an affiliation, but there will be opportunities for all volunteers to get involved.

This initiative is fully supported by the Naval Engineering Board and DCNEO will ensure that all those selected for key mentoring and leadership positions will have this made clear to Line Managers, and an Objective included reflecting the commitment and important nature of the role.

HOW DO I BECOME A STEM ADVOCATE, AND WHY DO YOU WANT ME TO REGISTER WITH STEMNET?

To get involved you need to register your interest by emailing NAVY Eng Spt-STEM Advocates, telling us a little bit about yourself and why you would like to be involved. You will be asked to register as a STEMNET Ambassador and you must have the support of your line manager.

When you register with STEMNET you join a network of like-minded people in an organisation which works with thousands of schools, colleges and STEM employers to give young people the chance to meet inspiring people. You will work with them to support national STEM events as well as RN-centred activities, bringing learning and career opportunities to life.

WHAT WILL I GET OUT OF IT?

There are few things more personally rewarding than engaging with enthusiastic young people, inspiring them to achieve and making a real difference to their educational experience. As members of the RN we have all been given the opportunity to work in a part of the engineering sector the majority of people do not get to experience; this makes you interesting, it sets you apart.

This is your opportunity to contribute in a really positive way to the future of engineering – in the RN and beyond – and, to coin a phrase, “It is a matter of getting up and doing it”.

To register interest in becoming an RN STEM Advocate or find out more, please contact NAVY Eng Spt-STEM Advocates or contact Lt Jenni Salt on 02392 547434.

Further information on STEMNET and the opportunities you will have as a STEMNET Ambassador can be found on their website: http://www.stemnet.org.uk/
THE SQUEAKY WHEEL – NEWO’S UPDATE

WO1 Nick Sharland

We continue to live in interesting times and, you may be pleased to hear, it’s widely recognised that RN engineers at all levels and in all sub-specialisations are operating under extreme pressure. The difficulty that I’ve experienced in organising visits to the front line have provided a clear indicator of this, so I’d like to again express my gratitude to those that have welcomed visits from CNEO and me; you’ve consistently provided us with useful, pertinent ammunition to fire into the NEB and we’ve always tried to present it as honestly and intelligently as it’s been offered. When not visiting the front line, I’ve been bothering those people who train and support it, trying to ensure that problems concerns are understood and are being addressed. Generally these organisations are working hard to make things better, often suffering from the same constraints of funding and personnel as us; but there is change afoot. We attempted to take stock of this during CNEO’s Conference in May and much is reported earlier in this issue. But, for those of you who couldn’t attend the conference these are some of the things from recent months I think worth highlighting.

The Armed Forces have created an Engineering Champion (AVM Young) whose right hand man is Captain Mike Rose RN. This may not seem like a huge move, but it is recognition that engineers are valued within all three Services and having a senior RN voice in the organisation is important. The organisation provides a point of contact to approach regarding tri-service engineering matters, such as pay and recognition and Captain Rose is investigating numerous options to try and gain the best possible reparation for the specific challenges that RN engineers face. It is only fair to point out though, that when discussing financial reward, absolutely everything must be cleared through HM Revenue and Taxes and consequently takes extra time.

At the waterfront, we have also set up Engineering Training Squadrons (following a suggestion from the Ratings cadre) to utilise more effectively the current excess of GS ET2. This has been really successful; using Northumberland as a training platform, the team has accelerated the training of those ETs awaiting sea appointments to the point where many are fully qualified before they join their first ship. Moreover, this looks like it may become an enduring solution (perhaps coupled with a HTS) to the long-running issue of easing the training burden on organic ship’s teams. However, not all initiatives have been as successful or as swift. The small dedicated team at Abbey Wood who are looking into Technical Publications have now identified that some 8500 are out of date for review. With limited budget and resource, they are currently trying to formulate a priority list to ensure the most important get addressed first. Similarly, problems with the delivery of hand tools rumble on; in the interim I know many of you have been involved in trying to ensure we have the right demand signal and although it is probably an unwelcome piece of extra work, hopefully it will pay back in the long term. In the meantime, the SIP team, with CNEO’s backing, is also looking into the possibility of Personal Tool Kits (PTK). On the training front, we have been beset by problems which mean that many of the new courses will not start until next year; although far from ideal and immensely frustrating, I can say that it was unavoidable unless we wanted to receive a sub-standard product. Given that proper training is a key tenet of the Naval Engineering Strategy and the recovery of the Branch, we had to sadly, bite this bullet.

Lastly, but by no means least, our communicators were finally recognised as technical ratings when the CIS were fully integrated into the Engineering Branch in April. It may not be an obvious move to all, but if you’ve seen the plans for the QE Class and Type 26, you’ll know that Communications Technology will soon be at the heart of all our engineering systems, so incorporating this specialisation early is the right thing to do. They are now a specialisation of the WE Dept and as such have both decreased the ‘ugliness’ factor and increased the ‘time awake’ factor of the cadre in one easy move (Sorry WEs – couldn’t help myself!).

So, in short, what’s been going on is innovation and change, although admittedly it may not be immediately obvious, we are slowly altering the course of our leviathan. It is an absolute truth that we, as the ratings cadre, must be involved in that change, we need to be part of (and the initiators of) innovation, if we are to grow the branch we think is needed. In the last 15 months I have yet to see any suggestion for improvement be rejected out of hand; nothing is off the table and everything should be challenged (within the realms of the NDA). As ever, I will represent your views, concerns and suggestions to whoever needs to hear them as clearly as I can, so please continue to use me as your conduit. As evidence that no-one escapes the ‘winds of change’ please note that my email address will change to ‘NAVY CNEO-WO1’ from 25th July.
THE FAA

is benefiting from “an extraordinary renewal of its maritime capability” with a £48Bn equipment programme for new carriers, ships, jets and helicopters. Only through outstanding leadership, modern training, exemplary Standards and Practices and continuous intelligent evolution of our organisation will any of the battle-winning capabilities be safely and confidently achieved.

LEADING A NEW GENERATION

MAN AND MACHINE

Search: “AEOC15” for more info.
WE need you!

What is the WE branch ethos, a call for suggestions?
The requirement to constantly adapt the Weapon Engineering sub-branch to meet the requirements of the Service has led to a raft of initiatives over the past few years, most of which you will all be familiar with. The way in which we operate within the modern defence sector demands that every pound spent is justified and scrutinised appropriately. As a result, the fabric of the branch can often appear to be overlooked and our esprit de corps, or ethos can be negatively impacted. Often, simple and inexpensive solutions are the answer to this problem but in order to do the subject justice we first need to define what ‘WE ethos’ is. Once we have a definition it is relatively straightforward to move forward with common sense policies to foster and protect it. With that in mind I am researching a paper to do just that; capturing as many ideas as I can, so as to present the branch with a consolidated list of initiatives to take forward.

The dictionary defines ethos as, ‘the characteristic spirit of a culture or community as manifested in its attitudes and aspirations’. In our case, branch ethos is generated from many areas: history (from the creation of the modern branch in 1946), camaraderie (from living and working in austere and challenging conditions, to playing football as a department on a far flung beach), veterans, serving personnel, training, jargon, professional pride and core values, dits and urban myths etc etc, the list is endless. It is just as important to know where we have come from as it is to know where we are going. The next page lists some of the areas you may wish to consider but in short I welcome ALL feedback and ideas as I research this subject. Branches that already do this well are: CIS, Gunners, FAA and the Royal Marines, please consider what you think these branches do well and what contributes to their branch ethos.

I will accept any idea, and constructive comment and will credit all original ideas in the final paper. My contact details are on the rear of this flyer. Many thanks in advance.
WHAT ARE YOUR VIEWS/OPINIONS OF THE FOLLOWING AND WHAT ELSE WOULD YOU SUGGEST?

- A WE branch association for all serving and retired personnel (the Association of Weapon Engineers (AWE)?)
- A branch newsletter / magazine focusing on all elements of the trade (history, technology, sport, social etc)
- A branch shop that could stock a range of branch merchandise
- Regular seminars and events in a number of geographic locations to promote social interaction and enhance branch camaraderie as well as technical events.
- Development of a branch spiritual home (HMS COLLINGWOOD) and its use for a number of social and professional events
- Access to the COLLINGWOOD photographic and historic archives and collections
- A branch motto (Simul Evolvere – WE Evolve / WE overcome) are some ideas, what is yours?
- Professional networking events with industry partners and institutes
- A free branch history book to be issued to all serving WEs
- Dedicated events and activity to represent the branch across a number of local and national memorials etc
- Expansion of WE mentoring schemes to include ratings, Sea Cadets etc
- Sponsorship opportunities from defence, engineering and technology companies as well as patronage
- Branch dinner
- WE Core values (Fidelity, Honesty, Innovation, Resilience, Precision, Alacrity etc)
- WE Portal (A home on the intranet for all WE matters, similar to the Helm)
- 70th Anniversary events (divisions, sport, WE fair etc) – this anniversary is next year.
- WE Prizes (WE of the year?)
- Free Lanyard for all WEs, in a similar fashion to the FAA and using branch colours
- WE ethos lessons in Phase 2 and 3 courses
- Networking / WE challenges
- WE team, based in COLLINGWOOD, to co-ordinate all ethos related initiatives on a long term basis so as not to lose momentum.
- Veterans in to spin dits to Phase 2 trainees / guest speakers
- Inter-branch competition – Sport etc
- Green stripes or identifying marks to distinguish WE Officers from other branches.
A multitude of people are involved with a piece of Naval equipment

From:

The Treasury, the taxpayer (ie you and me) and the people who perceive its capability, invent it, develop it, make it, buy it, fit it, prove it, support it, instruct those who are going to use it, use it, maintain it and fix it when it’s broken and, most importantly, those who depend upon it.

The photograph shows a connector from a Command Support System. These were the two plugs from the filters to the CSS monitor. The monitor filter kept blowing fuses but amazingly, the processor filter remained working.

It takes only one idiot with a screwdriver to make all their efforts futile.