National Defence / Défense nationale

CNTHA News Inside!

Maritime Engineering Journal

CANADA'S NAVAL TECHNICAL FORUM Fall 2000 / Winter 2001

High Readiness Unit: HMCS *Charlottetown* completes her Readiness Support Program

Also in this Issue:

- *Ship Safety for the New Millennium*
- *Staff College in the City of Light*
- *CNTHA News: "The Fighting Captain" — A Book Review*

Canada

Bird's away!

Photo by Bob Vance, courtesy United States Navy

A unique USN software tool simplifies the task of managing the radio frequency "soup" during multiship missile exercises
— page 20

Maritime Engineering Journal

FALL 2000/WINTER 2001

Vol. 19, No. 3 ***(Established 1982)***

Director General
Maritime Equipment Program Management
Commodore J.R. Sylvester, CD

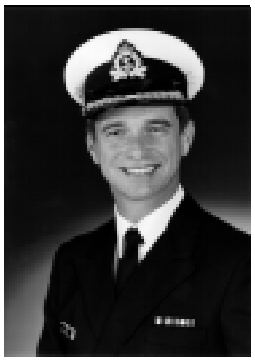
The *Journal* is available on the DGMEPM website located on the DND DIN intranet at http://admmat.dwan.dnd.ca/dgmepm/dgmepm/publications

DEPARTMENTS

FEATURES

Cover: HMCS *Charlottetown* returns to the fleet as a high-readiness unit after her outstanding readiness support program. (Photo by MCpl Barry Lake, Formation Imaging Services Halifax)

The *Maritime Engineering Journal* (ISSN 0713-0058) is an unofficial publication of the Maritime Engineers of the Canadian Forces, produced three times a year by the Director General Maritime Equipment Program Management. Views expressed are those of the writers and do not necessarily reflect official opinion or policy. Mail can be sent to: **The Editor, Maritime Engineering Journal, DMMS (6 LSTL), NDHQ, 101 Colonel By Drive, Ottawa, Ontario Canada K1A 0K2**. The editor reserves the right to reject or edit any editorial material. While every effort is made to return artwork and photos in good condition, the *Journal* assumes no responsibility for this. Unless otherwise stated, *Journal* articles may be reprinted with proper credit. A courtesy copy of the reprinted article would be appreciated.



Editor's Notes

"Article by (*Your Name Here*)" — Quality submissions are the lifeblood of the *Journal*

By Captain(N) David Hurl
Director of Maritime Management and Support

When the *Maritime Engineering Journal* was established in time for the first MARE branch seminar in 1982, the idea behind the magazine was to create a welcoming forum in which members of the maritime engineering community could discuss their professional activities and voice their opinions. Over the years our focus broadened to include the wider naval technical support network, but the fact that we have been able to continue this mission at all for 18 years in the context of an ever-changing work environment is directly attributable to one thing — the dedication of the hundreds of contributors who have recognized the "value added" in maintaining a professional dialogue.

For nearly two decades now, the technical branch of the Canadian navy has been delivering the *Maritime Engineering Journal* to a host of maritime forces, libraries and professional institutions worldwide. In the process, our "little branch journal" has carved out a place for itself in the international naval technical support community and attained a measure of hard-won respect. Thanks to the superior quality of your submissions, the *Journal* now enjoys a well-deserved reputation for offering up technically engaging articles and relevant opinion pieces that occasionally find their way into print a second time in other publications.

So "thank you" to all of you who have taken the time to put your thoughts down on paper so that the rest of us may understand the issues from your perspective. As we look ahead to publication of the *Maritime Engineering Journal* in the year 2001, everyone with an interest in Canadian naval support is invited to examine the issues that affect them and contribute to the dialogue through their professional expertise or opinion. Please keep it coming.

The *Journal* welcomes **unclassified** submissions, in English or French. To avoid duplication of effort and to ensure suitability of subject matter, prospective contributors are strongly advised to first contact **The Editor, Maritime Engineering Journal, DMMS, National Defence Headquarters, Ottawa, Ont., K1A 0K2, Tel. (819) 997-9355**. Final selection of articles for publication is made by the *Journal*'s editorial committee. Letters of any length are always welcome, but only signed correspondence will be considered for publication.

If you would like to change the number of copies of the *Journal* we send you, please fax us your up-to-date requirements so that we can continue to provide you and your staff with the best possible service. Our fax number is: **(819) 994-8709.**

Maritime Engineering Journal Objectives

• To promote professionalism among maritime engineers and technicians.

• To provide an open forum where topics of interest to the maritime engineering community can be presented and discussed, even if they might be controversial.

• To present practical maritime engineering articles.

• To present historical perspectives on current programs, situations and events.

• To provide announcements of programs concerning maritime engineering personnel.

• To provide personnel news not covered by official publications.

Commodore's Corner

HMCS *St. John's* Maintenance Study a good "reality check"

By Commodore J.R. Sylvester, CD
Director General Maritime Equipment Program Management

Bravo Zulu to the CO, officers and crew of HMCS *St. John's* for their first-level maintenance study (Spring 2000 issue). As discussed at last year's various technical support seminars, it has become increasingly apparent that not all of the prescribed planned maintenance is getting done, and that progress in correcting the situation is not happening as rapidly as any of us would like. The *St. John's* study was a great "reality check." In today's navy, the demands on a maintainer's time are significantly greater than they have ever been in the past. Increased training requirements, communal duties, quality of life — these are all valid contenders for people's time, but we cannot continue to defer maintenance.

Some believe that we may be overmaintaining our ships, in that not all of the specified planned maintenance routines are necessary. A *Halifax*-class follow-on maintenance evaluation is now under way, and we may yet see some reductions to the planned maintenance work. It would certainly be convenient if the problem could be solved by simply reducing the requirement, but there is no getting around the fact that achieving reliability and longevity in naval systems and equipment is predicated on a great deal of planned maintenance. Still, every little bit helps. Life-cycle material managers will continue to review their PM requirements, with input from the coasts, and wherever possible will drop certain PM requirements or extend the periodicity of the routines.

It may seem that we have been "getting away" with putting off much of our planned maintenance work until the last possible moment. In truth, though, there is a price to be paid for deferring maintenance, and the liability is just being passed along — to the fleet maintenance facility, to third-level maintenance, to a future crew — and the "bill" is growing all the while. Maintenance is the classic "pay me now or pay me later" dilemma, and paying later means paying more. Large repair and maintenance bills at third level mean less money for new ships, mid-life upgrades and equipment changes. Planned maintenance may not be glamorous, and the results are mostly invisible, but it is necessary to the long-term health of the fleet. Nevertheless, if ship's staff do not have the resources to complete planned maintenance (or corrective maintenance, for that matter) it must be documented and passed on to a repair facility.

There is little question that crews have limited flexibility in what they do with their time, and it is unlikely that sufficient ship staff hours can be found to handle all of the currently assigned maintenance. How we got ourselves into such a predicament is a long story involving the CPF project, elimination of the fleet maintenance groups, downsizing the FMFs, and some burying of heads in the sand. The intended ability of ships to offload some planned maintenance to shore-based units was also compromised by delegated maintenance budgets, which at times forced a choice between defect correction and planned maintenance. Ship's staff should not have to face this dilemma — again, they should pass the maintenance along, if necessary.

The solution to our maintenance dilemma will require the combined effort of the coasts and NDHQ. The Chief of the Maritime Staff has written to the formations, giving them an excellent outline of the situation and directing immediate specific action. At the same time, DGMEPM staff and the FMFs are progressing the maintenance validation, and I am examining options to expedite the DGMEPM portion of this work. As the Admiral mentioned in his letter, first- and second-level maintainers are encouraged to record maintenance accurately and, where applicable, submit planned maintenance amendment proposals (using the UCR format). Unless you say something, the LCMM won't know that the filter you are cleaning on a monthly basis never seems to need it. Contracting-out some first-level maintenance using prefacilitated contracts may be another part of the solution (and I appreciate that this view is not universally held).

The maintenance issue is not going to be solved overnight, but rest assured that it is not being ignored. If you have creative ideas on the subject of naval maintenance, please pass them along. And thanks again to the crew of HMCS *St. John's* for their initiative.

Branch Adviser Commentary

Promotion and Terms-of-Service Boards: Helping Your People Put Their "Best Face" Forward

By Captain(N) Mark Eldridge, CD
MARE Branch Adviser

As the Maritime Engineering Branch Adviser it is my principal role to represent the concerns of the NCM/officer sea technical occupations before the Chief of Maritime Staff and the corporate human resources community. In this regard, I have an indirect influence on members of the Branch in three ways:

• by assessing long-term strategic trends and making recommendations for any necessary adaptations within the Branch;

• by providing guidance for promotion and terms-of-service boards;

• and through input to the Professional Development List (the PDL).

My comments here stem from the latter two activities, and from my participation in the 1999 promotion and terms-of-service boards for MARS and MARE lieutenant-commanders, and MARE commanders. The comments are broadly applicable to most members of the Branch.

You likely know by now that promotion and terms-of-service boards are conducted "on-line." Members' service résumés (which are maintained in the *PeopleSoft* database), as well as your Performance Evaluation Reports (PERs)/course reports/academic histories are all available electronically. Instead of handling stacks of paper files, board members now use specialized software programs to input scores and resolve variances. I can tell you without qualification that this is truly an improvement over the old way of doing things — a fine example of technology at the service of process rather than the reverse. Furthermore, by holding the boards at the Asticou Centre in Hull, Québec, board members face virtually no interruptions and are able to give their total concentration to the task at hand. I have no doubt that this more focused and efficient process has resulted in better overall results, especially where large numbers of files are a factor.

You should also be aware that the boards do not see every file in each MOC/rank group. Rather, the career managers engage in an approved process of file selection before the boards sit. The criteria they use to select files for the boards' attention are discussed and agreed upon by both career management and Maritime staffs, and in future will be embodied in the Professional Development List. Career managers and the boards have the authority and responsibility to be satisfied that this selection is just. You may be assured that career managers are working in the best interests of your personnel and the navy, and that we have not yet consigned career management to algorithms.

Looking back on my experience with promotion and terms-of-service boards, I am able to offer a few observations concerning some basic things supervisors can do to ensure their personnel files make the best possible representation before a board:

• The Electronic Selection Boards (ESB) depend absolutely on the accuracy and completeness of the Personal History Résumé in *PeopleSoft*. If you have not checked and corrected the information in this database recently, the board could be assessing the "wrong" person.

• Second language scores are fundamental for promotion. The point separation between candidate number one and candidate number ten is often of the same order as the total points allotted for an "integral" ranking. So do whatever you can to help your personnel keep their scores

Submission Formats

As a rule of thumb, major article submissions should not exceed about 1,800 words. The preferred format is MS Word, accompanied by a hard copy of the typescript. The author's name, title, address and telephone number should appear on the first page.

Please submit photos and illustrations as separate pieces of artwork, or as individual *high-resolution* electronic files, and remember to include complete caption information.

current (they expire after five years).

• The importance of "potential" has doubled to 40 percent of the overall score. PER writers must therefore apply a commensurately greater effort in assessing, and conveying in writing a rated officer's likelihood for success at senior ranks. I found that narratives covering officers' potential were far too general, and left the board members to extract the necessary detail from between the lines. Please pay special attention to the guidance offered in the latest version of the "Branch Advisors Guidance on Promotion and Term-of-Service Boards." This document contains important information for making the key details in your PERs clear to the board. Think about the impact on a board of such statements as: "This officer can do my job now;" "…is capable of performing capably at the next rank now;" and "…clearly demonstrates flag potential." Especially at the commander rank, comments relating to appropriateness of out-of-trade/MOC employment are also important.

• Although the relative value of "performance" has diminished, it still forms the greater portion of the overall score. Ensure that the boards have the information they need when considering officers for promotion by using this section to make a statement on leadership (that is to say, with respect to people) and on professional judgment.

• Finally, there is much truth in the principle that people are their own best career manager. Teach your personnel to look about and seek the kind of experience that will enhance their chances of both reaching higher rank, and of performing well once there. Many if not most of us joined to do "hard engineering," but of course we quickly found that the navy offered a much broader array of opportunities. Carefully consider the implications of the Professional Development List as well as your people's own professional aspirations when reviewing their posting "wish lists." Consider also what future value lies in experience gained in non-engineering appointments. In short — think purple, think long-term.

As the Maritime Engineering Branch Adviser I am fundamentally at your collective service. I cannot do your divisional work for you, but I may be able to offer insight that will help you formulate career guidance for yourself and for the people you supervise, and highlight the aspects of an individual's career résumé that will have the greatest importance when a file is being screened for consideration by a board. As a supervisor you are unquestionably in the best position to work within the divisional/career management system and recommend a preferred course of career action for the personnel in your department.

Capt(N) Eldridge is the Director of Maritime Material Policy and Planning in the Chief of Maritime Staff organization in Ottawa. He is also the Maritime Engineering Branch Adviser.

Letters

Torpedoes away!

In the latest issue on pages 18 and 20 ("*HMCS St. John's Maintenance Capability Study*," *Maritime Engineering Journal*, Summer 2000) the titles are incorrect! Naval Electronics Techs(C) are "Communication" not "Combat," and NET(T) are "Tactical" not "Torpedo."

Notwithstanding the glaring clerical error, I am pleased to see this serious [maintenance] problem documented in the *Maritime Engineering Journal*. It is time everyone realized we have a maintenance problem, and that we devise ways to help resolve it. **— CPO1 Ken Cox, DNPR 3-4-3-2, Ottawa.**

[The error was ours. The authors had used only the short forms of NET(C) and NET(T) in their article, but in our editorial effort to "clarify" the meaning of these terms for readers who might not be familiar with the occupation titles, we made a mistake. The *Maritime Engineering Journal* apologizes to the authors and to the occupations concerned. — Editor]

Forum

Manning the ALSC Ships – Trying to get it right!

Article by Cdr Eric Bramwell,
Project Manager, Afloat Logistics and Sealift Capability Project

In the Summer 2000 issue of the *Maritime Engineering Journal*, LCdr Peter Egener raised a number of interesting points in his provocatively titled article, "*New Ship Manning Reductions — Have we got it wrong?*" Among his concerns he worries that there will be changes made to shipboard organizations, to the number of sailors in each occupation, to naval doctrine, and to the skills required to operate and maintain future classes, etc. All of these concerns are valid. However, equally valid and indisputably true is the fact that the different roles for the ALSC ships, technological advances, changes to equipment and systems, and different maintenance and support philosophies will cause a degree of change to the size of complement, and that we must be prepared for that change.

LCdr Egener is also concerned that, because the ALSC Statement of Operational Requirements addresses crew size superficially, it will be the ALSC contractor who decides "how the navy will operate its ships." It is true that the contractor will make decisions on equipment, systems and maintenance and support philosophy that will affect the way the navy operates its ships, but the contractor will not make these decisions based solely on the SOR. The Request for Proposals for the implementation phase will include a Statement of Work and a set of Ship Requirement Specifications that elaborate the requirements of the SOR.

A little background and context may ease LCdr Egener's concerns.…

Statement of Operational Requirements

The Statement of Operational Requirements for the Afloat Logistics and Sealift Capability Project — that is, the AOR replacement — states that "...project constraints include...a goal to reduce the size of each ship's company by 30 percent to 50 percent..." compared to the AOR complement of about 235 crew. This goal was written to give a threshold and a target reduction value. The 30-percent reduction is modest, and in line with planned crew reductions in other navies. The 50-percent value is a target. This reduction will be explored during project definition and its achievement will require that it be feasible with respect to cost, technology and operational flexibility. It is interesting to note that the intended reduction is considered to be not "sufficiently aggressive" by certain senior officers.

As an aside, it should be noted that our allies plan on crewing vessels of similar capability with even fewer personnel. The U.K.'s new Royal Fleet Auxiliary replenishment vessel RFA *Wave Knight* will have a crew of just 77, and the French navy is reported to be planning to operate its *Nouveau Transport de Chalands de Débarquement* (a landing platform dock, currently under contract and at design stage) with a crew of 160.

The ALSC SOR also includes a number of factors that will eventually have a role to play in the establishment of the ALS crew size/composition:

• ALSC ships will be crewed by military personnel;

• the expanded roles of the ALSC ships beyond that of the current AORs (enhancement of the sealift and support to forces ashore roles and the introduction of new technologies) will necessitate the development of a detailed training plan as well as a review of MOC specifications which may be affected by these changes in role; and

• the support concept for the ALSC requires that a number of core crew skills be available — i.e. that ship's staff able to operate all ship systems and perform first-line maintenance, and also maintain key systems (e.g. propulsion, electrical, replenishment systems, communications, weapons and sensors) to maintain combat capability.

ALSC Manning Study

Contrary to LCdr Egener's belief that we are proceeding in a "haphazard manner," PMO ALSC did identify the need for a complement study at the outset and is presently contracting for such a study. The study will follow the process and methodology adopted by NATO for such studies, an approach that has already been used by the U.S., the U.K. and the Netherlands. The purpose is to establish the feasible crew size for an ALSC ship. The Statement of Work for the manning study identifies tasks such as:

• sea and harbour duty watches;

• daily departmental work and routines to operate and maintain the ship, while successfully completing assigned missions as envisaged in the ALSC Concept of Employment and ALSC Concept of Maintenance and Support;

• manning in the first and second degrees of readiness;

• replenishment at sea in accordance with the ALSC SOR, concurrent with flying operations;

• all aspects of stores and cargo handling, including embarking, striking down, marshalling, assembling pallets/loads and offloading;

• flying stations;

• entering and leaving harbour, including working lines, fenders, anchors, boats and tugs as the situation dictates;

• cleaning stations and ship's husbandry;

• maintaining all systems in safe working condition (including the hull, deck, and deck fittings);

• firefighting and damage control;

• assuming the highest degree of NBC readiness (Zulu Bravo)**;**

• launching, recovering and operating ship's boats with a full boarding party embarked; and

• operating the ship when a prize or salvage crew is disembarked to another vessel.

The structure of the complement study is outlined below. The study will first derive a basic function list (i.e. a functional analysis for each of the main ALSC missions). These functions are then allocated to hardware, software, or personnel, with consideration of whether the function even has to be done on board ship. The allocation will consider performance level, reliability and flexibility, as well as the life-cycle cost of a trained individual. In the case of a continual function, the life-cycle cost would include all watchstanders. This activity will consider trade-offs that could reduce the required manning, such as alternative maintenance, alternative ship's husbandry and damage control concepts, and automation and labour-saving job aids.

For functions assigned to personnel, each function will be translated into tasks. Tasks are then combined and assigned to a feasible combination of specific MOCs and ranks. The time required to complete each task within the duty hours available under the watch system will determine the number of crew needed. The task assessments will be aggregated to determine a crew composition and size that is compatible with the navy divisional system. Scenario based simulations will then be used to validate the ability of the proposed manning to meet defined missions and emergency situations. Opportunity will be provided at each stage of the study for DND review and input as appropriate.

The study results will provide guidance to the project team in validating the feasibility of the reduction goals stated in the SOR and in developing the System Requirements Specification for the definition phase. The complement study may also be provided to industry as an aid to developing their proposals for the design, construction and support of ALSC. Crew size will form one element of the complex analysis of total ownership cost that will determine the best way forward to deliver an Afloat Logistics and Sealift Capability to the Canadian navy.

Manning the CADRE Ships — Let's get it right

Article by LCdr Mark Gray

As a member of the newly formed Command and Control and Area Air Defence Replacement (CADRE) Project under DGMEPM, my interest was piqued by our brief mention in LCdr Peter Egener's article, and by the concerns he raised regarding the general approach being taken to address reduced manning.

Since CADRE is in its infancy, we are able to take advantage of a couple of major initiatives. First of all, we are in the enviable position of being able to learn from the ALSC project. Secondly, CADRE has already established ties with the USN's Smart Ship project office, which is taking the lead in reduced manning efforts.

In any event, the article caused me to determine if someone in the navy was actively pursuing reduced manning. A quick trip to DMSS 2 revealed that Canada participates in Technical Panel HUM-TP9 — Human Factors Integration for Naval Systems — under the auspices of The Technical Co-operation Program. The Canadian contribution to this panel consists of Dr David Beevis (Defence and Civil Institute of Environmental Medicine, Toronto), who is the official representative, and Mr James Menard (Directorate of Maritime Ship Support 2-7-6, Ottawa), who provides naval-related expertise.

One of the main purposes of the panel is to provide insight into each country's national human factors R&D program. Until recently, Canada's R&D program in the area of reduced manning was virtually nonexistent. Fortunately for the navy, the Maritime Research and Development Overview Group (MRDOG) has asked Defence R&D Canada

(DRDC) and the Director General Operational Research to conduct a joint study of Canadian warship manning. Phase one of this work involves a preliminary study of reduced manning work already in progress, aimed particularly at work in the United States under the Smart Ship and DD-21 programs. The results from this phase and a recommended way ahead will be reported to MRDOG in the May-June 2001 timeframe.

If MRDOG approves the way ahead, and a second phase of the DRDC work commences sometime in 2001, then the CADRE Project will be a direct beneficiary of the work. CADRE will also benefit from the results of the upcoming ALSC manning study. Using a widely accepted "functional allocation" process, the study will allow trade-offs to be made in terms of manning versus level of technology/automation for identified ship functions.

Although the term "functional allocation" may be new to many people, the process has been around for many years. In fact, it was brought to my attention that the navy has already experienced two relatively recent reduced manning exercises. The first resulted from the replacement of the steamplant with gas turbines; the second from the move to canister-based weapons. Although I don't believe these technological innovations were ever couched as reduced manning initiatives, they certainly had that effect. Of course, they also resulted in changes to doctrine, training, integrated logistic support, etc.

The manning impact from gas turbines and canister-based weapons shows that reduced manning has been, and probably will continue to be, evolutionary in nature. Notwithstanding that we are now attempting to establish manning targets, the final numbers will be tempered by the inevitable trade-offs that are part of ship design. When can these trade-offs be made? LCdr Egener is correct in that "the navy must make some clear choices about how it wants to operate these ships." However, I read into this statement that he is implying that the choices should be made now. On the face of it, such an approach is appealing in a "proactive" sort of way. However, until we know the systems and equipment that we will be using to operate the ships, it is not possible to completely determine manning levels. And since we only specify performance specifications, these system choices are far along in the ship acquisition process.

Propulsion is one area where technological choices will significantly impact manning, training, integrated logistic support (ILS), doctrine and ship organization. For example, if CADRE ends up using electric propulsion, we will be making many more changes than we would if we stayed with a more conventional arrangement (e.g., CPF's CODOG arrangement). Who decides on the equipment choices? It will be industry that will make proposals, but as noted above, appropriately guided by the navy's performance requirements.

When system and equipment choices are made, organizations such as the Director of Naval Personnel Requirements (DNPR) will kick into high gear to assess all the impacts associated with any manning changes. Along with the PMO and DNPR, a number of other Chief of Maritime Staff organizations will be recruited to ensure that the necessary policy, doctrine and infrastructure are put in place to support CADRE. Given CADRE's schedule, we will realistically be in a position to start assessing the impact of any reduced manning initiatives after the start of the definition phase during FY 2003/2004.

Prior to that time we will be involved with ALSC's manning study and the DRDC work, and leveraging whatever we can from the USN's initiatives. As this information becomes available, I believe that the most critical trade-offs related to reduced manning will have been explored (at least as it relates to near-term technology impacts). These trade-offs will link a myriad of ship design and operational issues, including: reduced manning initiatives, technological advances, doctrine, training, ILS, and life-cycle costing. In the final analysis, we will have an adequate understanding of the risk and cost trade-offs between fewer sailors and more technology so that we can make informed decisions.

To conclude, I want to thank LCdr Egener for sparking interest in what is becoming a high-profile and challenging issue for our two main ship acquisition projects, ALSC and CADRE. I welcome any comments or suggestions on how the navy, and in particular CADRE, can move efficiently and effectively in the direction of reduced manning.

LCdr Gray is the project naval architect for the CADRE Project in Ottawa.

Heightened Awareness of Human Factors

Article by James P. Menard

To my surprise, fully three of the articles in the Summer 2000 edition touched on human factors issues in ship design and operation. Organizational change spelled the demise of the DGMEM section that was established to address such issues in the wake of the 1975 *DDH-280 Class Review* (i.e., the Yanow Report), which concluded that habitability (along with human engineering and safety) was the "black eye" of the 280 program. It is gratifying to know that there is now a heightened awareness of human factors in the marine engineering community at large.

In "*New Ship Manning Reductions — Have we got it wrong?*" LCdr Egener raises the point that we seem to be jumping on the reduced manning bandwagon without adequately preparing for it. As the project manager for changes to add bunks to the *Halifax*, *Kingston* and *Victoria* classes, I am well aware of the consequences of "getting it wrong." I have also participated in international groups that have included the leading proponents of reduced manning as a systems engineering challenge, and I feel confident that such an approach can bridge the gap between where we are now and where we want to be in new ship acquisitions. However, as LCdr Egener points out, there are many doctrinal and policy issues that need to be addressed before we get there.

In their article, "*HMCS St John's Maintenance Capability Study*," lieutenant-commanders Carosielli and Parent confirm what everyone suspected: that the maintenance workload for the *Halifax* class exceeds the time and resources available. A similar study done 15 years ago for the *Iroquois* class determined that, over a 24-month period and across eight technical disciplines, 41,715 hours were required for preventive maintenance routines, while only 23,098 hours were available. *Plus ça change*….

Incidentally, a 1991 study on board the steamers found that an average of 264 person-hours were required for cleaning stations *each day*. A similar study in 1993 on board HMCS *Vancouver* found that an average of 389 hours per day at sea were being expended on ship's husbandry — that's equivalent to more than 24 people in a two-watch system doing nothing but cleaning! If we are ever to reach the reduced manning goals set for ALSC and CADRE, we have to do a far better job of acquiring low-maintenance ship layouts, fittings and equipment.

In "*An Overview of Submarine Safety Management in the U.K. MoD*," LCdr Peer describes MoD's "world class Ship Safety Management System." Readers may be interested to know that all of our navy's recent ship acquisitions and conversions (CPF, TRUMP and MCDV) included a System Safety Program. The program required that a hazard analysis be made of every major platform and weapon system, and that each identified hazard be tracked until it was either eliminated or satisfactorily controlled. This information resides in the System Safety Database, which has been partially converted to digital format. Of course, not all hazards can be eliminated in the design phase, and an ongoing safety management effort is required during the in-service (and ultimately, disposal) phase.

In my experience as the matrix OPI for system safety engineering, the vast amount of effort that goes into the System Safety Program is not well documented from the point of view of transferring the knowledge to the operational community. The converse, updating the design phase body of knowledge with in-service data, also does not occur as a matter of course. The U.K. safety case concept appears to address these deficiencies and make safety a pan-navy, life-cycle activity.

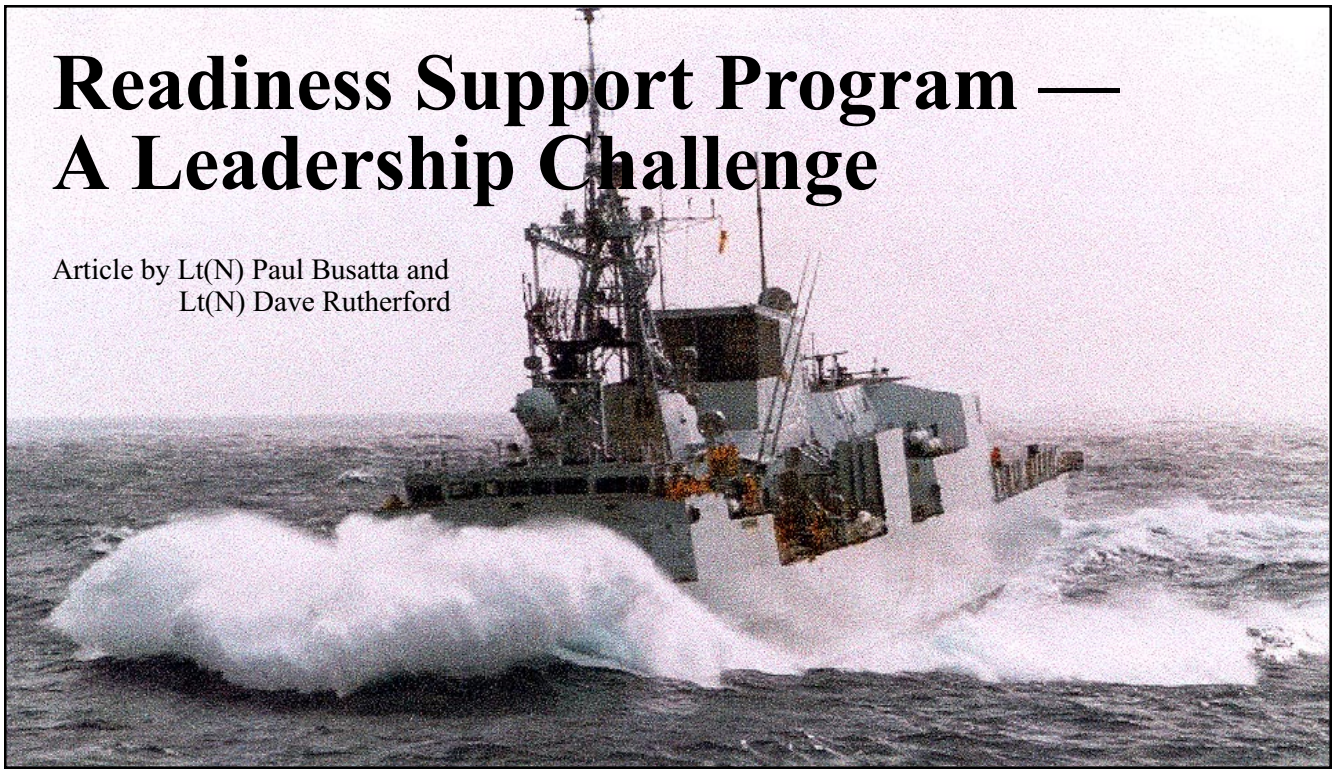
James Menard is the DMSS 2 generic engineer responsible for human engineering, system safety engineering and ship arrangements.

Share Your Snaps!

The *Maritime Engineering Journal* is always on the lookout for good quality photos (with captions) to use as stand-alone items or as illustrations for articles appearing in the magazine. Photos of people at work are of special interest. Please keep us in mind as an outlet for your photographic efforts. Photo Co-ordinator Harvey Johnson can be reached at (819) 994-8835.

Readiness Support Program — A Leadership Challenge

Article by Lt(N) Paul Busatta and
Lt(N) Dave Rutherford



(Photo by MCpl Barry Lake, Formation Imaging Services Halifax)

From August 1999 to March 2000, HMCS *Charlottetown* (FFH-339) underwent a Readiness Support Program (RSP) in preparation for combat readiness operations which included Mk-46 torpedo and Sea Sparrow missile firings. This article will relate some of the major challenges faced by the ship to complete the program and return to the East Coast fleet as a high-readiness unit. Strong, proactive leadership from all participants was vital throughout the program as the compressed schedule permitted minimal flexibility.

Charlottetown was the first ship to take advantage of an improved MARLANT RSP management methodology that incorporates proven aspects of the mission readiness preparation process currently used for missile firings. It features a master implementation plan, as well as mission readiness checks and reviews. The mission readiness checks took the form of trials and inspections, while the periodic mission readiness reviews provided progress updates and a forum for discussing critical path issues. This methodology delineates responsibility more clearly and improves the flow of information between personnel from the ship, the fleet maintenance facility and Sea Training. The intended result is a high-readiness unit that is technically ready for a missilex within six months of program completion.

The ship's experience identified several lessons for all agencies. Paramount among these was the requirement for a sound initial plan and an aggressive approach to achieving all objectives. *Charlottetown's* plan was developed by MARLANT N3 and co-ordinated through N37. Faced with a continual stream of conflicting activities and requirements, the ship's staff had to be extremely proactive in their assistance to N37 and in their liaison with outside agencies. Activities such as ammunitioning, storing, in-port training, equipment trials and maintenance requirements had to be closely monitored and co-ordinated.

Major Program Challenges

The Sea Readiness Inspection

Preparation for the sea readiness inspection proved to be a difficult challenge. The ship entered the RSP having completed a docking work period, followed by summer leave, with numerous equipment deficiencies. For instance, both Mk-29 gyros and the SPS-505 radar processing cabinet were transferred to higher priority units to correct their equipment deficiencies. Additional stress was loaded onto an already compressed schedule when No. 2 MWM diesel had to be replaced. This involved removing the FAMR soft patch, and later conducting load bank trials. The crew required extensive refresher training which will be discussed in more detail, which stretched manpower resources to the limit in the face of significant technical readiness demands. The main challenge was to identify and prioritize critical repair items, as Fleet Maintenance Facility *Cape Scott*'s resources were focused on preparing HMCS *Iroquois* for her upcoming NATO flagship deployment. As a result, *Charlottetown* met this RSP milestone on the last available workday and at the cost of significant overtime.

Degaussing Checks and Sonar Performance Figure Trials

Degaussing checks were delayed by failures of the ship's only gyro while on the range. As soon as repairs were completed, the ship re-

turned to the range to minimize the impact on the program. Fortunately, the ship met the signature specifications which negated the requirement to deperm. The ship made good use of the time gained by progressing equipment and internal organization checks. *Charlottetown's* crew then enjoyed a well deserved rest in her namesake city. Sonar performance figure trials were completed during the transit home.

Designated Maintenance Period I

The first designated maintenance period (DMP) presented the next challenge. The ship had to prepare for Phase One sea trials in competition with fleet demands on FMF *Cape Scott* resources. A total of 162 work items were submitted, but only 70 maintenance items were completed, with the remainder left at various stages of completion. The ship proactively identified key objectives, closely managed progress and reacted promptly when it was jeopardized, identifying critical path work items through message traffic to supporting authorities.

Refresher Training

Because the ship experienced a significant turnover of personnel during APS 1999, approximately 80 percent of our effective strength required full refresher training. This further stressed the ship's progress in preparing for trials and supporting the numerous outstanding corrective maintenance requirements. In addition, one third of the ship's company was required to support Operation Abacus as members of the ship's Naval General Duties Company. A significant portion of the planned maintenance had to be deferred.

Sea Trials

Co-ordinating maintenance and set-to-work trials within a compressed schedule in preparation for sea trials posed another significant challenge. The ship was allocated two DMPs to prepare systems for trial and to carry out the maintenance identified through trial deficiencies. To ensure timely delivery of trial reports, close liaison between the ship and the conducting authority was required. The new RSP methodology proved its worth on numerous occasions by highlighting problems and the impact of late completion of any one activity. This allowed the command to set priorities and determine overtime requirements to meet the RSP milestones. Close liaison with the FMF trial co-ordinator permitted the ship to progress preparations for workups, operations team training and weapons certification on a non-interference basis with concurrent work. The engineering and maintenance inspection was carried out toward the end of November 1999. Co-operation between the inspection team and ship's staff ensured a smooth inspection and a clear understanding of the corrective action required. The ship did not receive the final inspection report until two weeks before workups; however, numerous deficiencies were corrected through this close liaison.

Weapons Certification and Operations Team Training

On completion of Christmas leave, the ship entered the weapons certification process. Unfortunately, the 57-mm gun suffered a mechanical failure on completion of Phase Two sea trials, and close liaison with command engineering authorities was critical to returning this system to service in time for the on-board weapons certification. The following week, the STIR experienced a missile launch control interface fault during operations team training, which precluded further training on board. The last two days of the training serials were conducted on board HMCS *Montreal*. Her co-operation and support avoided a delay in the start of *Charlottetown's* second DMP, and was a good example of the sense of teamwork present in the Atlantic fleet.

DMP II

DMP II was dedicated to correcting the outstanding E&M inspection items and preparing for the retrial period. Superimposed on this effort was a late-breaking requirement to concurrently conduct a significant portion of the workup lecture program. Lecture preparation detracted from the ship's ability to support equipment maintenance requirements, making support from the ship's RSP co-ordinator and project leader critical. The command team was forced to extend the working day in order to meet all of the current RSP milestones. In true *Charlottetown* style, the ship's company readily understood and accepted these requirements, and their desire to excel ensured success.

Retrial Period

The ship made the best possible use of the retrial period to prepare for workups. With only two days at sea, time management of trials and the opportunity for organization checks were critical. The ship's harbour defence and damage control organizations were refined using the time available.

Summary

Charlottetown successfully completed workups on March 10, 2000 and was accepted by COMCAN-FLTLANT as a high-readiness unit. She then sailed for Combat Readiness Operations 1/00, which involved complex missile and torpedo exercises at the USN range near Puerto Rico. Successful completion of the RSP is attributed to consistent proactive communication and co-operation between the ship, fleet maintenance and command staffs. The RSP has provided excellent preparation for *Charlottetown's* next deployment with the USS *Harry S Truman* battlegroup in 2001.

Lt(N) Rutherford is Charlottetown*'s CSEO. Former MSEO Lt(N) Busatta is now the main propulsion officer in the MSE division of CFNES.*

Staff College in the City of Light

A Canadian MARE in Paris

Article by Cdr Ken Holt

(Photos courtesy of Cdr Ken Holt)

Opened in 1760, the Collège Interarmées de Défense in Paris hosts an international staff college course that receives high marks for the rich diversity of its program elements.

At the end of June 2000, one of the most memorable experiences of my life came to a close. I had just spent a rich and varied year as one of 315 staff college students from 64 different countries at the Collège Interarmées de Défense in Paris. Let me share with you some of my experiences in France during that year.

CID today is the product of several war colleges integrated into one, but its history dates back to the days of Louis XIV, the most famous student being Napoleon Bonaparte, who was a *cadet-gentilhomme* at the *école militaire* of the day. Napoleon's troops would later train on the Champ-de-Mars situated between the Collège and the Eiffel Tower (constructed for the 1889 Paris World's Fair). Although the concept of interoperability was introduced long before the existence of CID, the Collège has its pillars firmly anchored on the principles of joint operations in a multinational theatre.

I was part of the seventh graduating class at CID under the command of General Dellenbach, which began with a month-long indoctrination program in June 1999 for the 104 foreign students. In September, 211 French officers joined for the main program. Our staff college program consisted of conferences, syndicate project work and planning exercises for about two thirds of the time, with visits both in France and abroad rounding out the program.

Speakers at our conferences came to us from industry, government and the military, and included the French Chef d'état major des armées Gén. Kelche (France's highest ranking military officer), the Polish Ambassador, and company presidents of Vivendi (who took over Seagrams), Dassault, and Thomson CSF, to name a few. We also heard from senior officers from France, Germany, Italy, Spain and England.

Our syndicate work was organized by modules, covering working with the media, studies in geopolitics, military strategy, history and the future of the navy, and included planning exercises conducted at the strategic and operational levels following a method similar to that used by NATO. Individual projects were an important part of a more in-depth study of choice in the field of geopolitics or military strategy. My major paper was on the Gulf War.

Throughout the year we split into groups to visit military bases and units. My group visited the aircraft carrier *Charles de Gaulle* alongside in Brest, and spent 24 hours at sea on board the carrier *Foch* witnessing day/nighttime flight operations. At Saint-Dizier we flew in Alpha-jets and Jaguar fighters, and at Istres visited the test establishment for all French civilian and military aircraft, including the new Rafale. The French army demonstrated its capabilty with a mini-exercise at Mourmellon, featuring such hardware as the LeClerc tank. We had a chance to do some tactical flying in helicopters of the 6th Régiment in and around the forest at Compiègne both by day and by night (using night vision goggles), but flying under high-tension wires was a bit nerve-racking.

Each group also took one long trip outside of France. My group of 80 students went to Thailand and Viet-

nam for several weeks to learn about their military capabilities and better understand their geopolitical situations. The visits added a rich dimension to our experiences at CID.

The program at CID was designed to be flexible, and was unique for each student. Presentations given by other students taught us a great deal, and provided an opportunity to pose questions of a more delicate nature. The relative freedom of expression among the students created the conditions favourable for good, intelligent discussion. For instance, back-to-back presentations by the Indian and Pakistani students, including their views on Kashmir, were contradictory, but at the same time stimulated a well-informed debate that was quite valuable for those less well-informed regarding the geopolitical situation in that part of the world. The presentations were masterfully done, being both frank and respectful of each other's views.

It was interesting to look at the French military in general, as they are in the midst of a radical restructuring to modify their command structure and accommodate an all-volunteer force ("professionalization" is the term they use to describe the end of conscription in France), not to mention the European Defence structure now in rapid development. Although finance is one of the drivers, the new French models are quite different from those adopted by the Canadian Forces. For example, alternate service delivery (contracting out) would not be considered viable in France given the high level of government control of armaments. One of the French military's primary roles is nuclear dissuasion, which naturally translates into the highest level of security measures. In addition, because French unions are very strong, contracting to industry is often through government-directed contracts rather than by competition. The French military receives high-quality armaments, but there is a financial premium associated with the degree of state intervention.

On a lighter note, my family's daily life was also rich with new experiences. We couldn't help but enjoy the cuisine. We had always understood food and drink to be the *joie de vivre* of the French, but what surprised us was the choice available. For example, my wine book lists more than 2000 different wines made in France alone, never mind the rest of Europe. Add some cheese, a baguette, some fruit….That says nothing about the restaurants — French or otherwise, they were generally of exquisite quality, the only catch being the high prices.

"Fighter famil." The author at Saint-Dizier.

The question people most frequently ask is how we coped with life in a different language. For me, beginning with "B" level French, day-to-day life was not overly taxing, but I did need to take special care regarding business details since there are many formalities and legalities unique to France. For example, we were obligated by law to sign a three-year lease on our apartment even though we were staying only one year. Fortunately, we were able to break the lease on a technicality which allows for relocations required by one's employers.

The first couple of months at the Collège were a challenge, particularly given the specialized vocabulary and the speed of delivery of the speakers. I took a supplementary eight-week French-language course provided for foreign students, and passed the nation-wide language test administered by the Sorbonne. This training proved to be most useful later in the course when the workload intensified.

My wife Catherine took part in several discussion groups where the time was shared equally between French and English. She became quite popular since the majority of the participants were keen to improve their English. She also participated in French cooking classes and regular *soirées* with the other wives. A local fruit and vegetable vendor helped Catherine increase her French vocabulary during her visits to the market. Our son John (now five) began learning the language from scratch in the local *école maternelle*, or kindergarten. He adapted very well and now speaks French quite clearly. We have become quite comfortable in the Parisian lifestyle and are looking forward to our next few years in Paris, where I am now the CF naval attaché.

The year at the Collège Interarmées de Défense was a remarkable experience both professionally and culturally. The opportunities to travel to richly diverse places added an extraordinary dimension to our stay in France. Before attending CID, I thought it would be a chance of a lifetime. Now I underscore that impression and add an exclamation mark! I would be delighted to relate my experiences more fully to anyone interested in pursuing a similar career path.

Cdr Holt is the naval attaché at the Canadian Embassy in Paris, France.

Ship Safety for the New Millennium

"Safety is a perceived quality that determines to what extent the management, engineering and operation of a system is free of danger to life, property and the environment." [1]

Article by LCdr David Peer

The Canadian navy needs robust safety management. Public attitudes are changing, and our country is less tolerant of incidents that lead to loss of life or damage to property or the environment. As an organization, the navy has a responsibility to its members and to the public to maintain and operate its ships safely. As we move into the new millennium, public expectations and the increased complexity of our new ships and submarines will demand a more systematic approach to ship safety.

Only through a safety management system can the navy demonstrate proof of safe management and maintain public support for self-regulation of naval vessels. It is important for all of us to understand the fundamental concepts of safety in order to maintain our seagoing defence capability at peak efficiency, keep maintenance costs down, and avoid the headlines.

Ship safety encompasses both design and operational elements, but the most critical element is a management system. At present, two primary methods exist to implement safety systems: a regulatory approach, and a goal-setting approach. Each has its own merits and drawbacks.

The *regulatory approach*, which is suitable for well-established routine tasks, is easy to implement but the responsibility for safety rests with the regulator — the authority responsible for setting safety regulations that respond to safety concerns. The *goal-setting approach* is particularly suited to new, modified, or existing systems where complexity makes regulation difficult. Goal-setting requires a greater resource commitment from organizations because it demands a process or system to manage risk. The responsibility for safety in a goal-setting approach belongs with the owner-operator — the organization or individual charged with the responsibility to apply a safety management program to ships, systems and equipment. That responsibility could include meeting safety regulations, ensuring safety certificates are current, or managing and maintaining a formal system safety case (see "The Safety Case Concept") that identifies system hazards and emergency response measures.

The Canadian navy needs to draw on the strengths of both approaches to ensure that the tools and systems are in place to meet the safety challenges of the new millennium.

The Regulatory Approach to Safety

In a regulatory safety regime (*see Fig. 1*), the regulator sets the rules, and the owner-operators follow them. The problem with regulations is that they are often followed with little appreciation of the underlying safety concern. The regulator typically responds to a known safety concern in a process that results in a regulation. The application of the regulation results in compliance, misinterpretation or complaint. All three outcomes can provide feedback to the regulator on modifications necessary to achieve desired outcomes.

The regulatory approach is well understood. We all experience rules and regulations daily and accept that externally imposed definitions of right and wrong are necessary. Regulations are often welcomed because they provide a reference standard and help make routine tasks and activities safer.

Unfortunately, regulations tend to ensure that only the minimum requirement is met. An acronym pro-

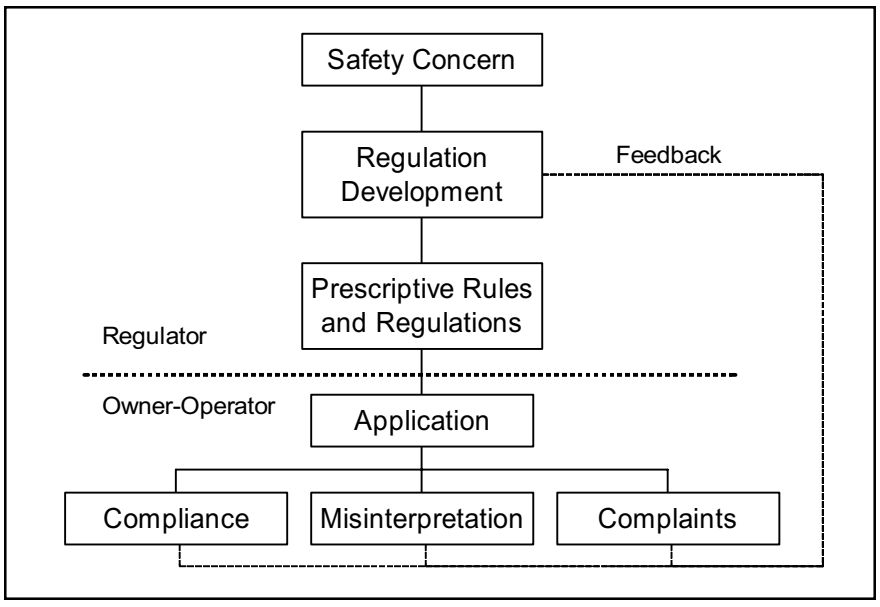


Fig.1 The Regulatory Approach

vided by a colleague in the UK MoD Ship Safety Management Office for this situation is CATNIP — Currently Available Technology Not Involving Prosecution. What incentive exists to exceed the requirement if liability in an accident is not affected? Reliance on regulation stifles innovative solutions to safety problems.

Regulations are difficult to keep up-to-date, and on the whole tend to be reactive and undergo revision under the shadow of major disasters or safety failures. The approach is inappropriate for novel systems and equipment, as regulations based on past experience can miss new failure modes or hazards.

Consider the current rules requiring double bottoms for oil tankers. These rules were the regulatory response to the 1989 *Exxon Valdez* grounding in Prince William Sound, Alaska in which 232,000 barrels of crude oil were spilled into sea. The technical solution may appear elegant and seem to reduce the likelihood of an oil spill, but at what cost! In fact, double bottoms introduced new, unforeseen hazards such as gas buildup and problems with maintenance and inspection that have the potential to cause a different disaster. The new regulations helped rebuild confidence around the world that tanker safety was improved, but major oil spills still continue. In hindsight, regulations on the use of alcohol at sea may have been more effective and much less expensive.

Regulation has a fundamental weakness in that the owner-operator needs no comprehensive safety management system since the regulator has the safety responsibility. The owner-operator only has to meet the regulations, even if they are inappropriate or not relevant to a situation. Responsibility is difficult to avoid in a self-regulating organization, but the fundamental weakness of this approach can still occur if internal organizations that use regulations shun any safety responsibility. The question of responsibility is complex, but in the end no self-regulating organization can afford to neglect safety.

The Goal-Setting Approach

The goal-setting approach was originally derived to deal with the safety of systems where little or no previous operational experience existed. Typically, regulation was difficult and the consequence of failure was likely to be catastrophic. The approach uses the safety case concept and seeks to answer six important questions:

1. What is my system?
2. What can go wrong?
3. What is the likelihood and consequence of something going wrong?
4. How can we reduce the likelihood and consequences of something going wrong?
5. How can safety be managed?
6. What should be done in case of an accident?

The major push in establishing the safety case concept came in response to a major explosion in a chemical plant in the United Kingdom in 1974. A modern, well-designed facility experienced a vapour cloud explosion after temporary plant modifications failed. The explosion killed 28 plant operators, damaged hundreds of residential homes, and demolished a multistorey office building. No one had anticipated the consequences. It was fortunate the explosion happened on the weekend or the death toll would have been much higher. The recommendations of the committee investigating the disaster led to the requirement for owners to develop safety cases for major hazard sites. The approach was a move away from the prescriptive regulations in force at the time.

The key element of the goal-setting approach is the presence of a safety management system which ensures that the methodology and system engineering techniques demanded by goal-setting are implemented effectively. The safety management system is a direct result of the responsibility that goal-setting places on the owner-operator to manage the risk of safety-related failures.

The safety management system is critical: it implements the philosophies and requirements of the approach by establishing the safety policy and the responsibility and relevant capability of individuals, by setting performance standards, by providing for measurement of performance and continuous improvement.

The goal-setting approach relies heavily on risk analysis techniques to prove that safety goals are met. The likelihood and consequences of serious accidents are evaluated to determine whether the cost of mitigation is warranted. The success of managing safety with goal-setting can vary widely. The concept of risk is often poorly understood and the approach is subject to incorrect application. This can be exacerbated by the passive role of the regulator.

The Safety Case Concept

A safety case is a formal written assessment of a system that documents the hazards, safeguards, safety management system, and emergency response plans. The safety case should stand alone, as the more it cross-references other documents the less effective it becomes.

The safety case rests with the "responsible authority" — the line manager responsible for safety. The responsible authority must have the authority and resources to change the design or operating procedures. If responsibility for the safety case must be transferred between responsible authorities, for example from a build project to a class desk, a formal transfer process is necessary.

The elements of a safety case are shown in *Fig. 2*. The structure responds to the six important questions and focuses on the significant hazards anticipated in the system. Risk analysis techniques are fundamental to the goal-setting approach and form the main part of a formal safety assessment.

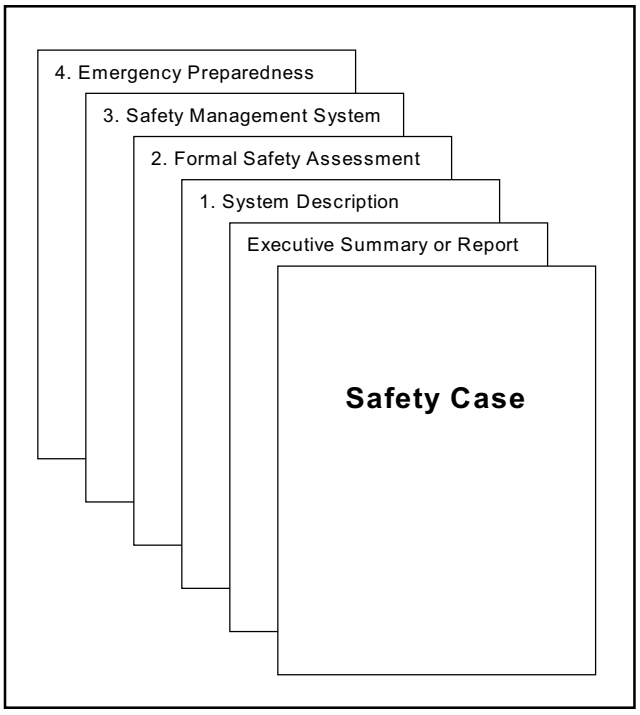


Fig. 2. Elements of a Safety Case

A safety case is prepared for submission to regulators by the authority responsible for a system and its operation. It is a live document, initiated at the earliest phase of system development, maintained through life, and only closed on system disposal. The safety case may need revision when changes to engineering details or operations introduce new unanticipated hazards or render critical safeguards ineffective.

The safety case is examined at regular intervals using safety certificates. The certification regime necessary to ensure a safe material and operational state is an output of the safety case. Safety certificates are prescriptive and demonstrate to the responsible authority and to the regulator that major hazards have been examined and reviewed following the requirements of the safety case. Certificates allow key hazards to be managed separately and efficiently.

The safety case should include a short executive summary or safety case report that specifies the system boundaries, outlines the operating environment, and presents key features of the safety case. The executive summary is reviewed and updated at key milestones in a system's life cycle. The safety case itself provides a continuous up-to-date and in-depth description of the system and environment, the formal safety assessment, the safety management system, and the emergency and contingency arrangements.

The formal safety assessment is the backbone of the safety case and provides the objective evidence that hazards are identified and mitigated. It includes three elements:

- Hazard Analysis — What can go wrong;
- Risk Assessment — The likelihood and consequences of something going wrong; and
- Risk Management — How to reduce the likelihood and consequences of a hazard.

The risk assessment determines the risk level and assesses it against established criteria to achieve consistent and cost-effective decision-making regarding hazards. Hazard control includes all actions required to remove, mitigate, or control the risk of a hazard. Proper application of risk assessment techniques is critical to the safety case concept.

A Way Ahead for the Canadian Navy

The Canadian navy is a self-regulating organization. As such, it has a responsibility to manage risk to life, property and the environment, and to maintain and operate assets efficiently. The navy currently relies almost exclusively on a regulatory approach to safety. Increasingly, society demands we take a proactive approach to safety issues, especially for hazards that have the potential for loss of life and damage to property or the environment. For the complex systems that the navy uses this most certainly will demand a broadening of safety management approaches to include goal-setting methods.

The approach adopted to manage safety should depend on the perceived risk. The regulatory approach offers an effective management technique for minor, low-technology systems and equipment, or for assets under external safety regulation. A goal-setting approach is appropriate for very complicated or novel systems. The navy needs a comprehensive safety management system to provide guidance on the most suitable and effective method for controlling risk.

A safety management system is critical to the success of any safety program. Because the navy self-regulates in many key areas of operations, definition of the regulator and the owner-operator functions, and where the responsibility for safety resides, is necessary. A safety management system establishes the responsibility and authority of senior management, subordinate organizations and regulators. It helps by placing the responsibility for safety with that part of the navy infrastructure having the capability, authority and responsibility to act.

Figure 3 illustrates the components of a safety program that combines regulation and goal-setting approaches for a self-regulating organization. Safety policy must originate with the executive authority — the highest level of management that exercises control over the navy's ship management system. The executive authority needs to set overall safety objectives and aims for the navy, and determine how the navy will implement safety policy.

The safety system is implemented using methods appropriate for the safety risk: safety cases for novel or

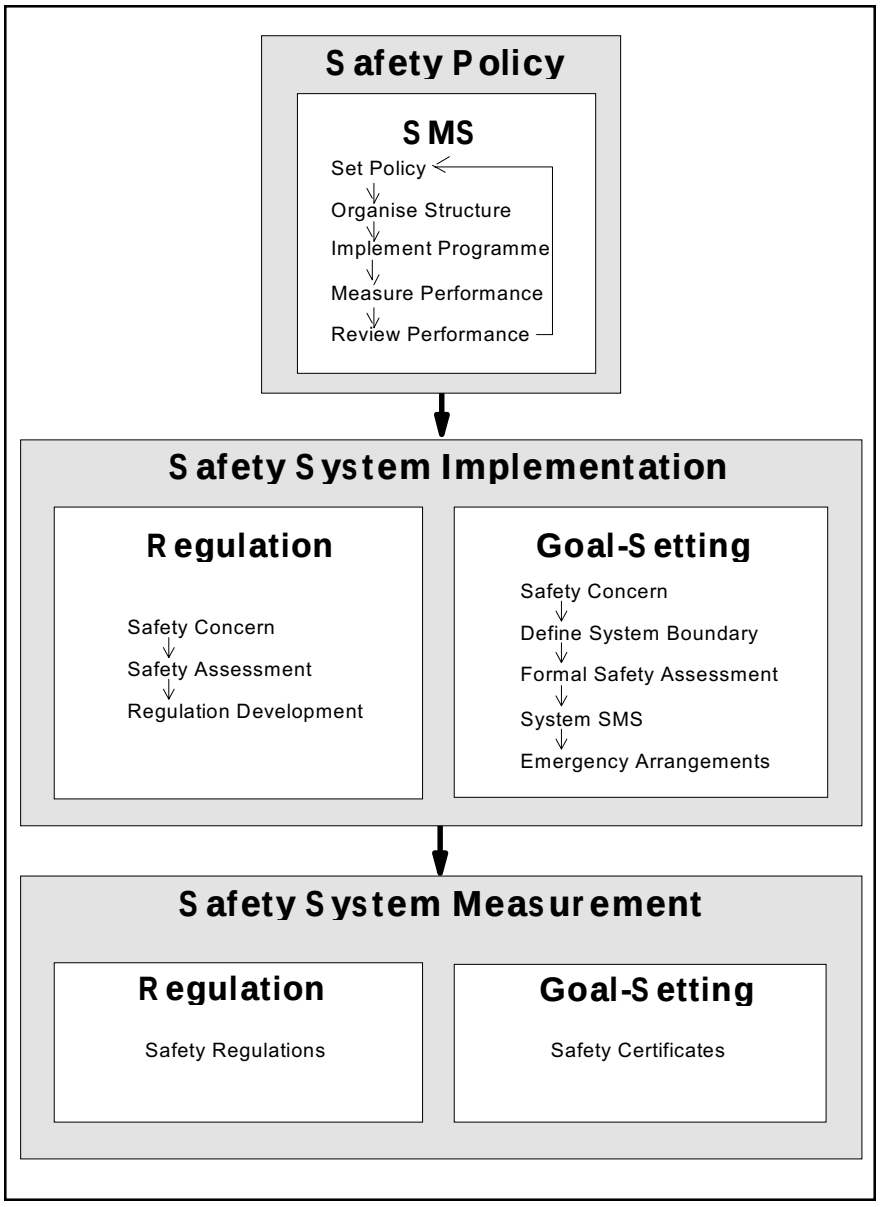


Fig. 3. Safety Program Structure

complicated systems; regulations for minor, low-technology systems. The safety management system identifies regulators and responsible authorities and delineates organizational responsibility and authority for ships and submarines, systems and equipment. Safety system effectiveness is measured using regulations or certificates. Both methods are prescriptive and can be almost identical when regulations are developed using risk-based techniques.

Conclusion

The Canadian navy needs a comprehensive safety management system that will encompass regulations and safety cases. A safety program with a strong safety management system will ensure that policy development, implementation and application setting can deal with all issues of ship, system and equipment safety.

A safety program would also help foster a navy-wide safety culture since the safety management program would cover all naval assets and systems. Society demands we take a proactive approach to safety issues especially for hazards that have the potential for loss of life and damage to property or the environment.

Safety is the concern of everyone. The navy demonstrates a duty of care to members and the public with a robust safety management system. A navy-wide safety program would ensure a consistent, unified approach to risk management, would foster a safety culture, and would place the navy at the forefront of safety management in Canada.

References

1. Kuo, C., *Ship Safety Fundamentals*, University of Strathclyde, Glasgow, 2000.
2. SSMO Training Module 2 — Ship Safety Techniques, Det Norske Veritas, 1999.
3. SSMO Training Module 3 — Maritime Risk Assessment Workshop, Det Norske Veritas, 1999.

LCdr Peer is on exchange with the Royal Navy in the Submarine Naval Architecture section of the Defence Procurement Agency.

Ship's Hazardous Material Portfolio

Article by Chris Scodras, P.Eng., and Michael Davies

The Directorate of Maritime Ship Support (DMSS 2) has tasked the Naval Engineering Test Establishment to develop the Ship's Hazardous Material Portfolio, a class-specific, electronic database linking integrated hazardous materials to shipboard equipment, compartments and reference documents. The purpose of the SHMP is to protect the health and safety of ship's staff and others who perform work in ships by identifying and minimizing the hazardous materials carried or installed on board. A hazardous material is defined as a poison, corrosive agent, flammable substance, explosive, radioactive chemical, or any other material which may pose some risk to human health or well-being. The SHMP will be called up in the Captain's Ship's Book, and in work packages for all dockings and work periods.

The operation of a ship requires the use of some hazardous materials. DMSS 2 is the technical authority for ship materials and is responsible for the DGMEPM Environmental Management System (EMS) now being developed. DMSS 2 responsibilities include specifying and providing technical advice on ship materials such as petroleum, oil and lubricants, coatings, insulation, cleaners, and any other hazardous substances. Material selection is based on factors such as personnel and fire safety, environmental regulations, fitness for purpose, compatibility with existing materials and equipment, and DND policy. Other life-cycle material managers (LCMMs) within DGMEPM may also specify hazardous materials to support ship equipment and systems.

Once materials have been introduced to ships by DGMEPM, either through initial design specifications, or during subsequent engineering changes or programs, DGMEPM LCMMs are responsible for ensuring that material selection is regularly reviewed in light of the latest regulations and hazard information. LCMM responsibilities as hazmat control authorities are further defined in *DAOD 4003-1, Hazardous Material Management*.

(Photos courtesy of NETE)

Hazardous materials are unavoidable in operational vessels. For example, most of the products used in shipboard firefighting are classed as hazmat and must be accounted for in the new Ship's Hazardous Material Portfolio.

In addition, DGMEPM requires up-to-date information on hazardous materials associated with individual ship classes and compartments when preparing work packages prior to work periods and ship disposals. This is required to support environmental assessments and to ensure that DND workers and contractors are advised of potential hazards. In the case of contracted work, it is essential that hazards be identified in the Statement of Work sent for tender to avoid later disputes, additional costs and ultimately, any potential health risks. This hazard information must include integrated materials (e.g. insulation, applied paint systems, etc.) and non-integrated materials (e.g. stored consumable materials). Ships that are being disposed of by sinking must be stripped of all hazardous materials, such as the petroleum, oil and lubricants integrated with equipment, polychlorinated biphenyls (PCBs) and all consumable hazardous materials held on board. A comprehensive list by ship class and compartment, cross-referenced to Equipment Registration Numbers, is required as a checklist to ensure that ships can be surveyed efficiently and declared to be hazmat-free with confidence.

In the Ship's Hazardous Material Portfolio, hazardous materials are divided into two categories: integrated and non-integrated. Non-integrated, or stored consumable hazardous materials, are individual containers of cleaners, oils, greases, compressed gases or paints. They are found on shelves or in cabinets throughout various compartments and may be obtained through local procurement. Integrated hazardous materials include similar substances, however,

they have been "integrated" or contained within fitted equipment or systems. These are the lubricants, ozone-depleting substances such as Freons, or compressed gases used to charge equipment; they also include the paint applied throughout the ship, batteries in equipment, and PCBs that may be a contaminant in various systems. These materials are required to operate the ship and are replenished or replaced as outlined in planned maintenance schedules, operating and maintenance instructions, and standard ship maintenance and repair specifications. MARLANT and MARPAC are responsible for hazardous material management and handling within the fleet, but it is the responsibility of LCMMs to remain informed on the hazards of integrated materials so they can make appropriate maintenance decisions and support the end-users.

The SHMP will assist LCMMs whenever a new integrated hazardous material is introduced, or an existing one is replaced. For example, LCMMs must be aware of storage and use requirements for the hazardous material being specified, and confirm compatibility with the ship's environment and intended compartment. They must have information about the environmental impact of that hazardous material to ensure that occupational safety and health, and Sustainable Development Strategy objectives and targets are not compromised. LCMMs must also be able to identify all equipment associated with the use of a particular hazardous material so that any changes required in hazardous material selection can be addressed. In addition, they must be able to identify all documents mandating the use of a specific hazardous material so that documents can be updated to reflect changes in specifications and material selection. Based on these LCMM functions, the SHMP has been designed to produce the following reports:

- List of hazardous materials mandated for use in ships by DGMEPM;
- List of hazardous materials, sorted by ship class and compartment, and cross-referenced to Equipment Application Codes;
- List of hazardous materials associated with any single compartment in a ship class; and
- List of DGMEPM documents that reference a particular hazardous material.

The various coatings required for ship upkeep are classed as "non-integrated" hazmat when they are stowed in their containers, but become "integrated" once they have been applied and become "one with the ship."

Populating the SHMP originally begins with a manual documentation review. Documents originating within DGMEPM are scanned for hazardous material names or specifications, and recorded with respect to applicable ship class and related equipment. The information is further validated through an onboard ship survey which includes a compartment-by-compartment hazardous material verification. In addition, different trades are consulted to review the hazardous materials associated with their equipment. Materials identified through the document review are confirmed and new ones recorded.

The plan for this project includes portfolios for the *Halifax*, *Iroquois*, *Protecteur*, *Kingston* and *Victoria* classes. HMCS *Protecteur* was surveyed in August 2000, and the completed SHMP was included in the work package for her upcoming refit. The *Iroquois*-class portfolio validation was conducted on board HMCS *Athabaskan* in October, and HMCS *St. John's* was to be surveyed before the end of 2000 to complete the *Halifax*-class portfolio. Initial portfolios will apply to all ships of each class, and may be individualized later as necessary to reflect differences in configuration.

Part of the purpose of the SHMP is to provide a baseline for hazardous material minimization. The initial portfolio gives visibility to those materials which should be eliminated due to obsolescence or because less hazardous replacements are available. This work will continue after baseline portfolios have been established for all classes of ships.

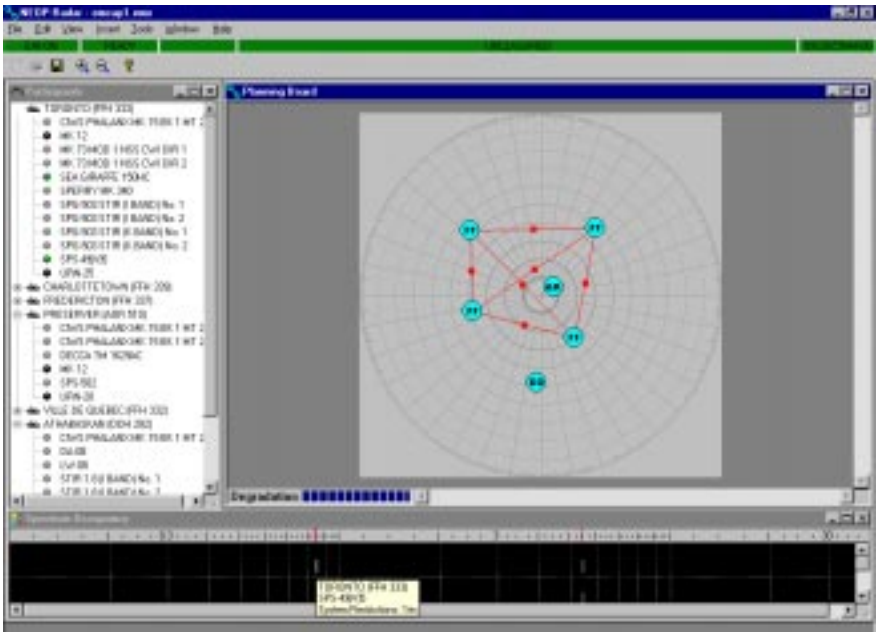
Chris Scodras is the SHMP task leader at the Naval Engineering Test Establishment in Montreal.

Michael Davies is the facilities manager of NETE.

Controlling RF During a Missile Exercise

Article by Lt(N) Steve Whitehurst

Imagine your ship on a missile range along with 25 other warships, many of which will be firing missiles concurrently. Now imagine the radio frequency (RF) soup your ship will be operating in while trying to achieve a successful engagement. As I found during my experience as the Canadian Task Group Electromagnetic Compatibility Analysis Program Officer (CTG EMCAPO) during an international missile exercise, frequency management is important and it can be accomplished in a multiunit environment. A unique RF management software tool made available to the Canadian navy by the USN went a long way toward simplifying the task.



The EMCAP V4.0 Windows-based user interface displays all relevant information pertaining to EMI. The Participants window provides information on each ship's RF emitters. The Planning Board window indicates the EMI between units, and the Spectrum Occupancy window indicates the frequencies at which EMI is occurring.

A radar's performance is adversely affected by environmental or background noise. If multiple emitters are operating at or close to the same frequency, electromagnetic interference (EMI) can result in false targets, decreased detection ranges, or other degraded performance. By simply assigning each emitter its own frequency or frequency band, EMI levels can be greatly reduced. Managing RF emissions can also ensure that naval units comply with applicable national and international laws and treaties. It is illegal to operate at certain frequencies in various regions of the globe so as not to interfere with coastal communication facilities. Ships and commanding officers face heavy fines if they fail to obey these laws.

During an international missilex in early 1999 the Canadian navy took a step forward in the field of RF management, assisted by the United States Navy. In April of that year, HMC ships *Toronto*, *Charlottetown*, *St. John's* and *Preserver* deployed to the Puerto Rican operation areas to conduct Canadian and international missile exercises involving units from the United States, Germany, Colombia, and Belgium. The large number of ships resulted in a dense electromagnetic environment.

Prior to the deployment, the Commander Canadian Fleet Atlantic received a message from the USS *Monterey*, the unit responsible for frequency management during the exercise, requesting detailed data on all RF emitters in the Canadian task group. The data would be loaded into a USN-developed software program called EMCAP, which would recommend operating frequencies to minimize EMI. Once our emitter data was sent, I travelled to the U.S. Naval Surface Warfare Center (Dahlgren Division) in Virginia where the EMCAP software had been developed, and where the EMCAP project experts were located. I was going there to help co-ordinate the EMCAP plan for the exercise, and to be introduced to the USN's methods for frequency management.

Accompanying me on this trip was MARLANT's EMI officer, Lt(N) Guy Wheeler from N34 Operational Readiness. We were received very well at Dahlgren by Margaret Neel, the EMCAP Project Manager, and by Deborah Garrison, a Sentel Corporation Systems engineer. They briefed us on EMI and frequency management, and gave us training on the operation of the EMCAP program. They also supplied us with an unclassified version of the EMCAP software which the Canadian navy could use to input its own confidential radar data.

From the lessons learned during the international missilex, a method

of managing Canadian RF emitters was established. During pre-exercise planning sessions, an EMCAP OPI or co-ordinator is selected. Then, approximately two months prior to deployment, a message is sent to all participating units to gather data on emitter operating frequencies, modes of operation, current settings and individual unit preferences or degradations. The EMCAP co-ordinator is then able to formulate a frequency assignment plan which minimizes EMI by ensuring maximum separation between adjacent operating frequencies or frequency bands. This procedure was successfully employed during Canadian Fleet Operations 1/99, and during subsequent exercises.

The use of the EMCAP software can greatly simplify the procedure. The program is capable of generating both data request and frequency assignment messages, saving the co-ordinator a significant amount of work. As well, the program uses a comprehensive set of data for each emitter and accurately predicts EMI. The program then selects a set of operating parameters for all emitters, thereby minimizing the overall predicted EMI. Despite these benefits, significant work needs to be done to take full advantage of the EMCAP software. A complete and accurate set of data for each emitter must be entered into the software's database, and information regarding all coastal and operating area restrictions must also be compiled and input. Additional copies of the unclassified EMCAP software acquired from the USN for issuance to participating units should be updated with the same information, and all units should undertake training in the operation of the program.

By interfacing the EMCAP software with other ship systems for electronic surveillance measures, datalink and global positioning, it should be possible to obtain real-time warnings regarding coastal restrictions and EMI levels from other units in the area. The system could then recommend possible solutions to the operators, such as shutting down certain RF emitters, employing sector blanking, or simply changing channels. The implementation of these recommendations must however remain manual to prevent the shutdown of critical equipment during operational engagements. Potential future applications of the program are currently being investigated at Dahlgren for the USN.

In summary, frequency management is essential in maximizing the performance of RF emitters and in ensuring compliance with coastal restrictions. This challenge, which can be quite complicated during international exercises or operations, can be significantly simplified through the use of the USN's EMCAP software package. Integrating this software with current ship systems will ensure EMI is always minimized, and that commanders are warned prior to interfering with coastal communication establishments and services.

Lt(N) Whitehurst is the Staff Officer Survivability in N34 at Maritime Atlantic Headquarters in Halifax.

Conferences:

INEC 2000 (Hamburg)

Conference Report by LCdr Pierre Demers

The fifth International Naval Engineering Conference, held in Hamburg in March 2000, drew 300 delegates from 20 nations to discuss the latest developments in marine engineering. The INEC is typically held every two years, and is organized by the UK's Institute of Maritime Engineers.

Some of the most significant issues presented at INEC 2000 related to the electric ship, crew reduction, technological innovation, the shift from blue ocean to littoral operations, commercial practices and cost management. As a maritime nation and a member of NATO, Canada has much to gain by keeping abreast of marine engineering developments around the world. An imminent shift to electrical propulsion for new naval ships also makes it imperative that Canada understands the new trends in order to take full advantage of any new technologies. Furthermore, with so much emphasis now being placed on interoperability and multinational operations, the Canadian navy will have to remain at the forefront of naval technology if it is to ensure satisfactory deployment with international forces.

Foreign Navies

U.S. Navy Focus

The Commander of U.S. Naval Sea Systems shared his vision for the future, describing a fleet that could compete with industry in attracting and retaining young talent, adapt to current business practices, address quality of life issues, and focus on combat capability.

The USN is looking at introducing a 12 000-tonne DD-21 "land attack" destroyer, but is waiting for industry to present proposals which include an electric propulsion option. The DD-21 will revolutionize warship design with its integrated propulsion system, full weapon load, and skeleton crew of 95. To operate a ship of this size with such a small crew, the USN believes it must capitalize on some of the e-business solutions pioneered by the corporate world. A major initiative in this respect is a proposed "single point of entry" customer service system, whereby any department of the navy can be accessed from anywhere in the world through one telephone number (or web address). According to the NAVSEA commander, up to 70 percent of phone enquiries could be satisfied within four hours with such a system.

The USN has also solved many of the combat system integration problems associated with putting a carrier battle group to sea. A formal, rigorous program to validate the combat system suite of an entire carrier battle group is now initiated well before deployment. The program involves testing individual combat systems at deployment minus 18 months (D-18), freezing system designs and developing standard operating procedures at D-12 months, and finally conducting sea trials six months prior to deployment.

Royal Navy Focus

The UK has developed a strategy for the 21st century in which future combatants, including aircraft carriers and attack submarines, will be configured to take full advantage of integrated full electrical propulsion (IFEP). For example, the propulsion configuration for the Type 45 (Type 42 replacement) will be an electrical propulsion plant, and the RN's latest class of LPD amphibious assault ships will also be fitted with electrical propulsion. The RN is also challenging the conventional monohull for frigates with the development and introduction of a trimaran design. Driven by the requirement to maximize payload, enhance seakeeping and reduce propulsion requirements, a *Triton* one-third scale trimaran demonstrator is presently at sea conducting trials.

Other Allies

Many other nations are equally committed to taking advantage of the benefits of the electric ship. The Royal Netherlands Navy has introduced its latest troop carrier, HMNS *Rotterdam*, with a fully integrated electrical power plant, and is presently working on an electrically propelled LCF-class anti-air/command frigate.

The Germans, meanwhile, are putting a mechanical plant into their F-124 frigate, but say they will introduce electric propulsion in the follow-on F-125. German MEKO multipurpose design concepts are also being introduced in a wide range of ship types to increase payloads, enhance stealth, reduce crew size and incorporate advanced propulsion. MEKO radar cross-sections are among the best in the world, and impressive infrared suppression is achieved through the use of horizontal exhaust trunking with a very effective seawater injection cooling system for GT and diesel exhaust. A CODAG arrangement has two diesel engines driving controllable pitch propellers for cruise speeds, and one gas turbine driving a waterjet propulsor for higher speeds.

The company Alstom is the lead corporation building electrical propulsion plants for cruise ships, and is successfully introducing podded propulsors on commercial ships.

The All Electric Ship

The main motivation for adopting the all electric ship is the significant savings that are available in through-life costs without affecting operational capability. Efficient operation of a reduced number of propulsion generators translates into lower fuel consumption and maintenance load. Widespread introduction of electrical auxiliary equipment such as steering gear, stabilizers and cranes is expected to significantly increase reliability and reduce maintenance. Despite higher unit purchase costs, the savings over the life of a warship can far outweigh the higher initial investment.

Modern electrical propulsion can now be designed with dual-purpose motor/generators. The traditional constant speed prime mover/generator, or genset, has several new options: variable speed alternators, permanent magnet alternators, single generator operation, high-voltage generation, and multiphase generation, to name a few. As for prime movers, the new complex cycle WR-21 gas turbine being funded by the American, British and French navies makes efficient operation possible over a wide speedband. The WR-21 is being marketed to compete against GE's LM-2500, and has successfully completed over 2000 hours of testing. It is presently undergoing endurance trials and shock testing. It has been selected by the RN for the Type 45 class.

Much effort is also being devoted to developing a power dense permanent magnet propulsion motor (PMPM) for warships. The RN Type 23 frigate (1980s technology) is fitted with two 1.5-MW DC propulsion motors (one for each shaft), which are approximately the same volume and weight of a modern 20-MW permanent magnet motor. The RN currently has a 2.5-MW transverse flux PMPM, and intends developing a full-scale 20-MW version for future frigates and carriers. The Americans,

During the conference it was repeatedly acknowledged that the move from mechanical to electrical propulsion is as significant as the changeover from sail to steam.

meanwhile, are testing a 19-MW induction motor at their land-based facility in Philadelphia.

With the introduction of all-electric ships, an integrated approach must be considered for power generation, distribution, consumption, protection and control. The USN's Integrated Power System (IPS) and the RN's IFEP are both studying the various components of the distribution system. High-voltage power networks have been introduced at sea for some time. The USN's aircraft carriers are fitted with a 4.1-kV distribution system, while modern cruise ships are fitted with 6.6-kV systems — all of which are supported by industry.

Over the past decade, a significant revolution has taken place in the design of power supply converters for controlling the speed of propulsion motors and converting power to suit the various loads. With no moving parts, modern electronic converters are highly reliable and quiet. The USN is testing an innovative 21-MW converter which does not require deionized water for cooling. Instead, this remarkable converter uses standard onboard fresh water, or even sea water for cooling in an emergency.

The RN is embarking on a major campaign to promote single generator operation on the premise of fuel savings and lower maintenance costs. Nuclear submarines have long operated under a single power plant (one reactor), with main batteries floating in parallel for backup power. Surface ship power integrity can also be demonstrated under single generator operation with the provision of an energy storage device (e.g. submarine batteries, flywheels, a superconducting magnetic energy storage device, regenerative fuel cells, etc.) floating in parallel to provide instantaneous backup propulsive power, and to power any future energy weapons such as lasers, magnetic guns and pulse weapons.

Mitigating the risk associated with electric warships can be accomplished, in part, by learning from industry as it assumes the bulk of the R&D effort (and risk) associated with introducing electrical propulsion and controls in cruise ships. Computer modelling can also be used to predict the behaviours of a fully integrated electrical plant. Finally, full-scale test facilities such as the USN's Land Based Facility in Philadelphia, and the UK's Technology Shore Demonstrator can be used to study the full impact of integrating prime movers, generators, converters, consumers and protection devices, while assessing power quality and validating theoretical models.

Classification Rules

On another front, classification societies are expanding the scope of their coverage to include warships. The UK has already used Lloyds Register Rules to build and maintain the helicopter carrier HMS *Ocean* and the ocean survey vessel HMS *Scott*, and plans to do the same with its future landing platform dock vessels. The Norwegian naval material command actually tasked Det Norske Veritas DNV to revise its rules to include naval ships. DNV now sponsors the Naval Craft Technical Committee, which includes members representing 12 countries. It is believed that a classification society can provide cost-effective, independently accountable processes for the procurement and in-service support of warships.

Manning Issues

Finally, with the current trend to minimize crew size while retaining capabilities, industry and military sectors are introducing innovative schemes to recruit, employ and retain dynamic, intelligent and adaptable personnel. During the conference it was repeatedly acknowledged that the move from mechanical to electrical propulsion is as significant as the changeover from sail to steam. Planners will have to make extensive use of computer modelling tools to identify the right combination of skill sets, knowledge, ranks and experience for navy personnel of future fleets.

Some basic questions do remain, however. For instance: How many people are required for damage control? What is the limit of automation? Will a peacetime crew differ from a wartime complement? In tackling these issues, it was agreed that no computer can replace sound strategic planning and a sense of vision.

Looking Ahead to INEC 2002

Naval engineers/planners are eagerly awaiting the next INEC, scheduled for April 2002 in Glasgow, Scotland. If last year's event is anything to judge by, attendees can expect a full agenda of technical updates on the latest in marine engineering technology that is certain to have relevance to the naval and commercial technical community.

LCdr Demers is the Marine Systems Engineer of the Afloat Logistics and Sealift Capability Project team in Ottawa.

Awards

1999 MARE Training Award Presentations

Photos by Private Shawn Kent,
CFB Halifax *Formation Imaging Services*

With the completion of each training year, a MARE Awards Board is convened to identify officers who have distinguished themselves from their peers in the pursuit of engineering excellence and leadership. The 2000 East Coast MARE mess dinner provided the occasion for the presentation of most of these prestigious awards. **— Lt(N) Chris Smith, CFNES (Officer Training Division), MARE Awards Officer.**

MacDonald DettwilerAward

The MacDonald Dettwiler Award is presented to the best overall MARE officer having completed the Head of Department qualification in the previous training year. The award was presented to Lt(N) Joseph Pike, (National Defence Quality Assurance Workcentre Halifax) by Grant Sullivan of MacDonald Dettwiler Canada. Runners-up included Lt(N) Cochrane (FMF *Cape Scott*), Lt(N) Gould (FMF *Cape Breton*), and Lt(N) Coffen (HMCS *Onondaga*).

Lockheed Martin Award

The Lockheed Martin Award is presented to the best overall CSE candidate having received the 44C qualification during the previous training year. Keith Bowden presented a naval sword, on behalf of Lockheed Martin Canada, to Lt(N) Jacques Major (FMF *Cape Scott*). Runners-up were Lt(N) Thibault (HMCS *Vancouver*), SLt Michaud (HMCS *Regina*), Lt(N) Pike (National Defence Quality Assurance Workcentre Halifax) and Lt(N) Campbell (FMF *Cape Scott*).

Naval Officer's Association of Canada Award

The NOAC Award is presented to the candidate displaying the highest standing of professional achievement and officer-like qualities on completion of the 44A qualification. This year, both the 1998 and 1999 awards were presented by James Bond (RCN retired) to SLt Lorinda Semeniuk (HMCS Vancouver — left, 1998 winner), and A/SLt Jay-Thor Turner (CFNES, on course at Dal Tech — 1999 winner).

CAE Award

The CAE Award is presented to the candidate who displays a high level of engineering excellence, academic standing and officer-like qualities on the MARE 44B Applications Course. Wendy Allerton, Marketing Manager/Marine Control Systems at CAE Inc., presented this year's award to SLt Ryan Kennedy (HMCS *Halifax*).

Peacock Award

The Peacock Award is presented to the best overall MSE who received the 44B qualification during the previous training year. Dr. George Xistris, Director NETE, presented a naval sword, on behalf of Peacock, to Lt(N) Helga Budden (HMCS *Iroquois*). Runner-up was Lt(N) Dionne (HMCS *Regina*).

Northrop Grumman Award

The Northrop Grumman Award is presented annually to the best overall Combat System Engineering graduate to complete the MARE 44C Applications Course. Cdr Joe Murphy, Commandant of Canadian Forces Naval Engineering School Halifax, presented the award to SLt Michael Montague (HMCS *Winnipeg*) on behalf of Northrop Grumman.

Mack Lynch Memorial Award

The Mack Lynch Memorial Award is presented annually to the Marine Systems or Combat Systems engineering candidate who in the opinion of his peers and instructors best exemplifies the qualities of a naval engineering officer. CFNES Commandant Cdr Joe Murphy presented the award to SLt Michael Montague on behalf of Jennifer Lynch, the sponsor of the award.

Bravo Zulu!

New Defence Research Special Operating Agency

The venerable Research and Development Branch of DND has reinvented itself as Defence Research and Development Canada (DRDC), a special operating agency within the department.

The new organization reports directly to the Deputy Minister. Dr. John Leggat leads DRDC as Assistant Deputy Minister for Science and Technology and Chief Executive Officer. With the new status, Dr. Leggat explained that "we will have greater flexibility to create an innovative path into the future through defence science, resulting in benefits for all Canadians. For many years we've been one of the best kept secrets in the federal government — that will change.

Special operating agency status gives DRDC an operating framework more specifically geared to the requirements of an R&D organization. It provides the autonomy and authority to patent inventions and garner royalties; streamline the development of research partnerships; simplify decision-making processes; and contract directly with Public Works and Government Services Canada. Agency status will also benefit the CF, providing improved access to outside science and technology and an enhanced technological edge in the field.

With an annual budget of $190 million, the new agency commands only a fraction of the R&D resources of NATO allies such as the United States. DRDC counters this by acting as an R&D knowledge broker, leveraging its investment in promising research and technology through partnerships with private industry, universities, other government departments, and international allies.

The new organization will continue to staff through the public service, but managers will institute a human resource system to attract and retain high-calibre personnel in the competitive hi-tech job market. The Ottawa headquarters and its five defence research establishments across Canada employ approximately 1000 people.

Helping provide troops with the right tools to do the job effectively and safely is an important part of DRDC's role. "The CF is still our client, and serving its needs is our primary focus," said Dr. Leggat, echoing a commitment that dates back to the Second World War.

For more information on Defence R&D Canada, visit their website at www.drdc-rddc.dnd.ca. **— Robin Kitchen, in *Materiel Matters,* No. 49, November/December 2000.**

CADRE Project Update: *Command and Control and Area Air Defence Replacement*

The CADRE Project to meet the navy's command and control (C2) and area air defence (AAD) requirements for 2010 and beyond is gearing up. Following the establishment of a project organization in early 2000 with the assignment of **Cdr John Westlake** as Project Director, in June DGMEPM assigned **Cdr Rick Houseman** as Project Manager. By fall, CADRE positions were being staffed with personnel from both the Chief of Maritime Staff and ADM (Material) organizations. Naval C2/AAD are currently being provided by the four *Iroquois*-class ships.

The project is just at the outset of the Options Analysis phase, and work is progressing to develop the Concept of Employment and Statement of Operational Requirements. These major activities are being led by Cdr Westlake's staff, and were progressed last fall during a Capability Definition Writing Board at the NAVCAN training facilities in Cornwall, Ontario. Using the wireless computer network *Decision Support System*, staff from CMS, DGMEPM, MARPAC, MARLANT and Operations Research, along with land and air operational staff, were able to view and make comments on several draft documents, including the Concept of Employment, chapters 1 and 2 of the Statement of Operational Requirement, and a capabilities matrix. Their comments and recommendations are being used to update these documents and to assess where further effort is required.

Although the project director takes the lead during the options analysis phase, project management staff are also busy preparing documentation necessary to achieve preliminary project approval. This documentation includes the project charter, project plan, project profile and risk assessment, as well as the options analysis. Several options are being considered, ranging from a completely new design to the purchase of an offshore design. As might be expected at this early stage of the project, *all* options to satisfy the requirement are being considered. Where possible, work is being leveraged on the experience gained by the Afloat Logistics and Sealift Capability Project, together with the experience of operational staff and DGMEPM personnel.

The current timetable for the CADRE Project is to achieve preliminary project approval in 2002. Activities in the definition and implementation phases are expected to result in an initial operational capability in approximately 2010, with project closeout by 2016. **— Cdr Rick Houseman, PM CADRE, Ottawa.**

MEPM's Farewell to the Cameron

(Photo courtesy of Priska Kincaid)

With water taxi service courtesy of HMCS *Carleton*, Charles Cameron arrives for his send-off party from DGMEPM. Following 22 years of service to DGMEPM, the man who became synonymous with CPF platform systems integration left DGMEPM last August to assume new duties as the Engineering Manager of Fleet Maintenance Facility *Cape Breton* in Esquimalt. — *Submitted by Cdr A.M. Smith, DMCM IRO, Ottawa.*

In the CPF shipbuildin' game,
Our Charles gained consid'rable fame.
When the need was for dealin',
No one did more wheelin',
For the ships, he takes credit (or blame)!

In drink, the preference of Charlie
Runs more to the malt than to barley.
Aye, to render him barkless,
Just feed him Glen Farclas,
Or slip him a dram of Glen Marley.

Out west, they've been running amok,
But nae more! They're in for hard luck.
There'll be discipline more, sir,
With Charles as enforcer
For the infamous Admiral Buck!

O'er the years we've quite often fought ...
All the same, he's taught us a lot.
It hasnae been bliss,
Yet we'll seriously miss
Our peripatetical Scot.

— From *Ode to the Cameron*,
by Robert Weaver

Retired MARE wins Nova Scotia engineering award

Retired MARE Capt(N) Dale Roushorn, P.Eng., CD, was presented with the APENS 2000 Engineering Award by the Association of Professional Engineers of Nova Scotia at the APENS annual general meeting in September. Capt(N) Roushorn retired from the navy in 1981, following a "double-hatted" appointment as Commanding Officer Naval Engineering Unit (Atlantic) and Deputy Chief of Staff (Engineering & Maintenance) in Maritime Command.

Capt(N) Roushorn began his distinguished naval career as an ordinary seaman in 1947; was sponsored by the navy for a B.Sc. in mechanical engineering (University of New Brunswick, 1958); and received an M.Sc. in naval architecture from MIT in 1961. He was the Naval Architect-in-Charge for the construction of the operational support ships HMCS *Protecteur* and HMCS *Preserver*, and while on exchange with the RN was appointed Constructor-in-Charge of the 12-ship *Leander*-class frigate new construction with DG Ships at Foxhill, Bath. As a commander serving in DGMEM in the mid-70s he was appointed team leader for the Future Surface Ship Study, and it was this team that produced a "preliminary design" for a vessel they called "The Canadian Patrol Frigate."

(Photo courtesy Capt(N) (Ret.) Thomas Brown)

Capt(N) (ret.) Dale Roushorn (*left*) receives the APENS 2000 Engineering Award from Association President, Ron Gilkie.

Following his retirement from the navy, Capt(N) Roushorn continued his engineering career with industry. He left just a few years later, only to find that he missed the thing he loved most — engineering. With business partner Don Hussey P.Eng., he formed DONELAD Hydronautics Ltd. (the name being made up of "DON," from Don Hussey, and "ELAD," which is D-A-L-E spelled backward!) DONELAD is now known as DHL Engineering, and Dale, at a young 70 years of age, continues to do what he enjoys most.

— Capt(N) (ret.) Thomas Brown P.Eng., Siemens Westinghouse Technical Services, Halifax.

Index to Vol. 19

National Defence
Defence nationale

FALL 2000/WINTER 2001

News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

Inside this issue:

CNTHA News ***Est. 1997***

CNTHA Chairman
RAdm (ret'd) M.T. Saker

DHH Liaison
Michael Whitby

Secretary
Gabrielle Nishiguchi

Executive Director
LCdr (Ret'd) Phil R. Munro

DGMEPM Liaison
Mr. R.A. Spittall

Maritime Engineering Journal Liaison
Brian McCullough

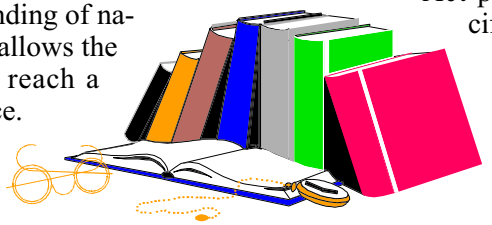
Newsletter Editor
Mike Saker

Newsletter Production Editing Services, Layout and Design
Brightstar Communications, Kanata, Ont.

CNTHA News is the unofficial newsletter of the Canadian Naval Technical History Association. Please address all correspondence to the publisher, attention Michael Whitby, Chief of the Naval Team, Directorate of History and Heritage, NDHQ Ottawa, K1A 0K2. Tel. (613) 998-7045, fax 990-8579. Views expressed are those of the writers and do not necessarily reflect official DND opinion or policy. The editor reserves the right to edit or reject any editorial material.

Access and the DHH Archives

Most members of the Canadian Naval Technical History Association are familiar with the Access to Information and Privacy (ATIP) acts. However, not everyone realizes that the acts apply to archival materials donated to the Directorate of History and Heritage through the CNTHA. Right now, the whole of the CNTHA collection is open to the public. Such openness promotes understanding of naval history and allows the Association to reach a broader audience.



ATIP may be a little bit more confusing when it concerns the donation of records containing either classified or protected material. Researchers can still request access to these records, and DND is bound by law to respond to each request and apply the Access/Privacy legislation accordingly. Naturally, the acts provide for protection of certain classes of information, and documents are sometimes severed so that only parts of them are released.

The *Privacy Act* is designed to protect personal information. A person's marital status, age, medical information, and other personal facts are stringently protected until twenty years after their death. However, personal opinions of civil servants or military personnel given in the course of employment are open. (The Act is available for viewing at www.privcom.gc.ca, and at most public libraries.)

The *Access to Information Act* (http://infoweb.magi.com/~accessca) is intended to promote democratic government by providing information to allow citizens to hold government accountable for what it does, and to vote in an informed way. The Act provides specific guidelines for safeguarding classified information, such as in the case of information relating to a weapon system currently in use by our navy. The information cannot not be released until that system is no longer in use by Canada or its allies, and has been declassified.

Information specifically excluded under the Access to Information Act is not subject to release (even though much of it is already available to the public). Library materials acquired solely for public reference, as well as materials placed in the National Archives of Canada, the National Library, or in the National Museums of Canada by, or on behalf of persons other than government institutions are all excluded. This means that private donations of

(See **Access**, *page 3)*

Update: The Collection

My last update reported that a number of documents had been received from the estate of RAdm S.M. Davis. This data is still being sorted and catalogued.

Meanwhile it is with regret that we must acknowledge the passing of RAdm C.W. (Carl) Ross, a fine naval officer and a dedicated engineer. His family informs us that he left several filing cabinets full of career data which will undoubtedly be varied when one considers his career: first as a naval electrical officer, then in administration, including National Defence College, and finally, following his naval career, as CEO of Stork Canada. We look forward

(See **Collection***, page 3)*

In Progress:

A History of the RCN Supply Branch

While the Directorate of History and Heritage at DND was recently launching its Naval Oral History Project with former senior naval and air officers, retired Cdr (S) Tom Treherne was busy writing up a "*History of the Paymaster and Supply Functions of the RCN*." Working from his home in Victoria, and during summer sojourns at his cottage near Ottawa, he has researched documents and interviewed retired officers and non-commissioned personnel to get their recollections in an effort to piece together Canada's naval supply history. To date he has produced drafts covering the periods 1910-1939, and 1939-1945.

In Part One of his history, which details the period from when the RCN was established in 1910 to the eve of the Second World War, it is not surprising to learn that the original paymasters were Royal Navy officers. After 1921, Canadian officer cadets joining the branch served initially with the RN, followed by a period at sea in Royal Navy ships as paymaster midshipmen. After promotion to paymaster sub-lieutenant, they would serve in the RN for two more years before returning for service in Canada. This method of entry continued up until 1941.

The narrative in Part One of Cdr Treherne's history concentrates on the various duties of the officers and men of the period, and provides an apt description of the growth and workings of the branch. During the 1930s, for example, the naval stores function in ships was the responsibility of the engineer officer. Under him, engineering storesmen performed the duties of demanding, storing and issuing of all naval and engineering stores. By 1938, however, when *Ottawa* and *Restigouche* joined the fleet, victualling assistants were drafted to each ship to carry out the naval stores duties.

Part Two of the draft manuscript covers the supply story through the Second World War. It was an extremely trying time for all concerned in meeting the demands for naval and fleet stores, and basic procedures and practices changed only as wartime circumstances dictated. As Cdr Treherne points out, the shipbuilding program that put our corvettes to sea created a need for spares, which made close co-operation between the engineering branch and the supply organization essential. In the final days of the war, the introduction of naval supply officers in barracks, bases and ships reflected the evolving situation.

There is much work ahead for the author as he presses on with Part Three, the post-war history of the supply branch. Progress appears to be good, but at this point it is still too early to predict when the completed project will become available.

— Capt(N) (ret.) John Nash, Ottawa.

New Ship, Old Ship

Most people know HMCS *Regina* (FFH-334) as a sleek, state-of-the-art patrol frigate on Canada's active fleet list. But in 1941, this ship's namesake — a revised Flower-class corvette (K234) — was launched from the same Marine Industries yard in Sorel, Québec where the modern-day ship would be launched some fifty years later.

The Battle of the Atlantic was in full swing when the corvette *Regina* took up North Atlantic escort duties in early 1942. Rushed into service, the little ship was dogged by defects, yet still managed to escort several successful convoys before being assigned to Operation Torch, the allied invasion of North Africa. A bout of "condenseritis" kept her out of the main action, but it was during follow-up operations in the Med in February 1943 that she distinguished herself by attacking and sinking the Italian submarine *Avorio* off Algeria.

Sadly, this plucky ship did not survive the war, except in name. Following a refit in Canada, she was torpedoed while assisting a Liberty ship in the Western Approaches and sank immediately with the loss of one officer and 29 crew. In 1994 the generations were bridged when several of *Regina*'s wartime survivors attended the commissioning of the new patrol frigate, HMCS *Regina*.

— Brian McCullough,
(with thanks to LCdr Sean Midwood and Cdr Karel Heemskerk — the current *Regina*'s commissioning CSE and EO — for the story idea)

*(**Access**, from page 1)*

non-governmental records to the National Archives are excluded from the Act and may not be released. On the other hand, if the same documents were donated to the DHH archives, they would be subject to ATIP.

While it is important that people realize that their donations to the CNTHA/DHH archives fall under the Access to Information and Privacy acts, we encourage you to donate relevant records here. By this process, we may continue to assist the Association in preserving and promoting Canada's naval history.

— Dr. Isabel Campbell,
Chief Archivist, DHH

*(**Collection**, from p. 2)*

to an involved sorting task which should result in valuable data for the collection.

And finally, we are still looking for data. Does anyone have documents or memories concerning the trials and test facility in Halifax, COMOPVAL?

As usual I can be reached by mail at 673 Farmington Ave., Ottawa, Ont., K1V 7H4; by fax at (613) 738-3894; and by e-mail at phil@ncf.ca.

— Phil Munro

About the CNTHA

The Canadian Naval Technical History Association is a volunteer organization working in support of the Directorate of History and Heritage (DHH) effort to preserve our country's naval technical history. Interested persons may become members of the CNTHA by contacting DHH.

A prime purpose of the CNTHA is to make its information available to researchers and casual readers alike. So how can you get to read some of it? For the moment there is only one copy of the Collection, situated at the Directorate of History and Heritage located at 2429 Holly Lane (near the intersection of Heron and Walkley Roads) in Ottawa. DHH is open to the public every Tuesday and Wednesday 8:30-4:30. Staff is on hand to retrieve the information you request and to help in any way. Photocopy facilities are available on a self-serve basis. Access to the building requires a visitor's pass, easily obtained from the commissionaire at the front door. Copies of the index to the Collection may be obtained by writing to DHH.

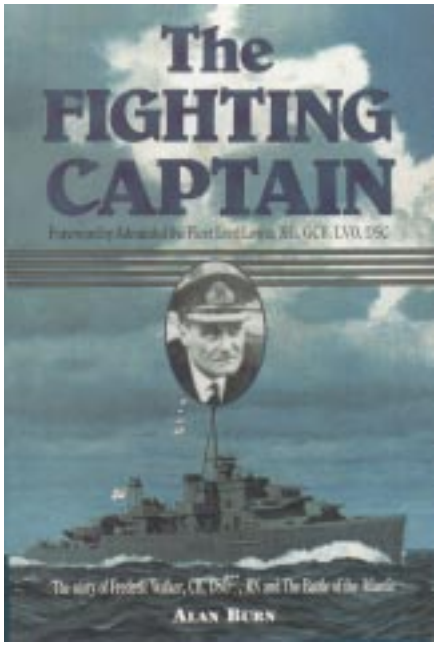
Book Review:

The Fighting Captain: Frederic John Walker RN and The Battle of the Atlantic

Reviewed by Roger Sarty

Alan Burn, *The Fighting Captain: Frederic John Walker RN and The Battle of the Atlantic*. Leo Cooper, an imprint of Pen and Sword Books, Ltd., 47 Church Street, Barnsley, South Yorkshire, S70 2AS, England, 1998. ISBN 0 85052 555 1, 204 pp. £12.95.

Captain "Johnny" Walker was the Royal Navy's leading anti-submarine ace during the Second World War. The Admiralty credited ships under his command with the destruction of 20 U-boats. After his untimely death in July 1944, the ships of his group received credit for sinking eight more U-boats. This was an outstanding record, but Walker's broader influence within the Royal Navy and other Allied navies as the prophet of offensive anti-submarine tactics was at least as important.



In December 1941 Walker commanded the escort of the Gibraltar to UK convoy HG-76 in the face of a large U-boat concentration. The defending warships, by aggressively pursuing U-boat contacts at a distance from the convoy, destroyed five submarines, for the loss of two merchant vessels and two of the escorts. It was the most successful defence of a convoy to that time, and a harbinger of the organization of support groups by the Allied navies that turned the tide in the Battle of the Atlantic in 1943. Walker, back at sea in mid-1943 after a shore appointment, led one of those support groups in a veritable slaughter of the U-boats that attempted to revive offensive operations against Allied convoys.

The story has already been well told by Terrence Robertson in *Walker R.N.*, which was first published in 1956 and subsequently reissued in many editions. Alan Burn's book, nevertheless, is an important contribution. It will be especially absorbing — and instructive — for naval personnel. Burn, who was Walker's gunnery officer in 1943-4, has augmented his own vivid memories with excellent research and first-person accounts from his shipmates. The descriptions of complex anti-submarine actions are some of the clearest and most exciting I have read. His analysis of Walker's tactical decisions and his leadership style is gripping and compelling. A "must-read" for naval professionals, and extremely entertaining to boot.

Roger Sarty is the Head of Historical Research and Exhibit Development at the Canadian War Museum in Ottawa.