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Maritime Engineering Journal

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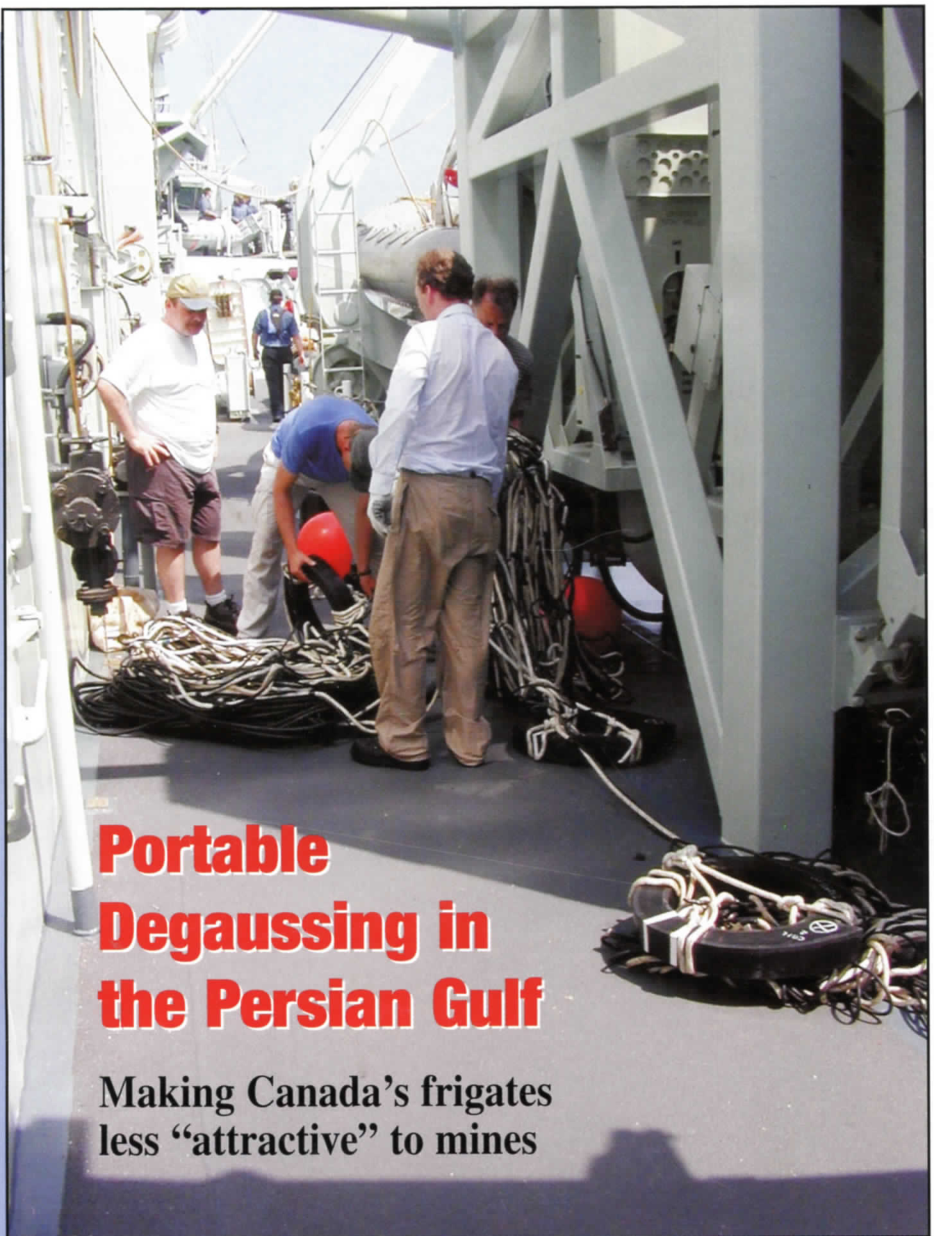

Portable Degaussing in the Persian Gulf

Making Canada's frigates less "attractive" to mines

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- The Case for Medium-voltage Switchgear
- Update on the Naval Technical Occupations

Canada

Submarine Safety Management —

DND Photo

Proposed safety goals for Canada's SUBSAFE program have already been successfully used in preparing the *Victoria*-class submarines for Canadian service. **— Story begins on page 10**

Maritime Engineering Journal

FALL 2003/WINTER 2004

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DEPARTMENTS

FEATURES

***CNTHA NEWS*:**

Cover: The concept of portable degaussing is not new. Between June 2002 and August 2003 a team from Fleet Maintenance Facility *Cape Breton* and Defence Research Detachment Canada-Atlantic made four trips to the Persian Gulf to evaluate and calibrate the magnetic signatures of eight Canadian and three foreign warships.*(Photo courtesy Glenn Morin)*

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Commodore's Corner

Make postgraduate training part of your career

By Commodore Roger Westwood, CD
Director General Maritime Equipment Program Management

The Department of National Defence is looking to the future, and that future has "education" written all over it. When it comes to meeting the challenges of modern leadership, DND and the Canadian Forces are putting their money on a highly motivated, highly educated officer corps. This direction is highlighted in the Canadian Forces Human Resources "Strategy 2020" initiative where a commitment has been made to develop and maintain an educated defence team.

As far as Naval Technical Officers are concerned, the focus today is most definitely on postgraduate (PG) education, particularly in the areas of information and weapons technology. The problem is, there are plenty of opportunities but very few applicants. We are still feeling the effects of a sharp decline in participation in sponsored PG education programs stemming from the mid-nineties. It's hard to imagine now, but the general perception at the time was that PG training would actually *negatively* impact someone's chances for promotion and career advancement. Thankfully those days are behind us, but we still have PG positions going unfilled each year.

There are several avenues open to candidates looking for PG education, and I urge you to consider them carefully. For instance:

a. On completion of Head of Department qualification, officers can apply for a number of sponsored PG programs in such areas as Naval Architecture, Missile Systems, Radars, Combat Systems Engineering, Underwater Acoustics Engineering, Electrical Engineering, Computer Engineering and Software Management, Naval Combat Command and Systems Integration, Business and Public Administration, Marine Systems Engineering, Reliability, Maintainability and Systems Analysis, and more. Approximately 12 sponsored PG starts are available each year through the Royal Military College at Kingston, as well as through other Canadian and foreign universities. Graduates of sponsored programs should be prepared for a term of employment with their sponsor while completing obligatory service.

b. Naval Technical Officers who have been selected for staff college can also take the masters program in Defence Studies at the Canadian Forces Command and Staff College in Toronto. This program has been enhanced to allow candidates to obtain this PG degree without any additional obligatory service, and I strongly recommend it to officers who have not already completed a postgraduate degree.

c. Finally, officers (and NCMs who have degrees) can also participate in part-time postgraduate education using funds provided by DND. Unsponsored programs allow you to advance your education while still being employed at your regular work. Funding for these programs must be requested through the career managers. As well, all members of the Canadian Forces may be authorized to spend up to $20,000 toward advanced education (ref. DAOD 5031-3).

If you would like more information concerning any of these avenues of study, please look up the DGMC/DMCARM 7 (Education) website at (http://hr.ottawa-hull.mil.ca/dgmc/engraph/edu_e.asp?cat=2#pg). The list of sponsored PG programs is announced on the website in early August each year. You might also contact your MOC adviser or career manager, or communicate with the DGMEPM Chief of Staff through the MARE Council website (http://dgmepm.ottawa-hull.mil.ca/Publications/council.asp).

Investing in a well-educated naval technical community simply makes sense any way you look at it, for you and for the navy. No matter which program you decide on, I believe your postgraduate studies will enrich your quality of life, provide direct benefit in your potential for promotion and enhance your employability. I wish you all the very best in your educational pursuits.

Branch Adviser Commentary

Maintaining Focus on the Naval Technical Occupations

By Captain(N) Pat Finn

Having returned to Ottawa in August after a five-year hiatus, I was appointed branch adviser for the technical officer and technical non-commissioned member occupations in the Naval Operations branch. Armed with this new title, I thought it best to find out just what the job entailed. A quick staff check revealed that the duties are defined in CFAO 4-11 and in MARCORD 4-1. As the branch adviser, I am directed to familiarize myself with the personnel matters affecting the naval technical occupations, and to provide advice to both the Chief of the Maritime Staff and the Assistant Deputy Minister (Human Resources – Military) and their staffs on issues affecting our branch.

During my recent tenure as commandant of the Canadian Forces Naval Engineering School in Halifax, I was exposed to many of the issues affecting our naval occupations. That said, I have much to learn about the significant work being performed by the career managers and occupation managers to improve the overall personnel situation in our branch. I have been actively reviewing various correspondence, including the Annual Military Occupation Reviews (AMOR), and discussing issues with the personnel experts to ensure that I am, in fact, aware of the issues affecting our branch.

As your branch adviser I am available to discuss concerns and issues that affect you. Bear in mind, however, that I am not your career manager and do not replace the divisional chain of command. Where possible, though, I will be attending the career manager briefs on the coasts as well as the meetings of the occupation councils. Given the size of our branch, I have asked Cdr Gary Loeper to act as my assistant adviser. He has already participated in many of the recent occupation councils and is providing advice in a number of areas.

So, where are we? For the officers the main focus remains on finalizing the changes arising from the recent split into three separate occupations: Naval Combat Systems Engineers (NCS Eng), Marine Systems Engineers (MS Eng), and finally, Naval Engineers (Nav Eng) for commanders and navy captains. While there is no longer a single term that refers to all members of the former "MARE" community, "Naval Technical Officers" has been adopted to describe the officers in our branch. With a few exceptions the work to create the new occupations is now complete, and separate merit boards for promotion from lieutenant to lieutenant-commander, and a combined merit board for promotion to commander were convened last fall.

On the training front, the theory course for NCS Eng officers has been eliminated and the updated applications course is now under way. The naval engineering school has been tasked by the Director of Maritime Training and Education to examine options for the MS Eng applications course. This is not to say that the course will necessarily

(Cont'd next page)

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.

be repatriated from HMS *Sultan*; however, the scope of the training must be examined to determine what can and should be delivered in Canada and what should remain out-serviced. The former Naval Architecture sub-occupation specialty is now a postgraduate specialty like all others, and last fall a Naval Constructor specialty qualification board convened to examine what qualifications and training are required. The Liquid Cargo Officer position on board AORs will thus be defined as an occupational specialty specification in which the additional specialized tasks, skills and knowledge required by LCOs are identified.

A point of focus for our non-commissioned members is the Military Occupational Structure Analysis Redesign & Tailoring (MOSART) Project. The purpose of MOSART is to examine the Canadian Forces military occupation structure to ensure it remains operationally effective in meeting its defence mission, now and well into the future. It is important to understand that there are no foregone conclusions from MOSART. It is simply a review methodology to examine our occupational structure.

The review begins with an occupational analysis, which includes a questionnaire for everyone in the occupation, and continues with a detailed analysis of the results to determine what changes, if any, would be most effective for the occupation and for the navy. A CMS Sponsor's Advisory Group, of which I am a member for the technical occupations, oversees the process. (The MOSART methodology was used to examine the officer occupations, and led to the three-occupation structure outlined above.) Early last fall I signed-off on the study protocol for the career field analysis of the naval combat systems occupations under the MOSART Project, and just recently signed a similar document for the marine systems occupations.

There are of course many other personnel issues affecting our branch, from recruiting to training to personnel tempo. I am becoming involved wherever and whenever possible to ensure that I can provide the best possible advice on these matters that affect all of you.

I would like to close by taking this opportunity to thank my predecessor, Capt(N) Mark Eldridge, for his hard work and dedication as our branch adviser. I know that the welfare of all members of the branch was always, and remains, near and dear to him. Mark, on behalf of everyone in the branch, I offer you sincere thanks and best wishes in your duties as the project manager for MASIS.

Letter to the Editor

Dear Sir:

I am writing to let you how much I appreciate receiving the *Maritime Engineering Journal* ever since it was established in 1982. I retired in 1984 and I find it most interesting to follow the many changes, both in engineering and organization, that have occurred since that time. Some of the articles in the *Journal* I find a little difficult to follow, but they are all interesting. It would seem that many of the problems we wrestled with prior to 1964, particularly those dealing with organization, are still being debated. The advances in the various branches of engineering are very impressive and our present ships are very different from the *St. Laurent* class, which were the last ones I had anything to do with.

I was appointed to NDHQ for the first time in 1948 after two years as electrical overseer on the Tribal-class destroyers being built in Halifax. Before that I had almost five years on loan to the Royal Navy, nearly all at sea. At headquarters I found myself heading the power electrical and gunnery fire-control section. Before long the government decided to modernize the navy and I became involved in the first shipbuilding program to be run by the engineering sections of the RCN. The electrical branch in particular made a strong attempt to have as much as possible of the ship's electrical equipment made in Canada to navy specifications. Most of the large Canadian manufacturers were not enthusiastic about this, but in the end they co-operated well. It was an interesting time and I was kept in Ottawa until HMCS *St. Laurent* was doing sea trials.

After that, I was employed in various ranks as: principal overseer for shipbuilding in the Maritime provinces, Deputy Superintendent of the Halifax dockyard, Deputy Comptroller (Program Control) in H.Q., head of the Civil Engineering Department (works and bricks), Director General Support Facilities, and finally, Chief of Sea Logistics Group. This was part of the tri-service unification, and after a year I decided it was time to leave. I had a very interesting and diverse career. I spent the next eighteen years involved in the construction of large buildings in Halifax. (Scotia Square and Purdy's Wharf).

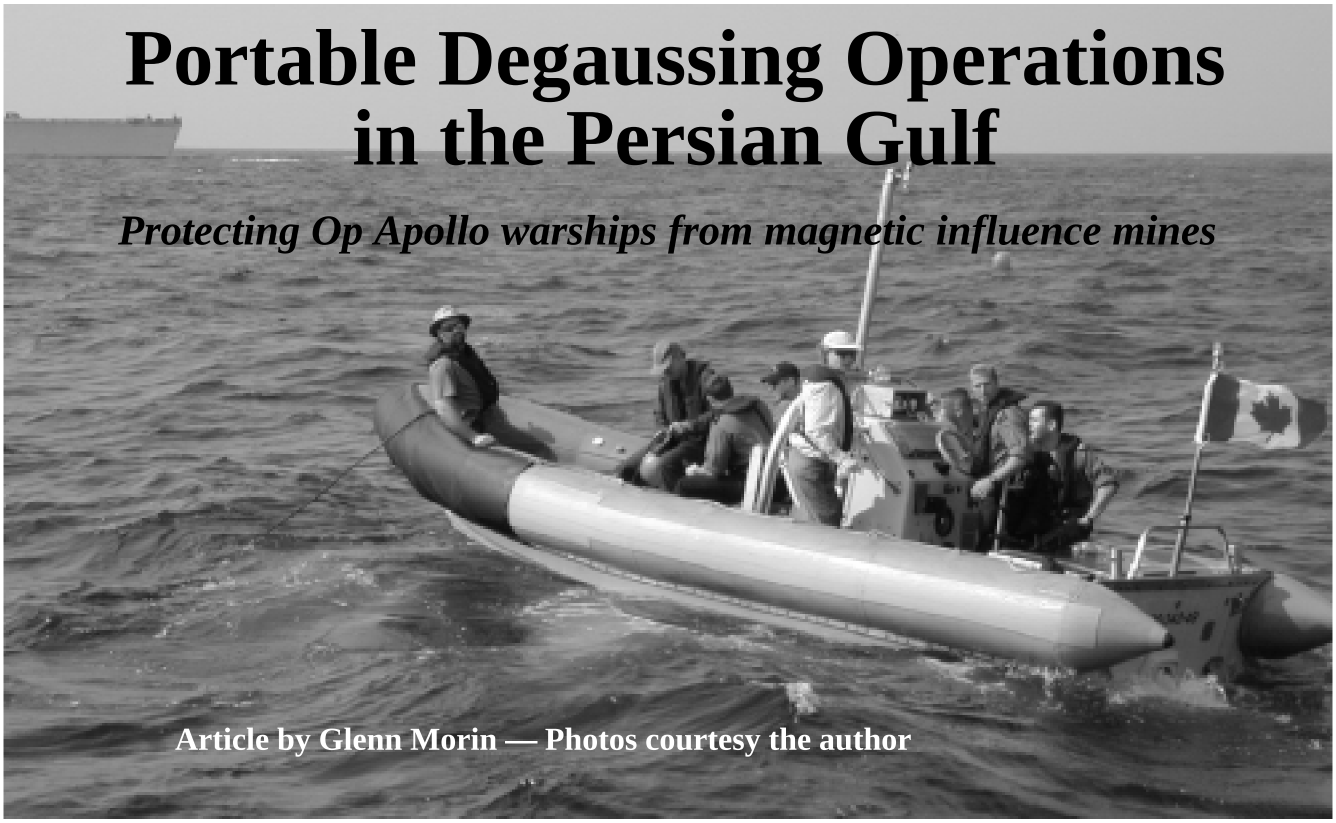
I enjoyed my time in the navy and continue to keep interested in it. Best wishes to all and, again, thank you for the *Maritime Engineering Journal*.

Yours sincerely,

John M. Doull, Commodore, RCN (Ret.)

Portable Degaussing Operations in the Persian Gulf

Protecting Op Apollo warships from magnetic influence mines



Article by Glenn Morin — Photos courtesy the author

Warships operating in areas where magnetic influence mines are a threat depend primarily on one major fitted defence system to keep them safe — their internal web of current-carrying electrical "degaussing" coils and controllers. When properly calibrated, the degaussing system minimizes a ship's magnetic signature and significantly reduces the risk of detonating influence mines that may be lurking below the surface.

Canada's involvement with degaussing on ships dates back to the Second World War when degaussing systems were developed to counter the threats posed by early magnetic mines. Nowadays Canadian warships are routinely degaussed on permanent range facilities located at Esquimalt and Halifax harbours. Ships make a series of runs over a fixed underwater magnetic sensor array connected to data acquisition equipment located ashore. Calibrating a ship's degaussing system involves taking a series of magnetic measurements of the ship over the sensor array in a process that can take several hours or days depending on the complexity of the degaussing system. On completion of a degaussing calibration, a ship is issued charts that predict how its degaussing settings should be adjusted for various locations around the world.

Organizing more than 450 metres of cable and ground tackle took a bit of work, but in the end it all packed up nicely and worked well. Our fears of getting things tangled during deployment never materialized.

But even this isn't perfect. The farther a ship ventures from where it was calibrated, the greater the error associated with the ship's settings and the less effective its degaussing becomes. In general, shipboard degaussing systems are most effective when calibrated at or near the area of operations. For the Canadian ships being deployed to the Persian Gulf as part of Operation Apollo, the potential problem of calibration errors in their degaussing systems was of particular concern given they would be operating in such a remote area with a history of mine warfare. The East Coast frigates were receiving updated degaussing calibrations at a facility in Sicily en route to the Gulf, but the ships sailing from the

Testing our equipment at a warehouse in the Persian Gulf.

West Coast had no such option along their western route to the Op Apollo theatre of operations. What to do?

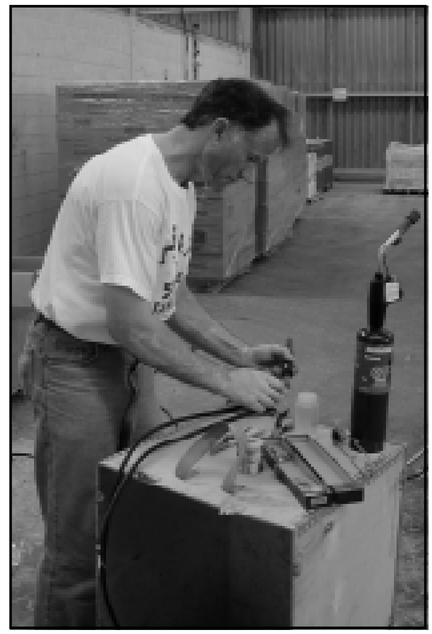
The matter came to a head one day at a meeting I was attending with Dr. Peter Holtham, a mine vulnerability analyst with Defence Research Detachment Canada – Atlantic. Senior staff were discussing what, if any, options for degaussing were available for West Coast ships. In a moment of inspiration I responded that we had some portable equipment that might do the trick. This statement ultimately resulted in our degaussing team being introduced to the pleasures of military vaccination and gas-mask training, and initiated a series of Middle East adventures beyond the scope of this article.

The concept of portable degaussing is not new and several countries have developed such systems. Our solution would be to assemble a portable degaussing range of our own design and calibrate the ships in-theatre. Between June 2002 and August 2003 various members of our team made four trips to the Persian Gulf to evaluate and calibrate the magnetic signatures of six West Coast ships, two East Coast frigates and three foreign warships.

Degaussing "to go"

In two weeks we assembled a workable system consisting of three vertical-axis sensors, 450 metres of underwater cable, signal amplifiers, 16-bit analogue-to-digital converters, laptop computer with data acquisition software, batteries, and various bits of ground tackle such as marker buoys and anchors. Total cost of the system was estimated at approximately $30,000 CDN. Because the portable system was assembled largely from spare parts used at our main Esquimalt degaussing facility, the quality of data we obtained from each was identical. The portable system couldn't provide the same comprehensive signature aspects that the Esquimalt facility produces, but it would still prove adequate for our purposes.

Sometimes less is more, and by going with a relatively simple system a ship's rigid hull inflatable boat (RHIB) could be used for both deployment and recovery of equipment and as a platform for data acquisition. The system was also small and light enough to be trans-



Kevin Ferguson (top) splices a sensor cable damaged by coral, while Phil Thornton (middle) makes soldering repairs. Kevin Ferguson connects up the signal amplifiers (bottom).

ported by helicopter if necessary. Total weight was approximately 300 kilograms. As the photographs show, our sensors, cables and ground tackle can become a bit of a mess, yet when properly organized fit quite nicely into the RHIB. Fortunately, our fears of getting things tangled during deployment never materialized.

Our choice of using induction coils as sensors was different, as most other navies perform magnetic measurements using magnetometers. While there are advantages to each, solenoids have the benefit of being passive, robust and cheap. Another benefit of our type of sensor was its high sensitivity to the magnetic components of AC electric fields. These fields are produced by the attenuation of corrosion currents by propeller shaft rotation and can be exploited by certain modern mines.

Working from a ship's RHIB outside Esquimalt Harbour, civilian range personnel from Fleet Maintenance Facility *Cape Breton* conducted the first test rangings using our portable degaussing setup. Our trials concluded without incident, but we realized we had seriously underestimated the physical effort required to retrieve 150 kg of equipment off the sea bottom. On subsequent trials we made a special point of requesting assistance from ship's staff in recovering our underwater equipment. As we became more proficient with the system, two of us with assistance from RHIB staff could deploy our equipment and be ready to collect data in less than one hour.

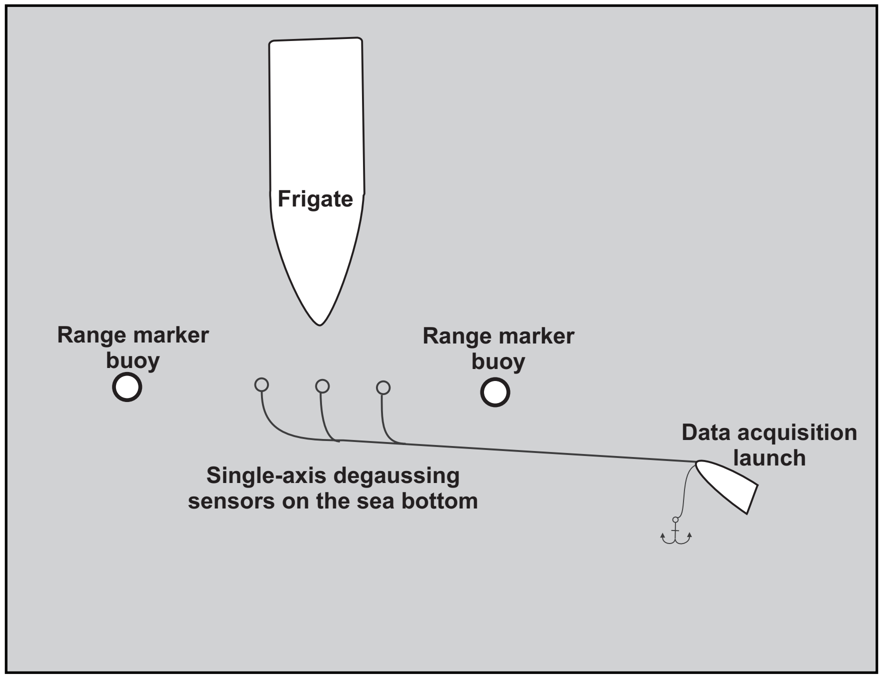


Fig.1. Equipment layout for degaussing ops.

In the early spring of 2002, having proven the system, we stowed our equipment on board a naval ship departing Esquimalt for the Persian Gulf. Our group would join the fleet later in-theatre. Mike Thompson, Kevin Ferguson, Phil Thornton and I would be representing FMF *Cape Breton*, while Dr. Peter Holtham and Troy Richards would be participating on behalf of Defence Research Detachment Canada – Atlantic.


Sorting through our equipment on the deck of a Canadian patrol frigate. Temperatures were in the mid-forties Celsius.

On task in the Gulf

Four ships were calibrated on this first trip (the last two ships being handled by Kevin and me). Without a doubt the most difficult ship to do was the first. It was so hot that one of our laptops shut down during a trial and several data acquisition cards suffered heat damage. Another major revelation was that acquiring data in a RHIB is less than satisfactory as we were only one breaking wave away from losing our electronics. We changed our methodology slightly and for all subsequent evaluations conducted our data acquisition from a launch. The additional protection afforded by the larger vessel also allowed us to operate in more adverse conditions than we could have done using the RHIB.

Optimally we would position our sensors along a magnetic east-west line, and have the ship that was being calibrated make multiple runs over the array along a heading of magnetic north or south (*Fig. 1*). We used a department store camping compass and a portable GPS as references. Marker buoys were positioned at either end of the array for the ship's reference. After deploying the sensors we paid out the underwater cable from the RHIB until we reached our data collection launch anchored nearby. The swing radius of the launch at anchor could potentially exceed the reserve length of sensor cable, so we had to be wary of changes in wind and tide. It was always a huge relief to make the final connection of the sensors to our electronics and see the data stream appear on the monitoring equipment.

A pensive Robert Dewey evaluates data during a trial involving an East Coast ship.

Sensors and cables ready for loading into a ship's RHIB.

Being somewhat paranoid about redundancy and spare parts, we had also shipped quite a collection of miscellaneous items including grappling hooks, inverters, depth sounders, cable-splicing kits, etc. Our preparations were good, and in truth we had a complete set of spares for almost everything. Even in a worst case scenario where we would be so unfortunate as to lose the entire system, we had sufficient spares to continue operations. One item that served us well was our depth sounder (actually a fish finder…and we brought two) whose transducer we would place over the side of the launch using a stick. An awareness of water depth and bottom profile was essential when selecting a site to deploy our equipment, and over the course of our work found that several launches were without that capability. The captain of one of the launches apologized for not have a working depth sounder and expressed surprise when we told him, "No problem — we brought our own!"

Sensors and cables on the stern of the launch following a successful operation.

Our third trip to the Persian Gulf from March 10 to 23, 2003 was probably the most interesting and included providing degaussing services to three foreign coalition vessels. Soon after our arrival the area experienced a major sand storm and high winds. Visibility was less than a kilometre and airline flights were affected. Many people elected to stay indoors and we saw the occasional person wearing dust mask and goggles. The storm produced sea conditions that were too dangerous for us to work in and we were forced to delay our initial operation. Seas remained rough the following day, but we were able to rendezvous with a ship and conduct our operations successfully (although, several people became seasick and we lost two anchors, some rope and chain, and a marker buoy).

On our return to port we were told that a foreign navy had flown in their own degaussing officer to assist us in calibrating one of their ships. We arranged to meet to discuss the requirements of their trial. Shortly thereafter, the media began reporting that coalition troops were commencing operations within Iraq. At the request of the foreign ship, and with a certain urgency, we advanced the trial date.

On trial day, wind and current conditions were such that our equipment was positioned 150 metres directly astern of the launch — an ideal situation. As the trial progressed, the weather began to deteriorate and we realized that our launch was beginning to drag its anchor. Normally it takes us at least an hour to recover our equipment using a RHIB, but once we got over the shock of dragging anchor we realized that it might provide a rare opportunity to recover all of our gear directly over the stern of the launch. Sure enough, as we dragged through our equipment we recovered all but one of the marker buoys (which we retrieved later) in a record-breaking time of under five minutes. By this time, most of us were soaked with sea water and perspiration, and the stern of the launch was completely awash. Having learned from experience, I was in the habit of carrying a change of clothes, and my wallet and passport in plastic bags. As we completed the trials on our third trip and prepared to depart, the nature of our work became more significant with reports of the deployment of influence mines to the north.

An armed escort accompanies us for a short time on our way to our trial site. Unidentified high-speed vessels referred to as "go-fasts" posed potential security problems and were always a concern.

Mission accomplished

I would characterize our trips to the Persian Gulf as arduous, yet satisfying. The 11-hour time difference between Esquimalt and the Gulf left us seriously jet-lagged. On our third trip it took us five days to reach our destination, and on the fourth and latest trip last August we were travelling without rest for almost 30 hours. On trip two we had the pleasure of working with our East Coast counterparts Robert Dewey and Andrew Mitchell.

Throughout the numerous deployments, cables were damaged, electronics had to be replaced, batteries were fried, and buoys and anchors were lost. Despite the wear and tear, with some judicious repairs the system has survived remarkably well and should be capable of many more deployments. All told, the portable system proved to be an effective method for calibrating the performance of the degaussing systems used by Canadian and other warships deployed on Op Apollo. We demonstrated an important capability and expertise that can be relied upon should the need arise again.

Andrew Mitchell (left) and Glenn Morin stand beside the complete portable degaussing kit packed up following operations on our second trip to the Persian Gulf.

Acknowledgments

Many people have assisted us in various ways and the services provided by the Forward Logistic Site were invaluable. I would also like to thank Commodore Eric Lerhe and Commander Tony deRosenroll who took us at our word and worked so hard to get us down there.

Glenn Morin is the Degaussing Range Officer at Fleet Maintenance Facility Cape Breton *in Esquimalt, British Columbia. He can be reached at:*

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Submarine Safety Management:

Proposed Goals for Canada's SUBSAFE Program

Article by LCdr Chris Tingle and LCdr David Peer

Operating submarines is one of the more hazardous endeavors undertaken in peacetime by the Canadian Forces. Fortunately, Canada has had a relatively good submarine safety record. Since the Second World War there has been only one serious accident (the collision between HMCS *Okanagan* and RFA *Grey Rover* in 1973) and one fatality in HMS *Sidon* in 1955.

Canada has been luckier than many other nations in this respect. Since 1945 upward of 1,300 men have died as a result of submarine accidents and more than 50 submarines have been lost. Nevertheless, recognizing the continuing potential for serious submarine accidents, and in the aftermath of a submarine hull valve quality assurance crisis, naval authorities in the early 1990s began to establish a structured program to measure and assure safety in Canada's newly acquired *Victoria*-class submarines.

The Canadian effort followed the trend in other navies to establish submarine safety programs. The USN instituted its SUBSAFE program (albeit largely focused on materiel issues) following the tragic loss of USS *Thresher* in 1963. By 1993 both the RAN and RN also had

Proposed safety goals for Canada's SUBSAFE program have already been successfully used in preparing *Victoria*-class submarines for Canadian service. The paramount aim of the program is to assure the overall safe operation and support of these vessels. (*DND photo*)

their own submarine safety programs in place. Canada joined their ranks in 2001 when VAdm Buck, Chief of the Maritime Staff and the newly designated SUBSAFE authority, inaugurated the Canadian program by signing a SUBSAFE policy for the Canadian navy (http://navy.dwan.dnd.ca/english/subsafe/subsafe.asp).

The Canadian navy's SUBSAFE program — in essence a safety management system for the *Victoria*-class submarines — is founded upon modern principles of risk management. Risk management is an excellent method for enabling more accurate understanding and control of submarine safety, and is most easily implemented when clear goals and objectives have been articulated. Although the Canadian SUBSAFE program policy statement did not include explicit safety goals at the time of its promulgation, submarine safety personnel in the Assistant Deputy Minister (Materiel) organization have now developed specific safety goals for implementing SUBSAFE that could be sanctioned by the safety program. In fact, the goals presented later in this article have already been successfully used during the materiel certification of HMCS *Victoria* and in the reaffirmation of the Submarine Safety Document Registers for *Windsor* and *Corner Brook*. The SSDR is a summary document that establishes the baseline materiel state of a submarine, and is required by the Formation Technical Authority to begin the licensing process to allow a submarine to proceed to sea.

To better understand the importance of safety goals in a risk management-based SUBSAFE program, it is worthwhile considering some basics of safety management systems. The first step, however, is to consider the highly subjective notion of what is "safe."

The concept of determining what is safe and what is not safe can be a highly charged and emotional issue which often depends on a stakeholder's frame of reference. What a first-time passenger on a cruise ship considers safe is likely far more cautious than what the more experienced captain and crew consider to be safe...which may be something else entirely from the way the ship's insurer sees things. Each has a different level of understanding about the ship, its capabilities and its operating environment, but all too often objectivity gives way to perception.

Risk management is most easily implemented when clear goals and objectives have been articulated. (*DND photo*)

Clearly the concept of "safe" can be considered a balance between what is valued by a stakeholder and how much the stakeholder can afford to lose. Because this means different things to different people, we need to rely on a common understanding that "safe" is a condition where all risks have been reduced to levels that are as low as reasonably practicable. Of course, one of the challenges in present-day safety management is establishing criteria and processes that can measure "reasonably practicable." Canada's SUBSAFE program, which has been defined by our own national values, addresses this with a risk management methodology that allows stakeholders to conduct their own risk assessment for any given scenario.

Safety Management Systems

Safety management systems in general can best be described as comprehensive, integrated systems for managing hazards associated with particular activities. A safety management system will usually comprise:

• the vision, mission, goals and objectives of the program;

• the organization, systems and procedures by which these are to be achieved;

• performance standards and measures; and

• a means of continuous improvement.

Modern safety management systems have gained considerable importance over the last decade for their ability to minimize personnel and materiel losses. The Department of National Defence and the Canadian Forces have upward of 13 safety programs, including SUBSAFE, each managing a variety of hazards in similar but different ways. Programs vary from being prescriptive, reactive vehicles for interpreting and amplifying safety legislation, to more innovative risk-based safety management systems that rely heavily on due diligence and knowledge about risk management.

Safety management systems have become especially important in situations where risk levels are high, systems are complex, and where little or no third party regulation exists. Such is the case with Canada's own risk-based SUBSAFE management effort which is not governed by outside regulation. In fact, there is no legislation in Canada that directly influences submarine operations since military vessels are exempt from the Canada Shipping Act. It can be argued, however, that legislation does exist which affects submarines indirectly. The Canada Labour Code Part 2, the highest level of doctrine governing the safety of federal employees, neither specifically includes nor excludes the Canadian Forces, but it does directly regulate DND employees required to work on board submarines in harbour and, occasionally, at sea.

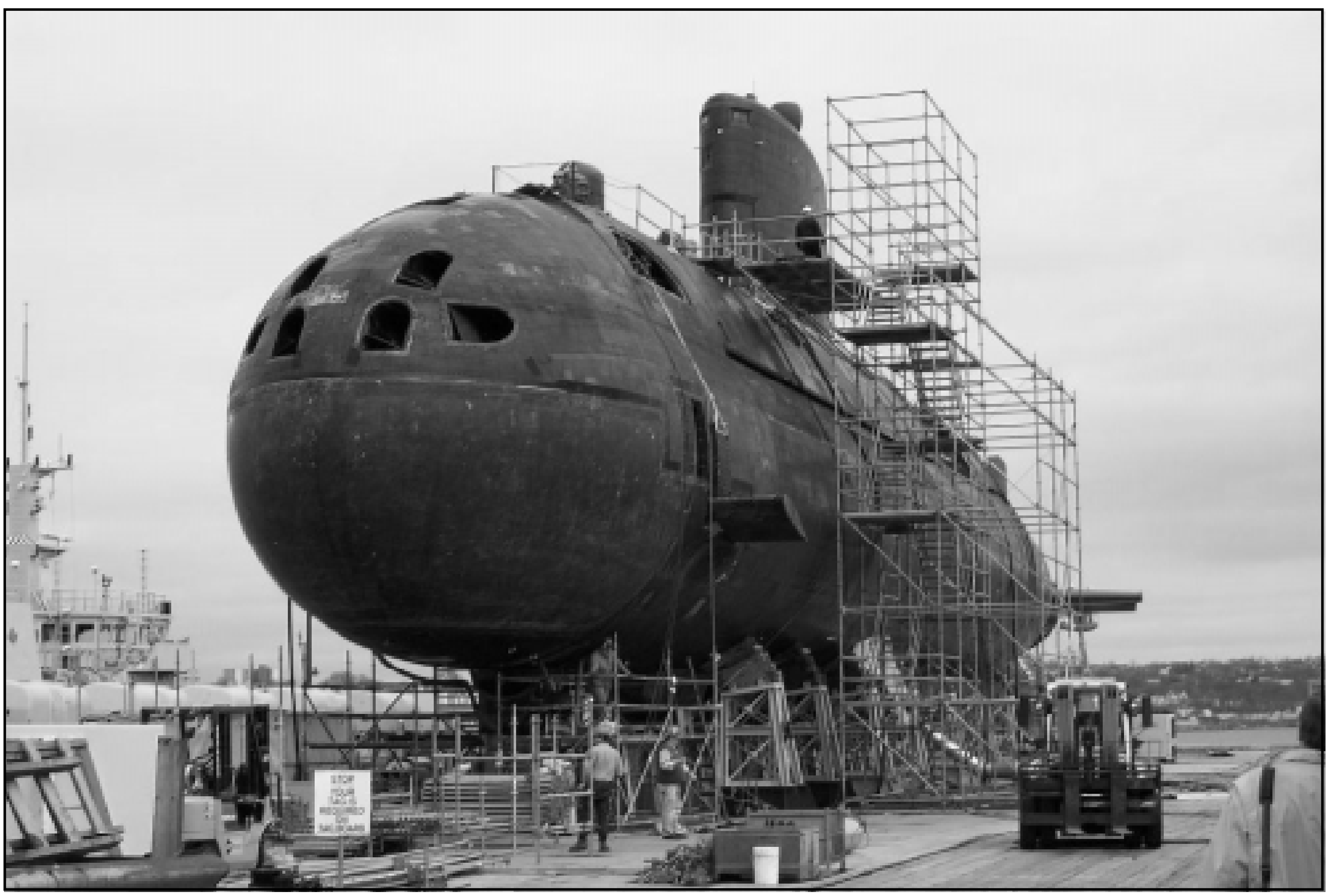
(*DND photo*)

The navy has therefore decided to voluntarily manage submarine hazards and risks systematically through advanced techniques such as risk management and safety management systems. The overriding aim is to preserve personnel and platforms, and to maintain the navy's capability to operate submarines in Canada. The key to success in this regard lies in establishing unambiguous goals against which a motivated workforce can measure the effectiveness of its safety management effort.

Goal Oriented Submarine Safety

Risk management may very well form the backbone of a submarine safety program, but it is the program's vision, mission and goals that provide its overall sense of purpose and motivation, and lay the foundation for safety performance measurement. Where a program's mission and vision generally express the state of safety a navy envisages for its submarines, and what success would look like, it is the program's goals that offer tangible direction for assuring and maintaining the desired level of safety with respect to submarine operation and support.

In general, safety goals are developed from the mission statement and



HMCS *Victoria* in Halifax. The key to success lies in establishing unambiguous goals against which a motivated workforce can measure the effectiveness of its safety management effort. (*DND photo*)

The SUBSAFE program's goals offer tangible direction for assuring and maintaining the desired level of safety with respect to submarine operation and support. (*DND photo*)

an understanding of the issues of concern. In the case of SUBSAFE, the issues involve designing, constructing, operating and maintaining a habitable pressure vessel capable of:

• diving and surfacing;

• manoeuvring in three dimensions;

• providing life-support and rescue facilities; and

• observing, navigating, communicating, defending and attacking.

Well-considered goals will serve to focus attention on particular issues and concerns, motivate and secure resources, and drive significant activities until a desired end state has been reached. In themselves, goals should place sufficient demands on people to motivate them to achieve higher levels of performance.

Goals express the mission statement in practical terms and can often be based on hard lessons learned. For example, the issue of providing life-support and rescue facilities for submarines was not taken seriously until USS *Squalus* and HMS *Thetis* sank 10 days apart in separate accidents during trial dives in the spring of 1939. Sadly, *Squalus* lost 26 of her crew of 59, and only four men of *Thetis*'s complement of 103 managed to escape.

The real change toward goal-oriented safety management developed as a result of serious incidents in the chemical industry, but only got serious attention in the marine industry years later following an explosion and fire on board the *Piper Alpha* oil and gas platform in the North Sea on July 6, 1988. That catastrophe claimed 167 lives and cost $2.8 billion, and remains the worst oil and gas platform disaster in history. That the disaster was preventable was unfortunate (it was attributed to a badly managed maintenance routine), but it revolutionized the way the in which safety was viewed by industry across the board.

The public inquiry into the *Piper Alpha* disaster recommended a shift in emphasis from an "inspection of sites" to an "auditing of systems" approach for minimizing risk. Although the inquiry was primarily aimed at the offshore industry, the fallout affected all industries. The inquiry noted that the disaster reinforced the underlying and important premise that management has a responsibility to develop systems that monitor safety and encourage safe working practices. Simply responding to the consequences of accidents is wholly insufficient. The inquiry's findings, published as the Cullen Report (1990), explicitly advocated goal-setting as a technique that might be more widely used in safety management systems.

Proposed SUBSAFE Goals for the *Victoria* Class

As Canada's SUBSAFE policy and program developed, the SUBSAFE authority approved a policy which is in essence a mission statement comprising the program's vision, core values, guiding principles and objectives. While specific goals were not explicitly stated in the policy, submarine safety personnel working for the Assistant Deputy Minister (Materiel) eventually identified the following 10 materiel safety goals to unify how our diverse organizations support submarine safety:

1. The submarine must be capable of achieving and retaining an adequate reserve of buoyancy;

2. The submarine must be capable of maintaining acceptable levels of stability;

3. The submarine must be capable of sustaining a safe operating environment for embarked personnel;

4. At sea, propulsion must be available at all times;

5. At sea, dived or surfaced, the geographical position of the submarine must be known at all times;

6. At sea, dived or surfaced, adequate capability to avoid collision must be available;

7. The submarine must always retain the ability to communicate with other vessels and shore authorities;

8. The risk of fire must be minimized;

9. The risk of explosion on or within the submarine must be minimized; and

10. The submarine must be capable of allowing all crew to escape

safely and be rescued from all operating conditions.

In spite of the fact these goals have not been formally promulgated by the SUBSAFE program, DGMEPM and the Maritime Forces Atlantic Formation Technical Authority have been successful in using them during the materiel certification of HMCS *Victoria* and for the reaffirmation of the Submarine Safety Document Registers for *Windsor* and *Corner Brook*. The intention is to seek formal approval of these goals through the SUBSAFE authority upon recommendation by the SUBSAFE board.

As the materiel authority for ADM(Mat) within the SUBSAFE program, DGMEPM continues to champion the use of so-called materiel element goals in assessing and assuring submarine safety. The goals not only serve as a filter for determining the aggregate risk to materiel safety posed by deviations, hazards and defects, they provide guidance and structure with respect to meeting a SUBSAFE objective that all submarines be materially certified. To that end, DGMEPM staff are continuing to develop a Canadian Submarine Safety Document Register that will establish a goal-based materiel certification regime. By linking the SSDR Certificates of Safety to SUBSAFE goals, DGMEPM can integrate materiel certification into the SUBSAFE vision and assure the safety of the *Victoria*-class submarines to the SUBSAFE authority, the boats' captains and crews, and to any civilian personnel who may be required to work on board them.

LCdr Tingle is the former Staff Officer for SUBSAFE with the Chief of the Maritime Staff. He is now Quality Systems Manager for the Australian Department of Defence's Directorate of Submarine Sustainment. LCdr Peer is the Submarine Naval Architecture Officer in DMSS 2.

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Electrical Power Distribution:

The Case for Specifying Medium-voltage Switchgear in Future Canadian Warships

Article by Mirko Maksimcev, M.Eng., P.Eng.

Low-voltage (440-V and 600-V) power distribution systems currently used for mechanical drive ships are only considered effective for power plants up to about five megawatts in size. As modern warship power plant sizes increase well above 10 MW, medium-voltage (1kV-69 kV) switchgear becomes a must, especially in the case of all-electric ships.

Medium-voltage switchgear has been successfully applied in the offshore industry for more than three decades. Companies like Santa Fe Global Drilling and Transocean Sedco-Forex consider only MV systems for the main power distribution of their recently built dynamically positioned rigs. Similarly, the main power plants for the offshore platforms *Hibernia* and *Terra Nova* feature only MV switchgear. On the other hand, navies around the world are only just starting to apply this technology by way of de-risking it in the context of an all-electric ship.

Continuing to employ low-voltage (LV) systems in large power plants has become impractical and expensive. Not only are these systems difficult to maintain, but they are troublesome overall. Inappropriately specified low-voltage power systems can result in equipment ratings that exceed manufacturers' standard maximum sizes for circuit breakers and bus bars, and even now the number and size of cables associated with LV systems has become uneconomical and barely manageable. Raising a system to medium voltage (MV) resolves such problems. The all-electric concept for modern warships leaves very little room for LV switchgear except for supplying the hotel load, LV instrumentation and small motors.

The all-electric ship (AES) concept is important in that it offers two compelling advantages for warships – increased war-fighting effectiveness, and reduced life-cycle cost. More effective war-fighting capability is achieved through:

Medium-voltage switchgear has been successfully applied to the power plants of huge offshore platforms such as *Hibernia* pictured here. *(Photo by Hibernia)*

- improved survivability;
- reduced infrared, acoustic and magnetic signatures;
- reduced vulnerability;
- capability to fit high-power weapons;
- application of podded propulsion; and
- increased range.

Reduced life-cycle costs stem from:

- the application of commonly available/interchangeable industrial equipment;
- equipment modularity;
- electrical interfacing, costing less to own than mechanical interfacing;
- a greater number of identical prime movers, providing ample redundancy and better efficiency; and
- reduced maintenance and manning requirements.

This article sums up the advantages of medium-voltage switchgear in an all-electric ship, and shows that while there is a knowledge gap there are no real safety risks associated with this type of equipment. The advantages of MV technology should be taken into consideration for all new naval vessels, and for vessels being converted from mechanical to electrical propulsion. It is also explained that, above a certain power-plant size, MV distribution is the only technical solution for rendering economical and efficient systems.

Fig. 1. This dramatic test bay photo was taken approximately 0.9 seconds after a short-circuit was ignited in a medium-voltage breaker compartment running 15-kV, 40-kA, 1-second arc-resistant metal-clad switchgear. Pressure release flaps on the top of the compartment opened to release hot by-products of the short-circuit explosion before the rising pressure could blow the doors and bolt-on panels on the front of the compartment open. In a real situation, this action would have prevented injury to personnel standing in front of the breaker compartment. ***(Courtesy Siemens Canada Ltd.)***

Comparison of MV and LV Switchgear

Medium-voltage power systems are characterized by higher circuit inductance than is found in LV systems, which makes fault current decay much slower. Circuit breaker interruption is thus made more difficult. Also, MV circuit breakers differ from LV breakers. While air-magnetic breakers dominate LV equipment, MV equipment uses mostly vacuum breakers and, to a much lesser extent, sulfur hexaflouride 6 (SF6) breakers. Medium-voltage switchgear equipped with vacuum breakers offers a number of important advantages over LV breakers:

• the arc-quenching medium is vacuum, not air; hence, contact travel is reduced because of the increased dielectric strength of vacuum;

• the vacuum breakers provide a much higher number of normal and fault circuit operations due to much-reduced contact wear offered by chromium copper (CrCu) contacts and special rotating arc-dispersion technology;

• the number of breaker moving parts is very much reduced – hence, vacuum breakers are virtually “maintenance free;”

• complex interlocking systems are applied to assure “closed door racking” of circuit breaker compartments to prevent personal injury;

• potential transformers are withdrawable (just like breakers) and interlocked with their respective breakers to ensure safety of personnel;

• the switchgear is compartmentalized, meaning that circuit breakers, bus bars, cables and LV instrumentation are located in separate, restricted access compartments;

• completely insulated bus bars with pre-engineered insulating "boots" for bus bar joints are provided;

• instrumentation is digital, requiring no calibration, and does not drift like analogue instrumentation; microprocessor based relays, meters and control devices are capable of communicating with higher automation systems, and are generally of much higher precision and quality than the ones found in LV equipment;

• co-ordination of protective devices is much better than for the LV switchgear since the MV protective curves can be digitally preset to prevent upstream breakers from tripping in response to local faults;

• arc-resistant switchgear design prevents personal injuries from short-circuits in any of the switchgear high-voltage compartments; and

• more demanding production and certification testing guarantees higher quality equipment.

[Note: Arc resistance can be achieved either by intentionally weakening the top of the switchgear so that it opens when a compartment develops a fault condition, or by physically making it impossible for phase-to-phase and phase-to-ground short-circuits to occur in the segregated bus gas-insulated switchgear (GIS). The segregated-bus GIS is said to be intrinsically arc-resistant.]

Experience with MV Equipment in the Offshore Industry

Power plants in the offshore industry typically have outputs in the range of 20-40 MW and higher to handle requirements for dynamic position-keeping, drilling and other production applications. The industry uses medium-voltage power distribution equipment for generators, thrusters, transformers, drives — for everything, in fact, other than the LV emergency generator, hotel load, navigation equipment and certain instrumentation.

Reliability is not an issue. Offshore MV equipment is rated either to European IEC or American ANSI standards, and certified to the rules for offshore equipment stipulated by the American Bureau of Shipping, Lloyd's Registry, or Det Norske Veritas. In fact, the reliability of completely integrated power and automation systems on well designed vessels is so good that downtime amounts to just a few hours per year, and that mainly for scheduled, intentional blackout recovery tests.

Overall, the offshore industry's experience with designing, operating and maintaining modern medium-voltage systems can offer valuable lessons for all-electric warship development. Apart from weapon considerations, offshore vessels compare to all-electric warships to the extent that they carry the same systems (if perhaps known by different names), and require ample redundancy to reduce the likelihood of power loss.

Offshore vessels employ a high level of automation, with at least dual redundancy backup for their integrated machinery control systems. Since companies insist on acquiring non-proprietary software and owning the source code, they enjoy great flexibility in their selection of hardware. Dependence on specific, custom-built hardware is avoided whenever possible. Furthermore, the digital instrumentation, protection and metering associated with MV systems allows for the application of most advanced standard industrial equipment, and facilitates a great degree of modularity and interchangeability. This translates into extremely high reliability and reduced equipment maintainability and life-cycle costs.

Safety Concerns

Most accidents and safety risks associated with electrical power distribution are related to the switching equipment, particularly to the very moment of switching when an operator could be standing in front of the switchgear cell. Given all of the aforementioned extra features that MV switchgear is equipped with, especially the arc-resistant design and an extremely clean safety record, the safety of personnel does not appear to be a problem.

Ground faults are also known to cause accidents, but here again medium-voltage switchgear may offer advantages over low-voltage switchgear. In naval shipboard LV installations, high-impedance grounding seems to be the norm regardless of a system's voltage. When a fault develops, the ground fault current is limited by the system grounding resistance to just a few amps. If it is not detected and cleared in a timely manner it can transform into a short-circuit current (after destroying the cable insulation) and become a fire hazard. MV switchgear minimizes this risk as much as possible through the use of far more advanced ground fault sensing relays.

The present lack of naval experience and expertise with MV switchgear may seem to raise a safety concern, if only because of the greater potential behind a system operating at 15 kV rather than 440 V. It is also true that MV switchgear leaves much less room for improvisation. People have to know what they are doing with it. When all is said and done, however, personnel who have been properly trained and qualified on the different principles and more complex procedures associated with MV switchgear operation should be fully competent from a safety perspective. The offshore industry has developed full confidence in its ability to safely operate medium-voltage equipment on board its vessels. Elaborate standards set for MV equipment by the industry have contributed greatly to this confidence, to the extent that medium-voltage equipment is considered to be all-round safer than LV equipment.

Available Options

Two basic types of MV switchgear are available for application in shipboard installations: air-insulated, and gas-insulated switchgear (GIS). The GIS uses sulfur hexafluoride 6 (SF6) to reduce the clearance between energized parts, resulting in a very compact compartment size that is about one-third the volume of an air-insulated compartment. Although more expensive and significantly less flexible for common applications, gas-insulated switchgear is maintenance-free and very safe. GIS also has a lifespan of about 30 years.

Since gas-insulated switchgear was developed for voltages of 25 kV and higher, it could make sense to take advantage of this. Transmitting electrical power at higher voltage effectively reduces the current, which in turn reduces loss of energy through the wires. At the moment, though, conventional synchronous generator design presents limitations in this regard. It is still worth noting, however, that proven technology does exist for raising system voltage up to 25 kV regardless of the type of MV switchgear that is applied. Nothing needs to be derisked.

Conclusion

Evolution to an all-electric ship is unavoidable, considering it is the only concept capable of providing the flexibility, war-fighting effectiveness and reduced life-cycle costs required of a modern warship. Similarly, the use of air- or gas-insulated medium-voltage switchgear will be unavoidable, and indeed be very beneficial in new naval vessels. MV switchgear offers benefits in sound and efficient power system design, better integration with higher automation systems (e.g., IMCS) because of intelligent switchgear relays capable of two-way communication, and better personnel protection due to the availability of arc-resistant design.

Safety concerns with MV switchgear are completely unfounded in light of pertinent reliability and application data. The experience and expertise associated with MV switchgear is available owing to its established use as standard equipment in the offshore industry and on board commercial cruise ships. This knowledge could now be transferred to personnel who may be called upon to specify, manage and operate MV switchgear equipment for the Canadian navy.

Mirko Maksimcev is an electrical propulsion systems engineer with DMSS 3. Prior to joining the Department of National Defence in 2002 he worked as Senior Systems Engineer/President of Montreal Systems Engineering Inc., and before that as a senior systems engineer for Siemens Canada Ltd.

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Canadian submarine liaison post at Abbey Wood

Article by LCdr Derek Hughes

A new Canadian submarine liaison post has been established at Abbey Wood in Bristol, England. The Canadian Submarine Liaison Officer (CSLO) is part of a 250-member U.K. Submarine Integrated Project Team mandated to support the Royal Navy's in-service submarines. The post will facilitate the exchange of submarine-related technical information between Canada and the British Ministry of Defence (MOD).

Canada's Type 2400 *Victoria*-class diesel-electric submarines share many similarities with the Royal Navy's nuclear-powered *Trafalgar* and *Vanguard* boats, all three having been designed and built in the same era. Since the three classes are expected to remain in service for some time, there is great scope for useful Canadian/U.K. co-operation on technical matters. Having an individual positioned to keep tabs on developments with the various classes will facilitate the flow of information and be useful in identifying potential areas of co-operation.

The U.K. is mainly interested in Canadian experience with certain technologies in the *Victoria* class as there could be future application in RN submarines. Canada is likewise interested in where the U.K. may be going. Although information exchange agreements are one means of facilitating this information flow, there is no substitute for personal contact in maintaining awareness of, and exchanging, available information.

Opportunities for individual cross contact between the two navies have decreased over the last several years owing to cutbacks in the number of available exchange positions. By 2002 the few Canadian/RN submarine exchange positions that had existed for officers and NCMs while the *Oberon* boats were in service were all gone. To make matters more difficult, the RN submarine branch is now focused almost entirely on nuclear boats and is unlikely to want to man an exchange to a conventional fleet.

Aerial view of the sprawling Abbey Wood facility in Bristol, U.K.

The idea of establishing a permanent submarine liaison position developed partly out of the considerable interaction between Canada and the U.K. around Canada's purchase of four nearly new *Upholder*-class submarine replacements for the O-boats. The presence in the U.K. of Canadian submarine crews and detachment staff with the project management office of the Submarine Capability Life Extension (SCLE) Project revitalized a relationship that reached a low point in the mid-1990s when there were doubts whether the Canadian submarine service would even continue. In 2001, DGMEPM and the MOD Submarine Integrated Project Team began discussions that resulted in the signing of the CSLO Memorandum of Understanding in 2003. It was evident that it would be extremely beneficial to both Canada and the U.K. if means could be found to maintain a personal submarine technical relationship between the two navies. Appointing a U.K.-based Canadian liaison officer was seen by both nations as being a highly effective way to build and sustain relationships and facilitate the exchange of information.

The Canadian Submarine Liaison Officer is a full member of the Submarine Integrated Project Team, which means the officer can easily stay current on U.K. issues and make useful contacts within the MOD, the RN and U.K. industry. The CSLO works on a day-to-day basis within the Submarine Integrated Project Team where current work is with the Design Authority Ship Systems, one of seven design authorities within the project team. The officer's work is relevant to both the U.K. and Canada, and at present includes environmental and hull valve development for both navies. Although the CSLO has ready access to the full RN/MOD support infrastructure, that access is not without its limitations. Both parties recognize that the CSLO may not be privy to certain areas of sensitive technology, particularly those involving RN dealings with the USN.

While it is hoped that the contacts and relationships engendered by the SCLE Project will continue to flourish, one thing remains unclear: how these relationships will be affected by the departure of the Canadian crews and other project staff following delivery of the last of the *Victoria*-class boats. Of particular concern is that the majority of RN and MOD personnel assigned to the submarine project will likely retire shortly after HMCS *Chicoutimi* is delivered later this year.

Contractual arrangements with original equipment manufacturers will always figure into the continued support of the *Victoria* class. Missing from these arrangements, however, is the navy-to-navy link that is so important when dealing with sensitive submarine issues between the two governments, and for establishing future naval co-operation. Having a Canadian Submarine Liaison Officer in position at Abbey Wood will go a long way toward keeping both materiel support and naval lines of communication open.

On a personal note, the submarine liaison experience has been extremely worthwhile for me. I fully expect that my replacement, who takes over the post this summer for the next three years, will find the work just as fulfilling in terms of its technical challenges and in the broader military experience it offers. If the opportunity ever arises in your own military career to take advantage of an exchange or liaison position such as this one, grab it. The cultural and work experience will be invaluable.

LCdr Hughes is the Canadian Submarine Liaison Officer at Abbey Wood in Bristol, U.K. He previously served in HMCS Onondaga *and was the MSEO in HMCS* St. John's. *He will be posted to DGMEPM this summer.*

Naval Technical Occupations

http://maritimeapp.mil.ca/dmarpers/intro_e.asp?dmarpers=1 (select "MOC Management")

Naval Technical Officer Occupations

In 2003 the Maritime Engineering (MARE) branch was re-structured into three new Naval Technical Officer occupations — Naval Engineers (Nav Eng), Marine Systems Engineers (MS Eng) and Naval Combat Systems Engineers (NCS Eng). Using the former MARE positions, three new preferred manning levels, or PMLs, were established for the new occupations. Under the new scheme all Commander and Captain(N) positions became Nav Eng billets (61 positions in total), while Sub-lieutenant, Lieutenant(N) and Lieutenant Commander positions were divided between the new MS Eng and NCS Eng occupations (242 and 241 positions, respectively).

To divide the old MARE preferred manning level of 483 positions for LCdrs and below among the new MOCs, three groups of jobs were identified — those with a hard requirement for MS Eng skills, those with a hard requirement for NCS Eng skills, and those for which either skill set would suffice. This latter division included traditional generic positions such as CF Any, Sea Gen and Eng Gen, as well as a number of MARE billets which, although labelled as MARE MS or MARE CS, could employ either flavour of Na-

Occupation	Trained Personnel	Preferred Manning Level
NAV ENG		
Captain(N)	11 people	12 positions
Commander	48 people	49 positions
MS ENG		
Lieutenant Commander	104 people	104 positions
Lieutenant(N) and Sub-lieutenant	108 people	137 positions
NCS ENG		
Lieutenant Commander	94 people	106 positions
Lieutenant(N) and Sub-lieutenant	127 people	136 positions

(Data current to Feb. 4, 2004)

Table 1. Trained Effective Strength vs. Preferred Manning Level

val Technical Officer. A new generic "Eng Sea" position type was thus coined to identify positions where the skills of a Naval Technical Officer are needed, but for which the particular skill sets of either MS or NCS engineers would be equally acceptable. Overall, the LCdr and below position list was found to include 133 hard MS Eng billets, 151 hard NCS Eng billets, and 177 generic billets. With such a substantial number of generic positions, the preferred manning levels of the two new MOCs were adjusted to give both occupations an equivalent measure of "health" from the outset.

As the manning numbers in Table 1 indicate, the navy's engineering branch is experiencing a shortage of personnel qualified to fill the available positions. The largest shortage is with the MS Eng Lt(N) and below group where only 108 of the 137 positions are filled. Given the current shortage of personnel in the Naval Technical Officer occupations, there is an increasing demand on the training system to produce Phase VI qualified MS and NCS engineers. The problem is compounded by the fact that it takes at least three years to train a Direct Entry MS or NCS engineer, and as much as seven years to train Regular Officer Training Plan candidates. It will require much co-ordination and proactive management on the part of the Directorate of Maritime Training & Education (DMTE) to ensure that forecast requirements for Lt(N) and SLt Marine Systems and Naval Combat Systems engineers are met.

Fortunately, recruiting has been very successful over the past few years, with a total of 27 NCS engineers and 29 MS engineers recruited in FY 03/04. Thanks to the recruiting bonus for engineers, nine of the NCS and 10 of the MS engineers were Direct Entry Officers who should be Phase VI qualified within three years. We are predicting that a total of 51 NCS and MS engineers will become Phase VI qualified in 2005, the largest number we have seen since the MARE "Get Well" program of the early 1980s. The challenge to DMTE, the fleet and shore training establishments in managing this high throughput of trained engineers will be significant.

— LCdr Heather Skaarup,
D Mar Pers 3-2,
NTO Occupation Manager

Non-Commissioned Member Occupations

NE Tech

The Naval Electronics Technician occupations are experiencing shortages in the Ordinary Seaman to Leading Seaman ranks. Attrition in 2003 outpaced QL3 production for a net loss to the MOC. Recruiting has been more successful for the Communications occupation, as it is felt that the terms Acoustic and Tactical are not clearly understood by potential enrollees and are therefore avoided. The occupation manager is pursuing the possibility of renaming the occupations and recruiting to a common NE Tech occupation. Selection or assignment to a specific discipline would occur just prior to completion of the academic phase of training. With the very demanding operational schedule over these past few years, combined with the shortage in the occupation's primary workforce, methods of reducing the workload and demand on technicians alongside are also being investigated. As the NE Tech occupation is currently under a full functional analysis and MOSART career field review, the majority of the occupation will be receiving a questionnaire to complete in early 2004.

— CPO1 G.G. Kemp,
NE Tech Occupation Manager

NW Tech

The Naval Weapons Technician occupation is also under a full functional analysis and MOSART career field review. In recent years, NW Techs have suffered from excessive waits (as much as 21 months in some cases) for training at the CF Naval Engineering School in Halifax. An additional QL3 training serial will be added in May 2004, which along with the regularly scheduled September serial should alleviate this problem. The occupation manager has also recommended that promotion to Able Seaman be awarded on completion of QL3 training or 30 months of service, whichever comes first. This is to avoid the situation whereby some NW Techs never wear their AB rank before becoming Leading Seaman after four plus years of service. This issue is pending the MOSART recommendations.

In April 2004 the NW Tech occupation will be manning six Master Seaman positions (three east and three west) on board the *Kingston*-class coastal defence vessels. A number of PO2 submarine positions are currently empty because there are no submarine-qualified Master Seamen high enough on the promotion list to be promoted into the positions. There are as yet no NW Tech positions identified as part of the weapons certification teams in either formation because the financial resources and offsets do not exist to bring them into effect. Certification teams will therefore continue to incrementally task other units to provide qualified NW Techs when needed.

— CPO1 P.G. Moore
NW Tech Occupation Manager

Mar Eng

The main problem facing the Marine Engineer occupations is that attrition continues to surpass recruitment, although gains have been made with increased enrolment. Unfortunately, it will take some time before these intake numbers make an impact at the Cert 3 level, as a shortage of Cert 3 qualified personnel on both coasts continues to be a problem. As a result of the removal of the Cert 4 requirement for eligibility for Indefinite Period of Service (IPS), many PO1s who did not qualify for IPS when submitted for their first and second look now meet the requirement for eligibility. D Mar Pers has recommended amending past terms of service IPS take-up rates to enable offering IPS to all Marine Engineer Artificer 314s. The Marine Engineering Technical Training Program (METTP) remains open to fleet candidates who are QL3 qualified to LS 312. The number of fleet candidates accepted to the program will fluctuate between a minimum of two and a maximum of four per course. There is to be a minimum of one East Coast and one West Coast candidate per course, with course serials commencing in January. As for the other naval technical trades, the functional analysis of the Marine Engineer occupations is currently in progress.

— CPO1 R.A. Atton,
Mar Eng Occupation Manager

E Tech/Mar El

The Electrical Technician and Marine Electrician occupations are healthy, with recruiting quotas keeping pace with attrition and promotions. Programmable logic control (PLC) and fibre optics have been incorporated into the QL5 core training, adding six weeks to the course. Response thus far has been very good. CFNES and CF Fleet School Esquimalt have run two-week PLC “delta training,” and intend running four or five more courses next year. There are no jobs for Mar Els on submarines, despite the fact that two positions exist. (These are filled by E Techs, as Mar Els can’t get machinery control console qualification to stand machinery control and secondary control console watches.) The MOSART functional analysis of these occupations is currently under way.

— CPO1 R. Charlton, E Tech/
Mar El Occupation Manager

Hull Tech

The Hull Technician occupation is still above the preferred manning level. Promotions have been healthy over all, with recruiting quotas keeping pace with attrition and promotions. QL6 training will be conducted for the first time at CFNES this fall. This was one of the recommendations approved with the East Coast option, which started with training at the QL5 level in the fall of 2001. The MOSART functional analysis of the Hull Tech occupation is under way.

— CPO1 R. Charlton,
Hull Tech Occupation Manager

FALL 2003/WINTER 2004

News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

The CNTHA's Document Library Continues to Grow

One of the more important initiatives of the Canadian Naval Technical History Association is the collection and cataloguing of Canadian naval technical papers covering a wide variety of subjects. In the 11 years since the Naval Technical History Project was first given the green light by DND's Directorate of History and Heritage, the document library has grown into a collection of 400 papers, articles, memoranda and notes documenting various aspects of the navy's post-1945 technical development.

A few of the more recent acquisitions, which have yet to be catalogued, offer a typical sampling of the wonderfully diverse nature of the material people think to send us:

• Staff Report E, Research, Engineering & Procurement (including the special problems in ship procurement), A Report to the Management Review Committee, May 1972.

• Technology and the Canadian Navy 1953-1984, Cdr Marc Garneau and Cmdre Ernest Ball, October 1985.

• Sonar Performance Figure Measurement, LCdr P.D.C. Barnhouse, Weapons System Engineering Officer, Ship Repair Unit (Atlantic), ca. 1971.

• The Naval Constructors Technical Bulletin, Vol.1, Nos. 8 and 9, undated.

• A Chapter in the History of Canadian Naval Sonar Development 1973-1995, F.A. Payne (Defence Scientist).

Responsibility for the collection now resides with me, having taken over the task from Phil Munro last year. Phil performed yeoman work in initiating the collection, setting up a cataloguing system, and persuading so many people to contribute a great number of very useful documents. The Directorate of History and Heritage supports this effort admirably by maintaining the collection at its facilities in Ottawa, and allowing researchers and other interested parties to access the papers for study.

As the curator of this growing, one-of-its-kind collection, I welcome all and sundry documentation on Canadian naval technical matters. Submissions may be mailed to me directly at 535 Kenwood Ave., Ottawa, K2A 0L7, or dropped off in the "NOAC" slot at HMCS Bytown Naval Officers Mess in Ottawa. I can also be reached by e-mail at: pat.barnhouse@sympatico.ca

— Pat Barnhouse

We'd love to hear from you…

If you have information, documents or questions you'd like to pass along to the Canadian Naval Technical History Association, please contact the Directorate of History and Heritage, NDHQ, MGen George R. Pearkes Bldg., Ottawa, Ontario, Canada K1A 0K2. Telephone: (613) 998-7045.

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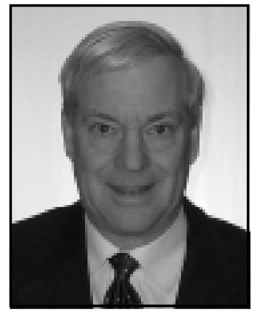
About the CNTHA

The Canadian Naval Technical History Association is a volunteer organization working in support of the Directorate of History and Heritage (DHH) 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 others. The Collection may be viewed at the Directorate of History and Heritage, 2429 Holly Lane (near the intersection of Heron Road and Walkley Road) in Ottawa.

DHH is open to the public Tuesdays and Wednesdays, 8:30 a.m. to 4:30 p.m. Staff are on hand to retrieve the information you request and to help in any way. Photocopy facilities are available on a self-serve basis. Copies of the index to the Collection may be obtained by writing to DHH.

Tony Thatcher chairs CANDIB subcommittee



Retired navy engineering commander **Tony Thatcher** has taken over as chair of the Canadian Naval Defence Industrial Base (CANDIB) Project subcommittee following the death of Ron Rhodenizer last October. Tony, who is General Manager for the Minor Warships and Auxiliary Vessels Project at **SNC-Lavalin Defence Programs** in Ottawa, served 28 years as a combat systems engineer in the Canadian navy before joining SNC-Lavalin in 1992.

During his naval career Tony served as the DMCS 7 section head for Combat Data Systems, Combat Systems Manager for the Tribal Class Update and Modernization Project, Combat Systems Officer for the Canadian Patrol Frigate Project, and as Combat Systems Engineering Officer for Naval Engineering Unit Pacific.

Thanks to the sponsorship of Ron Rhodenizer, and now Tony Thatcher, SNC-Lavalin very kindly continues to support the efforts of CANDIB by providing "e-room" and meeting space to facilitate the committee's work.

Naval history project briefing, April, 15th

The Canadian Naval Defence Industrial Base Project is holding an information session at 10:00 a.m. on Thursday, April 15 in the Crowsnest of the HMCS Bytown Naval Officers Mess, 78 Lisgar St., Ottawa. Persons interested in learning more about CANDIB's effort to document the development of the naval shipbuilding industry in Canada since 1950 are cordially invited. The organizers are hoping that people with first-hand experience in Canada's shipbuilding industry will be able to contribute to the project's information base.

To register for this free event, please contact Lisa Dudzik, Office Manager for SNC-Lavalin, at (613) 567-7004, Ext. 224. We very much hope to see you there. ***— Don Cruickshank***

New CNTHA/CANDIB website

At a recent meeting of the Canadian Naval Defence Industrial Base subcommittee it was agreed that **Don** and **Ian Wilson** will initiate action to develop a website for CNTHA and CANDIB use. The purpose of the website will be to provide an opportunity for the CNTHA and CANDIB teams to share project work in the form of documents, graphics and photos with a broader audience. It is hoped this will attract more support in the form of articles and/or interviews with people who have a background in naval programs. An image gallery will also be developed to share the growing collection of photos relating to shipbuilding and associated equipment/systems.

You can reach the website at http://www.donwilson.ca/cntha/CNTHA.html For further information, or to discuss any ideas for the development of the website, please contact either the webmaster: don@thewilsons.ca or our website developer: ian@thewilsons.ca ***— Don Wilson***