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James Franklin Carruthers, CD, PhD, Captain(N) (RCN Ret'd) (1943-2021)

The Visionary Force behind the RCN's Fully Integrated Combat Data Systems

By Cdr (Ret'd) Ken Bowering

When friends of Jim Carruthers gathered at his Ottawa-area home on July 16, 2022 to say farewell to a shipmate, naval engineer, father, husband and friend who'd lost his lengthy battle against prostate cancer, they were saying goodbye to the man who is widely recognized as the catalyst for ushering in a new era of modern combat data systems for the Royal Canadian Navy (RCN) and, indeed, for Allied navies.

Jim was born on May 14, 1943 in Drumheller AB, and went on to enjoy a remarkable engineering career, first with the RCN (1961-1982), and then with Ottawa's high-technology industry before retiring in 2006. He was a workaholic, whether in his naval, business, or philanthropic persona, and his personal style was to push the envelope whenever and however he could.

Jim enrolled in the Regular Officer Training Plan at the age of 18 and first attended Royal Roads Military College in Victoria, BC. After two years there, he transferred to RMC in Kingston, ON where, in 1965, he completed undergraduate studies in electrical engineering, and was commissioned Sub-Lieutenant, RCN. Little did he realize that the environment he was entering would prove to be such fertile ground for an engineering officer with his intelligence, energy, and determination to get things done.

The Navy and supporting organizations that Jim was immersing himself in during the 1960s featured a "fleet" of outstanding RCN and civilian engineers who were already leaving their mark on the state of naval engineering in Canada. They included such luminaries as: **VAdm Robert Stephens**, who led the 1958 Nuclear Submarine Survey Team; **VAdm John (Jock) Allan**, who served as project manager for the PM DDH-280 Project, Commander of Maritime Command, and Deputy Chief of the Defence Staff; **Professor John Plant**, principal at the Royal Military College; **VAdm Charles (Chuck) Thomas**, who served as Commander Maritime Command, and Vice Chief of the



Photos courtesy the family, except where noted.

Royal Military College Cadet James Carruthers would maintain ties with his alma mater throughout his naval and civilian careers.

Defence Staff; **RAdm Eldon (Ed) Healey**, who served as project manager for the Canadian Patrol Frigate Project, Chief of Engineering and Maintenance, and ADM Materiel; **Capt(N) Norm Smyth**, who was deputy PM for the CPF Project, and a long-time CEO within Canada's defence industry; and **Capt(N) Marc Garneau**, who became Canada's first astronaut, and later a senior federal cabinet minister.

As he took his own place among this group, Jim Carruthers would come to stand out as a great visionary. Others saw this capacity in him, and it was when he joined HMCS *Gatineau* (DDE-236) in 1965 that he first met Ed Healey, then a lieutenant-commander and the ship's engineering officer, and the man who would influence and mentor Jim throughout his naval career.

In the latter part of the 1960s, Jim worked alongside **Cdr Max Reid**, and **LCdrs Cam McIntyre** and **Jerry Smuck** as the ASROC system evaluation officer for sea trials of the prototype AN/SQS-505 hull-mounted and variable-depth sonar system aboard HMCS *Terra Nova*

(IRE-259). Those trials completed, in 1971 Jim commenced post-graduate studies in electrical engineering (digital machines) at Nova Scotia Technical College in Halifax, receiving his PhD in 1974. Now a lieutenant-commander, Jim joined the Directorate of Maritime Combat Systems (DMCS) at NDHQ in Ottawa, where he began his seminal work on what would become known as the Shipboard Integrated Processing and Display System, or SHINPADS.

By this time the Navy was operating its new DDH-280-class destroyers, ships that would carry the RCN into the guided missile age. These new “Sisters of the Space Age” featured an integrated combat system in which all combat systems communicated with one another through a central command & control system (CCS-280). It wasn’t an elegant form of integration, in that the various combat systems — sonar, radar, electronic warfare, surface & air weapons, tactical data link — came from different suppliers, and each had its own unique interface and data structure. This is where Jim’s visionary approach came to the forefront.

In joining DMCS 7, the Action Information section that would later be known as Combat Data Systems, Jim took over a couple of projects that his predecessor **LCdr Howie Burman** had begun. One of those was ADLIPS (Automatic Data Link Plotting System), an R&D project to enable the RCN’s older destroyer escorts to operate seamlessly with the new DDH-280s. The second was SAILS, the Shipboard Action Information Link System project that Jim Carruthers would build upon in developing SHINPADS.

As mentioned, the DDH-280s had several very different computer systems, each one of which used a unique programming language and data (word) structure. Jim’s thought was that it would be more efficient in terms of data transfer, and less costly in terms of development and support, if there were a single standard in play for the computers, programming language, digital interface, and user display interface. By 1974, others in DMCS 7 had already approached computer industry professionals to assess the benefits of adopting a standard computer and standard programming language, and it was the result of this study that gave impetus to Jim’s thesis.

DMCS 7 had also purchased four or five commercial mini-computers, and funded Defence Research Establishment Ottawa to subject them to the traditional “shake, rattle and roll” tests to determine if they could survive and operate in the naval environment. None of them passed, so the RCN decided instead to go with the USN’s AN/UYK-20 standard mini-computer. How the Canadian Navy acquired its first units is a story in itself, and had “Jim Carruthers” written all over it (see **Thinking Outside the Box**).

Later, under Jim’s direction, the RCN created the AN/UYK-505 — an AN/UYK-20 chassis and processor, but with significantly more memory, all of it solid-state — and later, the AN/UYK-507 modular micro-processor. At the same time, still mid-1970s, Jim was looking at all ship systems, not just combat systems. He envisaged a total ship integration concept where all important functions could be completely controlled, under all combat conditions, via one networked system. To achieve this, the system would require reliable data communications and a standard user interface. Jim recognized these needs, and championed development of a standard multi-function display, a product that would be manufactured by Computing Devices Canada (now General Dynamics Canada).

Jim also capitalized on another DMCS 7 R&D project that investigated the use of fibre-optic technology to provide speed, and data security. From this he envisaged a single data bus, probably using



AN/SYA-4 display consoles.

Photo by Hughes Aircraft Co.

Thinking Outside the Box

When the cruiser USS *Belknap* (CG-26) and aircraft carrier USS *John F. Kennedy* (CV-67) collided off the coast of Sicily on November 22, 1975, leaving eight sailors dead and causing millions of dollars damage to both ships, *Belknap* lost its entire superstructure, including the combat information center that housed its naval tactical data system. Despite the extensive damage, the USN decided to repair the ship and return it to operational service. However, it first had to procure the destroyed combat equipment. Everything was available except for one essential item — the AN/UYK-20 displays that were no longer in production.

In Ottawa, LCdr Jim Carruthers became aware of the US Navy’s search for replacements, and immediately recalled that the RCN had purchased several of these displays in the 1960s, and modified them for use with the RCN’s FHE-400 hydrofoil project (HMCS *Bras d’Or*). The project was cancelled in 1971, but Jim managed to locate the displays at Crown Assets where they were awaiting disposal. He was able to recover them, and while DMCS 7 technician Art Gill (ex-C2LT) removed the modifications that had been made years earlier, a trade was negotiated with the USN. The displays would be handed over in exchange for four AN/UYK-20 computers, thus giving the RCN first delivery of its recently selected standard processor.

— Ken Bowering

fibre-optic wire (even though that technology was very immature in 1974-75), being run in multiple paths throughout the ship to provide data integrity, security, and battle damage redundancy. His “total ship concept” envisaged a scenario where a ship could be at action stations and, from somewhere deep in the bowels of the ship, all of the ship’s combat command & control functions could be performed from a single multi-function display.

This was his SHINPADS concept, but it wasn’t always smooth sailing, especially with the “bean counters.” Nevertheless, in typical Jim Carruthers style, the more some people objected, the more he persevered with his vision. He knew he was on the right track. During an official presentation of his SHINPADS concept south of the border, it was endorsed with open arms and the pledge: “If the RCN won’t fund it, the USN will.”

Back home, a meeting of the Defence Management Committee was hastily convened to review the situation. When Ed Healey laid out the SHINPADS concept for the Committee, the response from Deputy Minister **Charles (Buzz) Nixon** (a former naval engineer),

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Jim and his wife Gail.



Jim at the helm on the Ottawa River near his Constance Bay home.

and Chief of the Defence Staff **Gen. Ramsay Withers** (also an engineer), was unequivocal: Why has this not come forward before? The government is looking for projects like this. Get this out to contract ASAP! The bean counters wisely realized that discretion at this point was the better part of valour.

In the 1990s, when the Canadian patrol frigates (CPFs) came to be, and when the DDH-280s got their TRUMP mid-life modernization, SHINPADS was invoked — not so much by the RCN, but by industry. It wasn't the entire concept as Jim had envisaged it, but it was a single data bus, standard displays, and standard computers. It is still the basis for combat systems integration in the modernized *Halifax*-class CPFs, and is a concept which, in principle if not in practice, has also been adopted by Allied navies.

Leaving NDHQ in 1981, Jim was promoted Captain(Navy), and appointed Commanding Officer of Naval Engineering Unit (Atlantic), double-hatted as D/COS Engineering and Maintenance on the Admiral's Staff at Maritime Command Headquarters in Halifax. By this time, all major naval combatants carried a Combat Systems Engineer as part of their crew, and here was another opportunity for Jim to contribute. Having served in a similar capacity aboard HMCS *Terra Nova* more than a decade earlier, Jim took it upon



During the late 1960s and early 1970s, Jim Carruthers participated as a project and evaluation officer for the installation and test firings of the RUR-5 anti-submarine rocket (ASROC) system aboard HMC ships *Terra Nova* (IRE-259) and *Gatineau* (IRE-236).

himself to extend his technical management responsibilities by meeting one-on-one with the fleet CSEs, thus nurturing the future of combat systems engineering in the RCN.

Jim served in the RCN for roughly 22 years, retiring in 1982 in the rank of Capt(N). He then worked another 24 years in Ottawa's high-technology industry. Throughout his professional careers, Jim encouraged others to drive hard, be prepared, and never give up on something you are convinced is the right thing to do.

In 2007, having retired from the high-tech industry, Jim returned to his naval roots by joining what is now the Naval Association of Canada. He was the powerhouse behind transforming the NAC into what it is today, and served as President of the Ottawa Chapter from 2012 to 2013, then as National President from 2013 to 2017. In 2017 he was awarded the prestigious RCN Admiral's Medal (now administered by the NAC), in recognition of his many contributions to maritime affairs.

Jim Carruthers' passing on November 1, 2021 left a void in many communities — communities he avidly supported — including the RMC Foundation, the Canadian Naval Technical History Association (CNTHA), and the Naval Association of Canada. His proudest philanthropic deeds included annual scholarships and other awards in support of his alma mater, the Royal Military College of Canada, the institution where as a disadvantaged kid from the prairies his inner talents and sheer grit were allowed to shine.



Ken Bowering served in the Navy from 1960 to 1981, and was the first naval officer to be posted to sea as a Combat Systems Engineer. In the mid-to-late 1970s, he and Jim Carruthers worked in the DMCS 7 Action Information section at NDHQ, and worked together again later as civilians at Norpak Corporation in Kanata, Ontario.

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