Photograph courtesy of the Canadian Forces

MARITIME COASTAL DEFENCE VESSEL (MCDV)

One of the largest mission systems projects undertaken by Thales Canada, Systems Division, is the Navy's Maritime Coastal Defence Vessel (MCDV) project. The MCDV project, under contract to Fenco MacLaren (a Division of SNC-Lavalin), involved design, construction, set-to-work, trials, delivery, and in-service support of a fleet of 12 multi-role coastal defence vessels. Thales Canada, Systems Division as a first-tier subcontractor to Fenco MacLaren, was responsible for the above-water electronic systems including the navigation system, exterior communications, interior communications, and S-band surveillance and X-band navigation radar and display system. In addition, Thales Canada, Systems Division provided the ships' minesweeping payloads and the integrated logistics support associated with all these systems.

The navigation system includes a differential GPS positioning system, LORAN C, speed log, gyro compasses, echo sounder, clocks, ship's whistle, and meteorological equipment. Interfaces from the navigation system are provided to the autopilot, mine warfare control system, and degaussing system. The navigation system provides repeatable positional accuracy to within five metres out to a range of 200 nautical miles from the shore-based differential GPS reference station, two of which are provided to the project.

The GPS reference stations are completely self-contained and, once positioned ashore and set in operation, they calculate GPS position corrections and transmit RTCM-104 formatted messages over an HF radio link.

One of the major systems developed and integrated by Thales Canada, Systems Division is the exterior communications system. It includes HF, VHF, and UHF radio communications, digital processor-based communications control and monitoring and message processing systems (CCMS and MPS), and a radio remote voice communication system.

The HF radio subsystem is compatible with ANDVT secure voice equipment, standard HF data modems, KG-84C and KWR-46 data cryptographic units, and

Link 11. It includes two 1 kW transmitters, three general purpose LF/MF/HF receivers, a 2182 kHz guard receiver, a weather facsimile receiver, and a differential GPS error correction receiver.

The VHF subsystem includes ship-fitted transceivers (fixed and scanning) and portable (hand-held) transceivers all covering the VHF maritime mobile band.

The UHF radio subsystem is compatible with KG-84C and KY-58 cryptographic equipment, standard data modems, and Link 11. It includes two transceivers (45 watt AM; 100 watt FM) for 225 MHz to 400 MHz operation and 121.5 and 243 MHz guard receivers.

The CCMS software controls, monitors, allocates, and switches the communications hardware, including the computer-controlled matrix switches which provide interconnectivity of "black" signals. The MPS utilizes KG-84C and KWR-46 cryptographic equipment for radio-teletype and broadcast reception, respectively. It is also fully compatible with ACP 127(G) message formats, baud rates, codes, and protocols. The CCMS and MPS software (written in Ada) is hosted on ruggedized, TEMPEST PCs.

The radio remote subsystem provides remote access for HF and UHF secure voice communications. This system consists of an Audio Distribution Interface Assembly (4 x 4 switching matrix meeting CID/09/15 level III), four operator stations with handsets, and four voice encrypted circuits.

The main components of the above-water surveillance system include an X-band high resolution navigation radar, an S-band long range surveillance radar, and a VHF direction finding system. Associated with the radar systems are three inter-switched automatic radar plotting aid (ARPA) display consoles.

The minesweeping payloads enable deep sweeps to be conducted in either single ship or two ship evolutions. The "on-board" equipment includes winches, local control system (with remote control in the Bridge), and a spare wire reel. The "wet end" equipment includes the sweep wires, explosive cutters, kites, otters/floats, channel markers, and a depth measurement system. Two of these ISO container-based payloads, each with a portable bulwark, were provided to the project and may be moved from ship to ship depending upon operational requirements.

In addition to responsibility for the mission systems (navigation, surveillance, communications, and towed minesweeping), Thales Canada, Systems Division had responsibility for the following systems engineering activities:

- topside layout of all sensors and antennas for communications, VHF DF, surveillance and navigation, including EMI/EMC issues, propagation-related performance factors, etc.;
- design of the deck ring for the 40 mm Bofors gun, siting of 50 cal. machine guns, and design and construction of small arms lockers and magazine fittings;
- communication system brass modelling and computer numerical analysis;
- layout of the Communications Control and Equipment Rooms (CCR and CER);
- human engineering and safety-related aspects of the mission systems, including full-scale CCR/CER mock-up, human engineering evaluation plans, tests, and test reports;
- development of practice (simulation) software for the exterior communication system;
- positioning of all underwater acoustic sensors (echo sounder, speed log, etc.);
- weight control of the mission system; and
- ILS (LSA and provisioning) for Thales Canada, Systems Division's mission systems.

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