



TS700 INTEGRATED COMMUNICATION SYSTEM

Thales Canada, System Division, a Division of Thales Canada Inc., developed a compact, versatile integrated exterior communications system for Canada’s fleet of twelve Maritime Coastal Defence Vessels – the 700 class ships. The system is suitable for military, coast guard, police, and other ships requiring an integrated point-to-point communications system.

The TS700 Integrated Communication System includes LF/MF/HF, VHF, and UHF radio communications equipment, customer-supplied cryptographic equipment, a radio remote system, and digital processor-based Communications Control and Monitoring and Message Processing Systems (CCMS and MPS). The highly integrated TS700 system can be operated from either of the CCMS and/or MPS system consoles which use ruggedized, TEMPEST (designed to meet NACSIM 5100A) data processing equipment. At the heart of the TS700 is an audio switch matrix which is expandable up to 63 inputs with virtually unlimited outputs. This feature enables the architecture to be adaptable to other equipment configurations.

The TS700 HF subsystem is compatible with standard HF data (including Link-11) modems and ANDVT (voice), KG-

84C (tactical RATT) and KWR-46 (broadcast) cryptographic units. It includes two 1 kW transmitters and three general-purpose LF/MF/HF receivers in addition to a dedicated 2182 kHz guard receiver, weather facsimile receiver, and differential GPS error correction HF receiver. The HF transmitters include exciters operating at milliwatt levels in the 405 kHz to 30 MHz band, 1 kW (PEP) power amplifiers in the 1.5 MHz to 30 MHz band, and power post-selectors (tuned filters) to reduce intermodulation distortion, harmonics, broadband noise, and spurious emissions at the power amplifier output. These feed the high power RF switch and lead to the HF couplers and 11 metre whip antennas.

The LF/MF/HF receivers cover the 10 kHz to 30 MHz band and feature pre-selector filters to reduce the effect of strong transmissions within ±10% of the tuned frequency. The LF/MF/HF receive subsystem also features two multicouplers, one with three separate broadband RF inputs which provide four HF outputs each and the other with a single RF input and three LF/MF and five LF/MF/HF outputs. RF outputs from the multicouplers feed the 2182 kHz distress receiver, the weather facsimile receiver/printer (80 kHz to 25 MHz facsimile and teletype, 518 kHz Navtex for teletype

NOTAMS), three LF/MF/HF receivers and pre-selector filters, and a single LF/MF/HF receiver dedicated to reception of differential GPS corrections. Broadband inputs to the multicouplers are provided by two independent LF/MF/HF passive conical monopole antennas (10 kHz to 30 MHz).

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

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

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

The TS700 system is designed for compatibility with other ship systems. This is achieved by collaboration with the ship design agent to optimize the ship's general arrangements, the sensors arrangements, and the layout of the communications equipment. This includes numerical and brass modelling (three foot ship model, frequency scale 50:1) of the LF/MF/HF antenna siting arrangements in order to quantify antenna-antenna coupling and measure antenna patterns and antenna impedances. The computer modelling also stresses safety to personnel (RADHAZ), including calculation of safe working distances with HF post-selectors in and out, and safety when handling ordnance (HERO) and fuel (HERF), including handling of low flash point temperature combustibles. Numerical analysis of near-field and HF antenna coupling for HF transmitter/transmitter coupling and HF, UHF, and VHF transmitter/receiver isolation is also undertaken.

The complete TS700 system also undergoes in-plant integration and test prior to shipping.

The TS700 system features an "open" architecture so that hardware from any equipment manufacturer can be utilized to the extent that such equipment is remotely-controllable.

Control, monitoring, allocation, and switching of the TS700 hardware is performed by a single operator via the CCMS software, with the computer-controlled switch matrix being used to achieve interconnectivity of "black" signals. The MPS also interfaces to this switch matrix through KG-84C (RATT) and KWR-46 (broadcast reception) cryptographic equipment. The MPS is fully compatible with ACP 127(G) message formats, baud rates, codes, and protocols including tactical and broadcast queues, and formatted and operator-to-operator lists. The CCMS and MPS systems use ruggedized, TEMPEST (designed to meet NACSIM 5100A) computers. Major functions of the TS700 software are:

CCMS System

- remote test and monitoring;
- complan management (create, test, and implement);
- log of activity and performance; and
- equipment remote control

MPS System

- message compilation and editing;
- message transmission;
- message reception; and
- flow monitoring and control

User Interface

- create, modify, and print (in-line or off-line) messages, complans, equipment configuration files, etc.;
- view status information;
- view logs (journals);
- interoperability; and
- view alarms and warnings.

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