T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION

T1-1 Scope

The intent of this specification is to replace the current Bridgemaster Radar system and the ECPINS electronic charting system on board the CCGS Earl Grey with an integrated system made by Furuno.

T1-2 Reference Drawings and Documents

Existing Radar and Electronic Chart Precise Integrated Navigation System (ECPINS) drawings (Reference for Removal):

Dwg. MM678-001-GA (Vessel General Arrangement)
Dwg. MM678-018-AD (Masts)
Dwg. MM678-019-BD Sheets 1-3 (X-band and S-band Radar System)
Dwg. MM678-025-WD (Racal/Decca Aft looking Radar)
Dwg. MM678-064-WD (Fiber Optic Gyro Navigat 3000)
Dwg. MM678-033-WD (ECPINS)
Dwg. MM678-046-Existing (AIS DGPS Distribution and Wiring Diagram)

New Furuno Radar and ECDIS drawings (Reference for Installation):

Dwg. MM678-073-WD Sheet 1-2 (Furuno Radar and ECDIS)
Dwg. MM678-050-BD (Bridge Remote Monitors)
Dwg. 17050-325 (Radar Mounts)
Dwg. MM678-064-WD (Fiber Optic Gyro Navigat 3000)
Dwg. MM678-063-WD (ELAC ES5100 ECHO SOUNDER)
Dwg. MM678-043-WD (Automatic Identification System)
Dwg. MM678-046-WD (AIS DGPS Distribution and Wiring Diagram)
Dwg. MM678-062-WD (Naviknot 450D Speed Log)
Dwg. MM678-033-WD (ECPINS)
Dwg. MM678-042-BD (Track Plot feed)
Dwg. MM678-057-BD (IMIC3)
Dwg. MM678-017-FP (Wheelhouse Arrangement floor plan)

Manuals and Documents

Earl Grey Radar Mounts Replacement
IME36240E_FAR3320W
IME36180E_FAR3230S
IME36160E_FAR3210
TIE00160B_1 Installation Handbook
IME44730F_FMD3200_3300

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T1-3 Standards

Fleet Safety and Security Manual (DFO/5737)
TP127 – Ship's Electrical Standards
IEEE 45:2002 – Recommended Practice for Electrical Installation on Ships
Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)

T1-4 Regulations

Canada Shipping Act, 2001

T1-5 Removal of Bridgemaster E Radar system and ECPINS

X & S Band Scanner Units

The S-Band scanner is located on the lower radar platform of the main mast, before any work is performed the power to the S-Band system and scanner must be isolated and locked out. The S-Band system and scanner is fed from panel 1E3 on the bridge, Breaker 17. Open and lock out Breaker 17. The S-Band Transceiver is fed from panel 1M10 Breaker 5, this must be opened and locked out. Disconnect the RF coaxial cable from the scanner. Refer to drawing MM678-019-BD, disconnect the cables listed in table 1 and remove the S-Band scanner, Antenna and coaxial RF cable. Locate the S-Band Antenna rotation safety switch, disconnect cables RDR-B-TUE1 and RDR-B-TUE from the switch and remove the cables and switch. Refer to drawing MM678-018-AD for S-band scanner location on mast.

Table 1 S-Band Scanner

Cable label	Scanner connector
RDR-B-AC4	TSH
RDR-B-PMB	TSC
RDR-B-PMT	SKP

The X-Band scanner is located on the upper radar platform of the main mast, before any work is performed the power to the X-Band system and scanner must be isolated and locked out. The X-Band system and scanner is fed from panel 1E3 on the Bridge, Breaker 2. Open and lock out Breaker 2. Disconnect the RF waveguide from the scanner, do not remove the waveguide as it will be inspected, repaired if required and used with the new system. Refer to drawing MM678-019-BD, disconnect the cables listed in table 2 and remove the X-Band scanner and Antenna. Locate the X-Band Antenna rotation safety switch, disconnect cables RDR-A-MOT and RDR-A-MOT1 from the switch and remove the cables and switch. Refer to drawing MM678-018-AD for X-band scanner location on mast.

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Table 2 X-Band Scanner

Cable label	Scanner connector
RDR-A-MOT1	TSA
RDR-A-PMB	TSC
RDR-A-PMT	SKP
RDR-A-TUE	TSB

X & S Band Transceivers and Inter-switch

The S-Band transceiver is located on the Bridge on the forward side of the Navigation console in the Radar closet. Before any work is performed the power to the S-Band system must be isolated and locked out. The S-Band system and scanner is fed from panel 1M10 on the bridge, Breaker 5. Open and lock out Breaker 5. Disconnect the RF coaxial cable from the transceiver and directional coupler. Refer to drawing MM678-019-BD, disconnect the cables listed in table 3 and remove the S-Band transceiver. The Directional coupler will be removed but will be retained as it will be reused with the new system. Do not remove cable RDR-B-AC2 this will be reused.

Figure 1: Radar Closet

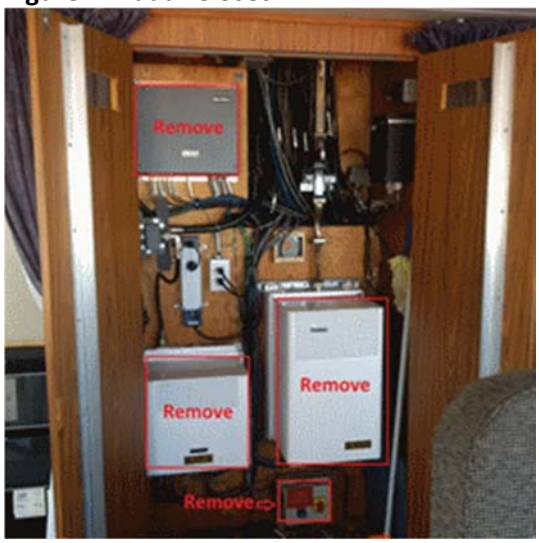

Table 3 S-Band Transceiver

Cable label	Transceiver connector
RDR-B-AC3	TSE
RDR-B-DAT3	TSB
RDR-B-PMB	TSC
RDR-B-PMT	SKP
RDR-B-TUE	TSB
RDR-B-VD1	SKV

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The S-band scanner control unit located on the bridge directly below the radar transceivers, it is to be removed. Disconnect and remove cables RDR-B-TUE and RDR-B-AC4 from the unit and remove the scanner control unit. Cable RDR-B-AC5 will not be removed, it is to be installed in an outlet box and terminated to a receptacle.

The X-Band transceiver is located on the Bridge on the forward side of the Navigation console in the Radar closet. Before any work is performed the power to the X-Band system must be isolated and locked out. The X-Band system and scanner is fed from panel 1E3 on the bridge, Breaker 3. Open and lock out Breaker 3. Disconnect the rigid RF waveguide from the transceiver. Refer to drawing MM678-019-BD, disconnect the cables listed in table 4 and remove the X-Band transceiver. The Directional coupler, rigid waveguide including the WR-112 twist will be retained as it will be reused with the new system. The waveguide WR-112 to WR-90 transition connected directly to the output of the X band transceiver will be removed. Do not remove cable RDR-A-AC2 this will be reused.

Table 4 X-Band Transceiver

Cable label	Transceiver connector
RDR-A-AC2	TSE
RDR-A-DAT3	TSB
RDR-A-PMB	TSC
RDR-A-PMT	SKP
RDR-A-TUE	TSB
RDR-A-VD1	SKV
RDR-A-MOT	TSA

The 2 X 4 way Inter-switch is mounted on the Bridge on the forward side of the Navigation console in the Radar closet directly above the S-band transceiver. Refer to drawing MM678-019-BD, disconnect and remove the cables listed in table 5 and remove the Inter-switch.

Table 5 Inter-switch

Cable label	Inter-switch connector	System
RDR-A-DAT3	TSTA	X-BAND
RDR-A-VID1	SKTA	X-BAND
RDR-A-TRIG	SKMA	X-BAND
RDR-A-VID	SKVA	X-BAND
RDR-A-DAT2	TSDA	X-BAND
RDR-A-DAT1	TSSA	X-BAND
RDR-B-DAT3	TSTB	S-BAND
RDR-B-VID1	SKTB	S-BAND
RDR-B-TRIG	SKMB	S-BAND
RDR-B-VID	SKVB	S-BAND
RDR-B-DAT2	TSDB	S-BAND
RDR-B-DAT1	TSSB	S-BAND

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

X & S Band Display and Processor Pedestals and associated equipment

The BridgeMaster X and S band Display and Processor Pedestals, monitors, associated equipment and cabling must be removed. The S-Band Radar display and processor unit is located forward on the bridge on the port side of the command steering station. Disconnect the cables listed in Table 6 and remove the Monitor, Processor, Interface unit and the cabinet the S-band display unit is mounted on. The isolation switch and connected AC cabling located behind the S- band display must not be removed, it will be uninstalled from the Radar cabinet prior to its removal and kept for installation once the new S-band pedestal is installed. Disconnect RDR-B-AC3 from the processor and display unit but do not remove the cable. Cables GYC-17, SPDLOG, AIS-23, IMIC3-ARPA-S and RDR-B-GPS must not be removed, they will be retained for installation with the new system. Figure 2 shows the location of the S-band cabinet and S- band display and processor unit.

Table 6 S-Band Pedestal

Cable label	S band system connector
SPDLOG (DL-12)	TSD
GYC-17	TSC
RDR-B-GPS	TSH
AIS-23	TSJ
RDR-B-AC3	TSP
IMIC3-ARPA-S	TSK
RDR-B-TRIG	SKM
RDR-B-VD	SKV
RDR-B-DAT2	TSA
RDR-B-DAT1	TSB

Figure 2: S-band Radar display and processor unit

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The X-Band radar display and processor is mounted on the STBD side of the chart table, disconnect the cables listed in Table 7 and remove the Monitor, processor and Interface unit. The isolation switch and connected AC cabling located behind the X-band display is to be left in place and reused with the new system. Disconnect RDR-A-AC3 from the processor and display unit but do not remove the cable. Cables GYC-17, SPDLOG, SC-18, RDR-M1 and RDR-B-GPS will be uninstalled from the X-band display and processor unit and retained for installation with the new system. Figure 3 shows the location of the X-band display and processor unit.

Figure 3: X-band display and processor unit

Table 7 X-Band Pedestal

Cable label	X band system connector
GYC-17	TSC
SPDLOG (DL-9)	TSD
RDR-B-GPS	TSH
SC-18	TSK
RDR-M1	SKW
RDR-A-AC3	TSP
RDR-A-TRIG	SKM
RDR-A-VID	SKV
RDR-A-DAT2	TSA
RDR-A-DAT1	TSB

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Aft Facing X-band radar

The Aft facing X-band Radar display unit, processor unit, pedestal and interface unit are located on the port side of the bridge on the STBD side of the Port ship control station. Before work is performed the power to the aft facing X-Band system must be isolated and locked out. The X-Band system and scanner is fed from panel 2 1M10 on the bridge, Breaker 4. Open and lock out Breaker 4. Disconnect the cables listed in Table 8 and remove the Monitor, Processor, Interface unit and turning unit complete with 4 foot antenna. The scanner safety switch located on the fire monitor platform beside the ladder must be removed including the connecting cable AR-5. The aft facing radar power isolation switch and connected AC cabling mounted on the aft facing radar Display and Processor pedestal is to be left in place and reused with the new system. Disconnect cable AR2 from the processor and display unit but do not remove the cable. The A/C feed cable from Panel 2 1M10 Breaker 4 will be retained for use with the new system. Cables GYRO, SPLOG, AIS-25, GPS, RM-2 and AR2 will be disconnected from the X-band display and processor unit and retained for installation with the new system. Refer to drawing MM678-025-WD for cable disconnections and labelling. Refer to drawing MM678-001-AD for the location of the aft X-Band scanner and antenna. Figure 4 shows the location of the Aft facing X-band pedestal and display and processor unit.

Table 8 X-Band Aft facing radar system

Cable label	Aft X band radar system connectors
GYRO	TSC (processor)
SPLOG	TSD (processor)
GPS	TSH (Interface unit)
AR2	TSP (processor)
RM-2	SKW
AR1	TSE (scanner unit)
AR-3	TSA (processor) TSB (scanner unit)
AR-3	SKV (processor and scanner unit)
RDR-B-SKY	SKY (processor) TSK(Interface unit)
AR-5	Scanner Safety switch
AIS-25	TSJ (Interface unit)

Figure 4: Aft facing X-band Radar Display and Processor unit and Pedestal

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Electronic Chart Precise Integrated Navigation System (ECPINS)

The ECPINS system must be removed, the console is located to the STBD side of the Chart table. The cabinet and all associated equipment and cabling is to be removed, refer to drawing MM678-033-WD. The wind speed feed to the ECPINS from the STBD Young 0626 Marine wind tracker will not be removed. This cable is labelled WND-ECDIS, it will be disconnected from the RS232-422 converter installed in the rear of the ECPINS rack and retained for use with the new ECDIS. Figure 5 shows the location of the ECPINS cabinet. Refer to drawing MM678-033-WD for the removal of the ECPINS.

Figure 5: ECPINS System and Cabinet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Cable Removals

The following cables are to be removed. Refer to drawings MM678-019-BD, MM678-025-WD and MM678-064-WD, the following cables must be removed.

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR-B-TUE1	14/3	S-Band Antenna rotation safety switch, located on the Mast.	Scanner Control unit located in Radar closet on bridge.	50 feet
RDR-B-AC4	12/3	S-Band Scanner unit located on the Main Mast, connector TSH.	Scanner Control unit located in Radar closet on bridge.	65 Feet
RDR-B-PMB	9261	S-Band Scanner unit located on the Main Mast, connector TSC.	S-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSC.	50 feet
RDR-B-PMT	89259	S-Band Scanner unit located on the Main Mast, connector SKP.	S-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector SKP.	50 feet
RDR-B-DAT3	9514	S-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSB.	Interswitch located in Radar closet on bridge, connector TSTB.	10 feet
RDR-B-TUE	9318	S-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSB.	Scanner Control unit located in Radar closet on bridge.	10 feet
RDR-B-VID1	82259	S-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector SKV.	Interswitch located in Radar closet on bridge, connector SKTB.	10 feet
RDR-B-TRIG	82259	Interswitch located in Radar closet on bridge, connector SKMB.	Bridgemaster E display coter Babord de la console on Port side of steering Console, connector SKM.	30 feet
RDR-B-VID	82259	Interswitch located in Radar closet on bridge, connector SKVB.	Bridgemaster E display on Port side of steering Console, connector SKV.	30 feet
RDR-B-DAT2	9514	Interswitch located in Radar closet on bridge, connector TSDB.	Bridgemaster E display on Port side of steering Console, connector TSA.	30 feet
RDR-B-DAT1	9514	Interswitch located in Radar closet on bridge,, connector TSSB.	Bridgemaster E display on Port side of steering Console, connector TSB.	30 feet
RDR-A-MOT1	9312	X-Band Antenna rotation safety switch.	X-Band Scanner unit located in Radar closet on bridge, connector TSA.	12 feet
RDR-A-MOT	9312	X-Band Antenna rotation safety switch.	X-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSA.	50 feet
RDR-A-PMB	9261	X-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSC.	X-Band Scanner unit located on the Main Mast, connector TSC.	70 feet
RDR-A-	89259	X-Band Bulkhead Transceiver unit	X-Band Scanner unit located on the	70 feet

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
PMT		located in Radar closet on bridge, connector SKP.	Main Mast, connector SKP.	
RDR-A-TUE	9318	X-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSB.	X-Band Scanner unit located on the Main Mast, connector TSB.	70 feet
RDR-A-DAT3	9514	X-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSB.	Interswitch located in Radar closet on bridge, connector TSTA.	10 feet
RDR-A-AC2	14/3	X-Band Bulkhead Transceiver unit located in Radar closet on bridge, connector TSE.	Radar Isolation switch located behind the X-band radar processor on the bridge.	30 feet
RDR-A-VD1	82259	X-Band Bulkhead Transceiver unit located in in Radar closet on bridge, connector SKV.	Interswitch located in Radar closet on bridge, connector SKTA.	10 feet
RDR-A-TRIG	82259	Interswitch located in Radar closet on bridge, connector SKMA.	Bridgemaster E display 250 on chart table, connector SKM.	30 feet
RDR-A-VID	82259	Interswitch located in Radar closet on bridge, connector SKVA.	Bridgemaster E display 250 on chart table, connector SKV.	30 feet
RDR-A-DAT2	9514	Interswitch located in Radar closet on bridge, connector TSDA.	Bridgemaster E display 250 on chart table, connector TSA.	30 feet
RDR-A-DAT1	9514	Interswitch located in Radar closet on bridge, connector TSSA.	Bridgemaster E display 250 on chart table, connector TSB.	30 feet
AR1	14/3	Aft Radar Isolation switch	Aft Radar Scanner unit connector TSE	82 feet
AR-3	9388	Aft Radar Display and Processor unit connector TSA	Aft Radar Scanner unit connector TSB	82 feet
AR-3	Belden 89259	Aft Radar Display and Processor unit connector SKV	Aft Radar Scanner unit connector SKV	82 feet
RDR-B-SKY		Aft Radar Display and Processor unit connector SKY	Aft Radar Interface unit connector TSK	5 feet
AR-5	9218	Aft Radar Scanner safety switch located beside the ladder leading to the fire monitor platform.	Aft Radar Scanner unit connector PLZA	32 feet
GYC-6	BASC 14/6	Sperry Booster AW132-049 located in electronics room OUT2, L4.	AFT 10KW X-band radar located PORT side of bridge connector TSC.	80 feet
GYC-8	ALPHA 3SH.T W.PR. #16 AWG	Sperry Booster AW132-049 located in electronics room OUT2, L5.	X-band radar located on Chart table connector TSC.	80 feet
GYC-10-1		Gyro JB located inside Bridge FWD console STBD side.	JB located in S-band radar cabinet FWD on bridge.	100 feet
GYC-17		JB located in S-band radar cabinet FWD on bridge.	S-Band radar display located FWD on bridge connector TSC	5 feet
EC-12		Distribution Unit 13B-074 located in	ECPINS cabinet located to STBD side on	80 feet

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
		electronics room, connector L7.	Chart table, SIU TB2 Port 2.	
S-Band Waveguide	AVA5-50	S-Band Directional Coupler RF output located on the bridge in the Radar closet.	S-band Scanner unit RF input located on the lower platform of the Main Mast.	65 feet

T1-6 Disposal and Care / Custody of removed equipment

All removed equipment must be returned to the Canadian Coast Guard (CCG) upon completion of this installation. All removed cables are to be properly disposed of.

T1-7 Furuno Radar and Electronic Chart Display and Information system (ECDIS) Installation

X & S Radar Antenna unit pedestals

The existing Radar pedestals including cable transits and cable supports on the main mast for the X and S band Antenna units must be modified and or replaced as per the provided installation specification and drawing (DWG # 17050-325) provided by EYE Marine Consultants. The existing radar pedestal including cable transits and cable supports on the Fire Monitor Platform for the 10KW aft facing X-band scanner unit must be modified and or replaced as per the provided installation specification (Earl Grey Radar Mounts Replacement) and drawing (DWG # 17050-325) provided by EYE Marine Consultants. The contractor is responsible to provide all required materials for the construction, assembly and finishing of the pedestals. The Pedestals will be finished (Primed and Painted) to match their surroundings.

Radar Antenna units installation

X-band Antenna RSB-130N unit installation

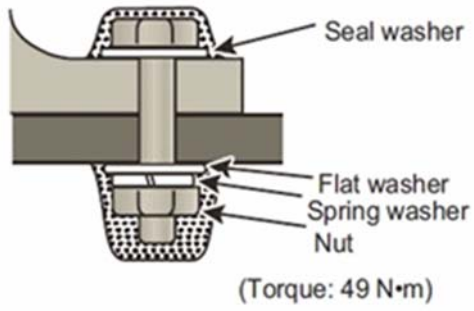
Install the 25KW X-band system Antenna unit P/N: RSB-130N including 6.5 foot antenna P/N: XN20CF/6.5 on the upper radar platform of the main mast on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using four M12 hex bolts complete with nuts, flat washers and lock washers. The mounting bolts must be installed facing down otherwise they may interfere with the removal of the Antenna units cover. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An X-band Radar power Isolation Switch will be installed on the Main Mast at the base of the upper Radar platform where the existing Bridgemaster X-Band Antenna rotation safety switch had been located. The waveguide flange on the RSB-130N is in a different location then on the existing Bridgemaster unit. The existing waveguide shall be modified and may have sections added or removed as required for connection to the Furuno Antenna unit. Once the modifications are complete the waveguide must be pressure tested to ensure no leaks are present.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The waveguide will be sealed at each end using pressure windows, the pressure in the waveguide will be raised to 5p.s.i. Ensure that the pressure doesn't drop below 4p.s.i. within 4 hours. If leaks are found they must be repaired and the pressure test must be performed until successful. All waveguide clamps and supports must be inspected and repaired or replaced as required. See Furuno Chart Radar Installation Manual document IME36240E_FAR3320W sections 1.1.1 and 1.1.2 for specific instructions for assembling, hoisting and mounting the Antenna unit. The Antenna unit must be installed as per the manufactures recommendations.

S-band Antenna unit RSB-131N installation

Install the 30KW S-band system Antenna unit P/N: RSB-131N including 12 foot antenna P/N: SCN36CF on the lower radar platform on the main mast on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using eight stainless steel M12 hex bolts complete with nuts, flat washers and lock washers. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An S-band Radar power Isolation Switch will be installed on the Main Mast at the base of the lower Radar platform where the existing Bridgemaster S-Band Antenna rotation safety switch had been located. See Furuno Chart Radar Installation Manual document IME36180E_FAR3230S section 1.1 and subsections for specific instructions for assembling, hoisting and mounting the antenna unit. The Antenna unit must be installed as per the manufactures recommendations.



X-band aft facing Antenna unit RSB-128 installation

Install the 12KW aft facing X-band system Antenna unit P/N: RSB-128 including 4 foot antenna P/N: XN20CF/4 on the aft edge of the fire monitor platform on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using four M12 hex bolts, nuts, flat washers and lock washers. The mounting bolts must be installed facing down otherwise they may interfere with the removal of the Antenna units cover. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An Aft Radar power Isolation Switch will be installed on the Port side of the ladder leading to the Fire Monitor platform where the existing Bridgemaster Scanner Safety switch had been located. See Furuno Chart Radar Installation Manual document IME36160E_FAR3210 sections 1.1 for specific instructions for assembling, hoisting and mounting the Antenna unit. The Antenna unit must be installed as per the manufactures recommendations.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

X & S Radar and ECDIS display and processor pedestal mounting bases

The Bridgemaster S-band Radar display and processor unit is mounted on a cabinet to the PORT side of the Command steering station. The Bridgemaster Aft facing X-band Radar display and processor unit is mounted on a pedestal located on the STBD side of the Port Ship control station. The ECPINS system is mounted in a cabinet to the STBD side of the Chart table. These three pedestals or cabinets must be removed as per section 5.1.1 of this document. Refer to floor plan drawing MM678-017-FP for the pedestal locations.

The provided Furuno Radar display and processor pedestals will be installed on the bridge in the 3 locations the above mentioned cabinets and pedestals were removed from. Bases must be fabricated and installed on the bridge deck for the mounting of each pedestal. The mounting base will be of welded steel construction, a minimum of ¼ inch steel plate will be used and it will be finished to match the existing deck. The mounting bases will raise the height of each pedestal by 8 inches and will ensure the vertical surfaces of the new pedestals are parallel with the existing consoles. The dimensions of the mounting surface on the new Pedestal is 600mm x 596.24mm, the mounting base will have the same dimensions. These dimensions are to be confirmed at the time of fabrication and installation. The mounting bases must be welded or firmly bolted to the Bridge deck. A mount will be fabricated inside of each of the mounting bases for the installation of the provided Marine Isolation transformer, the mount and transformer must not interfere with the passage of cables or the installation of the Pedestal complete with equipment. The pedestals will be mounted to the bases using M10 stainless steel hardware through the 10 existing mounting holes in the base of the pedestal. The contractor will be responsible to provide all materials for the construction and finishing of the pedestal mounting bases and for the mounting of the pedestals.

25KW X Band Down mast Transceiver RTR-108 and PSU-014

The 25 KW X-band transceiver will be mounted in the Radar Closet in place of the Bridgemaster X-band transceiver. The exact location will be determined at time of installation, the positioning of the X-band transceiver is critical to the connection of the transceiver to the existing WR-112 rigid waveguide. The mounting location inside the Radar Closet must be approved by CCG representative. The RTR-108 transceiver must be positioned so the transceiver output flange couples to the existing waveguide without applying stress to the joint. The transceiver output flange is of a plain type, the mating section of waveguide must be a choke type and the pair of flanges must be coupled with one O-ring, four bolts, spring washers and nuts. The X-band power supply unit PSU-014 will be mounted inside the Radar closet on the bridge. The exact mounting location inside the Radar Closet will be determined at the time of installation and must be approved by CCG representative. M6 hex Stainless steel hardware will be used to mount each unit. Install, label and terminate the remaining cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to figure 6 for suggested locations of power supplies and Radar transceivers. Existing outlets and equipment installed inside the Radar closet may be relocated if required for the installation of the radar power supplies and transceivers.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

30KW S Band Down mast Transceiver RTR-109 and PSU-014

The 30 KW S-band transceiver will be mounted in the Radar Closet in place of the Bridgemaster S-band transceiver. The exact mounting location will be determined at the time of installation and must be approved by CCG representative. The directional coupler removed in section 5.1.1.2 will be reinstalled inside the Radar closet. Connect the provided Coaxial cable P/N: WF-H50-7S from the output of the directional coupler to the input of the S-band antenna unit RSB-131N installed on the lower platform on the main mast. A short length of coaxial cable P/N: WF-H50-7S will be connected from the S-band RTR-109 output flange to the input of the directional coupler. Refer to Furuno TIE00160B_1 Installation Handbook Section 1.3.6 for instructions on terminating the S-band RF coaxial cable. The S-band power supply unit PSU-014 will be mounted inside the Radar closet on the bridge. The exact mounting location inside the Radar Closet will be determined at the time of installation and must be approved by CCG representative. M6 hex Stainless steel hardware will be used to mount each unit. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to figure 6 for suggested locations of power supplies and Radar transceivers. Existing outlets and equipment installed inside the Radar closet may be relocated if required for the installation of the radar power supplies and transceivers.

Figure 6: Radar Closet Suggested Furuno Radar locations

Hub 3000 and Hub 100

The Furuno Intelligent Hub 3000 and Hub 100 will be mounted inside the Radar closet using the provided hardware or four 4x20 Stainless steel screws. Due to the limited space in the Radar closet the exact location will be determined at the time of installation. Install the cable clamp included with the Hub-3000 using the provided hardware. Refer to manual IME36240E_FAR3320W sections 1.8, 1.9 and 2.8 for specific installation and wiring details. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

MC3000S

The MC3000S will be mounted inside the Radar closet using the provided hardware or four 4x20 Stainless steel screws. Due to the limited space in the Radar closet the exact location will be determined at the time of installation. The provided Newmar 115-24-10 24 VDC power supply and the provided 24 VDC fuse block will be installed in the bottom of the Radar closet. An output from the fuse block will supply 24 VDC to the MC3000S. Refer to manual IME FAR3320W sections 2.7.1 and 1.7 for specific installation and wiring details. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2.

Furuno Aft facing Radar Processor

The Aft facing Display and processor is to be installed in the same location as the Bridgemaster aft facing radar had been located. This is to the STBD side of the Port Ship Control Station. The Hatteland 26" display, Furuno EC3000 Radar processor, Always ON UPS and Always ON Battery Bank will be installed in the provided Furuno Pedestal (See section 5.1.3.3). A mounting bracket will be made to firmly fix the UPS and Battery Bank to the lower shelf in the Pedestal. The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the pedestal. The existing Aft Radar isolation switch will be installed on the Furuno Pedestal in an accessible location that does not interfere with the operation of the Radar. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

Mount the trackball/Keypad P/N: RCU-024 in the provided tray on the FHLCOMMPED pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

The PSU-014 power supply for the 12KW aft facing Radar will be installed inside the Port Ship Control Station Console. Installation location of the PSU-014 inside of the console is to be determined at the time of installation. The PSU-014 will be firmly fixed in place using the provided hardware. A mounting bracket will be fabricated and installed for the installation of the PSU-014 if required. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific processor and power supply installation and wiring details.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Figure 7: Radar/ECDIS Pedestal

Figure 8: Port Ship Control Station and Bridgemaster Aft facing radar locations

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Furuno ECDIS Processor

The ECDIS Display and processor will be installed in the location the ECPINS system was removed from. This is to the STBD side of the Chart table. See figure 9 for the ECPINS location. The Hatteland 26" display and Furuno EC3000 Multifunction processor will be installed in the provided Furuno Pedestal (See section 5.1.3.3). The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the Furuno pedestal. The lower shelf in this pedestal will be used to mount the X-band EC3000 processor (See section 5.1.3.11).

The Always ON UPS and Always ON Battery Bank will be installed in the cabinet below the X-band display on the STBD side Chart table.

Mount the trackball/Keypad P/N: RCU-024 in the provided tray on the FHLCOMMPED pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME44730F_FMD3200_3300 sections 1 and 2 for specific ECDIS processor installation and wiring details.

Figure 9: ECPINS location

Furuno S-Band Radar Processor

The S-Band Radar Display and processor will be installed in the location of the existing Bridgemaster S-band system. This is to the Port side of the Command Steering Station. The Hatteland 26" display, Furuno EC3000 Multifunction processor, Always ON UPS and Always ON Battery Bank will be installed in the provided Furuno Pedestal (See section 5.1.3.3). A mounting bracket will be made to firmly fix the UPS and Battery Bank to the lower shelf in the Pedestal.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the pedestal. The existing S-Band Radar isolation switch will be installed on the Furuno Pedestal in an accessible location that does not interfere with the operation of the Radar. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

Mount the trackball/Keypad RCU-024 in the provided tray on the FHLCOMMPED pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific S-Band Radar processor installation and wiring details.

Furuno X-band Radar Processor

The X-Band Radar Hatteland Display and RCU-024 trackball and Keypad will be installed in the location the Bridgemaster X-band system had been located. The X-band system is located on the STBD side of the Chart Table. The Hatteland 26" display will be mounted on the Chart table top using the provided Hatteland HD TMB SX1-C1 mounting brackets. Mount the trackball/Keypad RCU-024 just forward of the Hatteland display in a location comfortable and convenient for operation of the Radar. The RCU-024 will be mounted using the supplied desk fixing plate. Prior to mounting the RCU-024 ensure that the optional USB cable is connected and secured to the RCU-024 unit.

The Furuno EC3000 X-band radar processor will be installed in the lower shelf of the ECDIS Pedestal located to the STBD side of the Chart table.

The Always ON UPS, Always ON Battery Bank and Marine Isolation transformer will be installed in the bottom of the STBD side Chart table cabinet below the X-band display. The existing X-Band Radar isolation switch will be left in place on the shelf above the Chart table.

Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678073WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific X-Band Radar processor installation and wiring details.

Sensor Interfaces

Heading input from Navigat 3000 Fibre Optic Gyro

Refer to drawing MM678-064-WD, the following cables must be removed (already listed in Section 5.1.2 cable removals.)

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Cable Label	From	To
GYC-6	Sperry Booster AW132-049 located in electronics room OUT2, L4.	AFT 10KW X-band radar located PORT side of bridge connector TSC.
GYC-8	Sperry Booster AW132-049 located in electronics room OUT2, L5.	X-band radar located on Chart table connector TSC.
GYC-10-1	Gyro JB located inside Bridge FWD console STBD side.	JB located in S-band radar cabinet FWD on bridge.
GYC-17	JB located in S-band radar cabinet FWD on bridge.	S-Band radar display located FWD on bridge connector TSC
EC-12	Distribution Unit 13B-074 located in electronics room, connector L7.	ECPINS cabinet located to STBD side on Chart table, SIU TB2 Port 2.

An Actisense Buffer P/N: PRO-BUF-1 BAS-R will be installed in the cabinet on the STBD side of the Navigation Console. Cable ALDBN-2 will be disconnected from COM1 of the Aldebaran E-Chart computer and be fed to the input of the Actisense buffer. Cable ALDBN-2 will be relabeled as GYC-Distribution once it has been installed to the Actisense buffer. See the figure 10 below for the suggested location of the Actisense PRO-BUF-1 BAS-R.

Install, label and terminate the Acti-sense PRO-BUF-1 BAS-R cabling as per drawings MM678-064-WD, MM678-063-WD and MM678-073-WD.

Figure 10: Gyro Actisense location

AIS inputs from SAAB J4 AIS terminal box

Refer to drawing MM678-043-WD, cable AIS-21 will be moved from Connector K4 ECDIS in the AIS J4 terminal Box to Connector K3 Pilot.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Existing Cables AIS-23, AIS-24 and AIS-25 from the Consolidated Technologies Mini-EX will be reused and terminated to the Furuno EC3000 Radar processors as per drawing MM678-073-WD sheets 1 and 2.

A new cable (AIS-ECDIS) will be installed from Connector K4 ECDIS in the J4 AIS terminal box to J3 of the Furuno EC3000 ECDIS processors I/O board located on the STBD side of the Chart table. See Figure 11 for the location of the AIS J4 Terminal box and the Consolidated Technologies Mini-EX.

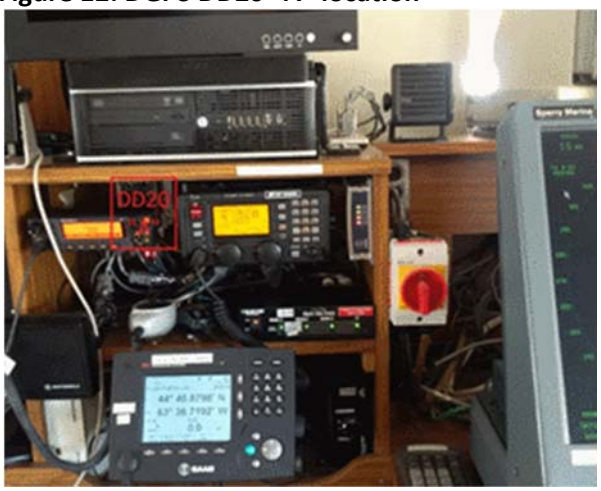
Figure 11: AIS J4 Terminal Box and Mini Expander

DGPS inputs from SAAB R4 distribution system

Refer to drawing MM678-046-Existing, the Data Distributor labelled DD20 “A” will be removed and replaced with an Actisense Buffer P/N: PRO-BUF-1 BAS-R. The existing cabling connected to DD20 “A” will be retained and terminated as per drawings MM678-046-WD and MM678-073-WD. See the Figure 12 for the location of DD20 “A”. The cable connected from DD20 “A” to the ECPINS system will be labelled GPS-ECDIS and used for connection to the Furuno EC3000 ECDIS processor (Connector J5 on the ECDIS EC3000 I/O board). The cables previously used for connection from DD20 “A” to the X (XRDR10), S (SRDR11) and aft BridgeMaster Radars (AR2) will be reused and relabeled as GPS-RDR-X, GPS-RDR-S AND GPS-RDR-AFT. Connect these cables to the EC3000 processors as per drawings MM678-073-WD sheets 1 and 2 and MM678-046-WD.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Figure 12: DGPS DD20 "A" location



Speed input from the Naviknot 450D Speed Log system

Refer to drawing MM678-062-WD cables DL-9, DL-10, DL-11 and DL-12 must be moved from the 200 P/NM outputs on TB3 to NMEA outputs 2, 3, 4, 5 and 6 on TB3 of the Naviknot Electronics unit. Terminate cables DL-9, DL-10, DL-11 and DL-12 as per drawing MM678-062-WD and MM678-073-WD. See figure 13 for the location of the Naviknot Electronics Unit.

Figure 13: Naviknot Electronics Unit location

Depth input from the ELAC ES5100 system

Refer to drawing MM678-063-WD, Cables ES-RDR-AFT, ES-ECDIS, ES-RDR-S and ES-RDR-X must be installed, labelled and terminated as per drawings MM678-063-WD and MM678-073-WD. The Echo Sounder Expander A shown in drawing MM678-063-WD is located in the Cabinet on the PORT side of the Navigation console, See figure 13.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Figure 13: Naviknot Electronics Unit location

Wind speed to ECDIS

Refer to drawing MM678-033-WD, cable WND-ECDIS connected from the STBD Young 0626 Marine Wind Tracker to a RS422-232 converter inside the ECPINS cabinet must be disconnected from the RS422-232 converter inside the ECPINS cabinet and retained. This cable will be terminated to the Furuno ECDIS EC3000 processor I/O board connector J8 once it has been installed. Install, label and terminate this cable as per drawing MM678-073-WD.

Radar Track Target data

Refer to drawing MM678-042-BD, Cable SC-18 shall be disconnected from TSK on the Bridgemaster E X-band display and retained. Once the new Furuno X-band EC3000 processor has been installed SC-18 must be connected to I/O board connector J8 of the processor. Install, label and terminate this cable as per drawing MM678-073-WD and MM678-042-BD.

Refer to drawing MM678-057-BD, Cable IMIC3-ARPA-S shall be disconnected from TSK on the Bridgemaster E S-band display and retained. Once the new Furuno S-band EC3000 processor has been installed cable IMIC3-ARPA-S must be connected to I/O board connector J8 of the processor. Install, label and terminate this cable as per drawing MM678-073-WD and MM678-057-BD.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Bridge Remote Monitor Connection

Refer to drawing MM678-050-BD, the existing Bridge wing monitors, and cabling will be reused with the new Furuno System.

Using a VGA to DVI adaptor the VGA cable RDR-M1 that had been connected to the Bridgemaster X-band Radar display must be connected to DVI2 on the Furuno X-band Radar processor (EC3000) located on the STBD side of the chart table.

Using a VGA to DVI adaptor the VGA cable RM-2 that had been connected to the Bridgemaster X-band Aft looking Radar display must be connected to DVI2 on the Furuno Aft looking X-band Radar processor (EC3000) located on the STBD side of the Port Ship Control Station.

A new VGA cable will be run from the Black Box Video switch model ACL0404A input 3 to DVI2 on the Furuno ECDIS EC3000 processor located to the STBD side of the Chart table. A VGA to DVI adaptor will be used to connect the VGA cable to the DVI2 port on the ECDIS processor.

Grounding

EC-3000 processor units

The EC-3000 processors will be grounded using a green jacketed stranded wire with a minimum size of 14 AWG and appropriately sized ring terminals. The grounding terminal for the processor is located beside DVI2 on the front panel of the processor, run the ground wire from the terminal on the processor to the tray it is installed on.

Hatteland Monitor

Grounding not required when powered from A/C input.

HUB -3000

The HUB-3000 will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located beside the fuse on the front panel of the HUB-3000. Connect one end of the ground wire to the ground terminal of the HUB-3000, the other end will be connected to the existing ground point in the Radar closet.

HUB-100

The HUB-100 will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located on the rear panel of the HUB-100. Connect one end of the ground wire to the ground terminal of the HUB-100, the other end will be connected to the existing ground point in the Radar closet.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

PSU-014

Ground the power supplies using flexible #6 green jacketed, stranded copper wire and appropriately sized ring terminals. The grounding terminal is located beside the cable entry on the front panel of the PSU-014. Connect one end of the ground wire to the ground terminal of the PSU-014, the other end will be connected to the existing ground point in the Radar closet.

X & S band transceivers

Ground the transceivers using flexible #6 green jacketed, stranded copper wire and appropriately sized ring terminals. The grounding terminal is located on the mounting rail below the cable entry on the transceiver. Connect one end of the ground wire to the ground terminal of the Transceiver, the other end will be connected to the existing ground point in the Radar closet.

MC-3000S Sensor Adaptor

The MC3000S will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located on the far right of the front panel of the MC-3000S. Connect one end of the ground wire to the ground terminal of the MC-3000S, the other end will be connected to the existing ground point in the Radar closet.

X & S band Antenna Units

The X & S Antenna units have ground terminals installed on their base plates. The ground wire provided from Furuno with the Antenna unit will be installed from the ground terminal to a ground point on the Pedestal the Units are installed on.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

T1-8 Cable Installation

Install, label and terminate the following cables as per drawings MM687-073-WD sheets 1 & 2, MM678-050-BD, MM678-064-WD, MM678-063-WD, MM678-043-WD, MM678-046-WD, MM678-062-WD, MM678-042-BD and MM678-057-BD.

All wire wire pulls must be inspected by on-site CCG representative prior to installation of covers. Cable installations and removals in transits must be testing by ultrasonic or other means to prove air /water tightness upon completion of cable installation.

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR-A-AC2	Marine AC 14/3	X-band Antenna Unit and Transceiver Isolation switch located on the Main Mast below the upper platform (X-band).	X-band radar Isolation switch located STBD side of Chart table.	65 Feet
RDR-B-AC2	Marine AC 14/3	S-band Antenna Unit and Transceiver radar Isolation switch located on the Main Mast below the lower platform (S-Band).	S-band radar Isolation switch located on S-band FHLCOMMPED Pedestal.	65 Feet
RDR-A-AC3	Marine AC 14/3	X-band radar Isolation switch located STBD side of Chart table.	Always ON isolation transformer located inside chart table cabinet below X-band display, AC input.	10 Feet
RDR-B-AC3	Marine AC 14/3	S-band radar Isolation switch located on S-band FHLCOMMPED Pedestal.	Always ON isolation transformer located inside mounting base for S-Band FHLCOMMPED Pedestal, AC input.	10 Feet
RDR-A-AC4	Factory AC Power Cable	X-band Always ON isolation transformer located inside chart table cabinet below X-band display, AC output.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC input.	6 Feet
RDR-B-AC4	Factory AC Power Cable	Always ON isolation transformer located inside mounting base for S-Band FHLCOMMPED Pedestal, AC output.	S-band GES-102N UPS located inside S-Band FHLCOMMPED pedestal lower shelf, AC input.	6 Feet
RDR-A-AC5	Marine AC 14/3	X-band PSU-014, located in Radar closet on bridge TB1.	X-band radar Isolation switch located on the Main Mast below the upper platform.	35 Feet
RDR-B-AC5	Marine AC 14/3	S-band PSU-014, located in Radar closet on bridge TB1.	S-band radar Isolation switch located on the Main Mast below the lower platform.	30 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
ECDIS-AC1	Marine AC 14/3	AC distribution Panel 1M10 breaker 6, located to Aft of Chart table.	ECDIS Always ON isolation transformer located in void space below ECDIS console, AC input.	25 Feet
ECDIS-AC2	Factory AC Power Cable	ECDIS Always ON isolation transformer located inside mounting base for ECDIS FHLCOMMPED Pedestal, AC output.	X-band GES-102N UPS located inside ECDIS pedestal on lower shelf, AC input.	6 Feet
RDR-AFT-AC1	MARINE AC 14/3	AFT radar Isolation switch located on AFT facing radar FHLCOMMPED Pedestal.	Always ON isolation transformer located inside mounting base for Aft facing radar FHLCOMMPED Pedestal, AC input.	10 Feet
RDR-AFT-AC2	MARINE AC 14/3	AFT radar Isolation switch located on AFT facing radar FHLCOMMPED Pedestal.	Aft Facing X-band Antenna Unit Isolation switch located on the Port side of the Water Monitor Platform ladder.	75 Feet
RDR-AFT-AC3	Factory AC Power Cable	Always ON isolation transformer located inside mounting base for Aft facing radar FHLCOMMPED Pedestal, AC input.	X-band GES-102N UPS located inside the Aft Radar pedestal on lower shelf, AC input.	4 Feet
RDR-AFT-AC4	MARINE AC 14/3	Aft facing X-band radar PSU-014, located inside of Port Ship Control station, TB1.	Aft Facing X-band Turning Unit Isolation switch located on the Port side of the Water Monitor Platform ladder.	75 Feet
RDR/ECDIS-01	RBA-DETD/10P.75BK	X-Band Turning Unit RSB-130N located on Main Mast upper platform, connectors TB802 & TB803.	X-band Transceiver unit RTR-108 located in Radar closet on bridge, connectors TB802 & TB803.	40 Feet
RDR/ECDIS-02	RBA-DETD/10P.75BK	S-Band Turning Unit RSB-131N located on Main Mast lower platform, connectors TB802 & TB803.	S-band Transceiver Unit RTR-109 located in Radar closet on bridge, connectors TB802 & TB803.	35 Feet
RDR/ECDIS-03	Factory Cable RW-00135	X-band Transceiver unit RTR-108 located in Radar closet on bridge, connectors TB801& J281	X-Band PSU-014 located in Radar closet on bridge, connectors TB131 & J102	5 Feet
RDR/ECDIS-04	Factory Cable RW-00135	S-band Transceiver Unit RTR-109, located in Radar closet on bridge, connectors TB801& J281	S-Band PSU-014 located in Radar closet on bridge, connectors TB131 & J102	5 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR/ECDIS-05	CAT 5E (30M max length)	X-band PSU-014, located in Radar closet on bridge, connector J101	EC3000 X-band Processor unit A located on Chart table of Bridge, Connector J16	25 Feet
RDR/ECDIS-06	CAT 5E (30M max length)	S-band PSU-014, located in Radar closet on bridge, connector J101	EC3000 S-band Processor unit C located on STBD side of steering Console, Connector J16	30 Feet
RDR/ECDIS-07	TTYCSCLA-1Q (18 AWG 4 Conductor)	X-band PSU-014, located in Radar closet on bridge, connector TB132.	EC3000 X-band Processor unit A located on Chart table of Bridge, Connector J10.	25 Feet
RDR/ECDIS-08	TTYCSCLA-1Q (18 AWG 4 Conductor)	S-band PSU-014, located in Radar closet on bridge, connector TB132.	EC3000 S-band Processor unit C located on Port side of steering Console, Connector J10.	30 Feet
RDR/ECDIS-11	CAT 5E	EC3000 Processor unit A (X-band), LAN 1.	HUB3000 located in radar closet, Port 1.	25 Feet
RDR/ECDIS-12	CAT 5E	EC3000 Processor unit B (ECDIS), LAN 1.	HUB3000 located in radar closet, Port 2.	25 Feet
RDR/ECDIS-13	CAT 5E	EC3000 Processor unit C (S-band), LAN 1.	HUB3000 located in radar closet, Port 3.	30 Feet
RDR/ECDIS-14	Marine A/C 14/3	Furuno HUB3000 A/C input.	AC outlet located in radar closet, fed from distribution panel 1E3, breaker 11.	10 Feet
RDR/ECDIS-15	CAT 5E	EC3000 Processor unit A (X-band) LAN 2.	HUB100 located in radar closet, Port 1.	25 Feet
RDR/ECDIS-16	CAT 5E	EC3000 Processor unit B (ECDIS) LAN 2.	HUB100 located in radar closet, Port 2.	25 Feet
RDR/ECDIS-17	CAT 5E	EC3000 Processor unit C (S-band) LAN 2.	HUB100 located in radar closet, Port 3.	30 Feet
RDR/ECDIS-18	Factory A/C power cable	EC3000 Processor unit A (X-band) A/C input.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC output.	10 Feet
RDR/ECDIS-19	Factory A/C power cable 20 ft	EC3000 Processor unit B (ECDIS) A/C input.	ECDIS GES-102N UPS located inside chart table cabinet below X-band display, AC output.	20 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR/ECDIS-20	Factory A/C power cable	EC3000 Processor unit C (S-band) A/C input.	S-band GES-102N UPS located inside S-Band FHLCOMMPED pedestal lower shelf, AC output.	10 Feet
RDR/ECDIS-21	Factory cable (DSUB9P-X2-A-L5M)	EC3000 Processor unit A (X-band) COM1.	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA, COM1.	6 Feet
RDR/ECDIS-22	Factory DVI Cable 20ft	EC3000 Processor unit A(X-band) DVI1.	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA DVI.	20 Feet
RDR/ECDIS-23	Factory Cable (part of RCU-024)	EC3000 Processor unit A (X-band), I/O board J12.	RCU-024 Trackball and Keypad J12.	6 Feet
RDR/ECDIS-24	Factory USB cable	EC3000 Processor unit A (X-band) USB.	RCU-024 Trackball and Keypad USB.	6 Feet
RDR/ECDIS-25	Factory USB cable	EC3000 Processor unit B (ECDIS) USB.	RCU-024 Trackball and Keypad USB.	6 Feet
RDR/ECDIS-26	Factory Cable (part of RCU-024)	EC3000 Processor unit B (ECDIS), I/O board J12.	RCU-024 Trackball and Keypad J12.	6 Feet
RDR/ECDIS-27	Factory cable (DSUB9P-X2-A-L5M)	EC3000 Processor unit B (ECDIS) COM1.	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA COM1.	6 Feet
RDR/ECDIS-28	Factory DVI Cable	EC3000 Processor unit B(ECDIS) DVI1.	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA DVI.	6 Feet
RDR/ECDIS-29	Factory USB cable	EC3000 Processor unit C (S-band) USB.	RCU-024 Trackball and Keypad USB.	6 Feet
RDR/ECDIS-30	Factory Cable (part of RCU-024)	EC3000 Processor unit C (S-band), I/O board J12.	RCU-024 Trackball and Keypad J12.	6 Feet
RDR/ECDIS-31	Factory cable (DSUB9P-X2-A-L5M)	EC3000 Processor unit C (S-band) COM1.	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA COM1.	6 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR/ECDIS-32	Factory DVI Cable	EC3000 Processor unit C (S-band) DVI1.	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA DVI.	6 Feet
RDR/ECDIS-33	CAT 5E patch cable	EC3000 Processor unit A (X-band) LAN 3.	EC3000 Processor unit A (X-band), I/O board J15.	1 Feet
RDR/ECDIS-34	CAT 5E patch cable	EC3000 Processor unit C (S-band) LAN 3.	EC3000 Processor unit C (S-band), I/O board J15.	1 Feet
RDR/ECDIS-35	Factory A/C power cable	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC output.	6 Feet
RDR/ECDIS-36	Factory A/C power cable 20ft	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	ECDIS GES-102N UPS located inside chart table cabinet below X-band display, AC output.	20 Feet
RDR/ECDIS-37	Factory A/C power cable	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	S-band GES-102N UPS located inside S-Band FHLCOMMPED pedestal lower shelf, AC output.	6 Feet
RDR/ECDIS-38	Factory Cable NR203PF-VVS1.25	HUB100 located in radar closet A/C power input.	AC outlet located in radar closet, fed from distribution panel 1E3, breaker 11.	6 Feet
RDR/ECDIS-39	CAT 5E patch cable	HUB100 located in radar closet Port 5.	MC3000S located in radar closet, J3.	10 Feet
RDR/ECDIS-40	Belden 9316	MC3000S located in radar closet, J2 pins 1 & 2.	24 VDC fuse block located in Radar closet.	10 Feet
RDR/ECDIS-41	Belden 9312	Newmar power supply 115-24-10 located in bottom of Radar closet, 24 VDC output.	24 VDC fuse block located in Radar closet.	5 Feet
RDR/ECDIS-42	Factory Cable RW-00135	X-band Turning unit RSB-128 located aft on water monitor platform, connectors TB801& J281.	Aft facing X-Band radar PSU-014 located inside Port ship control station, connectors TB131 & J102.	75 Feet
RDR/ECDIS-43	CAT 5E (30M max length)	Aft facing X-band radar PSU-014 located inside Port ship control station connector J101.	Aft facing X-band radar EC3000 Processor unit D located on STBD side of Port ship control station, I/O board Connector J16.	20 Feet
RDR/ECDIS-44	TTYCSCLA-1Q (18 AWG 4 Conductor)	Aft facing X-band radar PSU-014 located inside Port ship control station, TB132.	EC3000 Processor unit D (Aft facing Radar), I/O board Connector J10.	20 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
RDR/ECDIS-45	CAT 5E	EC3000 Processor unit D (Aft facing Radar), LAN 1.	HUB3000 located in radar closet, Port. 4.	50 Feet
RDR/ECDIS-46	CAT 5E	EC3000 Processor unit D (Aft facing Radar), LAN 2.	HUB100 located in radar closet, Port 4.	50 Feet
RDR/ECDIS-47	Factory Cable (part of RCU-024)	EC3000 Processor unit D (Aft facing Radar), I/O board J12.	RCU-024 Trackball and Keypad J12.	6 Feet
RDR/ECDIS-48	Factory USB cable	EC3000 Processor unit D (Aft facing Radar), USB.	RCU-024 Trackball and Keypad USB.	6 Feet
RDR/ECDIS-49	Factory cable (DSUB9P-X2-A-L5M)	EC3000 Processor unit D (Aft facing Radar), COM1.	Aft facing Radar Hatteland Display HD 26T21 MMD MA4-FOGA, COM1.	6 Feet
RDR/ECDIS-50	Factory supplied DVI cable	EC3000 Processor unit D (Aft facing Radar), DVI1.	Aft facing Radar Hatteland Display HD 26T21 MMD MA4-FOGA, DVI input.	6 Feet
RDR/ECDIS-51	Factory A/C power cable	Aft Radar Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	GES-102N UPS located inside Aft facing Radar FHLCOMMPED pedestal on lower shelf, AC output.	6 Feet
RDR/ECDIS-52	Factory A/C power cable	EC3000 Processor unit D (Aft facing Radar), A/C input.	GES-102N UPS located inside Aft facing Radar FHLCOMMPED pedestal on lower shelf, AC output.	6 Feet
RDR/ECDIS-53	CAT 5E patch cable	EC3000 Processor unit D (Aft facing Radar), LAN 3	EC3000 Processor unit D (Aft facing Radar), I/O board J15	1 Feet
RDR/ECDIS-54	WF-H50-7S (20M)	S-band Transceiver Unit RTR-109, located in Radar closet on bridge, RF Output Microwave coaxial Plug.	S-Band Directional Coupler located inside Radar closet, RF input.	60 Feet
RDR/ECDIS-54-1	WF-H50-7S (20M)	S-Band Directional Coupler located inside Radar closet, RF output.	S-Band Turning Unit RSB-131 located on Main Mast lower platform, RF Input waveguide flange.	42 Feet
AIS-ECDIS	TTYCSLA-1Q	AIS terminal box J4, located on Port side of Radar closet. connector K4 ECDIS	ECDIS EC3000 Processor unit B, I/O board connector J3	30 Feet
GYC-RDR-X	TTYCSLA-1Q	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 2	X-band Radar EC3000 Processor unit A, I/O board connector J4	15 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

CABLE LABEL	CABLE TYPE	FROM	TO	Cable Length (Estimated)
GYC-ECDIS	TTYCSLA-1Q	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 4	ECDIS EC3000 Processor unit B, I/O board connector J4	20 Feet
GYC-RDR-S	TTYCSLA-1Q	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 3	S-band Radar EC3000 Processor unit C, I/O board connector J4	15 Feet
GYC-RDR-AFT	TTYCSLA-1Q	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	Aft facing radar EC3000 Processor unit D, I/O board connector J4	22 Feet
ALDBN-2	Belden 9322	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	Aldebaran Electronic charting computer on the port side of the Navigation Console, Com1, pins 2 and 5.	10 Feet
ES-RDR-X	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	X-band Radar EC3000 Processor unit A, I/O board connector J7	15 Feet
ES-ECDIS	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 3	ECDIS EC3000 Processor unit B, I/O board connector J7	20 Feet
ES-RDR-S	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 4	S-band Radar EC3000 Processor unit C, I/O board connector J7	30 Feet
ES-RDR-AFT	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 2	Aft Radar EC3000 Processor unit D, I/O board connector J7	30 Feet
RM-7	VGA cable	Black Box Video Switch input 4. Location is on Chart table shelf STBD side.	EC3000 ECDIS Processor unit B located STBD of Chart table, DVI12	10 Feet

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

T1-9 Government Furnished Equipment

Description	Part Number	Quantity
Processor Multifunction	EC3000	4
Furuno Trackball/Keyboard	RCU-024	4
Hatteland 26" display	HD 26T21 MMD MA4-FOGA	4
Mounting Bracket, Hatteland 26" Display	HD TMB SX1-C1	1
Radar Display and Processor Pedestal	FHLCOMMPED	4
Sensor Adapter Interface - Serial	MC3000S	1
Network Switch/Radar Interswitch	HUB3000	1
Sensor Data Network Switch	HUB100	1
25KW X Band Down mast Transceiver	RTR-108	1
30KW S Band Down mast Transceiver	RTR-109	1
Radar Power Supply	PSU-014	3
Cable Assembly, Radar Scanner - 30 Metres, Ethernet	RW-00135	3
25KW X Band Scanner Unit	RSB130N	1
30KW S Band Scanner Unit	RSB-131N	1
10KW X Band Scanner c/w transceiver	RSB-128-105N	1
Antenna unit to TR unit cable	Tricab RBA-DETD/10.75BK	100 feet
DVI-VGA adaptor	Foxconn CQHC000V-A11	3
Actisense Intelligent Buffer	PRO-BUF-1-BAS-R	3
Always On Marine UPS	GES-102N	4
Always On Battery Bank	BBU-102NA	4
Always On Isolation Transformer	3KVA Isolation Transformer	4
Belden Power Cable (MC3000S)	Belden 9316	30 feet
Newmar Power Supply 24VDC	115-24-10	1
Fuse Block 24VDC	BlueSea 5025	1
Isolation Switch	Moeller P1-25 with Housing	3
S-Band elliptical waveguide	WF-H50-7S (20M)	1
Power Supply to Transceiver connection cable	RW-00135	100 feet
Sensor interface cable	TTYCSLA-1Q	275 feet
Hatteland Display Brilliance Control Cable	DSUB9P-X2-A-L5M	4
Marine A/C cable	DVA-PVTD/3C2.5BK	450 feet
Belden Data Cable	Belden 9322	30 feet
Belden Power Cable (Newmar Power supply)	Belden 9312	30 feet
Belden Data cable CAT5E	Belden 1300SB	359 feet
Video cables	DVI	5
Video cables	VGA	1

Excess cable must be returned to the Canadian Coast Guard (CCG) upon completion of this installation.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

T1-10 Material to be supplied by Contractor

- WR-112 waveguide and bends as required for the connection of existing waveguide run to the Furuno X-band RSB-130N Antenna Unit.
- Materials for the construction and finishing of the Antenna Unit Pedestals.
- Materials for the construction and finishing of the FHLCOMMPED Display and Processor pedestal Mounting bases complete with mount for the Always ON Isolation Transformer.
- Mounting Brackets for fixing the Always ON UPS and Battery Bank to the lower shelves of the FHLCOMMPED Display and Processor pedestals.
- Stranded Copper green jacketed grounding wire as specified and required for the grounding of installed equipment.
- All materials required to complete statement of work. All cables are to be properly secured in existing cable trays. In locations where trays do not exist, appropriate hangers are to be installed.

T1-11 Set to Work / Commissioning

The Contractor shall notify the onsite CCG representative in advance as much as possible when the physical installation is complete. The onsite CCG representative will arrange for an OEM authorized field service representative (FSR) to conduct the set to work and commissioning of the Furuno Radar and ECDIS System. The installation will not be considered complete until the system has been commissioned.

T1-12 Documentation

The Contractor shall ensure that the Manuals supplied with the new equipment unit are returned to CCG prior to the acceptance of this item.