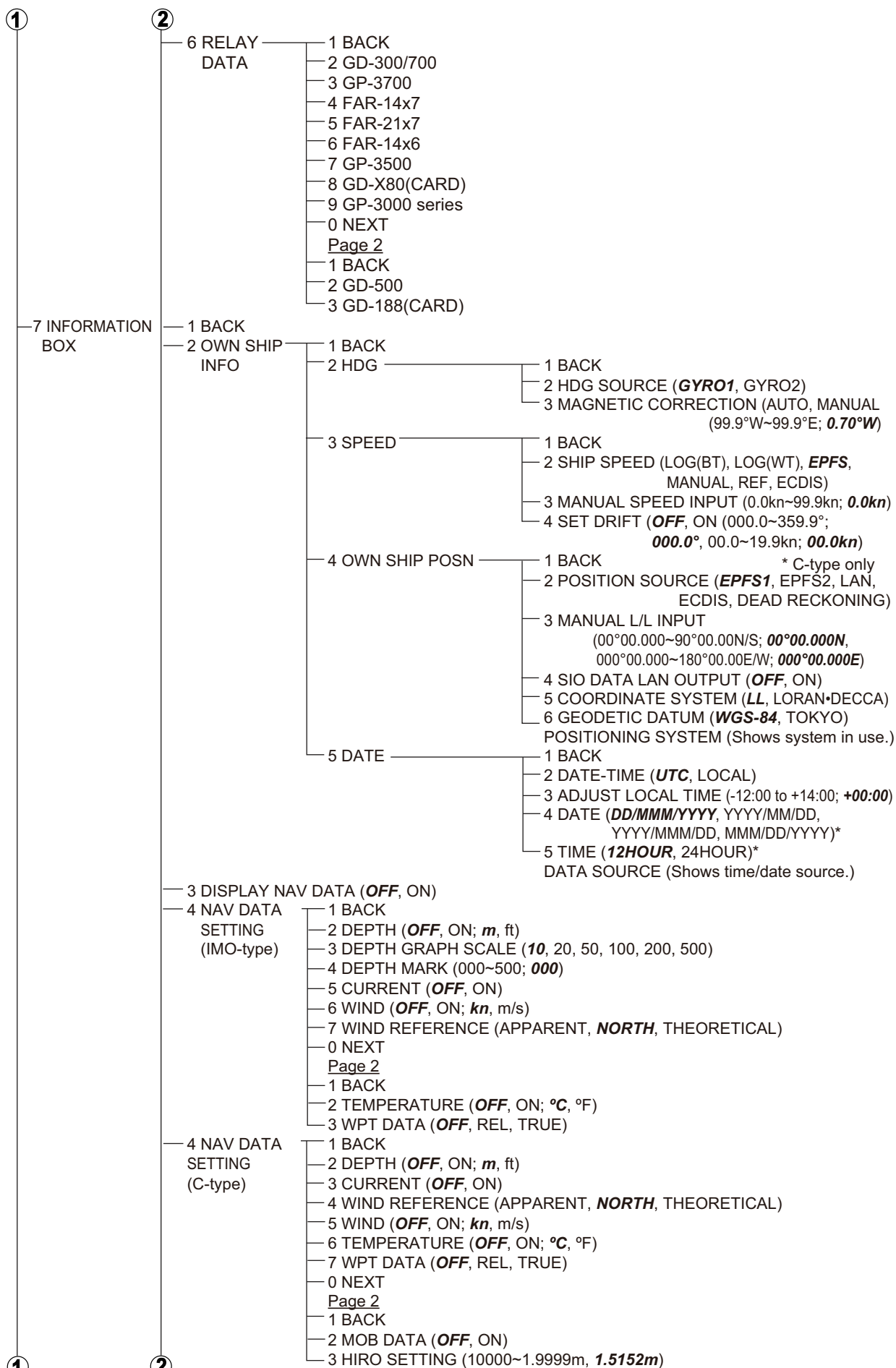
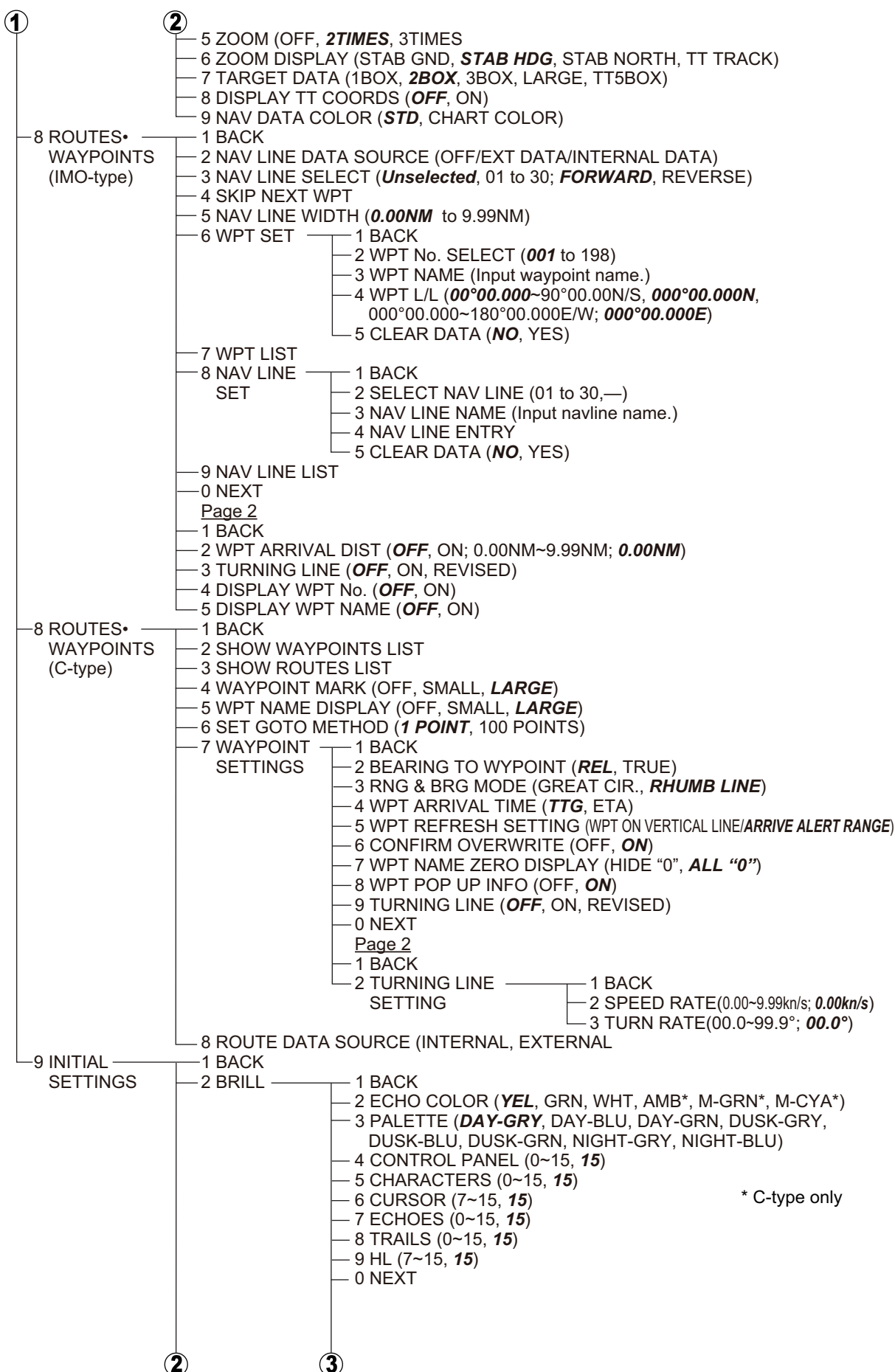
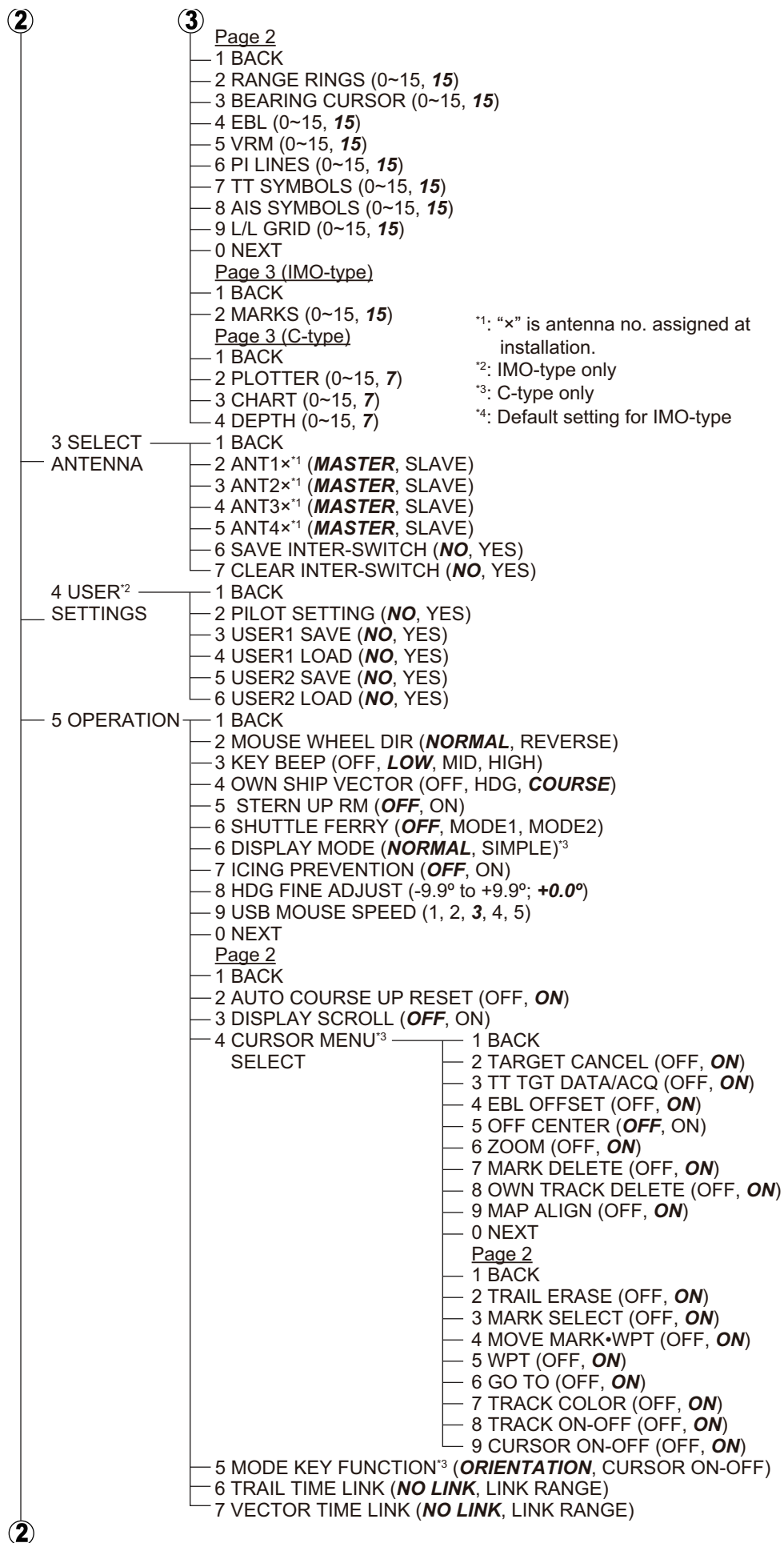


APPENDIX 1 MENU TREE





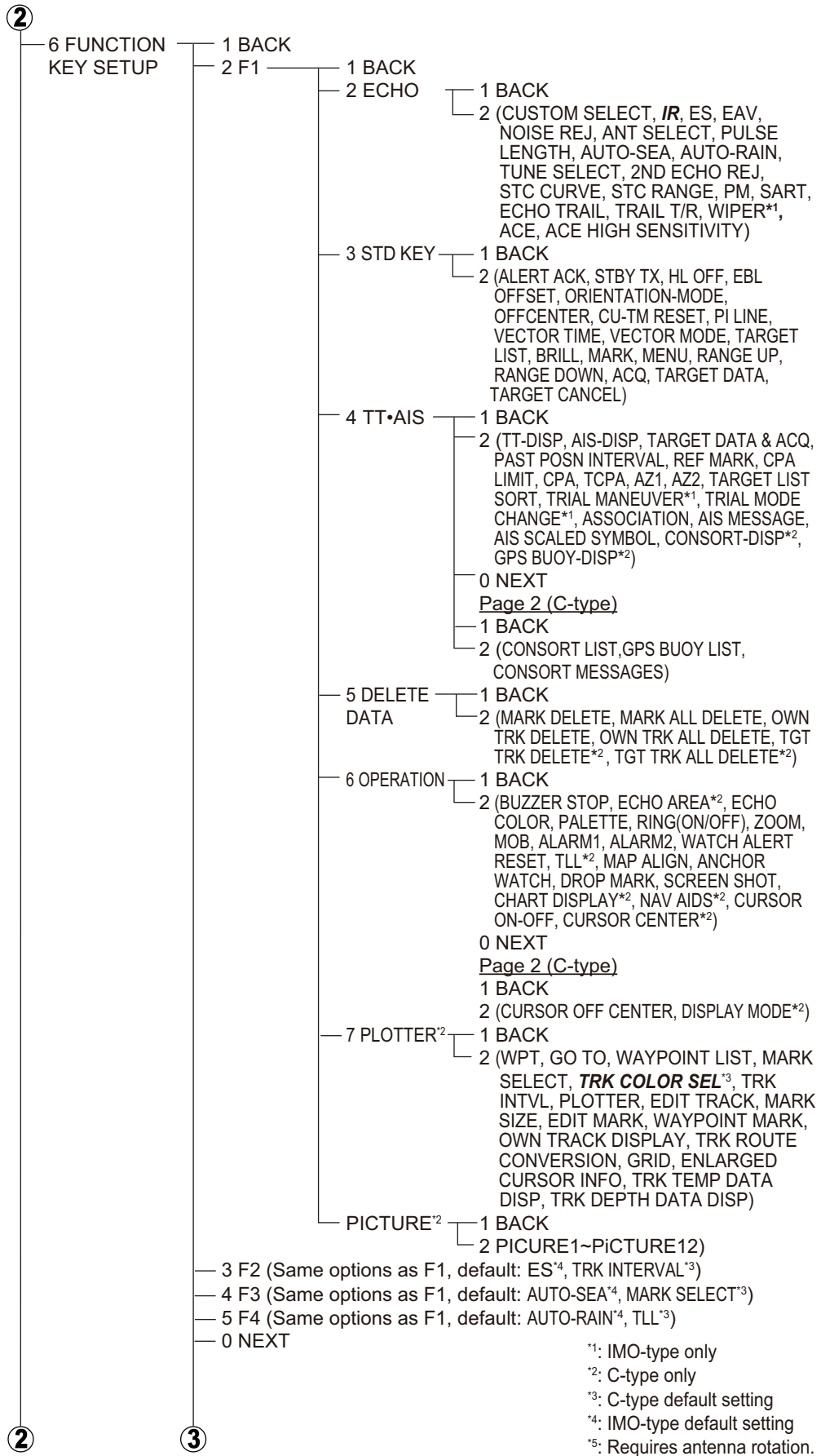


*1: "x" is antenna no. assigned at installation.

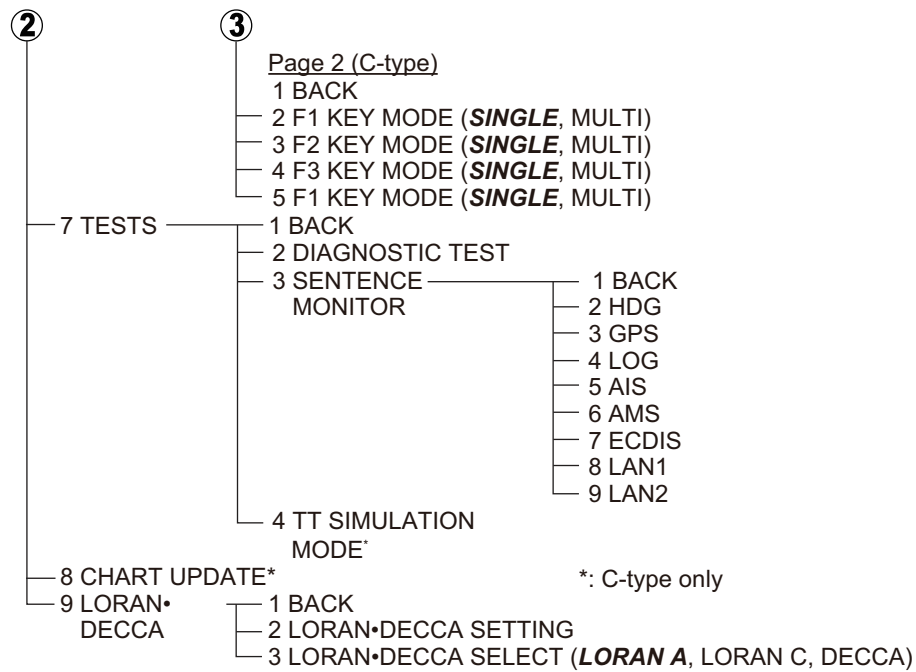
*2: IMO-type only

*3: C-type only

*4: Default setting for IMO-type



APPENDIX 1 MENU TREE



Right-click the display.

Default settings in bold italic.

- 2 (TARGET DATA / ACQ, TARGET CANCEL, TT TGT DATA / ACQ^{*1}, EBL OFFSET, OFF CENTER, ZOOM, MARK DELETE, OWN TRACK DELETE, MAP ALIGN, TRAIL ERASER², MARK SELECT², MOVE MARK•WPT², WPT², GO TO², TRACK COLOR², TRACK ON-OFF², CURSOR ON-OFF²)
- 0 NEXT
- Page 2
- 1 BACK
- 2 TGT DATA/ACQ SETTING (**ANY**, TT ONLY, AIS ONLY)
- 3 TGT CANCEL SETTING (**ANY**, TT ONLY, AIS ONLY)
- 4 CIRCLE CURSOR^{*1}
- 5 REF MARK^{*1}

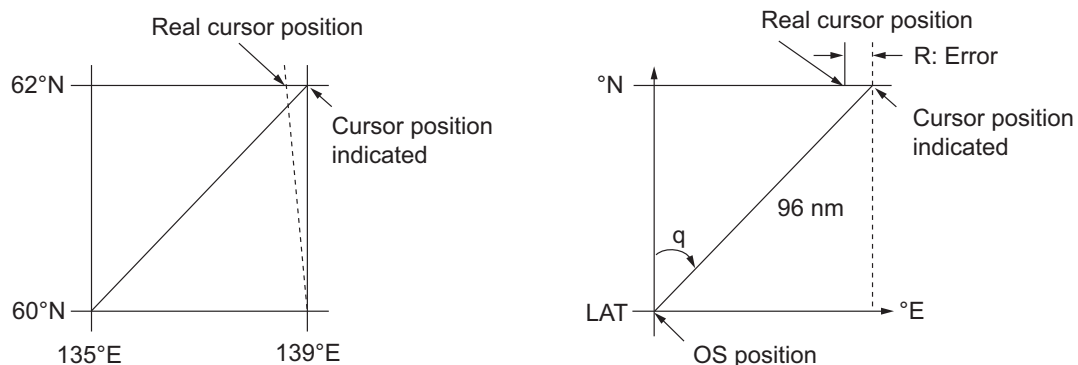
^{*1}: IMO-type only

^{*2}: C-type only

APPENDIX 2 LONGITUDE ERROR TABLE (96 NM SCALE)

The longitude lines concentrate on the north pole and south pole, namely, 1 nm is equivalent to 1 minute at 0 degree latitude, 2 minutes at 60 degrees latitude, 3 minutes at 70 degrees latitude and so on. For this reason, a longitude error occurs on the radar display.

For example, when own ship is at 60°N and 135°E, even if the cursor indication is 62°N and 139°E, the real cursor position is deviated to the left (west) side. The table below shows the longitude error, represented from 0° to 90° at 96 nm from the radar center (own ship).



(nm)									
LAT \ q	5°	10°	15°	20°	25°	30°	35°	40°	45°
75°	0.2256	0.4444	0.6496	0.8350	0.9950	1.1248	1.2202	1.2786	1.2980
70°	0.21980213	0.43290201	0.632803	0.8134132	0.96923215	1.09551918	1.1884382	1.24517456	1.26402037
65°	0.21229339	0.41810678	0.61115946	0.78556318	0.93600295	1.05790007	1.14755221	1.20224625	1.22034042
60°	0.20316898	0.40012949	0.58486463	0.75173456	0.89565021	1.0122297	1.09793265	1.15016811	1.16737294
55°	0.19249832	0.37910698	0.55411863	0.71218478	0.84848102	0.95885565	1.03998717	1.08933651	1.10552105
50°	0.18036264	0.35519924	0.51915545	0.66721485	0.79485438	0.89818413	0.97406698	1.02021439	1.03525547
45°	0.16685429	0.32858822	0.48024119	0.61716701	0.73517843	0.83067689	0.90076355	0.94332783	0.95711098
40°	0.15207608	0.29947644	0.437672	0.56242216	0.66990732	0.7568477	0.82060477	0.85926197	0.87168229
35°	0.13614047	0.26808546	0.39177186	0.53339693	0.59953781	0.67725844	0.73420069	0.76865661	0.77961957
30°	0.11916876	0.2346542	0.3428901	0.44054055	0.52460545	0.59251483	0.6422089	0.67220131	0.68162348
25°	0.10129001	0.19943707	0.29139874	0.37433139	0.44568053	0.50326182	0.54532952	0.57063015	0.57843983
20°	0.08264056	0.16270211	0.23768966	0.30527334	0.36336372	0.41017869	0.44429984	0.46471615	0.47085389
15°	0.06336208	0.12472888	0.18217162	0.23389198	0.27828148	0.31397386	0.33988878	0.35526538	0.35968447
10°	0.04360137	0.0858064	0.12526714	0.16073056	0.19108136	0.21537949	0.23289096	0.24311083	0.24577764
5°	0.02350833	0.04623087	0.0674093	0.08634588	0.10242699	0.11514595	0.1241207	0.12910605	0.13000029
0°	0.00323737	0.0063035	0.00903844	0.01130406	0.01299309	0.01403609	0.0144058	0.0141187	0.01323356

APPENDIX 2 LONGITUDE ERROR TABLE (96 NM SCALE)

(nm)

LAT \ q	50°	55°	60°	65°	70°	75°	80°	85°	90°
75°	1.2780	1.2192	1.1233	0.9933	0.8332	0.6479	0.4431	0.2249	0
70°	1.24442563	1.18701379	1.09356117	0.96694117	0.81103484	0.3061092	0.43117887	0.21881975	0
65°	1.20131324	1.14577786	1.05546143	0.93315023	0.78260251	0.60843159	0.41596331	0.21107193	0
60°	1.14905813	1.09582188	1.00932899	0.89225746	0.74821409	0.58162173	0.397582	0.20171772	0
55°	1.08805799	1.03752602	0.95551494	0.84457408	0.70813132	0.55038538	0.37617487	0.19082831	0
50°	1.0187708	0.97133397	0.89442885	0.79046297	0.66265924	0.51496026	0.35190481	0.17848659	0
45°	0.94174265	0.89774948	0.82653562	0.73033596	0.61214392	0.47561599	0.32495654	0.16478648	0
40°	0.85754099	0.81733258	0.75235195	0.66465066	0.55696981	0.43265198	0.29553516	0.14983224	0
35°	0.76681293	0.73069528	0.63744242	0.59390696	0.49755683	0.38639524	0.26386458	0.13373769	0
30°	0.67024897	0.63849695	0.58741521	0.51864327	0.43435714	0.33719779	0.23018583	0.11662531	0
25°	0.568584	0.54143927	0.49791741	0.43943239	0.36785173	0.28543407	0.19475522	0.09862535	0
20°	0.46259176	0.44026091	0.40463016	0.35687717	0.29854675	0.23149802	0.15784242	0.07987479	0
15°	0.35307892	0.3357319	0.30826343	0.2716059	0.22696965	0.17580013	0.11972833	0.06051633	0
10°	0.2487894	0.22864776	0.20955062	0.18426754	0.15366517	0.1187643	0.08070304	0.0406973	0
5°	0.12684572	0.11982348	0.10624302	0.09552679	0.0791912	0.04106355	0.04106355	0.02056855	0
0°	0.01184713	0.01008727	0.008104	0.00605903	0.00411455	0.00111154	0.00111154	0.00028325	0

APPENDIX 3 ALERT CODES, MESSAGES & MEANINGS

For ALF format alerts, the alert identifier (the first three/five digits of the alert code), is displayed on the alert list and in the alert box. The alert instance (the last one or two digits of the alert code), is transferred along with it's identifier to the connected Bridge Alert Management System. The table below shows the alert ID for ALF formats alerts, with the instance separated by a comma. ALR format alerts have no instance assigned.

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
-	52190,1	TARGET CAPACITY	Caution Cat: B	Message: "TT TARGET 95%(AUTO)" Meaning: Automatically acquired target capacity has reached 95%.
Remedy: Press the ALARM ACK key. Remove TT symbols manually.				
523	190,2	TARGET CAPACITY	Warning Cat: A	Message: "TT TARGET FULL(AUTO)" Meaning: Automatically acquired target capacity has reached 100%.
Remedy: Press the ALARM ACK key. Remove TT symbols manually.				
-	52190,3	TARGET CAPACITY	Caution Cat: B	Message: "TT TARGET 95%(MAN)" Meaning: Manually acquired target capacity has reached 95%.
Remedy: Press the ALARM ACK key. Remove TT symbols manually.				
525	190,4	TARGET CAPACITY	Warning Cat: A	Message: "TT TARGET FULL(MAN)" Meaning: Manually acquired target capacity has reached 100%.
Remedy: Press the ALARM ACK key. Remove TT symbols manually.				
-	52190,5	TARGET CAPACITY	Caution Cat: B	Message: "AIS DISPLAY 95%" Meaning: AIS display capacity has reached 95% (333 targets).
Remedy: Press the ALARM ACK key. Adjust [AIS DISP FILTER] settings to decrease the number of targets displayed.				
531	190,6	TARGET CAPACITY	Warning Cat: A	Message: "AIS DISPLAY FULL" Meaning: AIS display capacity has reached 100% (350 targets).
Remedy: Press the ALARM ACK key. Adjust [AIS DISP FILTER] settings to decrease the number of targets displayed.				
-	52190,8	TARGET CAPACITY	Caution Cat: B	Message: "AIS CAPACITY FULL" Meaning: AIS capacity has reached 100% (1200 targets).
Remedy: Press the ALARM ACK key. Adjust [AIS DISP FILTER] settings to decrease the number of targets displayed.				
-	52190,9	TARGET CAPACITY	Caution Cat: B	Message: "ACTIVE AIS 95%" Meaning: Active AIS target capacity has reached 95% (48 targets).
Remedy: Press the Press the ALARM ACK key . Sleep all unnecessary AIS targets.				
535	190,10	TARGET CAPACITY	Warning Cat: A	Message: "ACTIVE AIS FULL" Meaning: Active AIS target capacity has reached 100% (50 targets).
Remedy: Press the ALARM ACK key. Sleep all unnecessary AIS targets.				

APPENDIX 3 ALERT CODES, MESSAGES & MEANINGS

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
526	191,1	CPA/TCPA	Alarm Cat: A	Message: "TT DANGER OF COLLISION" Meaning: TT is within CPA/TCPA threshold, danger of collision.
Remedy: Press the ALARM ACK key. Take evasive action if necessary. Adjust CPA/TCPA settings.				
536	191,2	CPA/TCPA	Alarm Cat: A	Message: "AIS DANGER OF COLLISION" Meaning: AIS target is within CPA/TCPA threshold, danger of collision.
Remedy: Press the ALARM ACK key. Take evasive action if necessary. Adjust CPA/TCPA settings.				
521	192,1	NEW TARGET	Warning Cat: A	Message: "TT NEW TARGET" Meaning: A new TT target has entered the Acquisition Zone.
Remedy: Press the ALARM ACK key. Confirm location of new target.				
529	192,2	NEW TARGET	Warning Cat: A	Message: "AIS NEW TARGET" Meaning: A new AIS target has entered the Acquisition Zone.
Remedy: Press the ALARM ACK key. Confirm location of new target.				
527	193,1	LOST TARGET	Warning Cat: A	Message: "TT TARGET LOST" Meaning: TT target is lost.
Remedy: Press the ALARM ACK key. Lost target indication (blinking in red) is removed.				
528	193,2	LOST TARGET	Warning Cat: A	Message: "REF TARGET LOST" Meaning: REF targets is lost.
Remedy: Press the ALARM ACK key. Lost target indication (blinking in red) is removed.				
537	193,3	LOST TARGET	Warning Cat: A	Message: "AIS TARGET LOST" Meaning: AIS target is lost.
Remedy: Press the ALARM ACK key. Lost target indication (blinking in red) is removed.				
720	194,1	SYSTEM ERROR	Warning Cat: B	Message: "NO HEADLINE SIGNAL" Meaning: Heading marker signal interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
721	194,2	SYSTEM ERROR	Warning Cat: B	Message: "NO AZIMUTH SIGNAL" Meaning: Antenna signal is interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
722	194,3	SYSTEM ERROR	Warning Cat: B	Message: "NO TRIGGER SIGNAL" Meaning: Antenna trigger interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
723	194,4	SYSTEM ERROR	Warning Cat: B	Message: "NO VIDEO SIGNAL" Meaning: Video signal interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
70	194,5	SYSTEM ERROR	Warning Cat: B	Message: "CTRL UNIT COM ERROR" Meaning: Keyboard (RCU-014/015/016) signal interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
782	194,6	SYSTEM ERROR	Warning Cat: B	Message: "PM COM ERROR" Meaning: PM communication error.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
48	194,7	SYSTEM ERROR	Warning Cat: B	Message: "TUNE ERROR" Meaning: TUNE error due to faulty settings or malfunction.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
727	194,8	SYSTEM ERROR	Warning Cat: B	Message: "RADAR ANT COM ERROR" Meaning: Signal between processor and antenna interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
781	194,9	SYSTEM ERROR	Warning Cat: B	Message: "MTR-DRV COM ERROR" Meaning: Signal between antenna's SPU and MTR-DRV interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
783	194,10	SYSTEM ERROR	Warning Cat: B	Message: "RF-CONVERTER COM ERROR" Meaning: Signal between antenna's SPU and RF-CONVERTER interrupted/lost.
Remedy: Press the ALARM ACK key. Restore signal or rectify reason for signal loss.				
784	194,11	SYSTEM ERROR	Warning Cat: B	Message: "LAN1 NETWORK ERROR" Meaning: LAN1 IP address is use by other equipment.
Remedy: Press the ALARM ACK key. Check IP settings and assign a unique IP address.				
785	194,12	SYSTEM ERROR	Warning Cat: B	Message: "LAN2 NETWORK ERROR" Meaning: LAN1 IP address is use by other equipment.
Remedy: Press the ALARM ACK key. Check IP settings and assign a unique IP address.				
786	194,13	SYSTEM ERROR* ⁶	Warning Cat: B	Message: "RP COM ERROR" Meaning: Signal between MAIN board and RP board in the processor is interrupted or lost.
Remedy: Press the ALARM ACK key. Restore the signal or rectify the reason for the signal loss.				
787	194,14	SYSTEM ERROR* ⁶	Warning Cat: B	Message: "NO TUNE GATE SIGNAL" Meaning: No tune gate signal from the FAR-2x58/FAR-2268DS antenna.
Remedy: Press the ALARM ACK key. Consult your local dealer for service.				
788	194,15	SYSTEM ERROR* ⁶	Warning Cat: B	Message: "RP VERSION MISMATCH" Meaning: MAIN board and RP board software versions do not match.
Remedy: Press the ALARM ACK key. Consult your dealer for a software update.				
789	194,16	SYSTEM ERROR* ⁶	Warning Cat: B	Message: "TX-HV ERROR" Meaning: FAR-2x58/FAR-2268DS Antenna voltage is below 300 V.
Remedy: Press the ALARM ACK key. Turn the PSU-019 power on. If the problem persists, consult your local dealer for service.				
485	52485,1	DEPTH	Warning Cat: B	Message: "DEPTH ALERT" Meaning: Ship position outside set anchor watch zone.
Remedy: Press the ALARM ACK key. Confirm Own Ship location and adjust as necessary.				

APPENDIX 3 ALERT CODES, MESSAGES & MEANINGS

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
495	52495,1	ANCHOR WATCH	Warning Cat: B	Message: "OUT OF ANCHOR WATCH ZONE" Meaning: Ship position outside set anchor watch zone.
Remedy: Press the ALARM ACK key. Confirm Own Ship location and adjust as necessary.				
-	52540,1	AIS MSG	Caution Cat: B	Message: "TRANSMIT ERROR" Meaning: Unable to transmit AIS binary message.
Remedy: Press the ALARM ACK key. Check power to AIS unit.				
450	52601,1	SENSOR ERROR	Warning Cat: B	Message: "NO GYRO SIGNAL" Meaning: No heading information received from gyrocompass for five seconds.
Remedy: Press the ALARM ACK key. Match the on-screen indication with the actual gyrocompass.				
278	52601,2	SENSOR ERROR* ¹	Warning/ Caution Cat: B	Message: "NO LOG(WT) SIGNAL" Meaning: No speed data received for five seconds when [LOG(WT)] is set as speed reference.
Remedy: Press the ALARM ACK key. Check SDME sensor. Use a different sensor if necessary.				
284	52601,3	SENSOR ERROR* ²	Warning/ Caution Cat: B	Message: "NO LOG(BT) SIGNAL" Meaning: No speed data received for thirty seconds when [LOG(BT)] is set as speed reference.
Remedy: Press the ALARM ACK key. Check SDME sensor. Use a different sensor if necessary.				
170	52601,4	SENSOR ERROR	Warning Cat: B	Message: "NO POSITION SIGNAL" Meaning: EPFS Error. No position data received from EPFS device for thirty seconds.
Remedy: Press the ALARM ACK key. Restore the signal. This indication cannot be erased if the position signal is missing. The indication is automatically removed when the signal is restored.				
469	52601,5	SENSOR ERROR	Warning Cat: B	Message: "POSITION DATUM UNKNOWN" Meaning: DTM sentence not received for thirty seconds, or erroneous data received.
Remedy: Press the ALARM ACK key. Use the WGS-84 datum.				
272	52601,6	SENSOR ERROR	Warning Cat: B	Message: "NO UTC SIGNAL" Meaning: UTC error. No date or time data received for thirty seconds. No ZDA sentence input.
Remedy: Press the ALARM ACK key. Restore the signal to remove this indication.				
380	52601,7	SENSOR ERROR	Warning Cat: B	Message: "AIS COM ERROR" Meaning: No AIS data received for thirty seconds. Note: When [AIS FUNC] is set to [OFF], this message is prioritized as a Caution level alert; when [AIS FUNC] is set to [ON], it is prioritized as a Warning level alert.
Remedy: Press the ALARM ACK key. Check power and connection to AIS unit.				

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
279	52601,8	SENSOR ERROR	Warning Cat: B	Message: "NO COG/SOG SIGNAL" Meaning: EPFS Error. No COG/SOG data received from EPFS device for thirty seconds.
Remedy: Press the ALARM ACK key. Restore the signal. This indication cannot be erased if the COG/SOG signal is missing. The indication is automatically removed when the signal is restored.				
50	52601,9	SENSOR ERROR	Warning Cat: B	Message: "ECDIS COM ERROR" Meaning: No ECDIS data received for thirty seconds.
Remedy: Press the ALARM ACK key. Check power and connection to ECDIS unit.				
-	52602,1	SOURCE CHANGE	Caution Cat: B	Message: "POSN SOURCE CHG" Meaning: Positioning sensor input lost, automatically changed sensors.
Remedy: Press the ALARM ACK key. The indication is automatically removed when the signal is restored or a different sensor is selected.				
-	52602,2	SOURCE CHANGE	Caution Cat: B	Message: "SPD SOURCE CHG" Meaning: Speed sensor input lost, automatically changed sensors.
Remedy: Press the ALARM ACK key. The indication is automatically removed when the signal is restored or a different sensor is selected.				
-	52602,3	SOURCE CHANGE	Caution Cat: B	Message: "HDG SOURCE CHG" Meaning: Heading sensor input lost, automatically changed sensors.
Remedy: Press the ALARM ACK key. The indication is automatically removed when the signal is restored or a different sensor is selected.				
740	52740,1	EXT RADAR ERROR	Warning Cat: B	Message: "EXT RADAR NO SIGNAL" Meaning: Selected radar has an error. (Only displayed when Interswitch is active.)
Remedy: Press the ALARM ACK key. Restore the external radar to normal operating condition.				
750	52740,2	EXT RADAR ERROR	Warning Cat: B	Message: "EXT RADAR COM ERROR" Meaning: Communication with external radar interrupted or lost. (Only displayed when Interswitch is active.)
Remedy: Press the ALARM ACK key. Check connection and power to the external radar.				
790	52790,1	ARRIVAL	Warning Cat: B	Message: "ARRIVED AT WPT" Meaning: Ship has entered the destination arrival alert zone. Note: This alert appears on C-type radars only.
Remedy: Press the ALARM ACK key. No other action required.				
791	52791,1	XTD LIMIT	Warning Cat: B	Message: "XTD LIMIT EXCEEDED" Meaning: Cross-track error, ship is off-course. Note: This alert appears on C-type radars only.
Remedy: Press the ALARM ACK key. Check course and adjust as necessary.				
-	52001,1	HW STATUS NOTICE	Caution Cat: B	Message: "RPU:FAN1 SPD ERROR" Meaning: FAN1 in the processor unit has low RPM.
Remedy: Press the ALARM ACK key. Have a qualified technician check the fan.				

APPENDIX 3 ALERT CODES, MESSAGES & MEANINGS

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
-	52001,2	HW STATUS NO-TICE	Caution Cat: B	Message: "RPU:FAN2 SPD ERROR" Meaning: FAN2 in the processor unit has low RPM.
Remedy: Press the ALARM ACK key. Have a qualified technician check the fan.				
-	52001,3	HW STATUS NO-TICE	Caution Cat: B	Message: "RPU:FAN3 SPD ERROR" Meaning: FAN3 in the processor unit has low RPM.
Remedy: Press the ALARM ACK key. Have a qualified technician check the fan.				
-	52001,4	HW STATUS NO-TICE	Caution Cat: B	Message: "RPU:HIG HIGH TEMP" Meaning: Temperature in the processor unit is above limit.
Remedy: Press the ALARM ACK key. Lower the temperature.				
-	52001,5	HW STATUS NO-TICE	Caution Cat: B	Message: "MONITOR:HIG HIGH TEMP" Meaning: Temperature in the monitor unit is above limit.
Remedy: Press the ALARM ACK key. Lower the temperature.				
-	52001,6	HW STATUS NO-TICE* ⁶	Caution Cat: B	Message: "RPU:FAN (RP) SPD ER-ROR" Meaning: The RPU fan on the RP board, in the processor unit, has low RPM.
Remedy: Press the ALARM ACK key. Have a qualified technician check the fan.				
-	52001,11	HW STATUS NO-TICE	Caution Cat: B	Message: "MD TYPE MISMATCH"* ³ Meaning: Unable to detect the MD board bandwidth.
Remedy: Press the ALARM ACK key. Check connections to the antenna.				
-	52001,12	HW STATUS NO-TICE	Caution Cat: B	Message: "PM TYPE MISMATCH"* ³ Meaning: FAN1 in the processor unit has low RPM.
Remedy: Press the ALARM ACK key. Have a qualified technician check the fan.				
-	52001,21	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:TEMP HIGH" Meaning: MTR-DRV board temperature is above limit.
Remedy: Press the ALARM ACK key. Lower the temperature.				
-	52001,22	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:OVER CUR-RENT" Meaning: MTR-DRV board power input from the motor is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the motor.				
-	52001,23	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:MOTOR POWER ERROR" Meaning: MTR-DRV board motor's voltage is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the motor.				
-	52001,24	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:P12V POWER ERROR" Meaning: Voltage in the +12V line of the MTR-DRV motor is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the power supply.				

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
-	52001,25	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:HALL SENSOR ERROR" Meaning: Error in the hall sensor signal detected by the MTR-DRV board.
Remedy: Press the ALARM ACK key. Have a qualified technician check the hall sensor.				
-	52001,26	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:ANTENNA LOCK" Meaning: Antenna lock detected by the MTR-DRV board.
Remedy: Press the ALARM ACK key. Unlock the antenna.				
-	52001,27	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:POWER SUPPLY ERROR" Meaning: MTR-DRV board detected an drop in power.
Remedy: Press the ALARM ACK key. Have a qualified technician check the power supply.				
-	52001,28	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:BRAKE RESISTANCE ERROR" Meaning: MTR-DRV board detected an error in the brake resistance.
Remedy: Press the ALARM ACK key. Have a qualified technician check the antenna brake.				
-	52001,29	HW STATUS NO-TICE	Caution Cat: B	Message: "MTR-DRV:OVERLOAD" Meaning: MTR-DRV board detected an overload.
Remedy: Press the ALARM ACK key. Have a qualified technician check the motor.				
-	52001,31	HW STATUS NO-TICE	Caution Cat: B	Message: "PM:P12V POWER ERROR" Meaning: Voltage in the +12V line of the PM board is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the power supply.				
-	52001,32	HW STATUS NO-TICE	Caution Cat: B	Message: "PM:PLL UNLOCK" Meaning: PM board's PLL is unlocked.
Remedy: Press the ALARM ACK key. Have a qualified technician check the PM board.				
-	52001,41	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:P6V POWER ERROR"*4 Meaning: Voltage in the +6V line of the RF-Converter is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the power.				
-	52001,42	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:P48V POWER ERROR"*4 Meaning: Voltage in the +6V line of the RF-Converter is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the power.				
-	52001,43	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:IF PLL UNLOCK"*4 Meaning: PLL lock on the IF side of the RF-Converter is unlocked.
Remedy: Press the ALARM ACK key. Have a qualified technician check the RF-Converter.				
-	52001,44	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:PLL UNLOCK"*4 Meaning: PLL lock on the RF side of the RF-Converter is unlocked.
Remedy: Press the ALARM ACK key. Have a qualified technician check the RF-Converter.				

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
-	52001,45	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:OUTPUT SIGNAL LEVEL ERROR"*4 Meaning: Signal output from the RF Converter is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the RF-Converter.				
-	52001,46	HW STATUS NO-TICE	Caution Cat: B	Message: "RF-CONV:INTPUT SIGNAL LEVEL ERROR"*4 Meaning: Signal input to the RF Converter is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the RF-Converter.				
-	52001,47	HW STATUS NO-TICE	Caution Cat: B	Message: "HPA:OUTPUT SIGNAL LEVEL ERROR"*4 Meaning: Signal output from the HPA board is outside rating.
Remedy: Press the ALARM ACK key. Have a qualified technician check the HPA board.				
-	52001,48	HW STATUS NO-TICE	Caution Cat: B	Message: "HPA:OUTPUT PEAK CURRENT ERROR"*4 Meaning: Peak current detected in the signal output from the HPA board.
Remedy: Press the ALARM ACK key. Have a qualified technician check the HPA board.				
-	52001,52	HW STATUS NO-TICE	Caution Cat: B	Message: "VSWR ERROR"*4 Meaning: Abnormal VSWR detected by the RF Converter.
Remedy: Press the ALARM ACK key. Have a qualified technician check the antenna.				
83	52002,01	HW STATUS ERROR	Warning Cat: B	Message: "RPU FAN1 NO ROTATION" Meaning: Fan1 in the processor unit is stopped or disconnected.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				
84	52002,02	HW STATUS ERROR	Warning Cat: B	Message: "RPU FAN2 NO ROTATION" Meaning: Fan2 in the processor unit is stopped or disconnected.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				
85	52002,03	HW STATUS ERROR	Warning Cat: B	Message: "RPU FAN3 NO ROTATION"*6 Meaning: Fan3 in the processor unit is stopped or disconnected.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				
86	52002,04	HW STATUS ERROR*5	Warning Cat: B	Message: "RPU FAN (RP) NO ROTATION" Meaning: The RPU fan on the RP board, in the processor unit, is stopped or disconnected.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				
87	52002,05	HW STATUS ERROR*5	Warning Cat: B	Message: "RPU RP HW ERROR"*7 Meaning: The RP board has stopped working. Charts and marks cannot be displayed.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				

ALR Alert ID	ALF Alert ID	Alert title	Priority & Category	Alert description
-	52729,01	POSN INT ERROR	Caution Cat: B	Message: "POSN INTERVAL ERROR" Meaning: Positioning interval (Lat/Lon) cycle has exceeded 10 seconds for a period of three minutes or more.
Remedy: Press the ALARM ACK key. Check the output settings for the connected EPFS device. Adjust output interval (cycle) as required.				
792	52792,01	CHART ERROR* ⁵	Warning Cat: B	Message: "CHART MEMORY ERROR" Meaning: An error has occurred while loading chart data.
Remedy: Press the ALARM ACK key. Have a qualified technician check the processor unit.				
570	52570,01	LEAVE* ⁵	Warning Cat: B	Message: "DESTINATION LEAVE" Meaning: Your ship has passed beyond the set distance while the [WAYPOINT DEPARTURE ALERT] is active.
Remedy: Press the ALARM ACK key. Check your route and waypoints and steer your vessel accordingly.				
571	52571,01	INTRUSION* ⁵	Warning Cat: B	Message: "INTRUSION BAN" Meaning: Your ship has entered a pre-set "no-go-zone" while the [NO GO ZONE] alert is active.
Remedy: Press the ALARM ACK key. Move your vessel away from the no-go-zone.				
572	52572,01	TEMPERATURE* ⁵	Warning Cat: B	Message: "WATER TEMPERATURE ALERT" Meaning: A change in water temperature was detected that matches the criteria for the [WATER TEMP ALERT].
Remedy: Press the ALARM ACK key. Move your vessel to an area within the alert limits.				
573	52573,01	CURRENT* ⁵	Warning Cat: B	Message: "CURRENT RIP" Meaning: A temperature change was detected that matches the criteria set for [SHEER ALERT].
Remedy: Press the ALARM ACK key. Move your vessel to an area within the alert limits.				

*1: When LOG(WT) is not selected, the alert priority for this alert is changed to "Caution". Caution level alerts are not shown on C-type radars.

*2: When LOG(BT) is not selected, the alert priority for this alert is changed to "Caution". Caution level alerts are not shown on C-type radars.

*3: This alert is output on magnetron radars only.

*4: This alert appears on S-BAND SSD radars only.

*5: This alert is output only on C-types radars.

*6: This alert is output only on S-BAND radars with High Speed Kits installed.

*7: When this alert is rectified, [Chart] button appears in yellow color. Click the [Chart] button to restore the system to normal operation.

APPENDIX 4 DATA COLOR AND MEANING

Validity and integrity of input data (mode indicator)

Data color	HDG	L/L	SPD	COG/SOG
Normal color (normal data)	THS-A, E HDT	GNS-A, D * ¹ , F, P, R and (NAV status: S, V) GGA-1, 2 * ¹ , 3, 4, 5 GLL-A, D and (status: A) RMC-A, D, F, P, R and (status: A) and (NAV status: S, V)	VBW-A VHW	VTG-A, D, P RMC-A, D, F, P, R and (status: A) and (NAV status: S, V).
Yellow-or-ange color (invalid data)		GNS-E, M, S GGA-6, 7, 8 GLL-E, M, S and (status: A) RMC-E, M, S and (Status: A)		VTG-E, M, S RMC-E, M, S, and (status: A)
Yellow color (low integrity)		GNS-A, D* ¹ , F, P, R, and (NAV status: C, U) RMC-A, D, F, P, R and (status: A) and (NAV status: C, U)		RMC-A, D, F, P, R and (status: A) and (NAV status: C, U)
***.*	THS-M, V, S	GNS-N GGA-0 RMC-N, (status: V), (NAV status: N) GLL-N, (status: V)	VBW-V	VTG-N RMC-N (status: V)

*¹: "Age of differential GPS data" in GGA and GNS sentences is ten seconds or higher. In this case, ship's latitude and longitude are displayed in yellow.

APPENDIX 5 ABBREVIATIONS

A:

Abbreviation	Word	Abbreviation	Word
ACK	Acknowledge	ACQ	Acquire
Act	Activate	ACE	Automatic Clutter Elimination
ANT	Antenna	AIS	Automatic Identification System
AP	Autopilot	ATON	Aids to Navigation
AUTO	Automatic	A/C RAIN	Anti Clutter Rain
A/C SEA	Anti Clutter Sea	AID	Aid
ALF	ALF sentence	ALR	Alarm
AMB	Amber	AMS	Alert Management System
APR	April	ARC	Arc
AUG	August		

B:

Abbreviation	Word	Abbreviation	Word
BLU	Blue	BCR	Bow Crossing Range
BCT	Bow Crossing Time	BRG	Bearing
BRILL	Brilliance	BT	Bottom Tracking

C:

Abbreviation	Word	Abbreviation	Word
CALC	Calculated	CALIB	Calibrate
CH	Channel	CHG	Change
CCRP	Consistent Common Reference Point	CONT	Continue
CPA	Closest Point of Approach	CORR	Corrected/Correction
CPU	Central Processing Unit	CRS	Course
CTW	Course Through the Water	COG	Course Over Ground
CU	Course Up	CYA	Cyan

D:

Abbreviation	Word	Abbreviation	Word
DTM	Datum	DEC	December
deg	degree(s)	DEST	Destination
DGPS	Differential GPS	DISP	Display
DIST	Distance	DR	Dead Reckoning

APPENDIX 5 ABBREVIATIONS

E:

Abbreviation	Word	Abbreviation	Word
E	East	EAV	Echo Averaging
EBL	Electronic Bearing Line	EBRL	Electronic Bearing Range Line
ECDIS	Electronic Chart Display and Information System	EP	Estimated Position
EQUIP	Equipment	ERR	Error
ES	Echo Stretch	ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure	EXT	External

F:

Abbreviation	Word	Abbreviation	Word
FEB	February	FILT	Filter/Filtered
FUNC	Function		

G:

Abbreviation	Word	Abbreviation	Word
GAP	Gap	GC	Great Circle
GND	Ground	GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System	GRAD	Gradation
GRN	Green	GRY	Gray
GT	Gross Tonnage		

H:

Abbreviation	Word	Abbreviation	Word
HD	Heading	HDG	Heading
HL	Heading Line	HSC	High Speed Craft

I:

Abbreviation	Word	Abbreviation	Word
IBS	Integrated Bridge System	ID	Identification
IMO	International Maritime Organization	INT	Interval
INS	Integrated Navigation System	INFO	Information
IR	Interference Rejection	IP ADDRESS	Internet Protocol Address

J:

Abbreviation	Word	Abbreviation	Word
JAN	January	JUN	June
JUL	July		

L:

Abbreviation	Word	Abbreviation	Word
L	Long pulse	LAT	Latitude
LAN	Local Area Network	LCD	Liquid Crystal Display
LIM	Limit	L/L	Latitude/Longitude
LOG	Log	LON	Longitude
LOP	Line Of Position		

M:

Abbreviation	Word	Abbreviation	Word
MAG	Magnetic	MAG	Magenta
MAN	Manual	MAR	March
MAX	Maximum	MAY	May
MBS	Main Bang Suppression	M-CYA	Multi Cyan
MD	Modulator	MENU	Menu
MFDF	Medium Frequency Direction Finder	MIC	Monolithic Integrated Circuit
M-GRN	Multi Green	M1	Medium pulse 1
MID	Middle	M3	Medium pulse 3
M2	Medium pulse 2	MON	Monday
MOB	Man Over Board	MSC	Maritime Safety Committee
Msgs	Messages	MTR-DRV	Motor Drive

N:

Abbreviation	Word	Abbreviation	Word
N	North	NAV	Navigation
NLT	Not Less Than	NMT	Not More Than
NOV	November	NR	Noise Rejector

O:

Abbreviation	Word	Abbreviation	Word
OS	Own Ship	OCT	October

P:

Abbreviation	Word	Abbreviation	Word
PAST POSN	Past Positions	PC	Personal Computer
PI	Parallel Index Line	PLT	Palette
PLL	Phase Locked loop	PM	Performance Monitor
PNK	Pink	POSN	Position
PPI	Plan Position Indicator		

APPENDIX 5 ABBREVIATIONS

R:

Abbreviation	Word	Abbreviation	Word
RACON	Radar beacon	RAD	Radius
RAM	Random Access Memory	RAIN	Anti Clutter Rain
RD	Read	RED	Red
REF	Reference/Echo Reference	R, REL	Relative
REJ	Rejection	RENC	Regional ENC Co-ordinating Centre
RFC board	RF Control board	RL	Rhumb Line
RM	Relative Motion	RNG	Range
ROM	Read Only Memory	ROT	Rate Of Turn
RTE	Route	RTGT	Reference Target
RX	Receive		

S:

Abbreviation	Word	Abbreviation	Word
S	South	S1	Short pulse1
S2	Short pulse2	S57	IHO Special Publication 57
SAR	Search and Rescue	SART	Search and Rescue Transponder
SD	Secure Digital	SEA	Anti Clutter Sea
SEL	Select	SENC	System ENC
SEP	September	SIO	Serial Input Output
SOG	Speed Over Ground	SOLAS	Safety of Life at Sea
SPD	Speed	SPU	Signal Processing Unit board
STAB	Stabilized	STBD	Starboard
STBY	Standby	STC	Sensitivity time control
Std	Standard	STW	Speed Through Water
SW	Switch	SYM	Symbol
Symb	Symbol(s)		

T:

Abbreviation	Word	Abbreviation	Word
T	True	TAG	Tag
TCPA	Time to CPA	TGT	Target
TM	True Motion	TPL	Transferred Line Of Position
True-G	True ground stabilized	True-S	True sea stabilized
TT	Target Tracking/Tracked Target	TTG	Time To Go
TX	Transmit		

U:

Abbreviation	Word	Abbreviation	Word
UNCAL	Uncalibrated	UTC	Coordinated Universal Time

V:

Abbreviation	Word	Abbreviation	Word
VECT	Vector	VRM	Variable Range Marker

W:

Abbreviation	Word	Abbreviation	Word
W	West	WAT	Water
WGS	World Geodetic System	WHT	White
W/O	Without	WOP	Wheel Over Point
WP	Waypoint	WPT	Waypoint
WR	Write	WT	Water Tracking
WTC	Water Tracking Current		

X:

Abbreviation	Word
XTE	Cross Track Error

Y:

Abbreviation	Word
YEL	Yellow

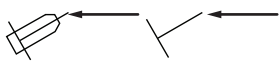
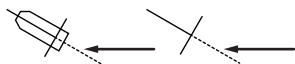
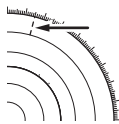
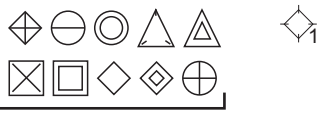
Units of measurement

Unit abbreviation	Meaning	Unit abbreviation	Meaning
deg	Degree(s)	ft	Foot/feet
H	Hour(s)	km	Kilometer(s)
KM	Kilometer(s)	kn	Knot(s)
KYD	Kiloyard(s)	min	Minute(s)
m	Meter(s)	MHz	Megahertz
NM	Nautical miles	sec	Second(s)
SM	Statute mile(s)	°	Degree(s)

APPENDIX 6 SYMBOLS

The pages following list the symbols which appear on your radar.

General symbols

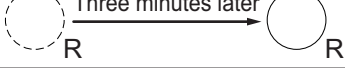
<u>Symbol/Icon</u>	<u>Name/Meaning</u>
 (on power switch)	Power Symbol
 	Own Ship Marker. Appears at the CCRP location as either a scaled symbol (left figure) or minimized symbol (right figure).
 	Own Ship Marker (shown when plotting track). Appears at CCRP location as a filled circle (plotting is on), or double circle (plotting is paused or off).
	Antenna mark. Indicates the location of your antenna and appears only when ship symbol is scaled.
	Heading line. Appears at the CCRP location and indicates your current heading.
	Stern line. Appears at the CCRP location and indicates your current stern direction.
	Fixed Range Rings. Appear with the CCRP location as the center and allow you to estimate range.
VRM 1  VRM 2	Variable Range Markers. Appear with the CCRP as the center* ¹ and allow for range measurement. The dashed line length for each VRM is different.
EBL2  EBL1 EBRL markers (range)	Electronic Bearing Lines. Indicate bearing. Shown as a dashed line with different line length from the heading line and each other. The small line that intersects the EBL is the EBRL, used for measuring range.
	North mark. Indicates the NORTH direction. Appears a thin dotted line at the edge of the operational display area.
	Cursor. Indicates the cursor location.
	Barge Icon. Indicates the barge location.
	Drop Mark. Appears at the location a drop mark is entered. Range and bearing from OS to the drop mark appear on-screen.
 IMO-types only	Origin Marks For numbered origin marks, number availability depends on your radar type. IMO-types: 1 to 10; C-types: 1 to 40
 	MOB (Man Over Board) Marks Left: C-types; Right: IMO-types
  	<u>Chart status (C-types only)</u> Left: Chart scale displayed correctly; Center: Chart scale displayed incorrectly; Right: There is no chart file.

<u>Symbol/Icon</u>	<u>Name/Meaning</u>
 	Other ship marks Left: consort ship; right: GPS buoy
IMO-types  C-types 	Waypoint marks
          	Marks (C-types only)
	Hold icon (C-types only) Indicates that track plotting is stopped (on-hold).
 	Recording interval icon (C-types only) Indicates the track recording interval in use.
	“Save” icon (C-types only) Indicates that the current voyage is being saved as a route.
	“Save” floppy disc icon (C-types only) Indicates that the current customized settings are not saved.

Radar map symbols (IMO type)

<u>Symbol</u>	<u>Name</u>	<u>Symbol</u>	<u>Name</u>
 Red	Buoy	 Orange	Mark
 Green	Buoy	 Orange	Mark
 Red	Buoy	 Orange	Mark
 Green	Buoy	 Magenta	Navline (map)
 Red	Buoy	 White	Coastline
 Green	Buoy	 Gray	Contour Line
 Red	Buoy	 Magenta	Danger Highlight
 Green	Buoy	 Magenta (cable)	Danger Highlight
 Magenta	Danger Highlight	 Orange	Mark
 Magenta	Danger Highlight	 Orange	Mark

TT/AIS symbols

TT symbols	
Symbol	Name
	Manually acquired target. Appears as a dashed circle at initial acquisition, changes to solid circle when tracking is stable.
	Automatically acquired target. Appears as a dashed red circle at initial acquisition, changes to solid circle when tracking is stable.
	Vector on acquired target (approx. 1 minute after acquisition)
	Stable tracking on acquired target (approx. 3 minute after acquisition)
	Dangerous target. Symbol flashes in red color to indicate that this target may be on a collision course with your vessel.
	Associated TT target. Appears when the target is associated and TT is given priority.
	Associated dangerous TT target. Appears in red color when the target is associated, TT is given priority and the target may be on a collision course with your vessel.
	Lost TT target. Indicates that this target is lost and is no longer being tracked. Appears as a flashing symbol with a red colored "X".
	Acquisition zone target. Appears when a target is acquired by the acquisition zone. Target symbol flashes in red color.
	Selected target. Indicates that the target is selected for data display (range, bearing, speed, etc.).
	Reference target. Indicates that this target is selected as a reference point for speed calculations.
T	Trial maneuver indication (IMO-types only)
S	TT simulation mode indication

Note: For C-types, you can change the TT symbol shape to one of the following symbols. You can also change the color of the selected symbol.



AIS symbols	
Symbol	Name
	Activated AIS target. Appears a thick-lined symbol. Color is selectable from the menu.
	Activated AIS target with vector. Indicates the target's ROT (Rate Of Turn). Vector appears when the target's ROT is higher than the menu setting.
	Dangerous AIS target. Flashing red symbol indicates that the target matches then CPA/TCPA criteria. Symbol stops flashing after the alert is acknowledged.
	Lost AIS target. Indicates that this target is lost and is no longer being tracked. Appears as a flashing symbol with a red colored "X" until the alert is acknowledged.
	Sleeping AIS target. Color is selectable from the menu.
	AIS target with no heading/COG data. Symbol faces the top of the screen. Furthermore, if CPA/TCPA cannot be calculated, symbol appears as a dashed line.
	AIS target selected for data display. Location of data display in the information box is indicated below the target as "A", "B" or "C".
	Associated AIS target. Appears when the target is associated and AIS is given priority.
	Dangerous associated AIS target. Appears in red color when the target is associated, AIS is given priority and the target may be on a collision course with your vessel.
	Active AIS target with scaled ship symbol. Indicates the target vessel's dimensions (length, width, antenna location) and changes on-screen size according to display range.
	AIS SART (TEST)
	AIS SART (ACTIVE)
	AIS Base station
	AIS Aircraft. Note: AIS aircraft are not regarded as a collision hazard. CPA and TCPA for AIS aircraft appears as "****".
	AIS Search and Rescue (SAR) Vessel

APPENDIX 6 SYMBOLS

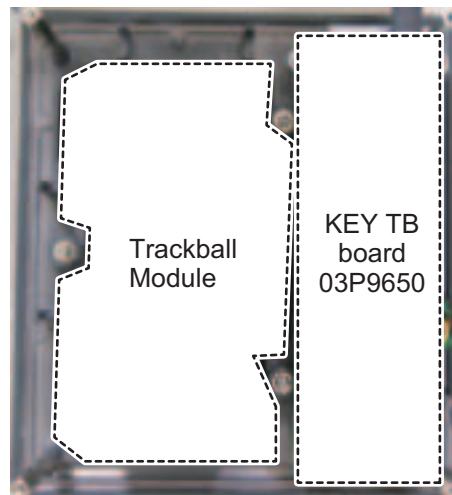
AIS Physical AtoN Symbol	AIS Virtual AtoN Symbol	Meaning
		Basic shape
	No virtual symbol	RACON
		Emergency wreck mark
		North cardinal mark
		East cardinal mark
		South cardinal mark
		West cardinal mark
		Port hand mark
		Starboard hand mark
		Isolated danger
		Safe water
		Special mark
Off Posn 	No virtual symbol	Off position (Displayed with yellow line and yellow text)
Unlit 	No virtual symbol	Light fail or at reduced range (Displayed with yellow text)
Racon err 	No virtual symbol	RACON error (Displayed with yellow text)
No physical symbol	Missing 	Missing (Displayed with yellow dashed line and yellow text)

APPENDIX 7 PARTS LOCATION

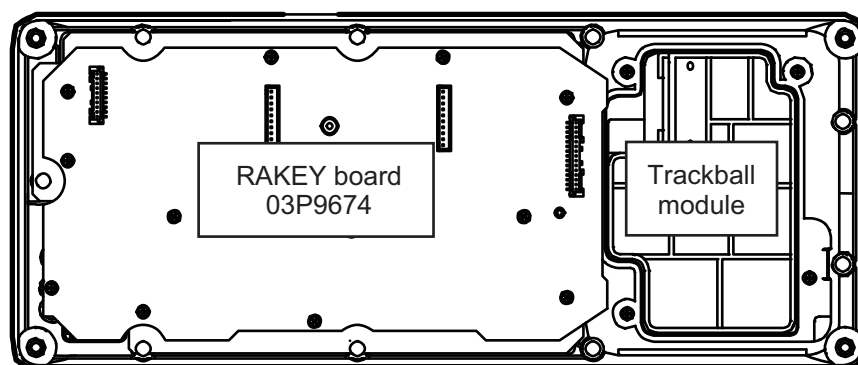
Control Unit RCU-014



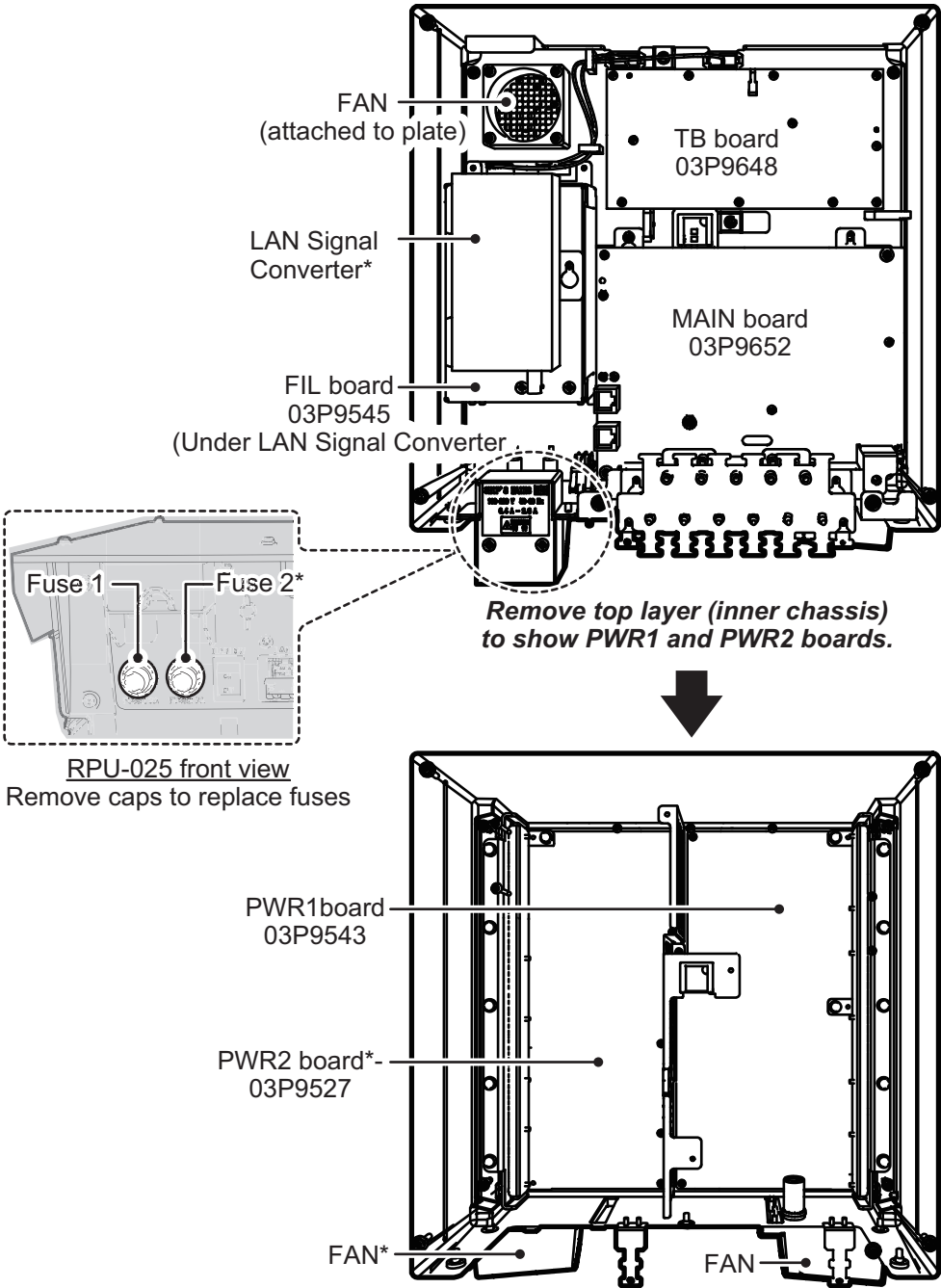
Control unit RCU-015/RCU-016



Control Unit RCU-031

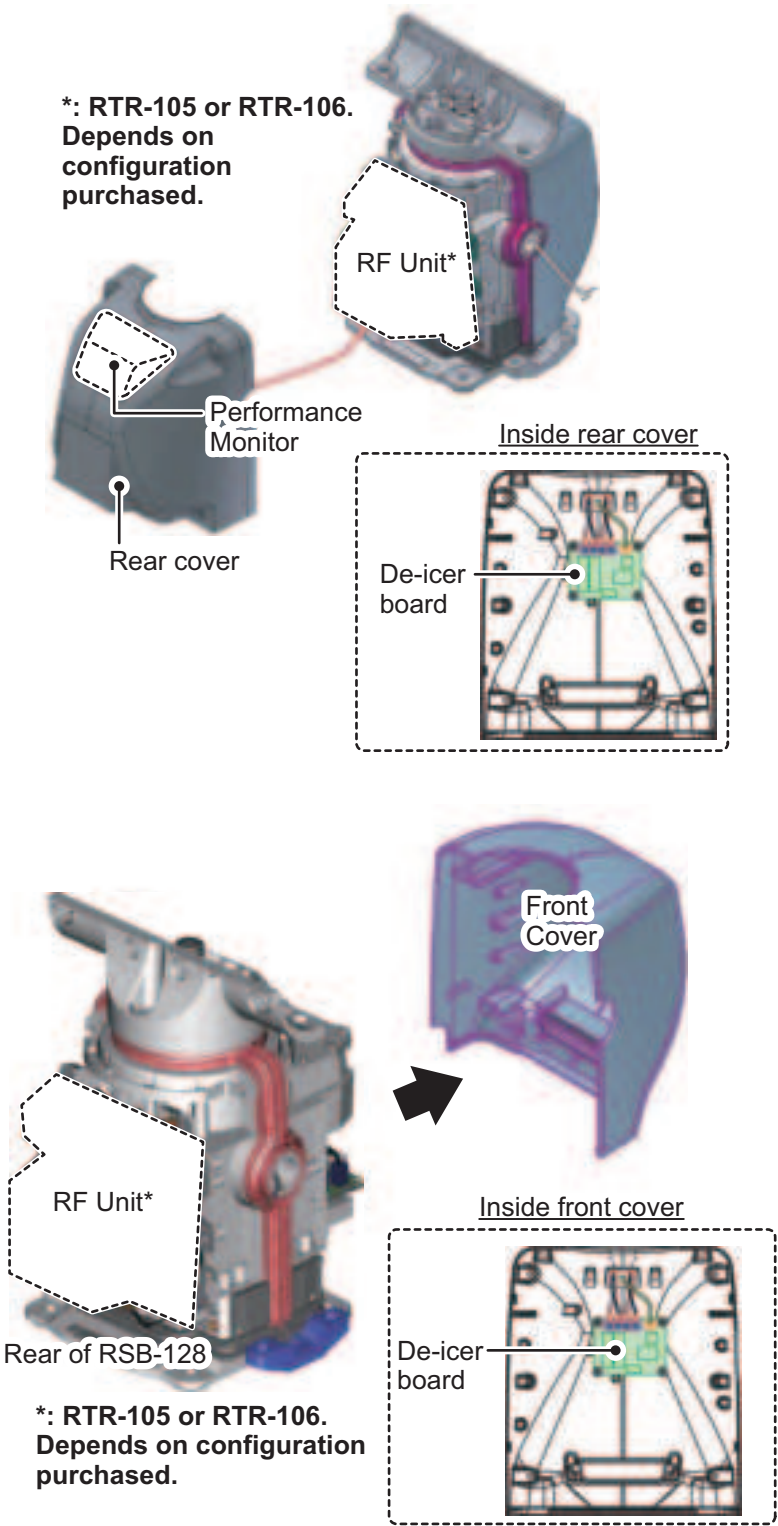


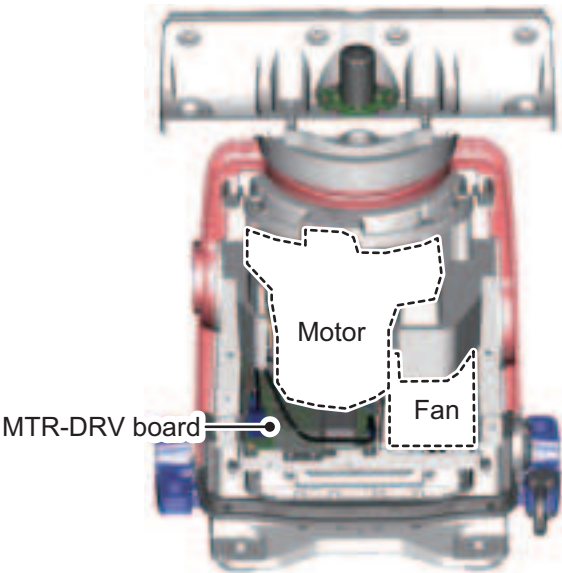
Processor Unit RPU-025



*: The presence of this component depends on configuration purchased.

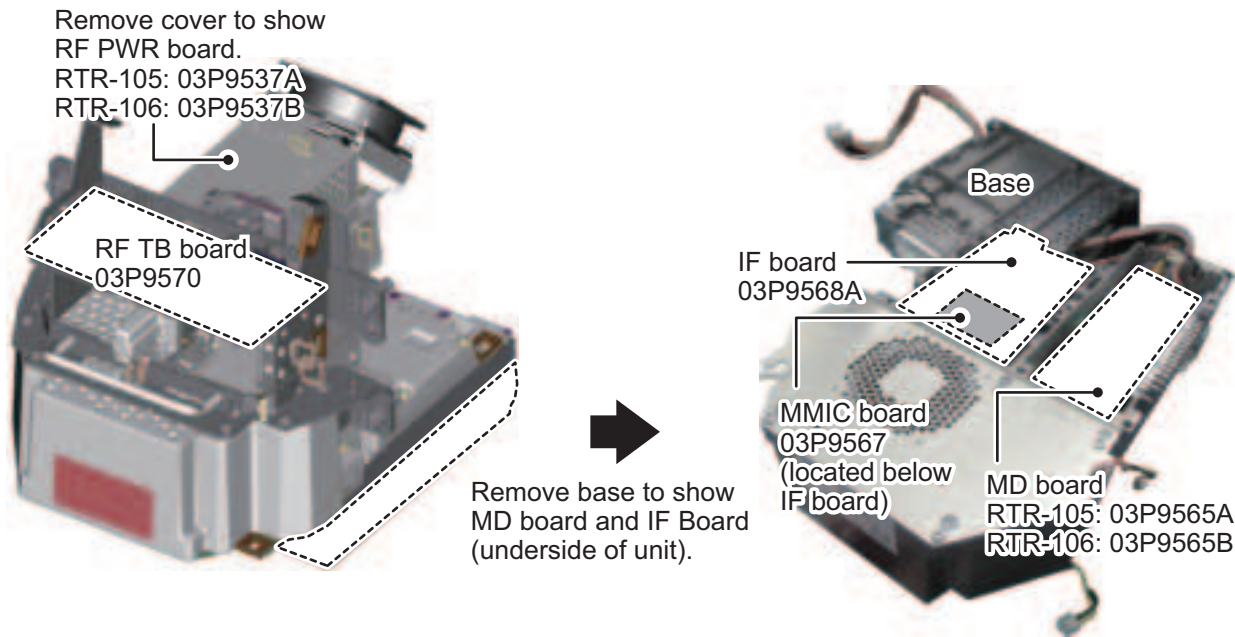
Scanner Unit RSB-128 (FAR-2218(-BB), FAR-2318, FAR-2228(-BB), FAR-2328)



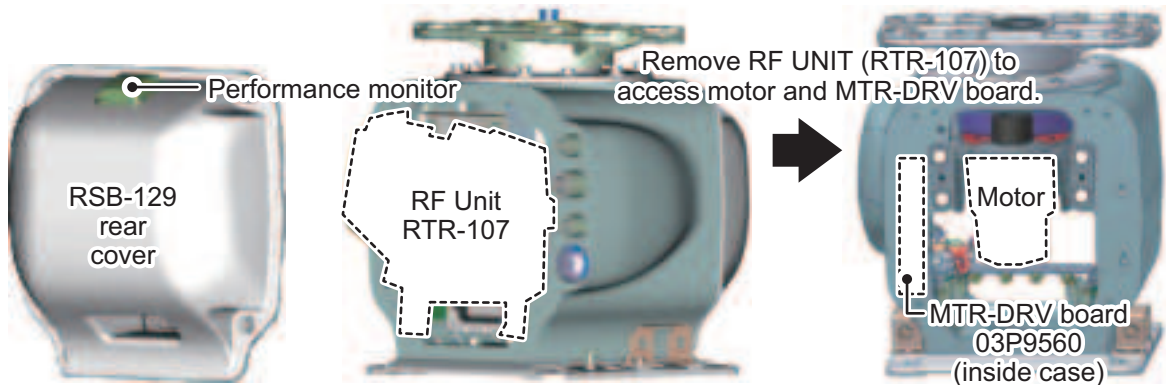


Front view of RSB-128
(front cover removed)

RF Unit RTR-105/106 (FAR-2218(-BB), FAR-2318, FAR-2228(-BB), FAR-2328)

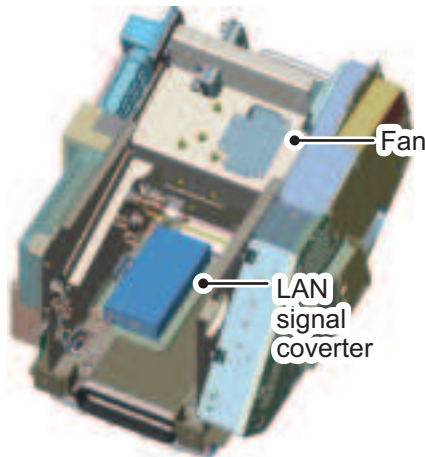
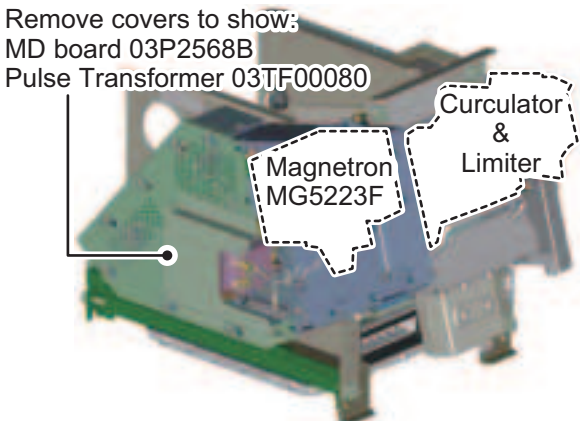
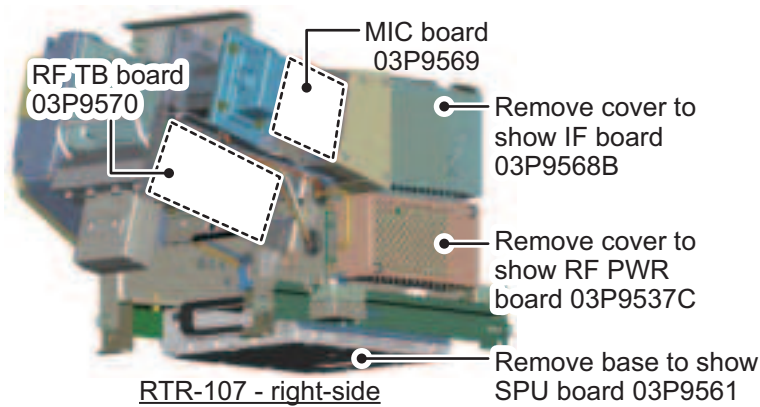


Scanner Unit RSB-129 (FAR-2238S(-BB), FAR-2338S)



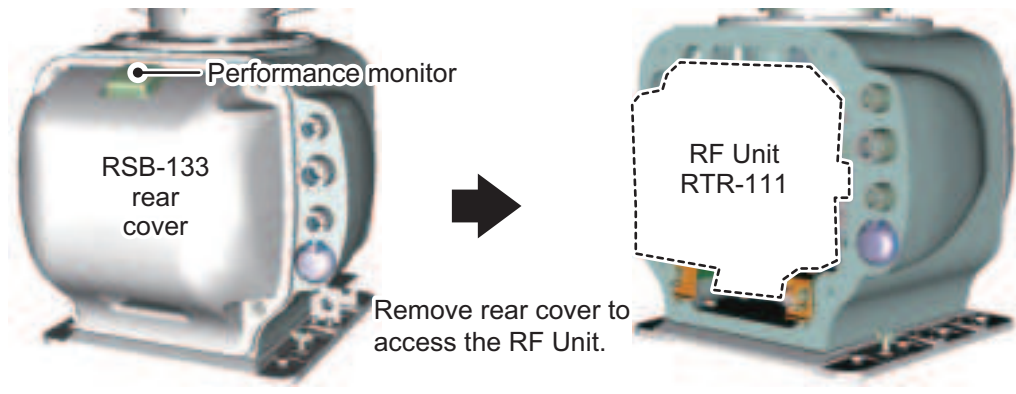
Remove rear cover to show the RF UNIT (RTR-107)

RF Unit RTR-107 (FAR-2238S(-BB), FAR-2338S)

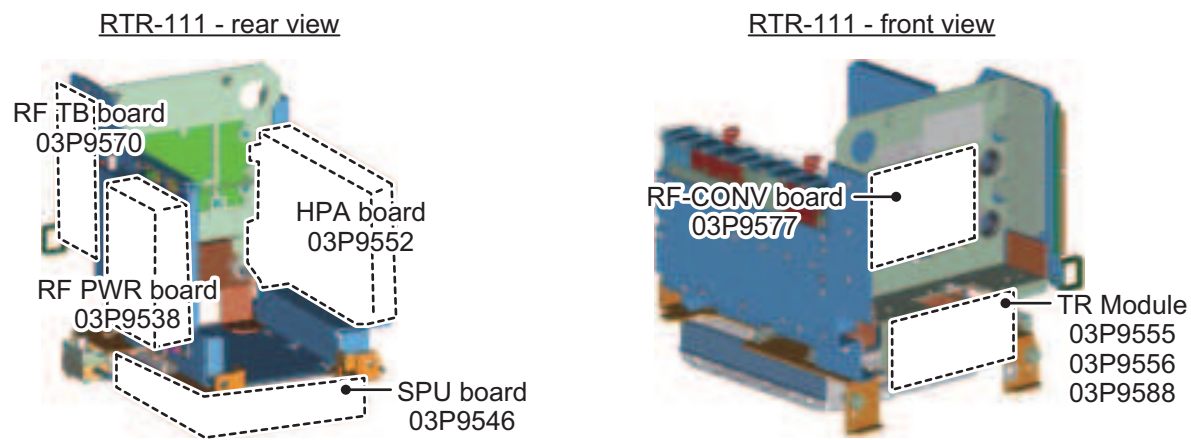


RTR-107 rear-view

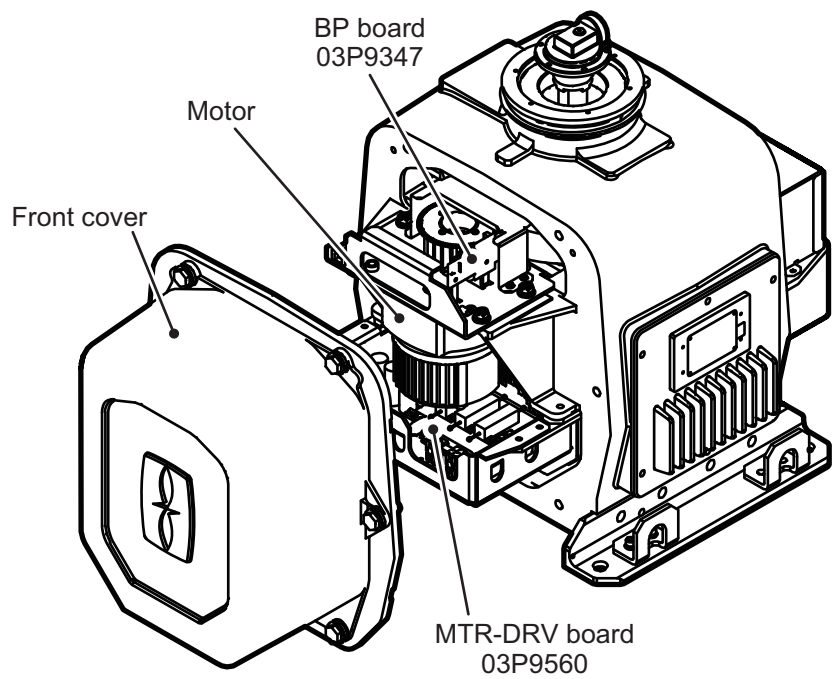
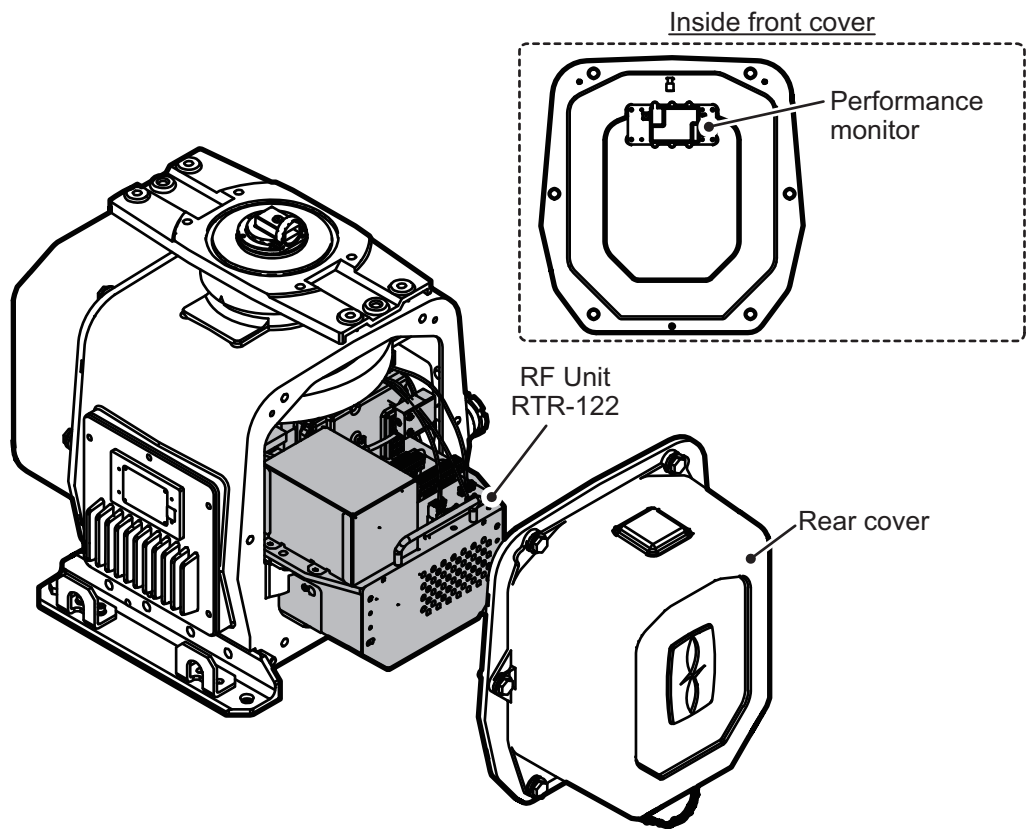
Scanner Unit RSB-133 (FAR-2238S-NXT(-BB)/2338S-NXT)



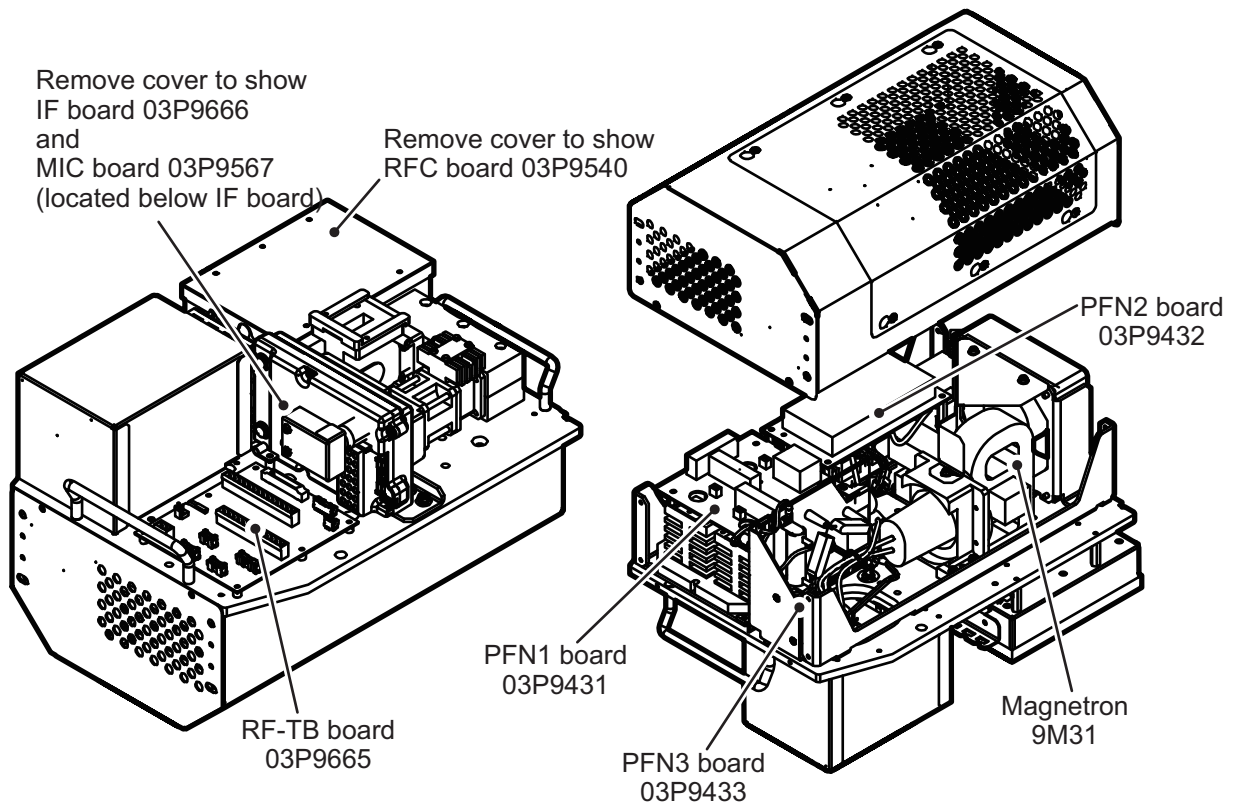
RF Unit RTR-111 (FAR-2238S-NXT(-BB)/2338S-NXT)

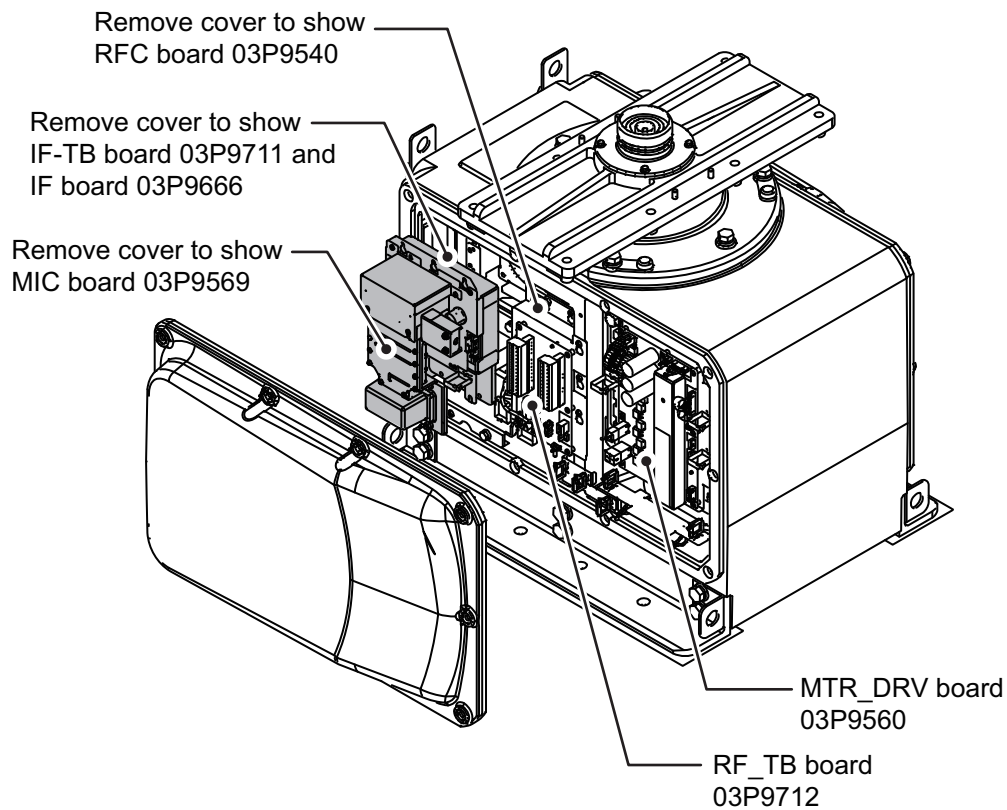
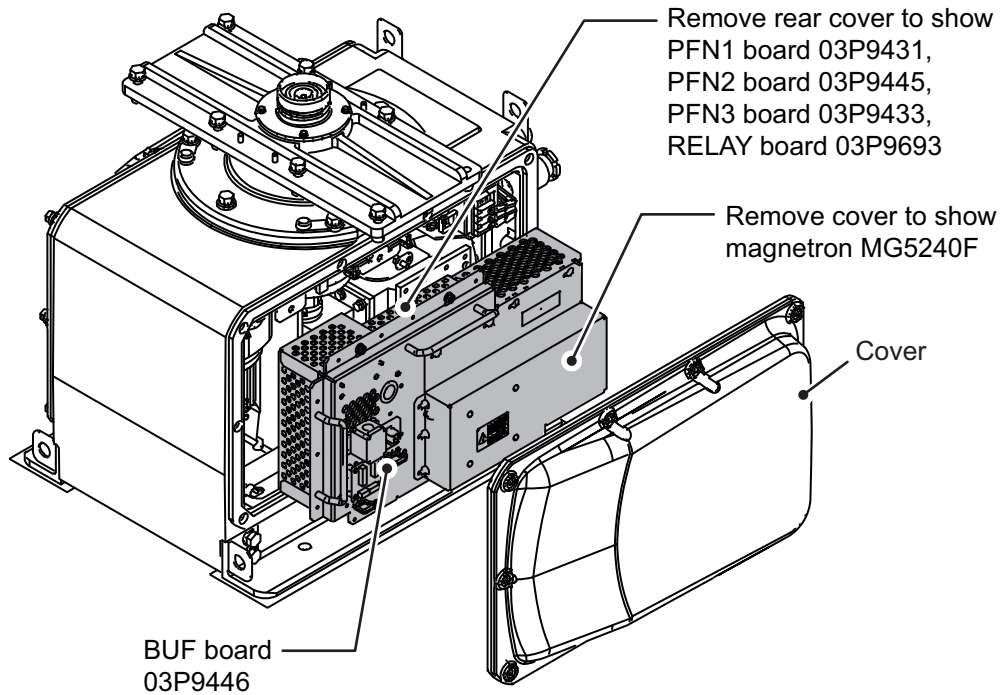


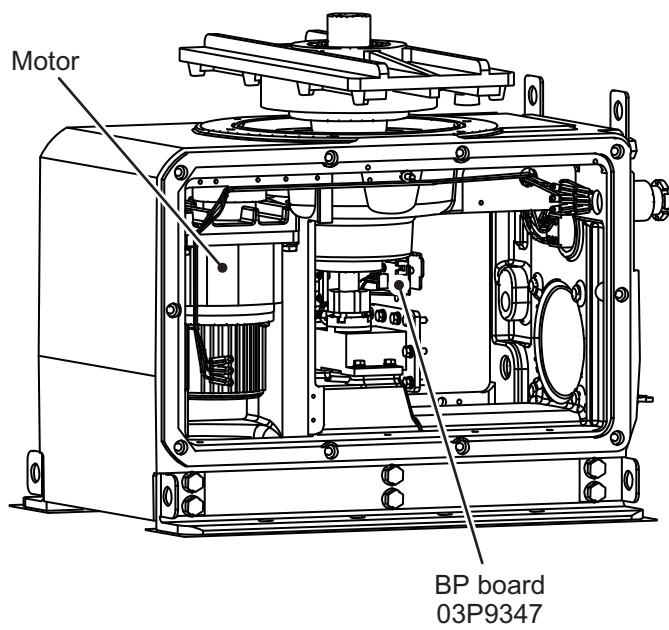
Scanner Unit RSB-139 (FAR-2258)



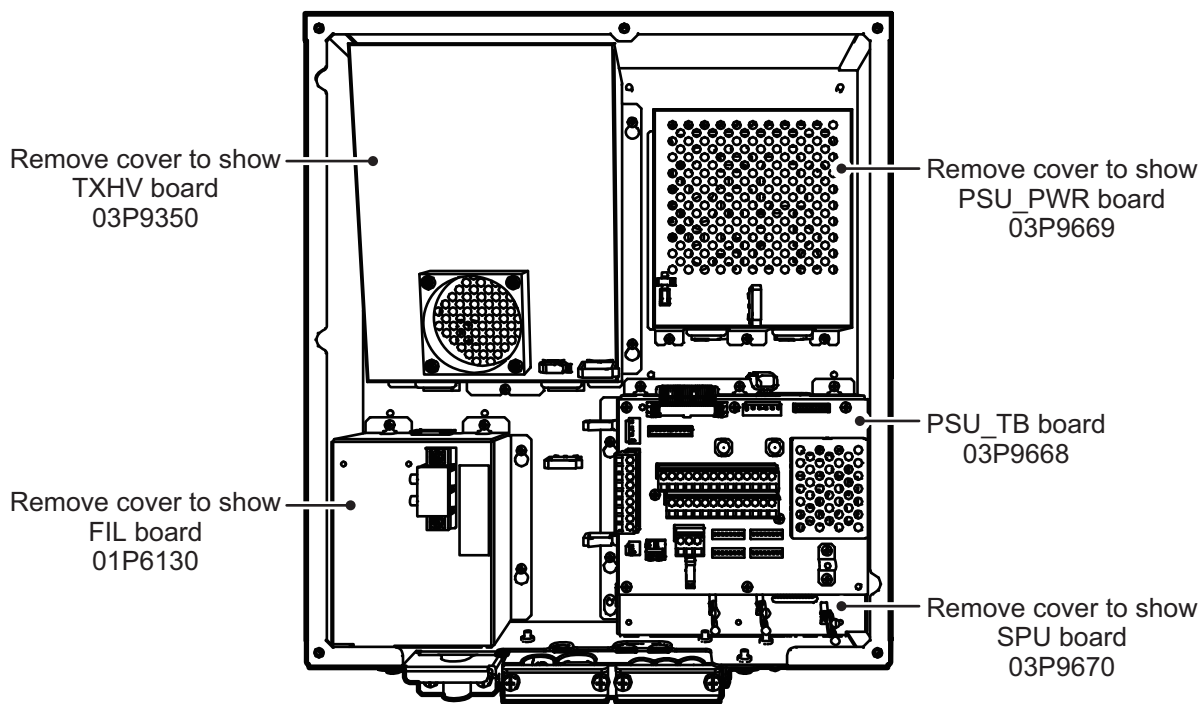
RF Unit RTR-122 (FAR-2258)



Scanner Unit RSB-144 (FAR-2268DS)



Power Supply Unit PSU-019



APPENDIX 8 RADIO REGULATORY INFORMATION

USA-Federal Communications Commission (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Caution: Exposure to Radio Frequency Radiation

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65.
- This equipment should be installed and operated keeping the radiator at least XX cm or more away from person's body.
- This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Innovation, Science and Economic Development Canada (ISED)

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient un ou plusieurs émetteurs / récepteurs exempts de licence qui sont conformes à la norme « exempts de licence RSS (s) » Canadienne d'Innovation, Sciences et Développement économique. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage.
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution: Exposure to Radio Frequency Radiation

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least XX cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISED. Cet équipement doit être installé et utilisé en gardant une distance de XX cm ou plus entre le dispositif rayonnant et le corps.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

XX cm

FAR-2258	RTR-122	1390 cm	FAR-2238S	RTR-107	460 cm
FAR-2218	RTR-105	440 cm	FAR-2338S		
FAR-2318			FAR-2238S-NXT	RTR-111	100 cm
FAR-2228	RTR-106	950 cm	FAR-2338-NXT		
FAR-2328			FAR-2268DS	RTR-129	1600 cm

1 ANTENNA RADIATOR

- ## 1.2 Beam width and sidelobe attenuation

Radiator type	X-band			S-band		
	XN12CF	XN20CF	XN24CF**	SN24CF*	SN30CF*	SN36CF
Length	4 ft	6.5 ft	8 ft	8 ft	10 ft	12 ft
Horizontal beam width	1.9°	1.23°	0.95°	2.6°	2.3°	1.8°
Vertical beam width	20°			25°		
Sidelobe within $\pm 10^\circ$	-24 dB	-28 dB	-28 dB	—		-24 dB
Sidelobe outside $\pm 10^\circ$	-30 dB	-32 dB	-32 dB			-30 dB
Sidelobe within $\pm 20^\circ$	—			-23 dB	-24 dB	—
Sidelobe outside $\pm 20^\circ$				-27 dB	-30 dB	

*: C-type radar only. **: 24 rpm only.

- | | | |
|-----|------------------|--|
| 1.3 | Polarization | Horizontal |
| 1.4 | Rotation | 24 rpm or 42 rpm (for high speed craft) |
| 1.5 | Wind load | 100 kn relative |
| 1.6 | De-icer (option) | On: when temperature goes down to 0°C
Off: when temperature goes up to +5°C |

2 TRANSCEIVER

- ## 2.1 TX Frequency and modulation

X-band (Magnetron)	9410 MHz $\pm$ 30 MHz, P0N
S-band (Magnetron)	3050 MHz $\pm$ 30 MHz, P0N
S-band (Solid state)	CH1 P0N: 3043.75 MHz/ Q0N: 3063.75 MHz $\pm$ 5 MHz or CH2 P0N: 3053.75 MHz/ Q0N: 3073.75 MHz $\pm$ 5 MHz

- ## 2.2 Output power

FAR-2218(BB)/2318	12 kW
FAR-2228(BB)/2328	25 kW
FAR-2238S(BB)/2338S	30 kW
FAR-2238S-NXT(BB)/2338S-NXT	250 W (equivalent to magnetron radar 30 kW)

- ### 2.3 Range scale, Pulse Repetition Rate and Pulselength

Magnetron radar: FAR-2218(BB)/2318/2228(BB)/2328/2238S (BB)/2338S

PRR (Hz approx.)	Range scale (NM)																				
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96				
3000*	S1																				
3000*			S2																		
1500				M1																	
1200						M2															
1000								M3													
600**										L											

1/2/4/8/16/32 NM ranges: C-type radar only

*: 2200 Hz with TT range on 32 NM. **: 500 Hz on 96 NM range.

Solid state radar: FAR-2238S-NXT(BB)/2338S-NXT

PRR (Hz approx.)	Range scale (NM)																				
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96				
2400*	S1																				
2000*			S2																		
1500				M1																	
1060						M2															
1000								M3													
600										L											

1/2/4/8/16/32 NM ranges: C-type radar only

*: 1800 Hz (S1) and 1500 Hz (S2) with TT range on 32 NM.

3 PROCESSOR UNIT

- 3.1 Minimum range 22 m
- 3.2 Range discrimination 26 m
- 3.3 Range accuracy 1% of the maximum range of the scale in use or 10 m, whichever is the greater
- 3.4 Bearing discrimination
 - X-band: 2.1° (XN12CF), 1.5° (XN20CF), 1.2° (XN24CF),
 - S-band: 2.8° (SN24CF), 2.5° (SN30CF), 2.0° (SN36CF)
- 3.5 Bearing accuracy ±1°
- 3.6 Range scale and Range ring interval (RI)

Range (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96
RI (NM)*	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1	2	2	4	4	8	8	16
Number of rings*	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6

1/2/4/8/16/32 NM ranges: C-type radar only.

*: changeable from menu for C-type radar.

- 3.7 Warm-up time 3 min. approx. (solid state radar excluded)
- 3.8 Presentation mode Head-up, STAB head-up, Course-up, North-up (RM/TM), Stern-up
- 3.9 Marks Cursor, Range ring, Heading mark, North mark, Bearing mark, VRM, EBL, Acquisition zone
- 3.10 Target tracking (TT)
 - Auto or manual acquisition: 100 targets in 24/32 NM (range selected from menu for maintenance)
 - Auto tracking on all acquired targets,
 - Tracking: 5/10 pts on all activated targets
 - Vector time: Off, 30 s, 1-60 min
- 3.11 AIS
 - Display capacity: 350 targets,
 - Tracking: 5/10 pts on all activated targets
 - Vector time: Off, 30 s, 1-60 min
- 3.12 Echo trail
 - True/Relative, Trail length: 0 to 30 minutes (30 s steps) or continue,
 - Maximum 48 hours setting available for C-type radar
- 3.13 Radar map 20,000 pts
- 3.14 Acquisition zone 2 zones

4 PLOTTER FUNCTIONS (for C-type Radar)

- 4.1 Projection Mercator
- 4.2 Useable area 85° latitude or below

- | | | |
|-----|---------------------------|---|
| 4.3 | Effective projection area | 0.025 to 120 NM (for STBY),
follows the radar range scale while transmitting |
| 4.4 | Memory capacity | |
| | Own ship's track | 30,000 pts (10,000 pts indicated) |
| | Other ship's track | TT: 100,000 pts (10,000), AIS: 10,000 pts (10,000),
consort ship: 10,000 pts (1,000), GPS buoy: 10,000 pts (1,000)
(): indicated pts |
| | Mark/line | 30,000 pts |
| | Waypoint | 3,500 pts |
| | Route | 200 routes with 100 waypoint each |
| 4.5 | External memory | Waypoint: 100 pts, 1 route |
| 4.6 | Electronic chart | Mapmedia |
| 4.7 | Own ship's tracking | 7 colors |

5 MONITOR UNIT

- | | | |
|-----|--------------------------|---|
| 5.1 | Screen type | |
| | MU-190 | 19-inch color LCD, 1280 x 1024 (SXGA) |
| | MU-231 | 23.1-inch color LCD, 1600 x 1200 (UXGA) |
| | MU-270W | 27-inch color LCD, 1920 x 1200 (WUXGA) |
| 5.2 | Brightness | |
| | MU-190 | 450 cd/m ² typical |
| | MU-231/270W | 400 cd/m ² typical |
| 5.3 | Visible distance | |
| | MU-190/270W | 1.02 m nominal |
| | MU-231 | 1.2 m nominal |
| 5.4 | Radar effective diameter | |
| | MU-190 | 282 mm |
| | MU-231 | 331 mm |
| | MU-270W | 349 mm |

6 INTERFACE

- | | | |
|-----|---------------------------------|--|
| 6.1 | Number of port (processor unit) | |
| | Serial | 7 ports (IEC61162-1/2: 2 ports, IEC61162-1: 4 ports, AD-10: 1 port) |
| | Alarm output | 6 ports: contact signal, load current 250mA
(Normal close/ open: 4, System fail: 1, Power fail: 1) |
| | DVI output | 2 ports: DVI-D, DVI-I or RGB picture data (for VDR)
(RGB resolution 1280x1024 (SXGA), 60.0Hz or
1440x900 (WXGA+), 59.9Hz) |
| | LAN | 2 ports: Ethernet 100Base-TX |
| | USB | 2 ports: USB flash memory and mouse/keypad |
| | RS-232C | 1 port: brilliance control |
| | Sub display (for ECDIS) | 2 ports: HD, BP, Trigger and Video signal |
| 6.2 | Data sentences (IEC61162-1/2) | |
| | Input | ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK ^{*1} , DBS ^{*1} , DBT,
DDC, DPT, DTM, GGA, GLL, GNS, HBT, HDG, HDM, HDT ^{*1} , MTW, |

- | | |
|--------|--|
| Output | MWV, OSD, RAQ, RMB, RMC, ROT, RTE, THS, TLL, TTM, VBW, VDM, VDO, VDR, VHW, VSD, VTG, VWR* ¹ , VWT* ¹ , WPL, ZDA ABM, ACK, AIQ, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT, OSD, RSD, TLB, TLL * ² , TTD, TTM, VSD
* ¹ : for retrofit. * ² : for C-type radar |
|--------|--|
- 6.3 Ethernet interface for IEC61162-450
- | | |
|----------------|----------------------------------|
| Port (LAN2) | 100Base-TX, IPv4, 8P8C connector |
| Data sentences | Same as 6.2 sentences |
- IEC61162-450 transmission group
- | | |
|-------------------|------------------------------------|
| Input | MISC, TGTD, SATD, NAVD, TIME, PROP |
| Output | Arbitrary (default: TGTD) |
| Multicast address | 239.192.0.1 to 239.192.0.16 |
| Destination port | 60001 to 60016 |
- Re-transmittable binary image transfer
- | | |
|-------------------|------------------------------|
| Multicast address | 239.192.0.26 to 239.192.0.30 |
| Destination port | 60026 to 60030 |
- Other network function excepted IEC61162-450
- SNMP, HTTP, Syslog, Furuno Management Protocol (FMP)
- 6.4 Output port on antenna unit
- Sub display (for radar/plotter) 1 port: HD, BP, Trigger and Video signal

7 POWER SUPPLY

7.1 Processor unit (w/ antenna unit)

FAR-2218/2318	100-230 VAC: 2.1-1.0 (2.9-1.3) A, 1 phase, 50-60 Hz or 24 VDC (21.6-31.2V): 5.4 A (9.0 A)
FAR-2228/2328	100-230 VAC: 2.3-1.1 (3.2-1.4) A, 1 phase, 50-60 Hz or 24 VDC (21.6-31.2V): 8.9 A (12.4 A)
FAR-2238S/2338S	100-230 VAC: 3.2-1.5 (5.6-2.5) A, 1 phase, 50-60 Hz
FAR-2238S-NXT/2338S-NXT	100-230 VAC: 2.6-1.2 (5.1-2.2) A, 1 phase, 50-60 Hz (): 42 rpm

7.2 Monitor unit

MU-190	100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz
MU-231	100-230 VAC: 1.0-0.6 A, 1 phase, 50-60 Hz
MU-270W	100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz

7.3 HUB (option)

100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz

7.4 De-icer (option)

100-115/220-230 VAC: 2.6/1.3 A, 1 phase, 50-60 Hz

8 ENVIRONMENTAL CONDITIONS

8.1 Ambient temperature

Antenna unit	-25°C to +55°C (storage: -25°C to +70°C)
Indoor units	-15°C to +55°C (storage: -20°C to +70°C)

8.2 Relative humidity

93% or less at +40°C

8.3 Degree of protection

Antenna unit	IP56
Processor/ monitor unit	IP22

	Control unit	IP20
	HUB	IP20 (HUB-100), IP22 (HUB-3000)
8.4	Vibration	IEC 60945 Ed.4

9 UNIT COLOR

9.1	Antenna unit	N9.5
9.2	Processor unit	N2.5
9.3	Control/ monitor unit	N2.5
9.4	HUB	N3.0 (HUB-100), N2.5 (HUB-3000)
9.5	Radar console	2.5GY5/1.5 (standard), 7.5BG7/2, 2.5G7/2, N7.5

10 PERFORMANCE MONITOR

10.1	PM-32A (X-band)	
	Frequency range	9380 to 9440 MHz
	Input power	+18 dBm to +30 dBm
	Output power	-21 dBm (1 st pulse max. output), -41 dBm (1 st pulse min. output)
	Step level	8 to 12 dB (1 st pulse to last pulse)
10.2	PM-52A (S-band, MAG)	
	Frequency range	3040 to 3080 MHz
	Input power	+25 dBm to +40 dBm
	Output power	-38 dBm (1 st pulse max. output), -58 dBm (1 st pulse min. output)
	Step level	8 to 12 dB (1 st pulse to last pulse)
10.3	PM-52B (S-band, SSD)	
	Frequency range	3063.75 ±2 MHz
	Input power	+5 dBm to +25 dBm
	Output power	-52 dBm (1 st pulse max. output), -72 dBm (1 st pulse min. output)
	Step level	8 to 12 dB (1 st pulse to last pulse)

1 ANTENNA RADIATOR

- | | | |
|-----|-----------------------|--|
| 1.1 | Type | Slotted waveguide array |
| 1.2 | Antenna length | 8 ft (XN24AF), 10 ft (XN30AF) |
| 1.3 | Horizontal beam width | 0.95° (XN24AF), 0.75° (XN30AF) |
| 1.4 | Vertical beam width | 20° |
| 1.5 | Sidelobe attenuation | |
| | XN24AF | -28 dB (within $\pm 10^\circ$ of mainlobe), -32 dB ($\pm 10^\circ$ outside of mainlobe) |
| | XN30AF | -26 dB (within $\pm 10^\circ$ of mainlobe), -33 dB ($\pm 10^\circ$ outside of mainlobe) |
| 1.6 | Polarization | Horizontal |
| 1.7 | Rotation | 24 rpm |
| 1.8 | Wind load (relative) | 100 kn (XN24AF), 70 kn (XN30AF) |

2.1	TX Frequency and modulation	9410 MHz $\pm$ 30 MHz, P0N
2.2	Output power	50 kW
2.3	Range scale, Pulse Repetition Rate and Pulselength	

PRR (Hz approx.)	Range scale (NM)																		
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96		
1900	S																		
1100				M1															
600									M2										
600										L									

1/2/4/8/16/32 NM ranges: C-type radar only

3.1	Minimum range	33 m
3.2	Range discrimination	25 m
3.3	Range accuracy	1% of the maximum range of the scale in use or 10 m, whichever is the greater
3.4	Bearing discrimination	1.2° (XN24AF), 1.0° (XN30AF)
3.5	Bearing accuracy	±1°
3.6	Range scale and Range ring interval (RI)	

Range (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96
RI (NM)	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1	2	2	4	4	8	8	16
Number of rings*	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6

1/2/4/8/16/32 NM ranges: C-type radar only, *: selectable from menu

- | | | |
|-----|----------------------|---|
| 3.7 | Warm-up time | 3 minutes approx. |
| 3.8 | Presentation mode | Head-up, STAB head-up, Course-up, North-up (RM/TM), Stern-up |
| 3.1 | Marks | Cursor, Range ring, Heading mark, North mark, Bearing mark, Target trail, VRM, EBL, Acquisition zone |
| 3.2 | Target tracking (TT) | Auto or manual acquisition: 100 targets in 24/32/48 NM
(range selected from menu for maintenance)
Auto tracking on all acquired targets,
Tracking: 5/10 pts on all activated targets |

		Vector time: Off, 30 s, 1-60 min
3.3	AIS	Display capacity: 350 targets, Tracking: 5/10 pts on all activated targets Vector time: Off, 30 s, 1-60 min
3.4	Radar map	20,000 pts
3.5	Acquisition zone	2 zones
3.9	Interswitch function	Selectable from menu

4 PLOTTER FUNCTIONS

4.1	Projection	Mercator
4.2	Useable area	85° latitude or below
4.3	Effective projection area	0.025 to 120 NM (for STBY), follows the radar range scale while transmitting
4.4	Memory capacity	
	Own ship's track	30,000 pts (10,000 pts indicated)
	Other ship's track	TT: 100,000 pts (10,000), AIS: 10,000 pts (10,000), consort ship: 10,000 pts (1,000), GPS buoy: 10,000 pts (1,000) (): indicated pts
	Mark/line	30,000 pts
	Waypoint	3,500 pts
	Route	200 routes with 100 waypoint each
4.5	External memory	Waypoint: 100 pts, 1 route
4.6	Electronic chart	Mapmedia
4.7	Own ship's tracking	7 colors

5 MONITOR UNIT (OPTION)

5.1	Screen type	
	MU-190	19-inch color LCD, 1280 x 1024 (SXGA)
	MU-231	23.1-inch color LCD, 1600 x 1200 (SXGA)
	MU-270W	27-inch color LCD, 1920 x 1200 (WUXGA)
5.2	Brightness	
	MU-190	450 cd/m ² typical
	MU-231/270W	400 cd/m ² typical
5.3	Visible distance	
	MU-190/270W	1.02 m nominal
	MU-231	1.2 m nominal
5.4	Radar effective diameter	
	MU-190	282 mm
	MU-231	331 mm
	MU-270W	349 mm

6 INTERFACE

6.1	Number of port (processor unit)	
	Serial	7 ports (IEC61162-1/2: 2 ports, IEC61162-1: 4 ports, AD-10: 1 port)
	Alarm output	6 ports: contact signal, load current 250mA (Normal close/ open: 4, System fail: 1, Power fail: 1)
	DVI output	2 ports: DVI-D, DVI-I or RGB picture data (for VDR)

- (RGB resolution 1280x1024 (SXGA), 60.0Hz or 1440x900 (WXGA+), 59.9Hz)
- LAN 2 ports: Ethernet 100Base-TX
- USB 2 ports: USB flash memory and mouse/keypad
- RS-232C 1 port: brilliance control
- Sub display (for ECDIS) 2 ports: HD, BP, Trigger and Video signal
- 6.2 Data sentences (IEC61162-1/2)
- Input ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK^{*1}, DBS^{*1}, DBT, DDC, DPT, DTM, GGA, GLL, GNS, HBT, HDT^{*1}, MTW, MWV, OSD, RAQ, RMB, RMC, ROT, RTE, THS, VBW, VDM, VDO, VDR, VHW, VSD, VTG, VWR^{*1}, VWT^{*1}, WPL, ZDA
- Output ABM, ACK, AIQ, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT, OSD, RSD, TLB, TLL, TTD, TTM, VSD
- ^{*1}: for retrofit.
- 6.3 Ethernet interface for IEC61162-450
- Port (LAN2) 100Base-TX, IPv4, 8P8C connector
- Data sentences Same as 6.2 sentences
- IEC61162-450 transmission group
- Input MISC, TGTD, SATD, NAVD, TIME, PROP
- Output Arbitrary (default: TGTD)
- Multicast address 239.192.0.1 to 239.192.0.16
- Destination port 60001 to 60016
- Re-transmittable binary image transfer
- Multicast address 239.192.0.26 to 239.192.0.30
- Destination port 60026 to 60030
- Other network function excepted IEC61162-450
- SNMP, HTTP, Syslog, Furuno Management Protocol (FMP)
- 6.4 Output port on antenna unit
- Sub display (for radar) 1 port: HD, BP, Trigger and Video signal

7 POWER SUPPLY

- 7.1 Power supply unit 100-115/220-230 VAC: 3.1/1.5 A, 1 phase, 50-60 Hz
- 7.2 Processor unit 100-230 VAC: 2.2-1.1 A, 1 phase, 50-60 Hz
- 7.3 Monitor unit
- MU-231 100-230 VAC: 1.0-0.6 A, 1 phase, 50-60 Hz
- MU-190/270W 100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz
- 7.4 HUB (option) 100-230 VAC, 1 phase, 50/60 Hz

8 ENVIRONMENTAL CONDITIONS

- 8.1 Ambient temperature
- Antenna unit -25°C to +55°C (storage: -25°C to +70°C)
- Indoor unit -15°C to +55°C (storage: -20°C to +70°C)
- 8.2 Relative humidity 93% or less at +40°C
- 8.3 Degree of protection
- Antenna unit IP56
- Power supply unit IP22
- Processor/ monitor unit IP22

	Control unit	IP20 (RCU-014/015/016), IP22 (RCU-031)
	HUB	IP20 (HUB-100), IP22 (HUB-3000)
8.4	Vibration	IEC 60945 Ed.4

9 UNIT COLOR

9.1	Antenna unit	N9.5
9.2	Power supply unit	N2.5
9.3	Processor unit	N2.5
9.4	Monitor/ control unit	N2.5
9.5	HUB	N3.0 (HUB-100), N2.5 (HUB-3000)

10 PERFORMANCE MONITOR

10.1	Frequency range	9380 to 9440 MHz
10.2	Input power	+18 dBm to +30 dBm
10.3	Output power	-21 dBm (1 st pulse max. output), -41 dBm (1 st pulse min. output)
10.4	Step level	8 to 12 dB (1 st pulse to last pulse)

SPECIFICATIONS OF MARINE RADAR FAR-2268DS (Non-IMO)

1 ANTENNA RADIATOR

- | | | |
|-----|-----------------------|---|
| 1.1 | Type | Slotted waveguide array |
| 1.2 | Antenna length | 10 ft (SN30AF/30DF), 12 ft (SN36AF) |
| 1.3 | Horizontal beam width | 2.3° (SN30AF/30DF), 1.8° (SN36AF) |
| 1.4 | Vertical beam width | 25° (SN30AF/36AF), 22° (SN30DF) |
| 1.5 | Sidelobe attenuation | -24 dB (within ±20° of mainlobe), -30 dB (±20° outside of mainlobe) |
| 1.6 | Polarization | Horizontal |
| 1.7 | Rotation | 24 rpm |
| 1.8 | Wind load (relative) | 70 kn |

2 TRANSCEIVER

- | | | |
|-----|--|-----------------------|
| 2.1 | TX Frequency and modulation | 3050 MHz ±30 MHz, P0N |
| 2.2 | Output power | 60 kW |
| 2.3 | Range scale, Pulse Repetition Rate and Pulselength | |

PRR (Hz approx.)	Range scale (NM)																			
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96			
1900	S																			
1100				M1																
600								M2												
600								L												

1/2/4/8/16/32 NM: for C-type only.

3 PROCESSOR UNIT

- | | | |
|-----|--|---|
| 3.1 | Minimum range | 37 m |
| 3.2 | Range discrimination | 32 m |
| 3.3 | Range accuracy | 1% of the maximum range of the scale in use or 10 m, whichever is the greater |
| 3.4 | Bearing discrimination | 2.5° (SN30AF/30DF), 2.0° (SN36AF) |
| 3.5 | Bearing accuracy | ±1° |
| 3.6 | Range scale and Range ring interval (RI) | |

Range (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96
RI (NM)	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1	2	2	4	4	8	8	16
Number of rings	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6

1/2/4/8/16/32 NM: for C-type only.

- | | | |
|------|----------------------|---|
| 3.7 | Warm-up time | 3 minutes approx. |
| 3.8 | Presentation mode | Head-up, STAB head-up, Course-up, North-up (RM/TM), Stern-up |
| 3.9 | Marks | Cursor, Range ring, Heading mark, North mark, Bearing mark, Target trail, VRM, EBL, Acquisition zone |
| 3.10 | Target tracking (TT) | Auto or manual acquisition: 100 targets in 24/48 NM (range selected from menu for maintenance)
Auto tracking on all acquired targets,
Tracking: 5/10 pts on all activated targets
Vector time: Off, 30 s, 1-60 min |
| 3.11 | AIS | Display capacity: 350 targets,
Tracking: 5/10 pts on all activated targets
Vector time: Off, 30 s, 1-60 min |

- | | | |
|------|----------------------|---|
| 3.12 | Echo trail | True/Relative, Trail length: 0 to 30 minutes (30 s steps) or continue |
| 3.13 | Radar map | 20,000 pts |
| 3.14 | Acquisition zone | 2 zones |
| 3.15 | Interswitch function | Selectable from menu |

4 PLOTTER FUNCTIONS (C-TYPE ONLY)

- | | | |
|-----|---------------------------|---|
| 4.1 | Projection | Mercator |
| 4.2 | Useable area | 85° latitude or below |
| 4.3 | Effective projection area | 0.025 to 120 NM (for STBY),
follows the radar range scale while transmitting |
| 4.4 | Memory capacity | |
| | Own ship's track | 30,000 pts (10,000 pts indicated) |
| | Other ship's track | TT: 100,000 pts (10,000), AIS: 10,000 pts (10,000),
consort ship: 10,000 pts (1,000), GPS buoy: 10,000 pts (1,000)
(): Number of points indicated. |
| | Mark/line | 30,000 pts |
| | Waypoint | 3,500 pts |
| | Route | 200 routes with 100 waypoint each |
| 4.5 | External memory | Waypoint: 100 pts, 1 route |
| 4.6 | Electronic chart | Mapmedia (newpec) |
| 4.7 | Own ship's tracking | 7 colors |

5 MONITOR UNIT

- | | | |
|-----|--------------------------|--|
| 5.1 | Screen type | |
| | MU-190 | 19-inch color LCD, 1280 x 1024 (SXGA) |
| | MU-231 | 23.1-inch color LCD, 1600 x 1200 (UXGA) |
| | MU-270W | 27-inch color LCD, 1920 x 1200 (WUXGA) |
| 5.2 | Brightness | |
| | MU-190 | 450 cd/m ² typical |
| | MU-231/270W | 400 cd/m ² typical |
| 5.3 | Visible distance | 1.2 m nominal (MU-231), 1.02 m nominal (MU-190/270W) |
| 5.4 | Radar effective diameter | 282 mm (MU-190), 331 mm (MU-231), 349 mm (MU-270W) |

6 INTERFACE

- | | | |
|-----|---------------------------------|--|
| 6.1 | Number of port (processor unit) | |
| | Serial | 7 ports (IEC61162-1/2: 2, IEC61162-1: 4, AD-10: 1) |
| | Alarm output | 6 ports: contact signal, load current 250mA
(Normal close/ open: 4, System fail: 1, Power fail: 1) |
| | DVI output | 2 ports: DVI-D, DVI-I or RGB picture data (for VDR)
(RGB resolution 1280x1024 (SXGA), 60.0Hz or
1440x900 (WXGA+), 59.9Hz) |
| | LAN | 2 ports: Ethernet 100Base-TX |
| | USB | 2 ports: USB flash memory and mouse/keypad |
| | RS-232C | 1 port: brilliance control |
| | Sub display (for ECDIS) | 2 ports: HD, BP, Trigger and Video signal |
| 6.2 | Data sentences (IEC61162-1/2) | |
| | Input | ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK ^{*1} , DBS ^{*1} , DBT,
DDC, DPT, DTM, GGA, GLL, GNS, HBT, HDT ^{*1} , MTW, MWV,
OSD, RAQ, RMB, RMC, ROT, RTE, THS, VBW, VDM, VDO, |

- | | | |
|--|--------|--|
| | Output | VDR, VHW, VSD, VTG, VWR* ¹ , VWT* ¹ , WPL, ZDA
ABM, ACK, AIQ, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT,
OSD, RSD, TLB, TLL* ² , TTD, TTM, VSD
* ¹ : for retrofit, * ² : C-type only. |
|--|--------|--|
- 6.3 Ethernet interface for IEC61162-450
- | | |
|----------------|----------------------------------|
| Port (LAN2) | 100Base-TX, IPv4, 8P8C connector |
| Data sentences | Same as 6.2 sentences |
- IEC61162-450 transmission group
- | | |
|-------------------|------------------------------------|
| Input | MISC, TGTD, SATD, NAVD, TIME, PROP |
| Output | Arbitrary (default: TGTD) |
| Multicast address | 239.192.0.1 to 239.192.0.16 |
| Destination port | 60001 to 60016 |
- Re-transmittable binary image transfer
- | | |
|-------------------|------------------------------|
| Multicast address | 239.192.0.26 to 239.192.0.30 |
| Destination port | 60026 to 60030 |
- Other network function excepted IEC61162-450
- SNMP, HTTP, Syslog, Furuno Management Protocol (FMP)
- 6.4 Input/output port on antenna unit
- | | |
|-----------------------|--|
| Input from main radar | 1 port: HD, BP, Trigger and Video signal |
| Output to sub radar | 3 port: HD, BP, Trigger and Video signal |

7 POWER SUPPLY

- | | | |
|-----|-------------------|---|
| 7.1 | Power supply unit | 100-115/220-230 VAC: 3.2/1.5 A, 1 phase, 50-60 Hz |
| 7.2 | Processor unit | 100-230 VAC: 2.8-1.4 A, 1 phase, 50-60 Hz |
| 7.3 | Monitor unit | |
| | MU-190 | 100-230 VAC: 0.7-0.4 A, 1 phase, 50/60 Hz |
| | MU-231 | 100-230 VAC: 1.0-0.6 A, 1 phase, 50/60 Hz |
| | MU-270W | 100-230 VAC: 0.7-0.4 A, 1 phase, 50/60 Hz |
| 7.4 | HUB (option) | 100-230 VAC, 1 phase, 50/60 Hz |

8 ENVIRONMENTAL CONDITIONS

- | | | |
|-----|-------------------------|--|
| 8.1 | Ambient temperature | |
| | Antenna unit | -25°C to +55°C (storage: -25°C to +70°C) |
| | Indoor unit | -15°C to +55°C (storage: -15°C to +70°C) |
| 8.2 | Relative humidity | 93% or less at +40°C |
| 8.3 | Degree of protection | |
| | Antenna unit | IP46 |
| | Power supply unit | IP22 |
| | Processor/ monitor unit | IP22 |
| | Control unit | IP20 (RCU-014/015/016), IP22 (RCU-031) |
| | HUB | IP20 (HUB-100), IP22 (HUB-3000) |
| 8.4 | Vibration | IEC 60945 Ed.4 |

9 UNIT COLOR

- | | | |
|-----|-----------------------|---------------------------------|
| 9.1 | Antenna unit | N9.5 |
| 9.2 | Power supply unit | N2.5 |
| 9.3 | Processor unit | N2.5 |
| 9.4 | Monitor/ control unit | N2.5 |
| 9.5 | HUB | N3.0 (HUB-100), N2.5 (HUB-3000) |

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Declaration of Conformity

**[FAR-2218/FAR-2218-BB/FAR-2228/FAR-2228-BB/FAR-2238S/
FAR-2238S-BB/FAR-2238S-NXT/FAR-2238S-NXT-BB/FAR-2258/
FAR-2268DS/FAR-2318/FAR-2328/FAR-2338S/FAR-2338S-NXT]**

Bulgarian (BG)	С настоящото Furuno Electric Co., Ltd. декларира, че гореспоменат тип радиосъоръжение е в съответствие с Директива 2014/53/EC, SI 2017/1206. Цялостният текст на EC/UK декларацията за съответствие може да се намери на следния интернет адрес:
Spanish (ES)	Por la presente, Furuno Electric Co., Ltd. declara que el tipo de equipo radioeléctrico arriba mencionado es conforme con la Directiva 2014/53/UE, SI 2017/1206. El texto completo de la declaración de conformidad de la EU/UK está disponible en la siguiente dirección Internet:
Czech (CS)	Tímto Furuno Electric Co., Ltd. prohlašuje, že výše zmíněné typ rádiového zařízení je v souladu se směrnicí 2014/53/EU, SI 2017/1206. Úplné znění EU/SK prohlášení o shodě je k dispozici na této internetové adrese:
Danish (DA)	Hermed erklærer Furuno Electric Co., Ltd., at ovennævnte radioudstyr er i overensstemmelse med direktiv 2014/53/EU, SI 2017/1206. EU/UK-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse:
German (DE)	Hiermit erklärt die Furuno Electric Co., Ltd., dass der oben genannte Funkanlagentyp der Richtlinie 2014/53/EU, SI 2017/1206 entspricht. Der vollständige Text der EU/UK-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar:
Estonian (ET)	Käesolevaga deklareerib Furuno Electric Co., Ltd., et ülalmainitud raadioseadme tüüp vastab direktiivi 2014/53/EL, SI 2017/1206 nõuetele. EL/GB vastavusdeklaratsiooni täielik tekst on kättesaadav järgmisel internetiaadressil:
Greek (EL)	Με την παρούσα η Furuno Electric Co., Ltd., δηλώνει ότι ο προαναφερθέντας ραδιοεξοπλισμός πληροί την οδηγία 2014/53/ΕΕ, SI 2017/1206. Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ/UK διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο:
English (EN)	Hereby, Furuno Electric Co., Ltd. declares that the above-mentioned radio equipment type is in compliance with Directive 2014/53/EU, SI 2017/1206. The full text of the EU/UK declaration of conformity is available at the following internet address:
French (FR)	Le soussigné, Furuno Electric Co., Ltd., déclare que l'équipement radioélectrique du type mentionné ci-dessus est conforme à la directive 2014/53/UE, SI 2017/1206. Le texte complet de la déclaration UE/RU de conformité est disponible à l'adresse internet suivante:
Croatian (HR)	Furuno Electric Co., Ltd. ovime izjavljuje da je gore rečeno radijska oprema tipa u skladu s Direktivom 2014/53/EU, SI 2017/1206. Cjeloviti tekst EU/UK izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi:
Italian (IT)	Il fabbricante, Furuno Electric Co., Ltd., dichiara che il tipo di apparecchiatura radio menzionato sopra è conforme alla direttiva 2014/53/UE, SI 2017/1206. Il testo completo della dichiarazione di conformità UE/RU è disponibile al seguente indirizzo Internet:
Latvian (LV)	Ar šo Furuno Electric Co., Ltd. deklarē, ka augstāk minēts radioiekārta atbilst Direktīvai 2014/53/ES, SI 2017/1206.

Pilns ES/AK atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē:

- Lithuanian (LT) Aš, Furuno Electric Co., Ltd., patvirtinu, kad pirmiau minėta radijo įrenginių tipas atitinka Direktyvą 2014/53/ES, SI 2017/1206.
Visas ES/JK atitikties deklaracijos tekstas prieinamas šiuo interneto adresu:
- Hungarian (HU) Furuno Electric Co., Ltd. igazolja, hogy fent említett típusú rádióberendezés megfelel a 2014/53/EU, SI 2017/1206 irányelvnek.
Az EU/EK-megfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen:
- Maltese (MT) B'dan, Furuno Electric Co., Ltd., niddikjara li msemmija hawn fuq-tip ta' tagħmir tar-radju huwa konformi mad-Direttiva 2014/53/UE, SI 2017/1206.
It-test kollu tad-dikjarazzjoni ta' konformità tal-UE/RU huwa disponibbli f'dan l-indirizz tal-Internet li ġej:
- Dutch (NL) Hierbij verklaar ik, Furuno Electric Co., Ltd., dat het hierboven genoemde type radioapparaat conform is met Richtlijn 2014/53/EU, SI 2017/1206.
De volledige tekst van de EU/VK-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres:
- Polish (PL) Furuno Electric Co., Ltd. niniejszym oświadcza, że wyżej wymieniony typ urządzenia radiowego jest zgodny z dyrektywą 2014/53/UE, SI 2017/1206.
Pełny tekst deklaracji zgodności UE/UK jest dostępny pod następującym adresem internetowym:
- Portuguese (PT) O(a) abaixo assinado(a) Furuno Electric Co., Ltd. declara que o mencionado acima tipo de equipamento de rádio está em conformidade com a Diretiva 2014/53/UE, SI 2017/1206.
O texto integral da declaração de conformidade da EU/UK está disponível no seguinte endereço de Internet:
- Romanian (RO) Prin prezenta, Furuno Electric Co., Ltd. declară că echipamentul radio menționat mai sus este în conformitate cu Directiva 2014/53/UE, SI 2017/1206.
Textul integral al declarației de conformitate UE/RU este disponibil la următoarea adresă internet:
- Slovak (SK) Furuno Electric Co., Ltd. týmto vyhlasuje, že vyššie spomínané rádiové zariadenie typu je v súlade so smernicou 2014/53/EÚ, SI 2017/1206.
Úplné EÚ/SK vyhlásenie o zhode je k dispozícii na tejto internetovej adrese:
- Slovenian (SL) Furuno Electric Co., Ltd. potrjuje, da je zgoraj omenjeno tip radijske opreme skladen z Direktivo 2014/53/EU, SI 2017/1206.
Celotno besedilo izjave EU/ZK o skladnosti je na voljo na naslednjem spletnem naslovu:
- Finnish (FI) Furuno Electric Co., Ltd. vakuuttaa, että yllä mainittu radiolaitetyyppi on direktiivin 2014/53/EU, SI 2017/1206 mukainen.
EU/UK-vaatimustenmukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa:
- Swedish (SV) Härmed försäkrar Furuno Electric Co., Ltd. att ovan nämnda typ av radioutrustning överensstämmer med direktiv 2014/53/EU, SI 2017/1206.
Den fullständiga texten till EU/Storbritannien-försäkran om överensstämmelse finns på följande webbadress:

Online Resource

http://www.furuno.com/en/support/red_doc

Notice for radiated immunity

The test for the radiated immunity is performed up to 2.7 GHz only without the special condition of spot frequency being applied. There would be chance where the equipment may be interfered with allocated services in the frequency range of 2.7 GHz to 6 GHz near the harbor, the river, bank of the lake, etc.