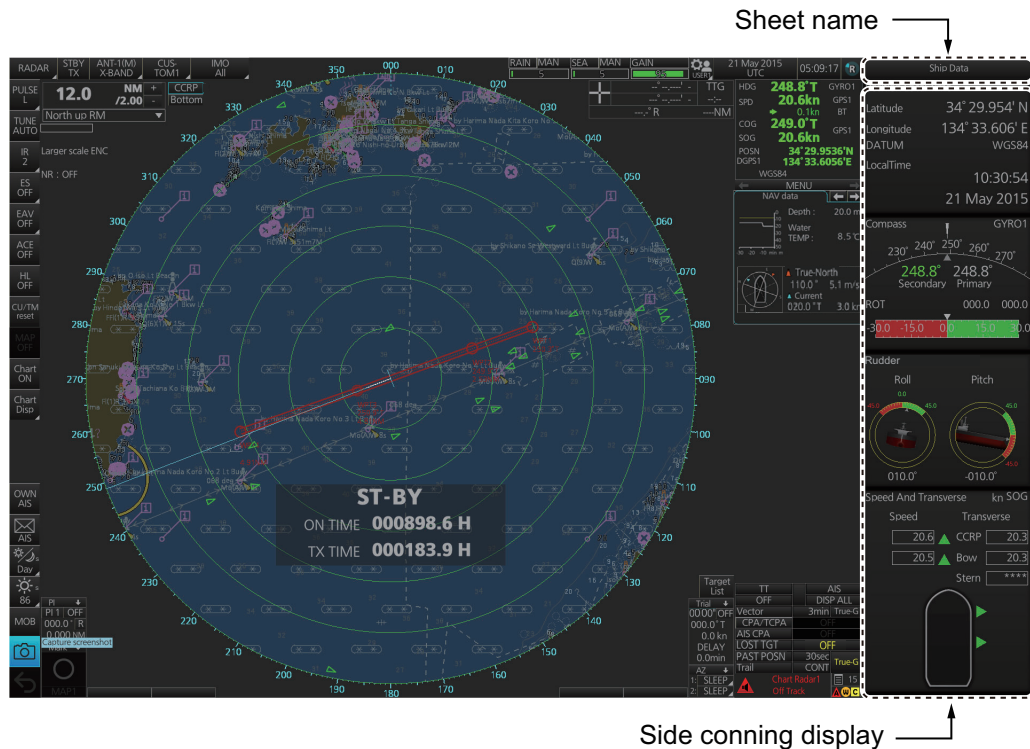


24.4 Side Conning Display (landscape monitor only)

With the landscape monitor, the side conning display can be shown in the information area, in the radar mode. The presence or absence of the display is determined during the installation.

Four side conning sheets are preset during the installation according to expected usage, possible navigation conditions, etc. (The operator cannot modify the sheets.) You can select a sheet by clicking the current sheet name at the top right corner on the display.



25. MAINTENANCE AND TROUBLESHOOTING

Periodic checks and maintenance are important for proper operation of any electronic system. This chapter contains maintenance and troubleshooting instructions to be followed to obtain optimum performance and the longest possible life of the equipment. Before attempting any maintenance or troubleshooting procedure please review the safety information below. If you cannot restore normal operation after following the troubleshooting procedures, do not attempt to check inside any unit; there are no user-serviceable parts inside. Refer any repair work to a qualified technician.

**WARNING**



Do not open the equipment.

Hazardous voltage which can cause electrical shock exists inside the equipment. Only qualified personnel should work inside the equipment.



Turn off the radar power switch before servicing the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.

Prevent the potential risk of being struck by the rotating antenna.



A transmitting radar antenna emits electromagnetic waves, which can be harmful, particularly the eyes.



Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

25.1 Maintenance

Regular maintenance is essential to good performance. A regular maintenance program should be established and should at least include the items shown in the table below.

Maintenance schedule

Interval	Check point	Check and measures	Remarks
When needed	FURUNO-supplied monitor unit and Processor Unit	Dust or dirt may be removed from a cabinet with a soft cloth. Water-diluted mild detergent may be used if desired. DO NOT use chemical cleaners to clean the display unit; they may remove paint and markings. To clean the LCD, wipe the LCD carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD. Do not use solvents such as thinner, acetone or benzene for cleaning. Also, do not use a degreaser or an antifog solution, as they can strip the coating from the LCD.	Do not use chemical-based cleaners for cleaning. They can remove paint and markings.
	Filter inside Processor Unit	Have a technician clean the filter if it is dusty. See section 25.4.	
3 to 6 months	Cabling	Check that all cabling is firmly connected and is not damaged.	
	Exposed bolts and nuts of antenna unit	Exposed bolts and nuts are subject to corrosion. Further, they may loosen by vibration.	Check that bolts and nuts are not corroded and are securely fastened. If corroded, clean and coat with anticorrosive sealant.
	Adhesive (marine sealant) on nuts and bolts	Check for deteriorations such as splits and peeling. Re-apply as required. For areas with extensive deterioration, remove the existing adhesive before re-applying a fresh coat.	Adhesive deterioration can result in water leakage, which can cause corrosion.

Interval	Check point	Check and measures	Remarks
3 to 6 months	Radiator	Dust, dirt and salt deposits on the radiator cause signal attenuation, resulting in loss of sensitivity. Wipe radiator with a freshwater-moistened cloth.	The radiator is made of fiber-glass reinforced plastic. Therefore, do not use gasoline, benzene and the like to clean the radiator. If the radiator is iced, use a wooden or plastic headed hammer to remove the ice. DO NOT use a steel hammer.
	Terminals, connectors	Check that all terminals and connectors on circuit boards are securely fastened.	Have a qualified technician check terminals and connectors.
6 months to 1 year	Screws on terminal boards in Processor Units	Check that all screws are tightly fastened.	Have a qualified technician check screws.
5 years	Grease on antenna rotary	Insufficient grease on the antenna rotary may cause cracks in the waterproofing gasket (V-ring). To prevent water leakage due to cracks in the V-ring, use the optional lubrication kit (OP03-229) to apply the grease to the antenna rotary.	Have a qualified technician apply the grease oil to the antenna rotary. If exposed to heavy wind, rain, or waves, it is recommended to apply the grease during the regular maintenance.

25.2 How to Replace the Fuses

The fuse in the following units protects those units from overvoltage (overcurrent) and internal fault. If a unit cannot be turned on, check if its fuse has blown. If the fuse has blown, find out the cause before replacing the fuse. If the fuse blows again after replacement, contact your dealer for advice.



WARNING

Use the proper fuse.

Use of a wrong fuse can damage the equipment or cause fire.

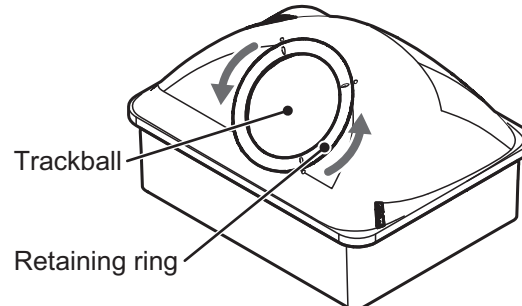
Unit	Power supply	Type
Power Supply Unit PSU-014/PSU-014-A	100-230 VAC	F1: FGBO-A 250V 7A PBF
Power Supply Unit PSU-015	100-230 VAC	F1: FGBO-A 250V 3A PBF F2: FGBO-A 250V 7A PBF
Power Supply Unit PSU-016	100-230 VAC	F1: FGBO-A 250V 5A PBF
Power Supply Unit PSU-018	100-230 VAC	F1: FGBO-A 250V 3A PBF F2: FGBO-A 250V 7A PBF
Monitor Unit	Refer to the Operator's Manual for the Monitor Unit.	
Processor Unit EC-3000/3005	100-115 VAC	FGMB-S 125V 10A PBF
	220-230 VAC	FGMB-A 250V 5A PBF
Sensor Adapter MC-3000S	24 VDC	FGMB-A 125V 3A PBF
Antenna Unit*	100-115/ 220-230 VAC	FGBO-A 250V 3A PBF

*: Only for configurations with the De-icer Kit installed.

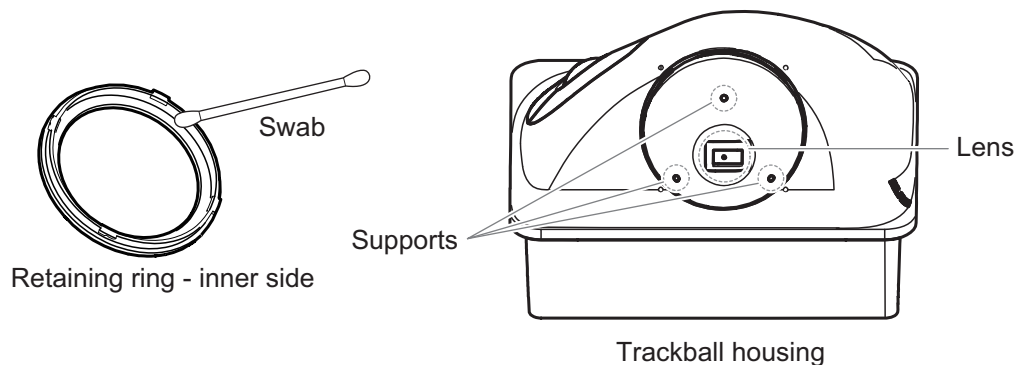
25.3 Trackball Maintenance

If the cursor moves abnormally, clean the trackball and inside the trackball housing (including the lens) as shown below:

1. Turn the retaining ring on the trackball module in the direction of the arrows (see figure below) to unlock it, then remove the retaining ring.



2. Use cellophane tape to remove the trackball from the trackball housing. Place the trackball and the retaining ring on clean, soft cloth laid on a flat surface.
3. Clean the ball with a damp, soft cloth, then use a dry, lint-free cloth to carefully wipe the ball dry.
4. Use a swab, moistened with water, to carefully clean the inside of the retaining ring, the inside of the trackball housing, the supports and the lens. Change the swab regularly so that dirt and dust build-up is easily removed.



5. Make sure that the trackball, trackball housing and retaining ring are completely dry.
6. Re-set the ball and retaining ring. Be sure the retaining ring is not inserted reversely.

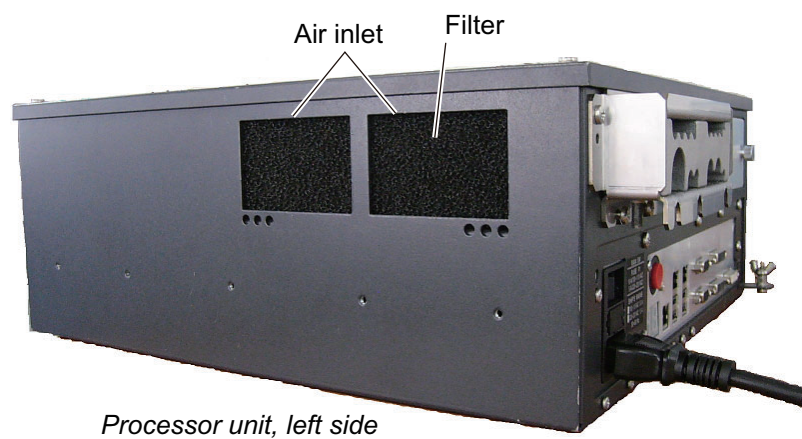
25.4 How to Clean and Replace the Air Inlet Filter

25.4.1 Processor Unit

Clean the air inlet filter in the Processor Unit when it becomes dusty. Turn the Processor Unit off, then remove the filter and clean it with water and a mild detergent. Rinse the filter, allow the filter to dry then return it to the Processor Unit.

Note 1: Be sure the air inlet is not blocked. A blocked inlet can cause the temperature to rise inside the cabinet, which can lead to malfunction.

Note 2: The right side of the Processor Unit has an exhaust vent. Remove dust from the vent as necessary.



Processor unit, left side

If the filter appears brittle and leaves residue on your hands when dry, replace the filter.

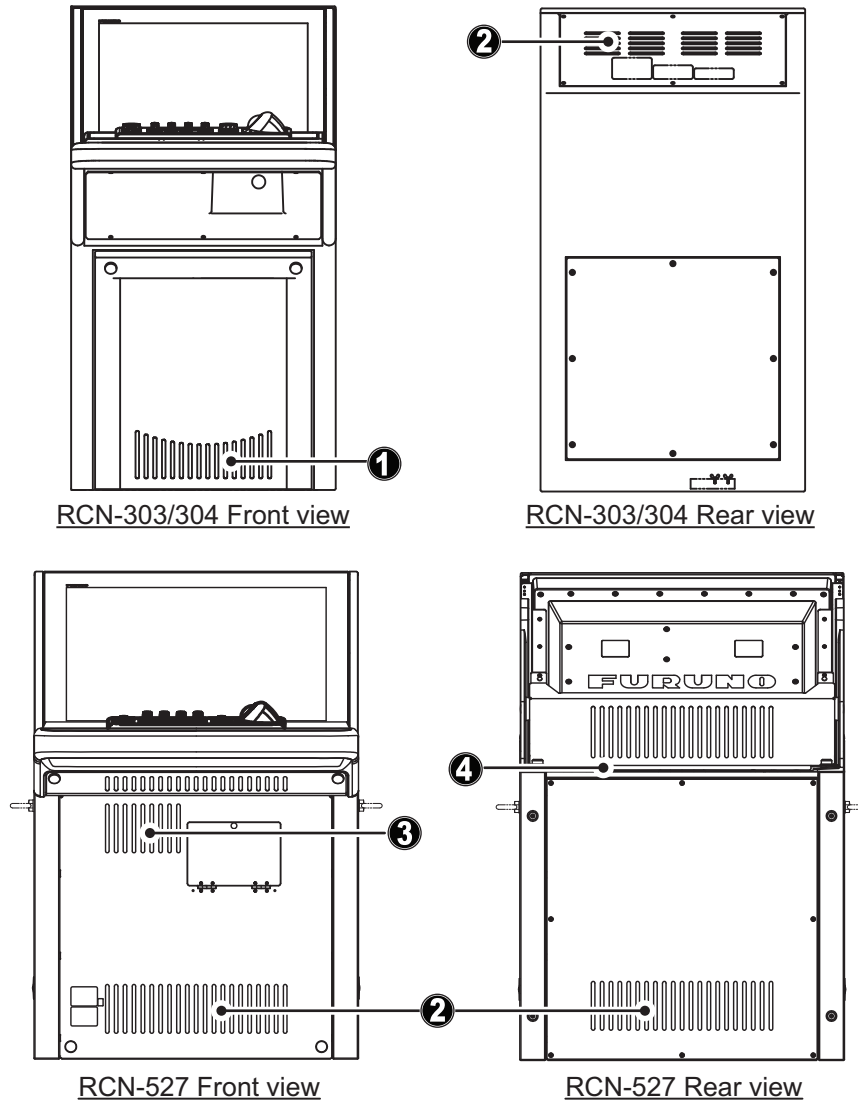
For filter replacement, consult your local dealer and quote the following details:

Part number:	24-014-0105
--------------	-------------

25.4.2 RCN-303/RCN-304/RCN-527 Console Units

The console unit air filters are fitted on the inside of the console units and are not accessible normally. The figures below show the locations of each air filter.

Note: The monitor size may differ, depending on the configuration purchased. The figures below are for reference only and are not to scale.



It is recommended to have a qualified technician clean and check the air filters when conducting routine service and maintenance. If the air filters require replacement, consult your dealer and quote the following details:

No.	Filter part no.	Remarks
1	03-163-7018	RCN-303/304: Front cover, lower section.
2	03-163-7219	RCN-303/304: Rear cover, upper section. RCN-527: Front & rear cover, lower section
3	24-014-3251	RCN-527: Front cover, upper section
4	24-014-3252	RCN-527: Inside monitor cover, console top side.

25.5 Confirmation of Cyber Incident Occurrence

The only cyber incident that this unit considers to be a Denial of Service (DoS) event is an excessive load on the network. This can be confirmed by the “Network overload” alert.

25.6 Forensics

Forensics is the collecting and analyzing evidence remaining on equipment after a cyber incident occurs. In the case of this unit, the audit log is the evidence. To preserve the audit log, follow section 22.2 [File Export] to obtain the event log and application log.

The above logs can only be viewed by service technician. The crew members must contact service technician in case of incident.

25.7 Backup and Recovery

Follow section 22.2 [File Export] and section 22.3 [File Import] to back up user data regularly and restore it as necessary. If the Hermace Gateway is connected, the service settings are also backed up on the Hermace Gateway.

If operations do not function properly even after restoring user data, contact a service representative.

25.8 Checking the Operation of Security Functions

The monitoring system can check the security features in the following methods.

Actions for the operator

Do the self test to check the following:

- The software version is the latest. For the latest software version, ask your dealer.
- The RX Flow for LANs 1 to 3 must be less than the RX Flow Threshold.
- The CPU Load of the HUB must be less than the CPU Load Threshold.
- If the “Watch” indication for each port of the HUB-3000 is “ON”, the “Link Status” indication is “UP”. If the “Watch” indication is “OFF”, the “Link Status” indication is “DOWN”.
- The RX Flow on each port of the HUB must be less than the RX Flow Threshold.
- Data on the RX Flow of the Sensor Adapter must be available.

Actions for the service technician

- Follow the Instruction Manual (AME-36940) to check that you can log in to the FAR-3xxx, MC-3000S and HUB-3000 equipment configuration screens.
- Confirm that the "Authentication successful" event occurs and that the event is recorded in the audit log.
- Check that the settings for the security data (see below) are compatible with the security policy of the ship's owner.

FAR-3xxx	
• IP Address • Chart Service Connection Settings • HUB-3000 Monitoring Settings	• Service Gateway Settings • Radar Connection Settings • Session Timeout
MC-3000S	
• IP Address	• Session Timeout
HUB-3000	
• IP Address • Default Gateway • Port Flow Config • Port Security • Port Mirror • Port Channel • Ring Protection • PDP • Static ARPs	• Mask Address • Port Config • Storm Control • QoS • VLAN • IGMP Snooping • STP • LLDP • SNMP

After checking these items, save the install data and setting data as necessary, referring to the Instruction Manual (AME-36940).

25.9 Troubleshooting

The troubleshooting table below provides common faults and the remedy with which to restore normal operation.

Radar troubleshooting

If...	then...	Remedy
the radar echoes disappear and the Alert "Lost Radar ANT" appears	check the connection between the processor unit and radar sensor.	Reconnect the cable (if loosened) then restart the equipment.
the Alert "ISW: NO RADAR" appears	• check the connection between the processor unit of this equipment and the processor unit in the LAN line. • check the connection between the processor unit and radar sensor in the LAN line.	Reconnect the cable (if loosened) then restart the equipment.
the equipment cannot be turned on	• power connector may have loosened. • ship's mains is off. • fuse has blown.	• Check connector. • Check ship's mains. • Replace fuse.

If...	then...	Remedy
the equipment can be turned on but nothing appears on the display	• brilliance is too low. • the ambient temperature is less than 0°C (32°F).	• Adjust brilliance. • The heater is warming the processor unit. The display appears in approx. 10 minutes.
key doesn't beep when operated	• key beep is turned off.	• Turn on key beep from the menu (see section 22.8).
picture not updated or picture freezes.	• If the picture freezes, the buzzer sounds and the Status LED blinks in red.	• Restart the equipment.
picture does not change even though range is changed.	• suspect faulty the RANGE key or video freeze.	• Hit the RANGE key several times. If nothing happens, restart the equipment.
only two index lines are displayed	• check index line distance setting.	• Refer to section 2.23.3 for how to adjust index line distance.
range rings are not displayed	• range rings are hid.	• Turn on the range rings.
tracked target is not tracked correctly	• sea clutter etc. are masking tracked target.	• Adjust A/C SEA and A/C RAIN to suppress sea and rain clutters.
sensitivity is poor	• suspect second-trace echo or soiled radiator.	• Reject second-trace echo; clean radiator.

Chart troubleshooting

If...	then...	Remedy
message "No connection to dongle" appears	• dongle is not connected.	• Connect dongle.
the message "There is no dongle or an error has occurred in the dongle. The system will automatically shut down." appears	• dongle is not connected. • data in the dongle is corrupted.	• Connect dongle. • Contact FURUNO for assistance.
monitored route is not displayed	• route has not been selected. • monitor route has not been selected to be visible above the chart.	• Select route to monitor. • Open the [Route] page of the [Symbol Display] menu and check the monitored route parts to show.
planned route is not displayed	• route has not been selected. • planned route has not been selected to be visible above the chart.	• Select route as "planned". • Open [Route] page of [Symbol Display] menu and check the planned route parts to show.
route monitoring is stopped	• alert "Route Failure" appears.	• Steer the ship back to the route then restart route monitoring.
symbol of user chart cannot be erased	• two or more symbols may be superimposed on each other.	• Do the delete action several times.
position cannot be found	• position sensor(s) is not selected on the [POSN] page. • position sensor is turned off. • sensor cable has loosened.	• Check position sensor selections. • Turn on position sensor. • Check cable.
ENC chart cannot be displayed	• no ENC chart for area. • dongle is not connected.	• Open ENC chart from [Manage Charts] dialog box • Connect dongle.

25. MAINTENANCE AND TROUBLESHOOTING

If...	then...	Remedy
past track is not displayed	past track is not selected to be visible.	Open [Tracking] page of [Symbol Display] menu and select [Own Ship Past Tracks] to [Primary] or [Secondary] as appropriate.
monitored user chart is not displayed on chart display	user chart is not selected to be visible.	Open [Mariner] page of [Symbol Display] menu and select parts to show.
user chart is not displayed on radar display	user chart is not selected in Voyage navigation mode.	Select user chart in Voyage navigation mode.
the message "Nearing memory usage limit. Click the Restart button to restart the system to prevent trouble." appears	the memory usage limit for software is close to capacity. Performance may be affected.	If you need to save your work, click the [Later] button then restart the equipment. If you don't need to save your work, click the [Restart] button. Note that the notice does not appear in the Conning mode.
the message "Memory usage limit reached. Click the Restart button to restart the system to prevent trouble." appears	the memory usage limit for software is reached. Performance may be affected.	Click the [Restart] button to reset the power. No other operations are available than restart. Note that the notice does not appear in the Conning mode.
both the display mode buttons [RADAR] and [CHART for RADAR] are yellow	the memory usage limit for software is close to capacity. Performance may be affected.	Stop all operations and restart the equipment.

25.10 Consumable Parts

The table below lists the consumable parts in the antenna unit, Monitor Units, Processor Unit and Sensor Adapters. Request a FURUNO agent or dealer to replace the consumable parts, to get the best performance and longest possible life from the equipment.

Note: The expected lifetimes are typical values. Actual lifetime depends on usage and ambient temperature.

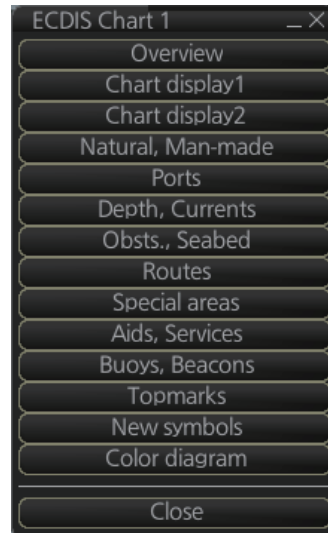
Part	Type	Lifetime	Remarks	
Antenna Unit				
Magnetron	FNE1201	5,000 hours	For X-Band radar (12 kW)	Check number of hours used at TX time. Reset time then adjust the PM gain after replacement (see section 2.32).
	MG5436	5,000 hours	For X-Band radar (25 kW)	
	MG5223F	7,000 hours	For X-Band radar (30 kW)	
Motor*	BV2-K155	-	For S-band radar	
	BV2-K156	-	For X-band radar	
Monitor Unit				
BEZEL& LCD ASSEMBLY	Refer to the Operator's Manual for the Monitor Unit.			
Processor Unit EC-3000/3005				
CPU Fan	KTA-555-01	8.5 years		
Power Fan	109P0612H761	8.5 years		
Chassis Fan	109P0612H761	8.5 years		
Sensor Adapter MC-3000S				
MC-CS Board	24P0114	8.5 years		
Sensor Adapter MC-3010A				
MC-ANLG Board	24P0115(-00)	7.0 years	24P0115(-11) and after do not require replacement.	

*: Lifetime of the motor varies greatly depending on usage environment. Regularly request the maintenance by a service technician. Even if there is no trouble or error, it is recommended to replace the motor every five years.

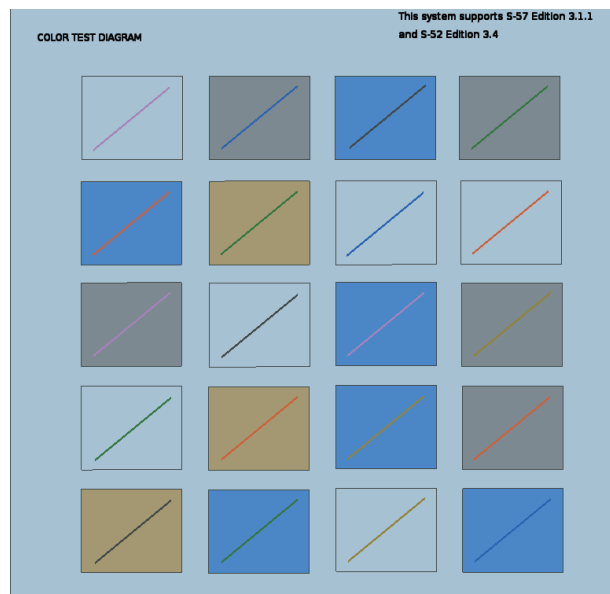
25.11 Color Differentiation Test for S57 Charts

The color differentiation checks if the chart radar monitor can distinguish between the various color-coded areas, lines and symbols.

1. Click the [Chart INFO] and [Chart 1] buttons on the InstantAccess bar™ to show the [ECDIS Chart 1] menu.



2. Click [Color diagram] to show the color test diagram.



If the colors are correct, the diagonal line will be distinguishable from its surroundings, at any brilliance setting.

25.12 Fallback Arrangements

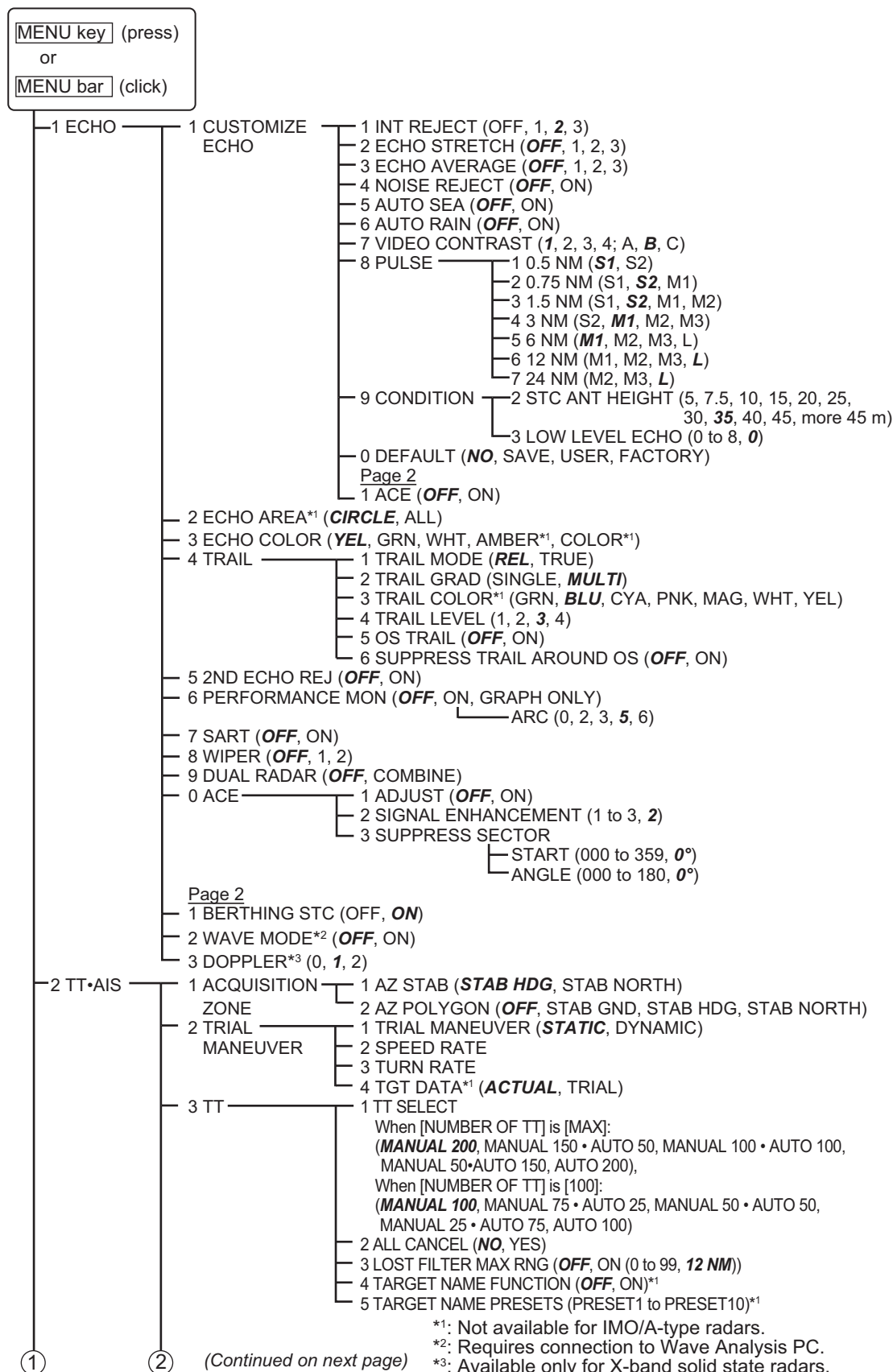
If the top priority sensor (e.g. GPS1) can not be used, this equipment automatically uses the second priority sensor (e.g. GPS2) when the multiple sensors (e.g. GPS1 and GPS2) are installed. When all sensors can not be used, each function is limited as follows:

Sensor	Operation of this equipment
Heading sensor	- The HDG indication reads "****.*°". - The presentation mode is automatically set for head-up. - TT, AIS, radar map, chart and echo averaging (EAV) are disabled.
Speed sensor	<u>When LOG(WT) is selected:</u> - The sensor used is automatically switched in the following priority order: GPS(BT) > LOG(BT). - The SPD indication reads "****.* kn" when both GPS(BT) and LOG(BT) can not be used.
	<u>When LOG(BT) is selected:</u> - The sensor used is automatically switched in the following priority order: GPS(BT) > LOG(WT). - The SPD indication reads "****.* kn" when both GPS(BT) and LOG(WT) can not be used.
	<u>When GPS(BT) is selected:</u> - The sensor used is automatically switched in the following priority order: LOG(BT) > LOG(WT). - The SPD indication reads "****.* kn" when both LOG(BT) and LOG(WT) can not be used.
COG/SOG sensor	- When the GPS sensor can not be used, the values of COG and SOG are calculated from HDG and LOG(BT). - Additionally when the heading sensor can not be used, the values of SOG is calculated from LOG(BT). The COG indication reads "****.*°".
Position sensor	- The POSN indication reads all asterisks. - AIS, radar map and chart are disabled.

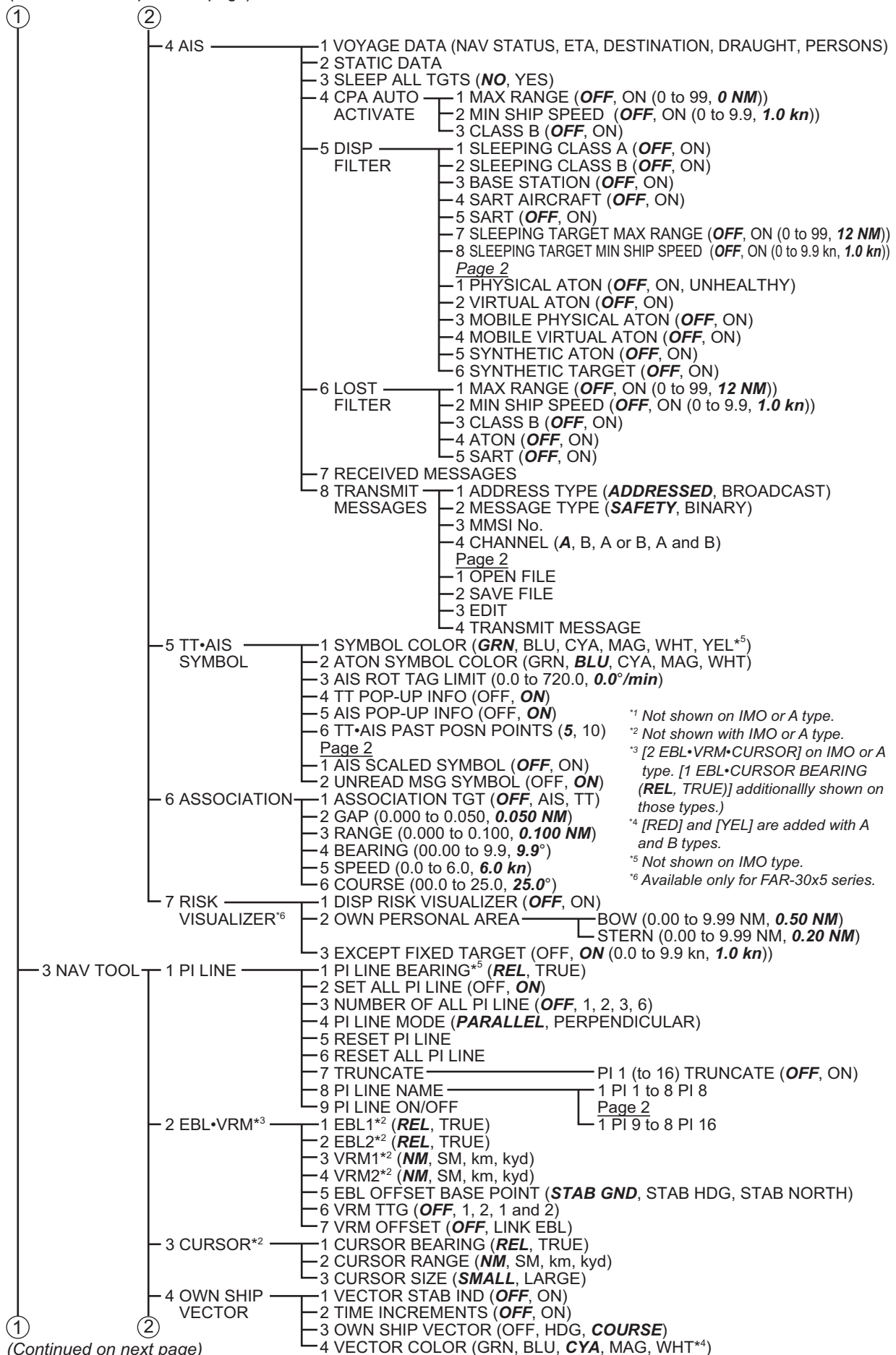
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APPX. 1 MENU TREE

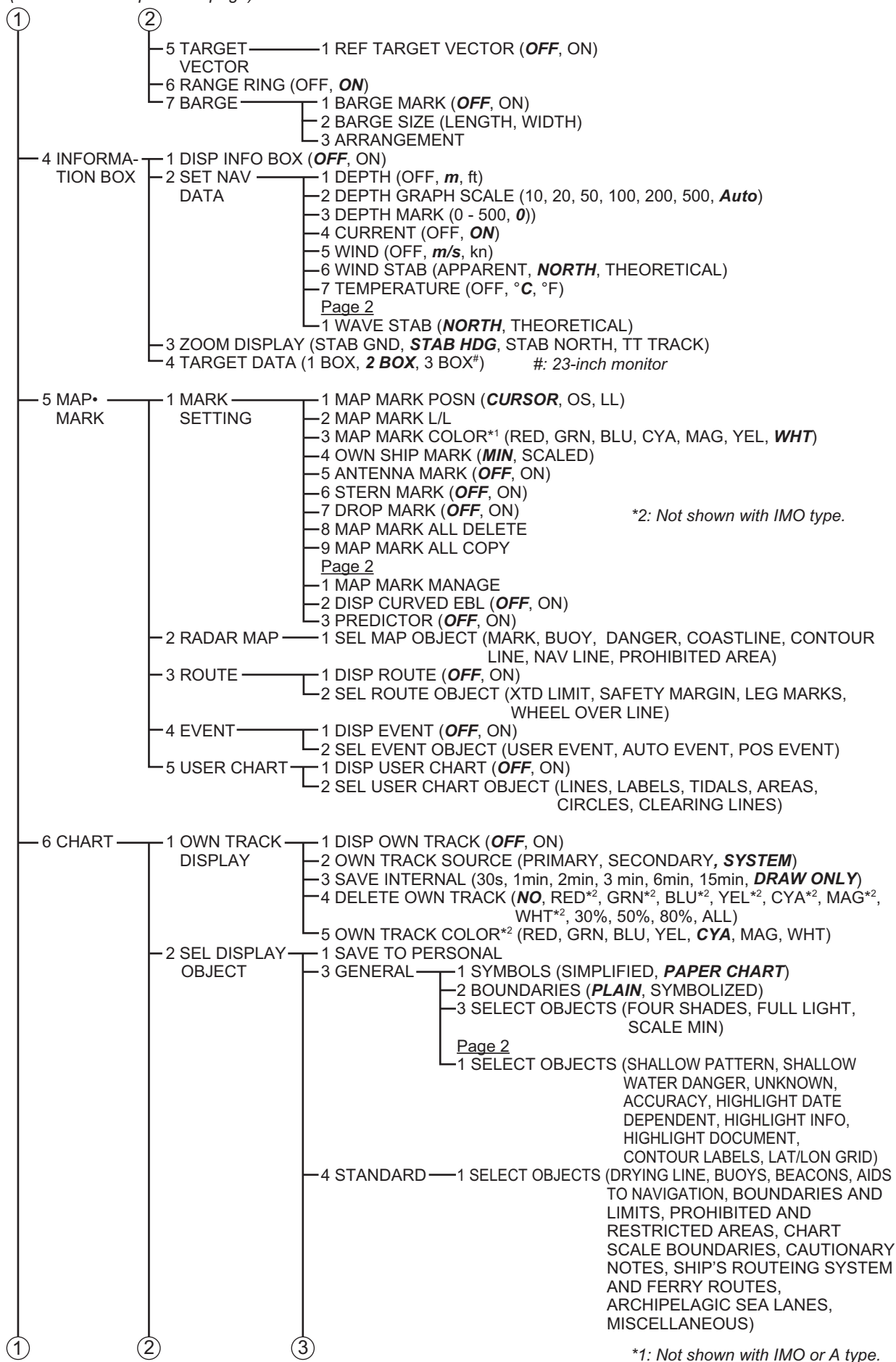
Radar menu



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^{*1} Not shown on IMO or A type.^{*2} Not shown with IMO or A type.^{*3} [2 EBL-VRM-CURSOR] on IMO or A type. [1 EBL-CURSOR BEARING (**REL**, TRUE)] additionally shown on those types.)^{*4} [**RED**] and [**YEL**] are added with A and B types.^{*5} Not shown on IMO type.^{*6} Available only for FAR-30x5 series.

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APPX. 1 MENU TREE

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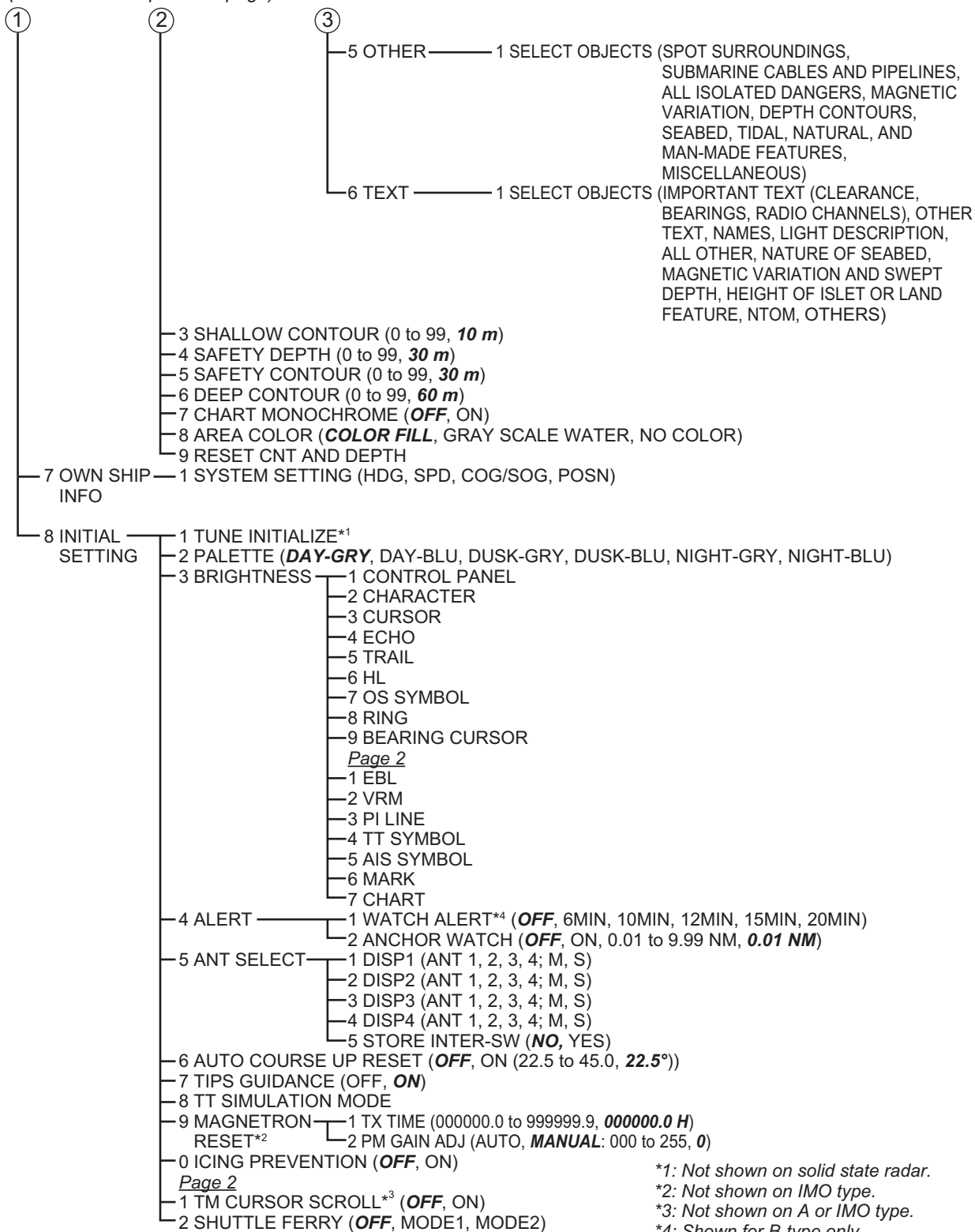
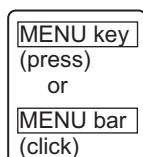
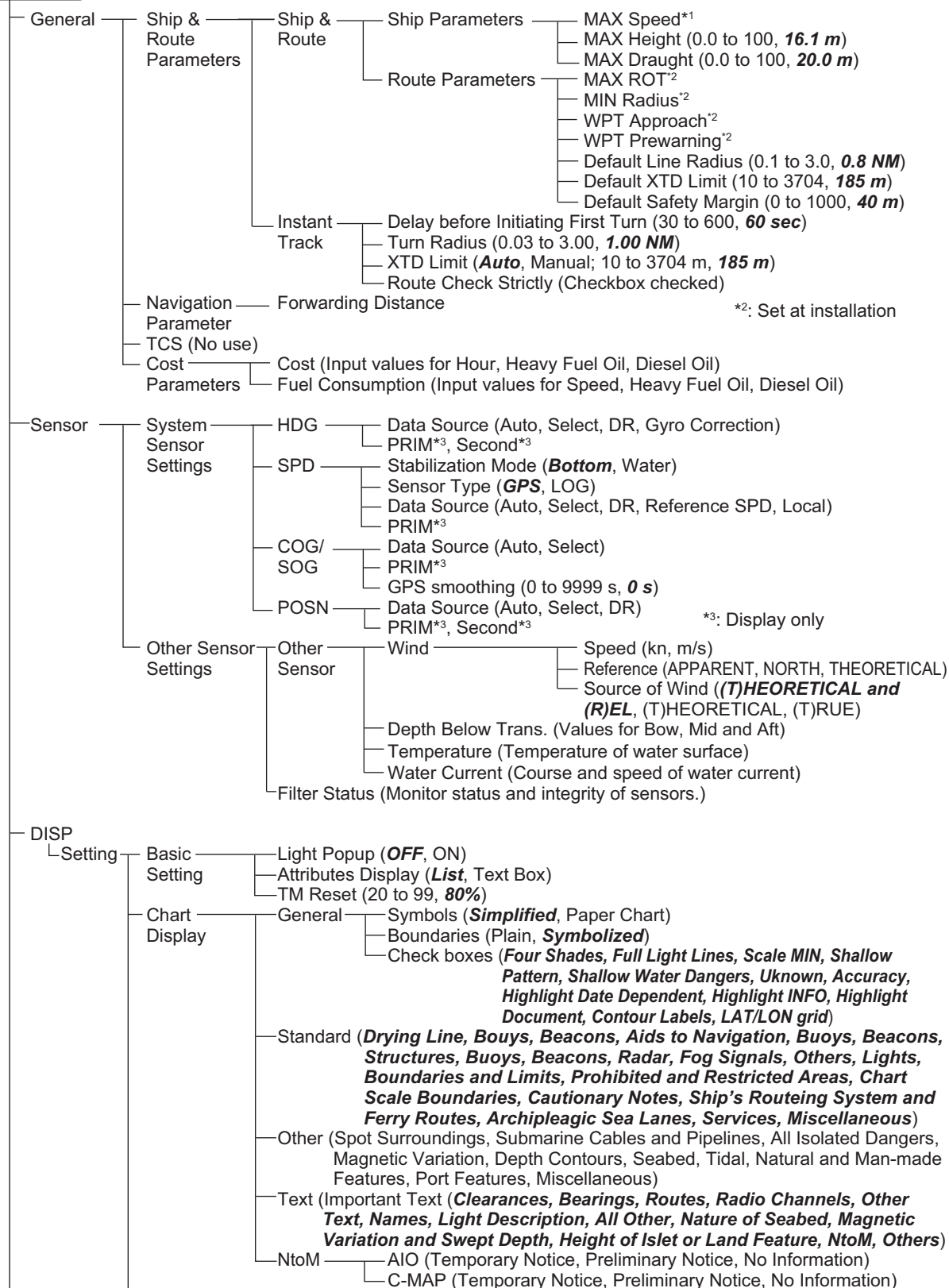


Chart menu



*1: Default and factory settings are dependent on your vessel specifications.

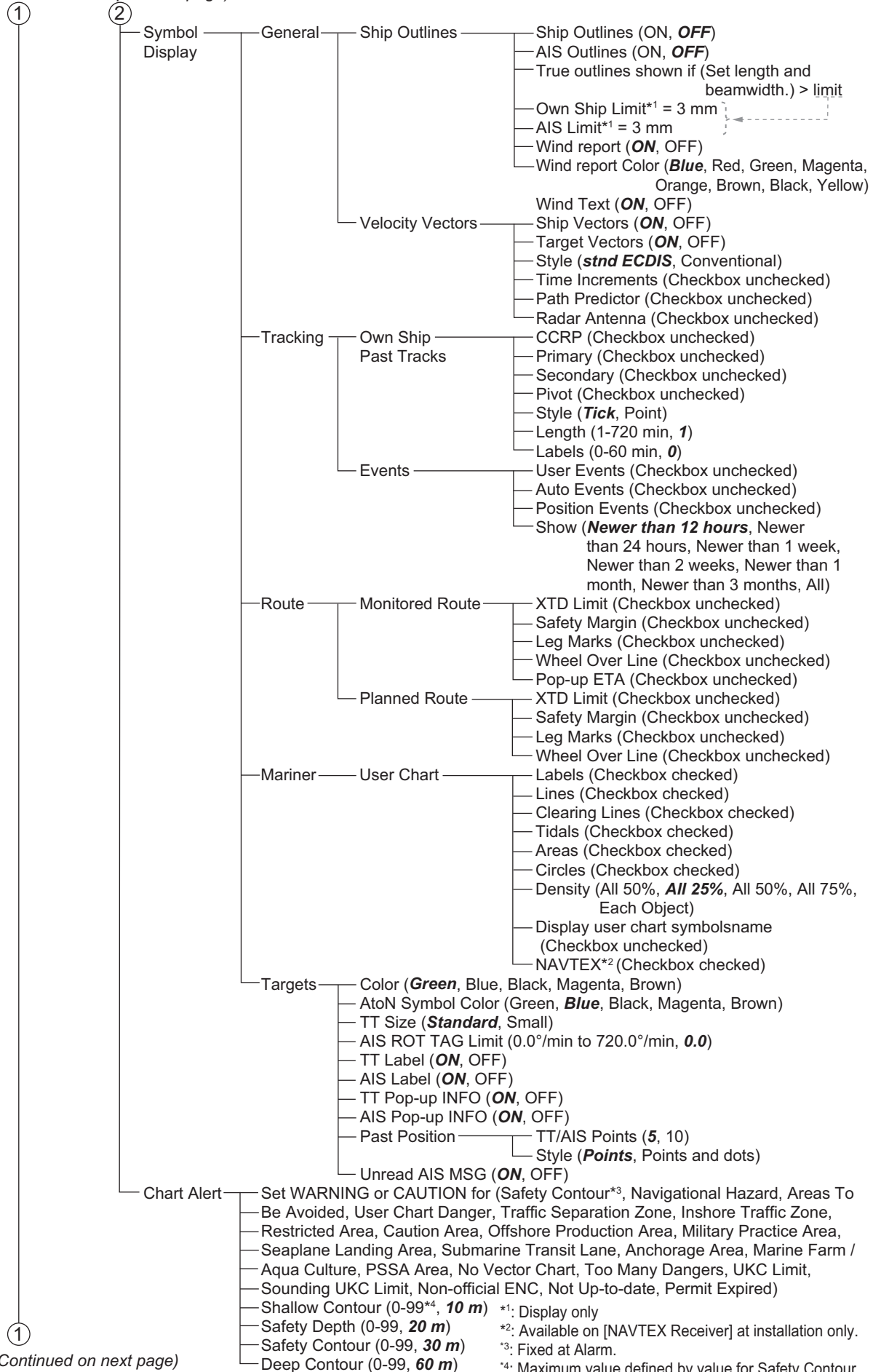


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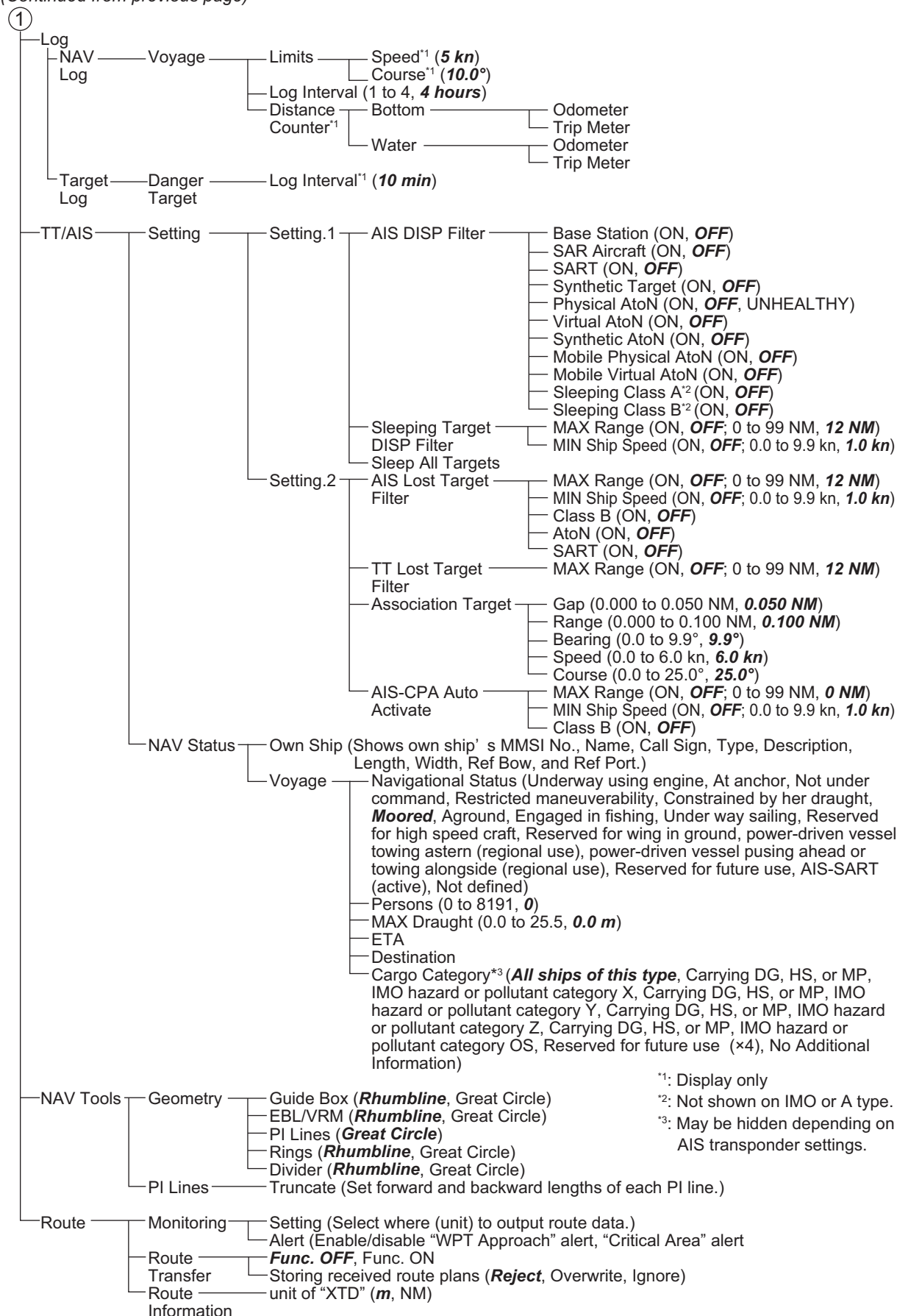
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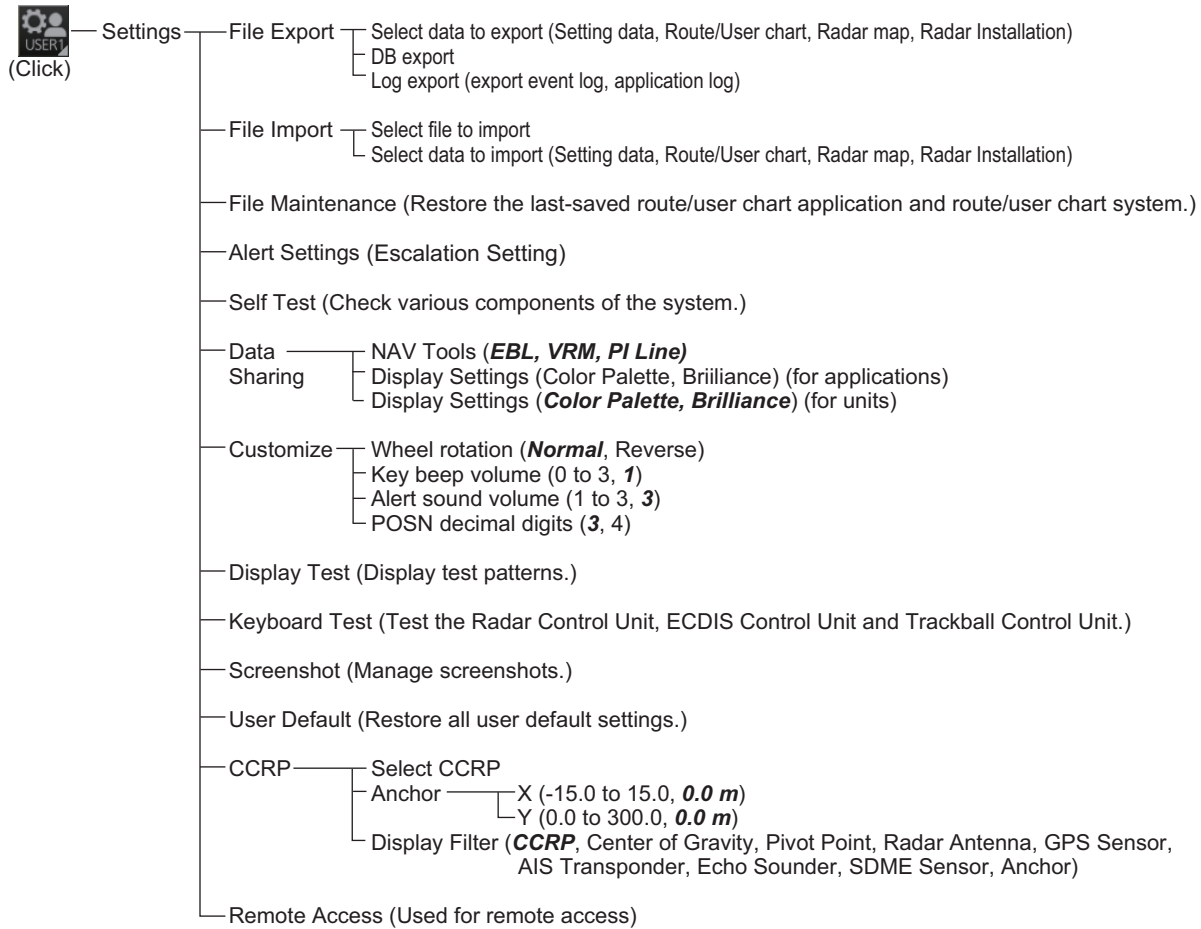
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^{*1}: Display only^{*2}: Not shown on IMO or A type.^{*3}: May be hidden depending on AIS transponder settings.

Settings menu



APPX. 2 ABBREVIATIONS AND SYMBOLS

Abbreviations

Abbreviation	Meaning
A/C	Anti Clutter
ACE	Automatic Clutter Elimination
ACK	Acknowledge
ACQ	Acquire
ACT	Activate
ADJ	Adjustment
AIO	Admiralty Information Overlay
AIS	Automatic Identification System
ALL	All
ALARM	Alarm
ANT	Antenna
Apr	April
ATON	Aid To Navigation
Aug	August
AUTO	Automatic
BB	Blackbox
BCR	Bow Cross Range
BCT	Bow Cross Time
BLU	Blue
BNWAS	Bridge Navigational Watch Alarm System
BRG	Bearing
BRILL	Brilliance
BT	Bottom Tracking
CANCEL	Cancel
Caps	Capital (letters)
CAT	Category
CCRP	Common Consistent Reference Position
CH	Channel
COG	Course over the ground
COM	Communication
CORR	Correction
CORRE	Correlation
CPA	Closest Point of Approach
CPU	Central Processing Unit
CSE	Course
CU/TM	Course-up/True Motion
CYA	CYAN
DATA	Data
DATREP	Data Report
Dec	December
DEMO	Demonstration

APPX. 2 ABBREVIATIONS AND SYMBOLS

Abbreviation	Meaning
DGPS	Differential Global Positioning System
DISP	Display
DIST	Distance
DR	Dead Reckoning
DTE	Data Terminal Equipment
E	English
E	East
EAV	Echo Average
EBL	Electronic Bearing Line
ENTER	Enter
EPFS	Electronic Position Fixing System
ES	Echo Stretch
ESC	Escape
ETA	Estimated Time of Arrival
EXT	External
Feb	February
FILT	Filter
GAIN	Gain
GPS	Global Positioning System
GRN	Green
GRY	Gray
GYRO	Gyrocompass
HDG	Heading
HIDE	Hide
HL	Heading Line
hr	hour
IMO	International Maritime Organization
IND	Indication
INS	Integrated Navigation System
IR	Interference Rejection
J	Japanese
Jan	January
Jul	July
Jun	June
kyd	kiloyard
L	Largest, Long (pulse length), Local
L/L	Latitude/Longitude
LAN	Local Area Network
LIST	List
LL	Latitude, Longitude
LO	Low
MAG	Magenta, Magnetic, or Magnify
MAN	Manual
Mar	March
MARK	Mark
MAX	Maximum
MENU	Menu
MID	Middle
min	minute

Abbreviation	Meaning
MIN	Minimum
MMSI	Maritime Mobile Service Identity
MOB	Man Overboard
MODE	Mode
MON	Monitor
MSG	Message
NAV	Navigation
Navtex	Navigational Telex
NM	Nautical miles
NO.	Number
N	North
Nov	November
NtoM	Notices to Mariners
Oct	October
OFF	Off
OFFSET	Offset
OS	Own Ship
OWN	Own
PALETTE	Palette
PANEL	Panel Illumination
PC	Personal Computer
PERPENDIC	Perpendicular
PI	Parallel Index (lines)
POSN	Position
PRIM	Primary
PSSA	Particularly Sensitive Sea Area
PULSE	Pulse
QLTY	Quality
R	Relative
RAD	Radius
RAIM	Receiver Autonomous Integrity Monitoring
RAIN	Rain
RANGE	Range
REF	Reference
Rel	Relative
RM	Relative Motion
RNG	Range
ROT	Rate of Turn
S	South, System
s	second
S1 (2)	Short1(2) (pulse length)
SAR	Search And Rescue
SART	Search And Rescue Transponder
SDME	Speed and Distance Measuring Equipment
SEA	Sea
SEL	Select
Sep	September
SM	Statute Miles
SOG	Speed Over the Ground

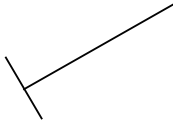
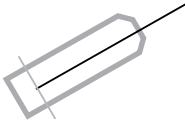
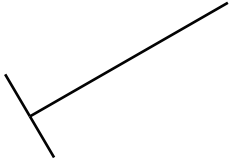
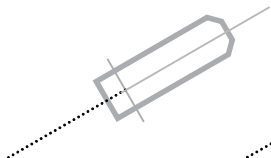
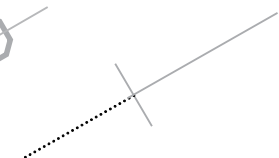
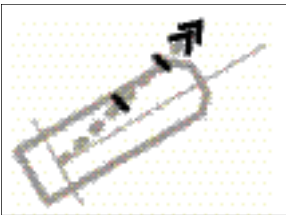
Abbreviation	Meaning
SPD	Speed
SPEC	Specification
SSD	Solid State Drive, Solid State Device
S.SRC	Sensor Source
STAB	Stabilization
STBY	Stand-by
STND	Standard
SW	Switch
SYN TGT	Synthetic Target
T	True
TARGET	Target
TB	True Bearing
TCPA	Time to Closest Point of Approach
TEMP	Temperature
TGT	Target
TGT, TGTS	Target, Targets
TIME	Time
TM	True Motion
TM/CU	True Motion/Course-up
TRAIL	Trail
True-G	True-ground
True-S	True-sea
TT	Tracked Target or Target Tracking
TTD	Tracked Target Data
TTG	Time to go
TTM	Tracked Target Information
TUNE	Tune
TX	Transmit
UKC	Under Keel Clearance
UNDO	Undo
UTC	Universal Time, Coordinated
VECT	Vector
VECTOR	Vector
VIEW	View
VRM	Variable Range Marker
W	West
W/O	Without
WHT	White
WOL	Wheel Over Line
WOP	Wheel Over Point
WPT	Waypoint
WT	Water Tracking
XTD	Cross Track Distance
YEL	Yellow

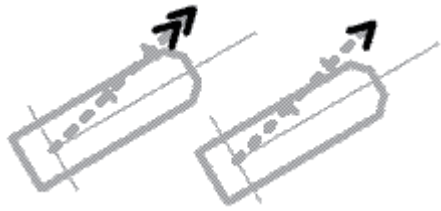
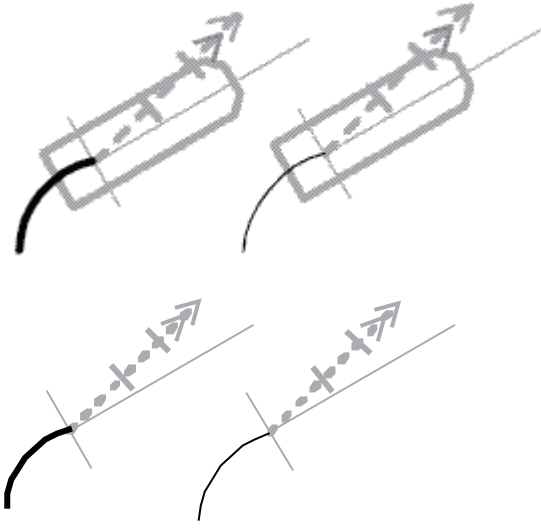
Symbols

Symbols on Control Unit

Symbol	Name
	Power switch
	Gain

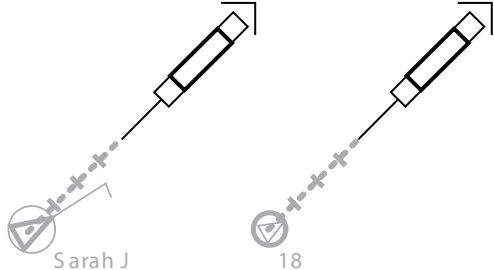
Symbols on display

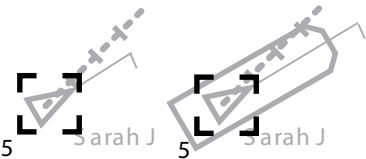
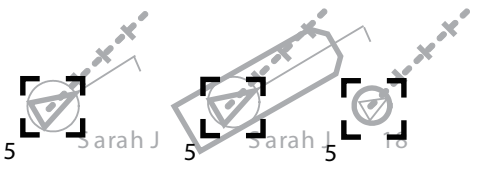
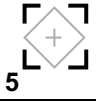
Symbol name and description	Symbol graphic(s)
Own ship - true scaled outline This can be displayed when based on user selection either beam width or length is more than 3 mm.	
Own ship - simplified symbol	
Own ship - minimized symbol	
Radar antenna position This symbol indicates location of the radar antenna. Select if position of radar antenna is displayed with symbol + in [MARK SETTING] menu.	
Own ship heading line This line originates from CCRP or Radar antenna position. CCRP: Consistent Common Reference Point	 
Beam line This line passes through the CCRP or radar antenna position.	
Stern line	 
Velocity vector - time increments	

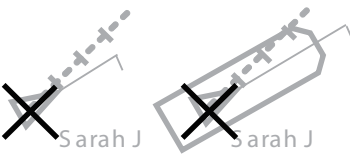
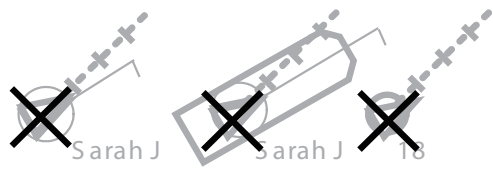
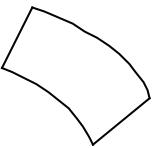
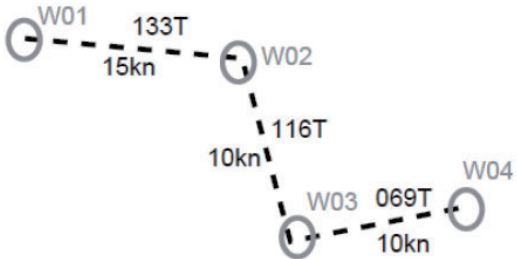
Symbol name and description	Symbol graphic(s)
Velocity vector - stabilization indicator Ground stabilization is indicated by double arrowhead and water stabilization is indicated as single arrowhead.	
Past track System past track is indicated by thick line. Raw sensor primary past track is indicated by thin line. Raw sensor secondary past track is indicated by gray thin line.	
Radar targets in acquisition state	 5 mm in diameter
Radar targets in acquisition state - automatically detected Automatically detected target symbol is red and it flashes until acknowledged.	 5 mm in diameter
Tracked radar targets	 18 3 mm in diameter
Tracked radar targets - dangerous targets Dangerous target symbol is red and it flashes until acknowledged.	 18
Reference targets TT: Standard or small user selection by Symbol Display (chart for radar mode only).	 R4 18
Sleeping AIS targets Orientation is towards heading (or COG if heading unknown).	
Activated AIS targets Orientation is towards heading (or COG if heading unknown).	 Sarah J

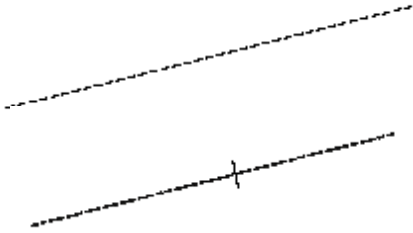
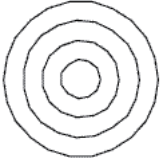
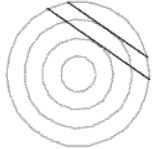
Symbol name and description	Symbol graphic(s)
Activated AIS targets - true scaled outlines - This can be displayed when based on user selection either beam width or length is more than 3 mm. - AIS outline: ON/OFF	 A rectangular outline with a small triangle inside, tilted at an angle. The text "Sarah J" is below it.
Activated AIS targets - dangerous targets Dangerous target symbol is red and it flashes until acknowledged.	 Two symbols: a triangle and a rectangle, both with a smaller triangle inside. The text "Sarah J" is below each.
No heading/COG data targets AIS target with no heading/COG data. Symbol faces the top of the screen.	 Two symbols: a triangle and a rectangle, both with a smaller triangle inside. The text "Sarah J" is below each.
Activated AIS targets - alternative	Associated targets represented by AIS target symbols  Two symbols: a circle with a triangle inside and a rectangle with a triangle inside. The text "Sarah J" is below each.
	Associated targets represented by radar target symbols  A circle with a triangle inside and the number "18" below it.
Activated AIS targets - heading lines	 Two symbols: a triangle and a rectangle, both with a smaller triangle inside. The text "Sarah J" is below each.
Activated AIS targets - heading lines - turn indicators	 Two symbols: a triangle and a rectangle, both with a smaller triangle inside. The text "Sarah J" is below each.

Symbol name and description	Symbol graphic(s)
Velocity vectors	Radar target velocity vectors
	AIS target velocity vectors
	Associated target velocity vectors
Target past positions	Radar target past positions
	AIS target past positions
	Associated target past positions

Symbol name and description	Symbol graphic(s)
Approaching and Collision areas (Predicted Area of Dangers)	Radar target predicted area of dangers 
	AIS target predicted area of dangers 
	Associated target predicted area of dangers 
AIS aid to navigation (AtoN) Physical (real) AtoN is solid line and virtual AtoN is dashed line. Other AIS AtoN symbol see "AIS AtoN symbols" on page 4-6.	
AIS search and rescue transmitter -SART	
AIS search and rescue transmitter -SART Test	
AIS base station	
AIS SAR vessel	
AIS SAR aircraft - fix wing	

Symbol name and description	Symbol graphic(s)
AIS SAR aircraft - helicopter	
Synthetic Target	
Synthetic Target - Distress	
Synthetic Target - Non HDG/COG	
Source of a received call or unread message	 AIS target AIS AtoN physical AIS base station
Selected targets	Selected radar targets 
	Selected AIS targets 
	Selected association targets 
	Selected AIS AtoN 
	Selected AIS-SART 

Symbol name and description	Symbol graphic(s)
Lost targets Lost target symbol is red and it flashes until acknowledged.	Lost radar targets 
	Lost AIS targets 
	Lost associated targets 
	LOST AIS AtoN 
	Lost AIS-SART 
Radar and AIS target acquisition area	
Waypoint	
Next waypoint	
Routes	
Event marker	

Symbol name and description	Symbol graphic(s)
User cursor	
Electronic bearing line (EBL) Second example show with range marker.	
Variable range marker (VRM)	
Range rings	
Parallel index lines	
Trial maneuver Displayed (flashing) during trial maneuver.	T
Simulation mode Displayed (flashing) during TT performance test.	S
Drop mark	

Radar map symbols

IMO and A types				B-type			
Category	Symbol	Color*	Name	Category	Symbol	Color	Name
Mark		Red	Buoy	Mark		7 colors	Buoy
		Green	Buoy			7 colors	Buoy
		Red	Buoy			7 colors	Buoy
		Green	Buoy			7 colors	Buoy
		Red	Buoy			7 colors	Danger
		Green	Buoy			7 colors	Danger
		Red	Buoy			7 colors	Mark
		Green	Buoy			7 colors	Mark
		Magenta	Danger			7 colors	Mark
		Magenta	Danger			7 colors	Mark
		Yellow-Orange	Mark			7 colors	Mark
		Yellow-Orange	Mark			7 colors	Mark
		Yellow-Orange	Mark			7 colors	Mark
Line		Magenta	Nav Line	Line		7 colors	Mark
		White	Coast Line			7 colors	Mark
		Gray	Contour Line			7 colors	Nav Line
		Magenta	Prohibited Area			7 colors	Coast Line
		Magenta	Cable (Danger)			7 colors	Contour Line
		Yellow-Orange	Line Mark			7 colors	Prohibited Area
		Yellow-Orange	Line Mark			7 colors	Cable (Danger)
						7 colors	Line Buoy
						7 colors	Line Mark
						7 colors	Line Mark
						7 colors	Line Mark

*Fixed

Symbols on operating buttons

Symbol	Meaning
	Minimize button (on InstantAccess bar™)
	Access AIS, Navtex functions (chart mode)
	Display received AIS message (radar mode)
	Access user profile, common settings, Number indicates the profile number in use.
	Information (show program no., operator's manual)
	Undo, redo Note: This symbol is not displayed on the FURUNO 19-inch monitor unit on radar mode or chart radar mode.
	Screenshot capture
 OR 	- Adjust the monitor brilliance - Adjust the control unit backlighting. (Chart mode only) The sharing method is shown as “S” (System) or “L” (Local).
 OR 	Color palette selection The sharing method is shown as “S” (System) or “L” (Local).
	Restores the calibration to the default settings.

APPX. 3 DATA COLOR AND MEANING

	Indication color	Sensor color	HDG	L/L	SPD	COG/SOG	Display example
SYSTEM	GRN	WHT	THS-A HDT	GNS-A, D, F, P, R GGA-1, 2, 3, 4, 5 GLL-A, D and (status: A) RMC-A, D, F, P, R and (status: A) *1	VBW-A VHW	VTG-A, D, P RMC-A, D, F, P, R and (status: A)	HDG 180.0° SPD 0.0kn COG 180.0° SOG 0.0kn POSN 48° 13.176' N GPS1 123° 29.764' W GYRO1 LOG1 WT GPS1
	RED	WHT		DGPS update interval in GGA, GNS sentence is higher than 10 seconds. GNS-A, D, F, P, R RMC-A, D, F, P, R and (status: A) *2			HDG 290.0° SPD 30.0kn COG 290.0° SOG 30.0kn POSN 24° 38.378' N GPS1 150° 34.831' E GYRO1 GPS1 BT GPS1 WGS84
	GRN (***.*)	No indication	THS-E, M, S: Invalid HDT: Invalid No sentences	GNS-E, M, S, N and (status: V): Invalid GGA-6, 7, 8, 0: Invalid GLL-E, M, S, N and (status: V): Invalid RMC-E, M, S, N and (status: V): Invalid No sentences	VBW-V: Invalid VHW: Invalid No sentences	VTG-E, M, S, N: Invalid RMC-E, M, S, N and (status: V): Invalid No sentences	HDG ***.° SPD **.°kn COG ***.° SOG **.°kn POSN ****.****' N ****.****' W
	GRN	YEL (DR)		Internally calculated due to loss of communication with sensor. (Dead Reckoning)			HDG 180.0° SPD 0.0kn COG 180.0° SOG 0.0kn POSN 48° 13.567' N DR 123° 27.108' W GYRO1 LOG1 WT GPS1
MANUAL	YEL (MAN*3) GRN (DR)	WHT (MAN*3) YEL (DR)	Correction setting value	Manual setting value (Dead Reckoning)	Manual setting value		HDG 180.0° SPD 0.0kn COG ***.° SOG **.°kn POSN 48° 13.567' N DR 123° 27.108' W MAN MAN WT

*1: Navigational status in RMC, GNS sentence shown in “S”, “V” only (IEC 61162-1 Ed.4 or later) or no navigational status field (IEC61162-1 Ed.3).

*2: Navigational status in RMC, GNS sentence shown in “C”, “U” only (IEC 61162-1 Ed.4 or later).

*3: “CORR1” replaces sensor name in case of heading offset.

APPX. 4 ALERT LIST

This radar provides aggregated header alerts for presentation of an aggregation on the AMS (Alert Management System). The following table shows the aggregate header alerts along with the corresponding ALF alert number.

Aggregated Alert Name	ALF No.*	Aggregated Alert Name	ALF No.*
Critical Point	3038, ×	Lost Target	3052, ×
Target Capacity	3042, ×	HUB Link ERR	10433, ×
	3043, ×	HUB Flow ERR	10436, ×
New Target	3048, ×	HUB overload	10439, ×

*: "×" indicates instance number.

Alerts which are not acknowledge within the set time limit are repeated as warning level, with the exception of the Alert "Anchor Watch". The Alert "Anchor Watch" is escalated from warning level to alarm level if the alert is not acknowledged within the set time. The default escalation time is as follows. If you require to change the escalation time, see section 22.5.

- IEC62923-2 standard alert: 270 s (fixed)
- Other than IEC62923-2 standard alert: 60 s (adjustable)
- "Anchor Watch": 120 s (fixed)
The escalation time for "Anchor Watch" is based on IEC61174 and time limit cannot be changed.

The table below lists the possible alerts for this radar. Each alert is listed with priority and category. This radar can output alerts in ALF or ALR format. The alert number for each depends on the output format and may differ.

Note 1: The ALR format is not BAM-compliant and shall not be used for new installations. It may be used for retrofitting on ships-in-operation only.

Note 2: You can change the priority for some alerts to [Warning] from the [Chart Alerts] page (see section 11.1.2).

Note 3: When this unit is assigned as a backup ECDIS, the following ALF alerts are output with the EI talker. (3015, 3024, 3031, 3032, 3035, 3038, 10645, 10703, 10801, 13035)

Note 4: None of the alerts support responsibility transfer.

Priority: Alarm, Warning, Caution

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3042, 1	523	TT TGT Full (Auto)	Cancel non-dangerous TT manually	Warning Cat: A
		Meaning: 100% of capacity for automatically acquired TT is used. Remedy: The number of acquired TT target became 100% of its limit. Stop tracking unnecessary TT targets.		
3042, 2	525	TT TGT Full (MAN)	Cancel non-dangerous TT manually	Warning Cat: A
		Meaning: 100% of capacity for manually acquired TT is used. Remedy: The number of acquired TT target became 100% of its limit. Stop tracking unnecessary TT targets.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3042, 3	531	AIS Display Full	Adjust [AIS DISP FILTER] settings	Warning Cat: A
		Meaning: 100% of maximum number of target which can be displayed is used. Remedy: The number of AIS target became 100% of that can be displayed. Change the display number using filter function.		
3042, 4	533	AIS CPTY Full	Adjust [AIS DISP FILTER] settings	Warning Cat: A
		Meaning: 100% of memory capacity for AIS targets is filled. Remedy: Memory for AIS targets is filled 100%. Cancel unnecessary targets.		
3042, 5	535	Active AIS Full	Sleep non-dangerous AIS manually	Warning Cat: A
		Meaning: 100% of capacity for active AIS is used. Remedy: The number of active AIS became 100% of its limit. Change the unnecessary targets to sleep mode.		
3043, 1	522	TT TGT 95% (Auto)	Cancel non-dangerous TT manually	Caution Cat: B
		Meaning: Appears when capacity for automatically tracked targets is full. Remedy: Remove TT symbol manually because the capacity for TT is 95%.		
3043, 2	524	TT TGT 95% (MAN)	Cancel non-dangerous TT manually	Caution Cat: B
		Meaning: Appears when capacity for manually tracked targets is full. Remedy: Remove TT symbol manually because the capacity for TT is 95%.		
3043, 3	530	AIS Display 95%	Adjust [AIS DISP FILTER] settings	Caution Cat: B
		Meaning: 95% of maximum number of target which can be displayed is used. Remedy: The number of AIS target became 95% of that can be displayed. Change the display number using filter function.		
3043, 4	532	AIS Capacity 95%	Adjust [AIS DISP FILTER] settings	Caution Cat: B
		Meaning: 95% of memory capacity for AIS targets is filled. Remedy: Memory for AIS targets is filled 95%. Cancel unnecessary targets.		
3043, 5	534	Active AIS 95%	Sleep non-dangerous AIS manually	Caution Cat: B
		Meaning: 95% of capacity for active AIS is used. Remedy: The number of active AIS became 95% of its limit. Change the unnecessary targets to sleep mode.		
3043, 7	547	AIS DATREP Full	Adjust [AIS DISP FILTER] settings	Caution Cat: B
		Meaning: 100% of memory capacity for AIS data report is filled. Remedy: Adjust the settings on the [DISP FILTER] menu.		
3043, 8	548	AIS SART Full	Adjust [AIS DISP FILTER] settings	Caution Cat: B
		Meaning: 100% of memory capacity for AIS locating device is filled. Remedy: Adjust the settings on the [DISP FILTER] menu.		
3043, 9	549	AIS SYN TGT Full	Adjust [AIS DISP FILTER] settings	Caution Cat: B
		Meaning: 100% of memory capacity for AIS synthetic target is filled. Remedy: Adjust the settings on the [DISP FILTER] menu.		
3044, -	519	CPA/TCPA	Take evasive action if necessary	Alarm Cat: A
		Meaning: Target is within CPA/TCPA threshold, danger of collision. Remedy: Take evasive action if necessary. Adjust CPA/TCPA settings.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3048, 1	521	TT New Target	Confirm TT new targets	Warning Cat: A
		Meaning: The system detected a new TT target. Remedy: Check the target details and take appropriate action.		
3048, 2	529	AIS New Target	Confirm AIS new targets	Warning Cat: A
		Meaning: The system detected a new AIS target. Remedy: Check the target details and take appropriate action.		
3052, 1	527	TT Target Lost	Check lost TGT. ACQ TGT if necessary	Warning Cat: A
		Meaning: The system lost a TT target. Remedy: Confirm that the target is lost, then acknowledge the alert.		
3052, 2	528	REF Target Lost	Check lost TGT. ACQ TGT if necessary	Warning Cat: A
		Meaning: The system lost a reference target. Remedy: Confirm that the target is lost, then acknowledge the alert. If the target was used as a speed reference, acquire a new reference target.		
3052, 3	537	AIS Target Lost	Confirm AIS lost targets	Warning Cat: A
		Meaning: The system lost an AIS target. Remedy: Confirm that the target is lost, then acknowledge the alert.		
3052, 5	552	AIS AtoN Lost	Confirm AIS lost AtoNs.	Warning Cat: A
		Meaning: The system lost an AIS AtoN. Remedy: Confirm that the AIS AtoN is lost, then acknowledge the alert.		
3052, 6	553	AIS SART Lost	Confirm AIS lost locating devices.	Warning Cat: A
		Meaning: The system lost an AIS locating device. Remedy: Confirm that the AIS SART is lost, then acknowledge the alert.		
3003, 1	541	AIS MSG Send ERR	Check AIS transponder or network	Caution Cat: B
		Meaning: AIS message transmission failed. Remedy: Check the connection with AIS.		
3006, -	760	Datum Mismatch	Check the GPS sensor status	Caution Cat: B
		Meaning: Datum mismatch between EPFS and chart. Remedy: Match the datum.		
3008, 2	729	LOST ISW FUNC	Use radar as standalone	Warning Cat: B
		Meaning: Interswitch function had to be stopped. (Only displayed when Inter-switch is active.) Remedy: Use the radar as a standalone.		
3008, 3	910	LOST WAVE FUNC	Check wave analysis PC or network	Warning Cat: B
		Meaning: Wave analysis function has a problem. Remedy: Check connection with wave analysis PC, or disable WAVE mode.		
3008, 100	691	Route Failure	Route monitoring stops	Warning Cat: B
		Meaning: Route monitoring is stopped because distance from route is more than set value of Max XTD. Remedy: Start route monitoring after approaching the monitoring route.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3015, 1	720	Lost Headline	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the heading signal from the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 2	721	Lost Azimuth SIG	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the azimuth signal from the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 3	722	Lost Trigger SIG	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the trigger signal from the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 4	723	Lost Video SIG	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the video signal from the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 5	724	Lost RPU Gyro	Check RPU gyro sensors or network	Warning Cat: B
		Meaning: There is a problem with the gyro signal from the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 8	727	Lost Radar ANT	Check connection with radar antenna	Warning Cat: B
		Meaning: There is a problem communicating with the SPU board in the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 9	770	Lost SPU	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the SPU board in the radar antenna. Remedy: For detailed information, conduct a [Self Test].		
3015, 10	771	Lost MTR-DRV	Execute the self test	Warning Cat: B
		Meaning: There is a problem communicating with the MTR-DRV board in the radar antenna. Remedy: For detailed information, conduct a [Self Test].		
3015, 11	773	Lost RF-CONV	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the RF-Converter board in the radar antenna. Remedy: For detailed information, conduct a [Self Test].		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3015, 12	774	Lost PSU	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the PSU-Control board in the power supply unit. Remedy: For detailed information, conduct a [Self Test].		
3015, 13	775	Lost HPA	Execute the self test	Warning Cat: B
		Meaning: There is a problem with the HPA board in the radar antenna. Remedy: For detailed information, conduct a [Self Test].		
3015, 14	781	Lost MTR-DRV COM	Execute the self test	Warning Cat: B
		Meaning: There is a problem communicating with the SPU board in the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 15	783	Lost RF-CONV COM	Execute the self test	Warning Cat: B
		Meaning: There is a problem communicating with the RF-Converter board in the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3015, 16	784	Lost PSU COM	Check connection with PSU-Control	Warning Cat: B
		Meaning: There is a problem communicating with PSU-Control board in the power supply unit. Remedy: For detailed information, conduct a [Self Test].		
3015, 21	170	Lost Position	Check position sensor status	Warning Cat: B
		Meaning: All position data has been lost for more than 30 seconds. Remedy: Check the connection with GPS sensors and sensor status.		
3015, 22	272	Lost UTC Signal	Check position sensor status	Warning Cat: B
		Meaning: Time data of all available GPS sensor has been not available for more than 3 seconds. Remedy: Check the connection with GPS sensors and sensor status.		
3015, 23	277	Lost Wind Signal	Check wind sensor or sensor status	Warning Cat: B
		Meaning: Wind speed/direction data of all available WIND sensors has been not available for more than 3 seconds. Remedy: Check the connection with wind sensors and sensor status.		
3015, 24	279	Lost COG/SOG SIG	Check position sensor status	Warning Cat: B
		Meaning: COG/SOG data of all available GPS sensor has been not available for more than 3 seconds. Remedy: Check the connection with GPS sensors and sensor status.		
3015, 25	284	Lost LOG(BT) SIG	Check speed sensor or sensor status	Warning Cat: B
		Meaning: SOG data of all available LOG (ground speed) sensors has been not available for more than 3 seconds. Remedy: Check the connection with LOG sensors and sensor status.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3015, 26	450	Lost Heading SIG	Check heading sensor or sensor status	Warning Cat: B
		Meaning: Heading data of all available heading sensor has been not available for more than 2 seconds. Remedy: Check the connection with heading sensors and sensor status.		
3015, 27	453	Lost SDME Sig-nal	Check speed sensor or sensor status	Warning Cat: B
		Meaning: Speed data from all available SDME has been not available for more than 3 seconds. Remedy: Check the connection with SDME and sensor status.		
3015, 28	278	Lost LOG(WT) SIG	Check speed sensor or sensor status	Warning Cat: B
		Meaning: STW data of all available LOG (water speed) sensors has been not available for more than 3 seconds. Remedy: Check the connection with LOG sensors and sensor status.		
3015, 30	380	Lost AIS COM	Check connection with AIS	Warning Cat: B
		Meaning: Data from AIS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. AIS is turned off, or there is a problem with network. Remedy: Check the connection with AIS and network.		
3016, 19	801	Lost PM	Execute the self test	Caution Cat: B
		Meaning: There is a problem communicating with the PM board in the radar antenna. Remedy: For detailed information, conduct a [Self Test].		
3016, 20	805	Lost PM BOARD	Execute the self test	Caution Cat: B
		Meaning: There is a problem communicating with the MTR-DRV board in the radar antenna. Remedy: Check connections between the radar antenna and the processor unit. If the problem appears to be caused by the radar antenna, contact your local dealer for service.		
3016, 24	382	Lost COG/SOG SIG	Check position sensor status	Caution Cat: B
		Meaning: COG/SOG data of all available GPS sensor has been not available for more than 3 seconds. Remedy: Check the connection with all GPS.		
3016, 25	383	Lost LOG (BT) SIG	Check speed sensor or sensor status	Caution Cat: B
		Meaning: SOG data of all available LOG (ground speed) sensors has been not available for more than 3 seconds. Remedy: Check that the sensor is powered.		
3016, 28	384	Lost LOG(WT) SIG	Check speed sensor or sensor status	Caution Cat: B
		Meaning: STW data of all available LOG (water speed) sensors has been not available for more than 3 seconds. Remedy: Check the connection with all LOG sensors.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3016, 30	381	Lost AIS COM	Check connection with AIS	Caution Cat: B
		Meaning: Data from AIS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. AIS is turned off, or there is a problem with network. Remedy: Check the connection with AIS and network.		
3024, 1	172	Off Track Alarm	Make XTD smaller	Alarm Cat: A
		Meaning: Deviation is big between planning course and current heading. While monitoring route, ship position deviates XTD Limit. Remedy: Reconfirm XTD Limit or keep own ship inside of channel limit.		
3031, 1	171	Safety Contour	Crossing safety contour. Take helm	Alarm Cat: A
		Meaning: When a check area is set, the vessel entered a shallower area than the threshold set in [Safety Contour]. Remedy: Reconfirm Safety Contour setting or change the course.		
3031, 2	496	Anchor Watch	Dragging anchor. Be careful it	Alarm Cat: A
		Meaning: While anchor watch alert function is enabled, ship's position has been outside of alarm area centering certain position for more than 3 seconds. Remedy: Be careful of dragging anchor.		
3032, 2	495	Anchor Watch	Dragging anchor. Be careful it	Warning Cat: A
		Meaning: While anchor watch alert function is enabled, ship's position has been outside of alarm area centering certain position for more than 3 seconds. Remedy: Be careful of dragging anchor.		
3035, 1	620	USR CHT Danger	Watch crossing user chart danger	Warning Cat: A
		Meaning: A User Chart Danger Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 2	621	Separation Zone	Crossing traffic separation zone	Warning Cat: A
		Meaning: A Traffic Separation Zone that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 3	622	ITZ	Watch crossing inshore traffic zone	Warning Cat: A
		Meaning: An Inshore Traffic Zone that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 4	623	Restricted Area	Watch crossing restricted area	Warning Cat: A
		Meaning: A Restricted Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 5	624	Caution Area	Watch crossing caution area	Warning Cat: A
		Meaning: A Caution Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3035, 6	625	OFS PROD Area	Crossing offshore production area	Warning Cat: A
		Meaning: An Offshore Production Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 7	626	MIL PRAC Area	Watch crossing military practice area	Warning Cat: A
		Meaning: A Military Protection Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 8	627	SPL Landing Area	Watch crossing seaplane landing area	Warning Cat: A
		Meaning: A Seaplane Landing Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 9	628	SM Transit Lane	Watch crossing submarine transit lane	Warning Cat: A
		Meaning: A Submarine Transit Lane that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 10	629	Anchorage Area	Watch crossing anchorage area	Warning Cat: A
		Meaning: An Anchorage Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 11	630	Marine Farm	Crossing marine farm/aquaculture	Warning Cat: A
		Meaning: A Marine Farm/Aquaculture that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3035, 12	631	PSSA Area	Watch crossing PSSA Area	Warning Cat: A
		Meaning: A PSSA Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 13	632	ATBA	Watch crossing areas to be avoided	Warning Cat: A
		Meaning: An Areas to be Avoided that is set to Alarm in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned, on ship's direction.		
3035, 14	645	NAV Hazard	Watch crossing navigational hazard	Warning Cat: A
		Meaning: One or more navigational hazards detected by the Look-ahead function. Remedy: Adjust course as necessary.		
3036, 1	594	USR CHT Danger	Watch crossing user chart danger	Caution Cat: B
		Meaning: A User Chart Danger Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3036, 2	595	Separation Zone	Crossing traffic separation zone	Caution Cat: B
		Meaning: A Traffic Separation Zone that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 3	596	ITZ	Watch crossing inshore traffic zone	Caution Cat: B
		Meaning: An Inshore Traffic Zone that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 4	597	Restricted Area	Watch crossing restricted area	Caution Cat: B
		Meaning: A Restricted Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 5	598	Caution Area	Watch crossing caution area	Caution Cat: B
		Meaning: A Caution Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 6	599	OFS PROD Area	Crossing offshore production area	Caution Cat: B
		Meaning: A Military Protection Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 7	600	MIL PRAC Area	Watch crossing military practice area	Caution Cat: B
		Meaning: A Seaplane Landing Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 8	601	SPL Landing Area	Watch crossing seaplane landing area	Caution Cat: B
		Meaning: A Seaplane Landing Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 9	602	SM Transit Lane	Watch crossing submarine transit lane	Caution Cat: B
		Meaning: A Submarine Transit Lane that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 10	603	Anchorage Area	Watch crossing anchorage area	Caution Cat: B
		Meaning: An Anchorage Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 11	604	Marine Farm	Crossing marine farm/aquaculture	Caution Cat: B
		Meaning: A Marine Farm/Aquaculture that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
3036, 12	605	PSSA Area	Watch crossing PSSA Area	Caution Cat: B
		Meaning: A PSSA Area that is set to Warning/Caution in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 13	606	ATBA	Watch crossing areas to be avoided	Caution Cat: B
		Meaning: An Areas to be Avoided that is set to Alarm in chart alert is detected inside the check area. Remedy: Be careful of the object mentioned here, on ship's direction.		
3036, 14	607	NAV Hazard	Watch crossing navigational hazard	Caution Cat: B
		Meaning: One or more navigational hazards detected by the Look-ahead function. Remedy: Adjust course as necessary.		
3038, 1 to 3038, 199	-	WPT xx Ap- proach (xx: way- point number)	Take helm if needed	Warning Cat: A
		Meaning: The wheel over point is soon being approached. Remedy: Be careful that WPT is approaching. Take helm if needed.		
3038, 10000	-	Critical Area	Confirm description of notes	Warning Cat: A
		Meaning: The critical area is soon being approached. Remedy: Be careful that critical area is approaching. Confirm description of notes.		
10303, 1	030	Lost SA1 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.1 sensor adapter and network.		
10303, 2	031	Lost SA2 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.2 sensor adapter and network.		
10303, 3	032	Lost SA3 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.3 sensor adapter and network.		
10303, 4	033	Lost SA4 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.4 sensor adapter and network.		
10303, 5	034	Lost SA5 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.5 sensor adapter and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10303, 6	035	Lost SA6 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.6 sensor adapter and network.		
10303, 7	036	Lost SA7 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.7 sensor adapter and network.		
10303, 8	037	Lost SA8 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.8 sensor adapter and network.		
10303, 9	038	Lost SA9 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.9 sensor adapter and network.		
10303, 10	039	Lost SA10 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.10 sensor adapter and network.		
10303, 11	094	Lost SA11 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.11 sensor adapter is detected. 30 seconds timeout. No.11 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.11 sensor adapter and network.		
10303, 12	095	Lost SA12 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.12 sensor adapter is detected. 30 seconds timeout. No.12 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.12 sensor adapter and network.		
10303, 13	096	Lost SA13 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.13 sensor adapter is detected. 30 seconds timeout. No.13 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.13 sensor adapter and network.		
10303, 14	097	Lost SA14 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.14 sensor adapter is detected. 30 seconds timeout. No.14 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.14 sensor adapter and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10303, 15	098	Lost SA15 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.15 sensor adapter is detected. 30 seconds timeout. No.15 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.15 sensor adapter and network.		
10303, 16	099	Lost SA16 COM	Check sensor adapter or network	Caution Cat: B
		Meaning: Communication error with No.16 sensor adapter is detected. 30 seconds timeout. No.16 sensor adapter is turned off, or there is a problem with network. Remedy: Check the connection with No.16 sensor adapter and network.		
10332, -	331	Lost SEL Gyro	Selected Gyro status missing	Warning Cat: B
		Meaning: When connected with Double Gyro System, instrument produced by YDK Technologies, "Double Gyro" status cannot be acquired. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.		
10403, 1	255	Lost Gyro 1 COM	Check the gyro status	Caution Cat: B
		Meaning: Data from this gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This gyro is turned off, or there is a problem with network. Remedy: Check the connection with this gyro and network.		
10403, 2	256	Lost Gyro 2 COM	Check the gyro status	Caution Cat: B
		Meaning: Data from this gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This gyro is turned off, or there is a problem with network. Remedy: Check the connection with this gyro and network.		
10403, 3	257	Lost Gyro 3 COM	Check the gyro status	Caution Cat: B
		Meaning: Data from this gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This gyro is turned off, or there is a problem with network. Remedy: Check the connection with this gyro and network.		
10403, 4	258	Lost Gyro 4 COM	Check the gyro status	Caution Cat: B
		Meaning: Data from this gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This gyro is turned off, or there is a problem with network. Remedy: Check the connection with this gyro and network.		
10403, 5	259	Lost Gyro 5 COM	Check the gyro status	Caution Cat: B
		Meaning: Data from this gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This gyro is turned off, or there is a problem with network. Remedy: Check the connection with this gyro and network.		
10403, 11	391	Lost ROT Gyro1	Check the ROT gyro status	Caution Cat: B
		Meaning: Data from this ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. Remedy: Check the connection with this ROT gyro.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10403, 12	392	Lost ROT Gyro2	Check the ROT gyro status	Caution Cat: B
		Meaning: Data from this ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. Remedy: Check the connection with this ROT gyro.		
10403, 13	393	Lost ROT Gyro3	Check the ROT gyro status	Caution Cat: B
		Meaning: Data from this ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds. Remedy: Check the connection with this ROT gyro.		
10403, 21	290	Lost GPS1 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 22	291	Lost GPS2 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 23	292	Lost GPS3 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 24	293	Lost GPS4 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 25	294	Lost GPS5 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 26	295	Lost GPS6 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 27	296	Lost GPS7 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10403, 28	297	Lost GPS8 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 29	298	Lost GPS9 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 30	299	Lost GPS10 COM	Check the GPS status	Caution Cat: B
		Meaning: Ship position data from this GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This GPS is turned off, or there is a problem with network. Remedy: Check the connection with this GPS and network.		
10403, 41	280	Lost SDME1 COM	Check the SDME status	Caution Cat: B
		Meaning: Speed data from this SDME sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This SDME sensor is turned off, or there is a problem with network. Remedy: Check the connection with this SDME sensor and network.		
10403, 42	281	Lost SDME2 COM	Check the SDME status	Caution Cat: B
		Meaning: Speed data from this SDME sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This SDME sensor is turned off, or there is a problem with network. Remedy: Check the connection with this SDME sensor and network.		
10403, 43	282	Lost SDME3 COM	Check the SDME status	Caution Cat: B
		Meaning: Speed data from this SDME sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This SDME sensor is turned off, or there is a problem with network. Remedy: Check the connection with this SDME sensor and network.		
10403, 51	235	Lost Depth1 COM	Check the echo sounder status	Caution Cat: B
		Meaning: Input of depth data from this echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This echo sounder is turned off, or there is a problem with network. Remedy: Check the connection with this echo sounder and network.		
10403, 52	236	Lost Depth2 COM	Check the echo sounder status	Caution Cat: B
		Meaning: Input of depth data from this echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This echo sounder is turned off, or there is a problem with network. Remedy: Check the connection with this echo sounder and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10403, 53	237	Lost Depth3 COM	Check the echo sounder status	Caution Cat: B
		Meaning: Input of depth data from this echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This echo sounder is turned off, or there is a problem with network. Remedy: Check the connection with this echo sounder and network.		
10403, 61	300	Lost Rudder1 COM	Check the rudder status	Caution Cat: B
		Meaning: Rudder data from this rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This rudder sensor is turned off, or there is a problem with network. Remedy: Check the connection with this rudder sensor and network.		
10403, 62	301	Lost Rudder2 COM	Check the rudder status	Caution Cat: B
		Meaning: Rudder data from this rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This rudder sensor is turned off, or there is a problem with network. Remedy: Check the connection with this rudder sensor and network.		
10403, 63	302	Lost Rudder3 COM	Check the rudder status	Caution Cat: B
		Meaning: Rudder data from this rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This rudder sensor is turned off, or there is a problem with network. Remedy: Check the connection with this rudder sensor and network.		
10403, 71	303	Lost HCS1 COM	Check the autopilot status	Caution Cat: B
		Meaning: Data from this HCS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This HCS is turned off, or there is a problem with network. Remedy: Check the connection with this HCS and network.		
10403, 72	304	Lost HCS2 COM	Check the autopilot status	Caution Cat: B
		Meaning: Data from this HCS has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This HCS is turned off, or there is a problem with network. Remedy: Check the connection with this HCS and network.		
10403, 81	305	Lost VDR COM	Check the VDR status	Caution Cat: B
		Meaning: Sentence from VDR has been discontinued for more than set time. (Set at installation) Default: 180 seconds VDR is turned off, or there is a problem with network. Remedy: Check the connection with VDR and network.		
10403, 91	306	Lost BNWAS1 COM	Check the BNWAS status	Caution Cat: B
		Meaning: Caution Sentence from BNWAS1 has been discontinued for more than set time. (Set at installation) Default: 180 seconds BNWAS is turned off, or there is a problem with network. Remedy: Check the connection with BNWAS1 and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10403, 92	307	Lost BNWAS2 COM	Check the BNWAS status	Caution Cat: B
		Meaning: Caution Sentence from BNWAS2 has been discontinued for more than set time. (Set at installation) Default: 180 seconds BNWAS is turned off, or there is a problem with network. Remedy: Check the connection with BNWAS2 and network.		
10403, 93	308	Lost BNWAS3 COM	Check the BNWAS status	Caution Cat: B
		Meaning: Caution Sentence from BNWAS3 has been discontinued for more than set time. (Set at installation) Default: 180 seconds BNWAS is turned off, or there is a problem with network. Remedy: Check the connection with BNWAS3 and network.		
10403, 101	360	Lost WIND1 COM	Check the wind sensor status	Caution Cat: B
		Meaning: Data from this wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This wind sensor is turned off, or there is a problem with network. Remedy: Check the connection with this wind sensor.		
10403, 102	361	Lost WIND2 COM	Check the wind sensor status	Caution Cat: B
		Meaning: Data from this wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This wind sensor is turned off, or there is a problem with network. Remedy: Check the connection with this wind sensor.		
10403, 103	362	Lost WIND3 COM	Check the wind sensor status	Caution Cat: B
		Meaning: Data from this wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds. This wind sensor is turned off, or there is a problem with network. Remedy: Check the connection with this wind sensor.		
10403, 111	370	Lost CURRENT COM	Check the water current sensor status	Caution Cat: B
		Meaning: Data from water current has been discontinued for more than set time. (Set at installation) Default: 60 seconds. Water current sensor is turned off, or there is a problem with network. Check the connection with water current and network. Remedy: Check the connection with water current sensor and network.		
10403, 121	371	Lost TEMP COM	Check water temperature sensor status	Caution Cat: B
		Meaning: Data from water temp. has been discontinued for more than set time. (Set at installation) Default: 60 seconds. Water temp sensor is turned off, or there is a problem with network. Remedy: Check the connection with water temp sensor and network.		
10403, 141	390	Lost NAVTEX COM	Check the NAVTEX status	Caution Cat: B
		Meaning: Data from NAVTEX has been discontinued for more than set time. (Set at installation) Default: 180 seconds. NAVTEX is turned off, or there is a problem with network Remedy: Check the connection with NAVTEX and network.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10432, -	431	HUB-3000 Error	Check HUB-3000 connections	Warning Cat: B
		Meaning: A network error has occurred between the HUB-3000 and one or more connected units. Remedy: Check network connections between the processor unit and networked units.		
10433, 1 to 10433, 128	-	HUB Link ERR	Check connection of HUBXX port Y.	Caution Cat: B
		Meaning: An illegal Link down or Link up was detected at HUB-3000. Remedy: Check connection of HUBXX port Y.		
10436, 1 to 10436, 128	-	HUB Flow ERR	Check the device on HUBXX port Y.	Caution Cat: B
		Meaning: The HUB-3000 port is overloaded. Remedy: Check the device on HUBXX port Y.		
10439, 1 to 10439, 16	-	HUB overload	Check devices connected to HUBXX.	Caution Cat: B
		Meaning: The HUB-3000 CPU is overloaded. Remedy: Check devices connected to HUBXX.		
10452, -	330	Conflict Gyro	Double Gyro Status Conflict	Warning Cat: B
		Meaning: When connected with Double Gyro System, instrument produced by YDK Technologies, two gyro has been displayed "Selected" status for 3 seconds. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.		
10492, -	500	Watch Alert	Reset timer or turn off the function	Warning Cat: B
		Meaning: Watch alert interval reached. Remedy: ACK the alert, check the radar display.		
10503, 1	851	GPS1 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 2	852	GPS2 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 3	853	GPS3 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10503, 4	854	GPS4 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 5	855	GPS5 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 6	856	GPS6 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 7	857	GPS7 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 8	858	GPS8 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 9	859	GPS9 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 10	860	GPS10 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship position data from this GPS is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10503, 11	871	Gyro1 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 12	872	Gyro2 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 13	873	Gyro3 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 14	874	Gyro4 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 15	875	Gyro5 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 21	861	SDME1 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship speed data from this SDME is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 22	862	SDME2 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship speed data from this SDME is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10503, 23	863	SDME3 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Own ship speed data from this SDME is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 31	881	ROT Gyro1 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this ROT Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 32	882	ROT Gyro2 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this ROT Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10503, 33	883	ROT Gyro3 Banned	Reset filter or check sensor status	Caution Cat: B
		Meaning: Heading data from this ROT Gyro is determined abnormal by integrity check. Remedy: Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.		
10512, 1	900	No POSN for FILT	Reset filter or check sensor status	Warning Cat: B
		Meaning: No valid position sensor is available for filter. (Banned or connection error) Remedy: Check the connection with all GPS.		
10512, 2	901	No SOG for FILT	Reset filter or check sensor status	Warning Cat: B
		Meaning: No valid COG/SOG sensor is available for filter. (Banned or connection error) Remedy: Check the connection with all GPS.		
10512, 3	902	No STW for FILT	Reset filter or check sensor status	Warning Cat: B
		Meaning: No valid CTW/STW sensor is available for filter. (Banned or connection error) Remedy: Check the connection with all GPS.		
10512, 4	903	No HDG for FILT	Reset filter or check sensor status	Warning Cat: B
		Meaning: No valid heading sensor is available for filter. (Banned or connection error) Remedy: Check the connection with all heading sensors.		
10543, -	539	AIS MSG Re-ceived	AIS message is received. Check it	Caution Cat: B
		Meaning: AIS message is received. Remedy: Check the AIS message.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10603, 1	273	Lost Bow Depth	Check the depth sensor status	Caution Cat: B
		Meaning: Depth data of all available depth sensors (Bow) has been not available for more than 3 seconds. Remedy: Check the connection with all echo sounders.		
10603, 2	274	Lost MID Depth	Check the depth sensor status	Caution Cat: B
		Meaning: Depth data of all available depth sensors (Midship) has been not available for more than 3 seconds. Remedy: Check the connection with all echo sounders.		
10603, 3	275	Lost Stern Depth	Check the depth sensor status	Caution Cat: B
		Meaning: Depth data of all available depth sensors (Stern) has been not available for more than 3 seconds. Remedy: Check the connection with all echo sounders.		
10603, 5	285	Lost HDG MAG	Check the magnetic compass status	Caution Cat: B
		Meaning: Heading data of all available magnetic gyro has been not available for more than 3 seconds. Remedy: Check the connection with all magnetic gyro.		
10645, -	644	Actual UKC Limit	Watch and avoid grounding	Warning Cat: A
		Meaning: Actual depth is outside the preset UKC limit. Remedy: Check depth, adjust heading accordingly.		
10703, -	700	RT version > 1	RT is rejected. Check connected units	Caution Cat: B
		Meaning: Received route transfer sentence (RTZ) is a higher version than this system. Remedy: Check route details. Some route details may not be displayed correctly.		
10712, -	728	ANT VER Mismatch	Consult local dealer for SW update	Warning Cat: B
		Meaning: Software version not correct. Remedy: Update the radar software. If the problem persists, consult your dealer.		
10752, 3	755	Select SART Mode	Signal detected. Select SART mode	Warning Cat: B
		Meaning: A SART signal was detected. This alert appears only for X-band solid state radars. Remedy: Show the SART marks on the radar display. Note: Keep in mind the following points: • This alert can occur when this equipment receives interference simultaneously from multiple radars. • This alert may not occur under the bad weather conditions such as at rain.		
10801, -	485	Depth Limit	Watch and avoid grounding	Alarm Cat: A
		Meaning: Actual depth is outside the echo alarm limit. Remedy: Check depth, adjust heading accordingly.		
10903, -	905	Audit log fail	Check the audit log.	Caution Cat: B
		Meaning: The event to be audited could not be saved in the audit log. Remedy: Check the audit log.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
10906, -	906	Network over-load	Check other devices in the network.	Caution Cat: B
		Meaning: The LAN interface is overloaded. Remedy: Check other devices in the network.		
13035, 1	634	UKC Limit	Watch and avoid grounding	Warning Cat: A
		Meaning: Measured depth from echo sounder is less than set UKC limit value. Remedy: Be careful that measured depth is less than UKC limit.		
13035, 2	635	Non-official ENC	Install official ENC charts	Warning Cat: A
		Meaning: When Non-official ENC is set to Warning/Caution in chart alert, the non-official chart area is detected inside the check area. Remedy: Install official ENC charts.		
13035, 3	636	No Vector Chart	Install vector charts	Warning Cat: A
		Meaning: When No Vector Chart is set to Warning/Caution in chart alert, the No Vector Chart area is detected inside the check area. Remedy: Install vector charts.		
13035, 4	637	Not Up-to-date	Install latest charts	Warning Cat: A
		Meaning: When Not Up to Date is set to Warning/Caution in chart alert, a chart area that is not up-to date is detected inside the check area. Remedy: Install the latest charts.		
13035, 5	638	Permit Expired	Update chart permits	Warning Cat: A
		Meaning: When Permit Expired is set to Warning/Caution in chart alert, a chart area that has an expired permit is detected inside the check area. Remedy: Update chart permits.		
13035, 6	646	Sounding UKC LIM	Watch and avoid grounding	Warning Cat: A
		Meaning: Chart depth for one or more legs is outside of UKC threshold. Remedy: Adjust course accordingly.		
13035, 7	647	Too Many Dangers	Change route geometry	Warning Cat: A
		Meaning: Selected route has too many dangerous objects in one or more legs. Remedy: Shorten the route or the look-ahead area.		
13036, 1	608	UKC Limit	Watch and avoid grounding	Caution Cat: B
		Meaning: Measured depth from echo sounder is less than set UKC limit value. Remedy: Be careful that measured depth is less than UKC limit.		
13036, 2	609	Non-official ENC	Install official ENC charts	Caution Cat: B
		Meaning: When Non-official ENC is set to Warning/Caution in chart alert, the non-official chart area is detected inside the check area. Remedy: Install official ENC charts.		
13036, 3	611	No Vector Chart	Install vector charts	Caution Cat: B
		Meaning: When No Vector Chart is set to Warning/Caution in chart alert, the No Vector Chart area is detected inside the check area. Remedy: Install vector charts.		

Alert ID		Alert title	Alert Message	Priority & Category
ALF	ALR			
13036, 4	612	Not Up-to-date	Install latest charts	Caution Cat: B
		Meaning: When Not Up to Date is set to Warning/Caution in chart alert, a chart area that is not up-to date is detected inside the check area. Remedy: Install the latest charts.		
13036, 5	613	Permit Expired	Update chart permits	Caution Cat: B
		Meaning: When Permit Expired is set to Warning/Caution in chart alert, a chart area that has an expired permit is detected inside the check area. Remedy: Update chart permits.		
13036, 6	614	Sounding UKC LIM	Watch and avoid grounding	Caution Cat: B
		Meaning: Chart depth for one or more legs is outside of UKC threshold. Remedy: Adjust course accordingly.		
13036, 7	615	Too Many Dangers	Change route geometry	Caution Cat: B
		Meaning: Selected route has too many dangerous objects in one or more legs. Remedy: Shorten the route or the look-ahead area.		

Priority: Indication

All indications are in category “B”. The indications are not subject to responsibility transfer and are not output as ALF sentences.

Note: Indications also appear in the [Alert] box on the screen and on the [Alert List].

Alert ID		Alert title	Alert Message
ALF	ALR		
10001, 1	001	Main Monitor Fan1 Rotation Speed Lowering	There is a problem with No.1 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan1 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 2	002	Main Monitor Fan2 Rotation Speed Lowering	There is a problem with No.2 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan2 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 3	003	Main Monitor Fan3 Rotation Speed Lowering	There is a problem with No.3 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan3 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 4	004	Main Monitor Fan4 Rotation Speed Lowering	There is a problem with No.4 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan4 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 5	014	Sub Monitor Fan1 Rotation Speed Lowering	There is a problem with No.1 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 6	015	Sub Monitor Fan2 Rotation Speed Lowering	There is a problem with No.2 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan2 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 7	016	Sub Monitor Fan3 Rotation Speed Lowering	There is a problem with No.3 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan3 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10001, 8	017	Sub Monitor Fan4 Rotation Speed Lowering	There is a problem with No.4 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 9	011	Main Monitor RS485 Communication Timeout	There is a problem with brightness control cable. Please exchange it
		Meaning: For Main monitor: Connected to COM1. There has been no communication from processor unit through RS485 for 180 seconds. (No communication implies in completed sentence or checksum error.) Remedy: Check the connection of brightness control cable.	
10001, 10	024	Sub Monitor RS485 Communication Timeout	There is a problem with brightness control cable. Please exchange it
		Meaning: For Sub monitor: Connected to COM2. There has been no communication from processor unit through RS485 for 180 seconds. (No communication implies in completed sentence or checksum error.) Remedy: Check the connection of brightness control cable.	
10001, 11	012	Main Monitor No Signal	There is a problem with video cable. Please exchange it
		Meaning: For Main monitor: Connected to COM1. There has been no signal continuously for 60 seconds. Remedy: Check the connection of video cable.	
10001, 12	025	Sub Monitor No Signal	There is a problem with video cable. Please exchange it
		Meaning: For Sub monitor: Connected to COM2. There has been no signal continuously for 60 seconds. Remedy: Check the connection of video cable.	
10001, 13	013	Main Monitor Sentence Syntax Error	There is a problem with brightness control cable. Please exchange it
		Meaning: For Main monitor, connected to COM1, value of externally input sentence is out of range that defined by sentence. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 14	026	Sub Monitor Sentence Syntax Error	There is a problem with brightness control cable. Please exchange it
		Meaning: For Main monitor, connected to COM2, value of externally input sentence is out of range that defined by sentence. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 15	027	Main Monitor COM Timeout	There is a problem with brightness control cable. Please exchange it
		Meaning: Communication with MU is interrupted. 60 seconds timeout. Remedy: Check the connection with the monitor.	
10001, 16	028	Sub Monitor COM Timeout	There is a problem with brightness control cable. Please exchange it
		Meaning: Communication with MU is interrupted. 60 seconds timeout. Remedy: Check the connection with the monitor.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10001, 17	073	Processor Unit CPU Temp High	CPU board temperature is high in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU temperature in processor unit exceeds threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 18	074	Processor Unit GPU Temp High	CPU board temperature is high in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: GPU temperature in processor unit exceeds threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 19	075	Processor Unit CPU Board Temp High	CPU board temperature is high in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU temperature in processor unit exceeds threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 20	076	Processor Unit Remote 1 Temp High	CPU board temperature is high in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU temperature in this processor remote control unit exceeds threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 21	077	Processor Unit Remote 2 Temp High	CPU board temperature is high in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU temperature in this processor remote control unit exceeds threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 22	078	Processor Unit CPU Fan Rotation Speed Lowering	There is a problem with a CPU Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of CPU fan in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 23	079	Processor Unit Fan1 Rotation Speed Lowering	There is a problem with No.1 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of CPU fan1 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10001, 24	080	Processor Unit Fan2 Rotation Speed Lowering	There is a problem with No.2 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of CPU fan2 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 25	081	Processor Unit Fan3 Rotation Speed Lowering	There is a problem with No.3 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of CPU fan3 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10001, 26	089	Processor Unit CPU board Battery Power Error	CPU board power voltage is abnormal in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU board battery voltage in processor unit is out of threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 27	090	Processor Unit CPU board Core Power Error	CPU board power voltage is abnormal in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: CPU board battery voltage in processor unit is out of threshold. Remedy: Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.	
10001, 28	070	RCU 1 COM Timeout	A communication error is detected with No.1 Remote Control Unit. Please check connection with No.1 Remote Control Unit
		Meaning: Communication error with this remote control unit is detected. 40 seconds timeout. Remedy: Check the connection with this remote control unit.	
10001, 29	071	RCU 2 COM Timeout	A communication error is detected with No.2 Remote Control Unit. Please check connection with No.2 Remote Control Unit
		Meaning: Communication error with this remote control unit is detected. 40 seconds timeout. Remedy: Check the connection with this remote control unit.	
10001, 30	072	RCU 3 COM Timeout	A communication error is detected with No.3 Remote Control Unit. Please check connection with No.3 Remote Control Unit
		Meaning: Communication error with this remote control unit is detected. 40 seconds timeout. Remedy: Check the connection with this remote control unit.	
10001, 31	400	Network Printer Not Available	Network printer is not available. Please check the printer status and connection
		Meaning: When executing printout, network printer is not recognized, network printer connection is interrupted, or printer error such as paper shortage, paper jam and run out of ink occurs. Remedy: Check that the printer is connected to network, or printer errors such as paper shortage, paper jam and run out of ink does not occur.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10001, 32	401	Local Printer Not Available	Local printer is not available. Please check the printer status and connection
		Meaning: When executing printout, local printer is not recognized, network printer connection is interrupted, or printer error such as paper shortage, paper jam and run out of ink occurs. Remedy: Check that the printer is connected, or printer errors such as paper shortage, paper jam and run out of ink does not occur.	
10002, 3	006	Main Monitor High Temperature Inside Monitor	FURUNO Monitor internal temperature is high. Please turn off monitor
		Meaning: Internal temperature exceeds threshold. Monitor: Connected to COM1 (Main Monitor). Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 4	019	Sub Monitor High Temperature Inside Monitor	FURUNO Monitor internal temperature is high. Please turn off monitor
		Meaning: Internal temperature exceeds threshold. Monitor: Connected to COM2 (Sub Monitor). Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 5	007	Main Monitor Fan1 No Rotation	There is a problem with No.1 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan1 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 6	008	Main Monitor Fan2 No Rotation	There is a problem with No.2 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan2 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 7	009	Main Monitor Fan3 No Rotation	There is a problem with No.3 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan3 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 8	010	Main Monitor Fan4 No Rotation	There is a problem with No.4 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM1 (Main Monitor). Fan4 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 9	020	Sub Monitor Fan1 No Rotation	There is a problem with No.1 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10002, 10	021	Sub Monitor Fan2 No Rotation	There is a problem with No.2 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: COM2 (Sub Monitor). Fan2 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 11	022	Sub Monitor Fan3 No Rotation	There is a problem with No.3 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: COM2 (Sub Monitor). Fan3 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 12	023	Sub Monitor Fan4 No Rotation	There is a problem with No.4 Fan of FURUNO Monitor. Please exchange it
		Meaning: For FURUNO monitor: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 13	082	Processor Unit CPU Fan No Rotation	There is a problem with a CPU Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of fan in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 14	083	Processor Unit Fan1 Fan No Rotation	There is a problem with No.1 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of fan1 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 15	084	Processor Unit Fan2 Fan No Rotation	There is a problem with No.2 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of fan2 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 16	085	Processor Unit Fan3 Fan No Rotation	There is a problem with No.3 Fan in Processor Unit. Please exchange it
		Meaning: Rotation speed of fan3 in processor unit is below threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 17	086	Processor Unit CPU board 5v Power Error	CPU board power voltage is abnormal in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: 5 V power voltage of CPU board in processor unit is out of threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10002, 18	087	Processor Unit CPU board 3.3V Power Error	CPU board power voltage is abnormal in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: 3.3 V power voltage of CPU board in processor unit is out of threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10002, 19	088	Processor Unit CPU board 12V Power Error	CPU board power voltage is abnormal in Processor Unit. Please turn off Processor Unit. If same error is occurred after a few minutes, please contact to service department of Furuno
		Meaning: 12 V power voltage of CPU board in processor unit is out of threshold. Remedy: If the error frequently occurs, contact FURUNO and inform frequency of occurrence.	
10050, 1	320	Lost CH1 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.1 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 2	321	Lost CH2 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.2 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 3	322	Lost CH3 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.3 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 4	323	Lost CH4 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.4 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 5	324	Lost CH5 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.5 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 6	325	Lost CH6 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.6 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 7	326	Lost CH7 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.7 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10050, 8	327	Lost CH8 COM	Check the serial port status
		Meaning: Input from processor unit serial ch.8 has been discontinued for more than certain time (Set at installation). Default: No timeout Remedy: Check the status of the serial port.	
10312, -	510	Lost MODBUS COM	Check MODBUS status and connection
		Meaning: Connection to the IAS (MODBUS) is lost or interrupted. Remedy: Check connection.	
10740, 1	730	ISW: STBY	Selected radar entered standby mode. Set selected radar to TX mode
		Meaning: The antenna unit selected with the Interswitch is in stand-by Remedy: Set the antenna unit to transmit state.	
10740, 2	740	ISW: NO SIGNAL	Selected radar has problem. Use radar as stand-alone
		Meaning: No video signal from the antenna unit selected with the Interswitch. Remedy: Check the antenna unit. Use radar as standalone.	

Alert ID		Alert title	Alert Message
ALF	ALR		
10740, 3	750	ISW: NO RADAR	Communication with selected radar has interrupted/lost. Use radar as standalone
		Meaning: No communication from the antenna unit selected with the Inter-switch. Remedy: Check that both the antenna unit and the processor unit are powered. Also check the wiring between the antenna unit and the processor unit. Use radar as standalone.	
10807, -	820	NAVTEX Message Received	NAVTEX Message is received. Please check it
		Meaning: NAVTEX message is received. Remedy: Check the NAVTEX message.	
10910, 1	911	LOST WV UTC SIG	Check that data input to Wave Analyzer is correct
		Meaning: An input error has occurred for time/date data. Remedy: Check data input to the Wave Analysis software.	
10910, 2	912	LOST WV COG/SOG	Check that data input to Wave Analyzer is correct
		Meaning: An input error has occurred for speed/course data. Remedy: Check data input to the Wave Analysis software.	
10910, 3	913	LOST WV WIND SIG	Check that data input to Wave Analyzer is correct
		Meaning: An input error has occurred for wind data. Remedy: Check data input to the Wave Analysis software.	
10910, 4	914	LOST WV RADAR ANT	Check that data input to Wave Analyzer is correct
		Meaning: An input error has occurred for radar data. Remedy: Check data input to the Wave Analysis software.	
10910, 5	915	LOST WV GYRO SIG	Check that data input to Wave Analyzer is correct
		Meaning: An input error has occurred for gyrocompass data. Remedy: Check data input to the Wave Analysis software.	

APPX. 5 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 définies 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 maintenant 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-3015	RTR-131	420 cm	FAR-3230SW-BB	RTR-109	230 cm
FAR-3210(-BB)	RTR-105	440 cm	FAR-3330SW		
FAR-3310			FAR-3035S-NXT	RTR-111	100 cm
FAR-3025	RTR-132	884 cm	FAR-3230S-SSD(-BB)		
FAR-3220(-BB)	RTR-106	950 cm	FAR-3330S-SSD		
FAR-3320			FAR-3025-NXT	RTR-123	330 cm
FAR-3220W-BB	RTR-108	550 cm	FAR-3220-NXT(-BB)		
FAR-3320W			FAR-3320-NXT		
FAR-3035S			FAR-3025-NXT-MARK-2	RTR-137	357 cm
FAR-3230S(-BB)	RTR-107	460 cm			
FAR-3330S					

1 ANTENNA RADIATOR

- | 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 | |

- | | | |
|-----|--------------|---|
| 1.3 | Polarization | Horizontal |
| 1.4 | Rotation | 24 rpm or 42 rpm (for high speed craft) |
| 1.5 | Wind load | 100 kn relative |

2.1 TX Frequency and modulation

- | | |
|----------------------|---|
| X-band (Magnetron) | 9410 MHz $\pm$ 30 MHz, P0N |
| X-band (Solid state) | CH1: 9403.75 MHz (P0N)/ 9423.75 MHz $\pm$ 5 MHz (Q0N) or
CH2: 9413.75 MHz (P0N)/ 9433.75 MHz $\pm$ 5 MHz (Q0N) |
| S-band (Magnetron) | 3050 MHz $\pm$ 30 MHz, P0N |
| S-band (Solid state) | CH1: 3043.75 MHz (P0N)/ 3063.75 MHz $\pm$ 5 MHz (Q0N) or
CH2: 3053.75 MHz (P0N)/ 3073.75 MHz $\pm$ 5 MHz (Q0N) |

- | | | |
|-----|-------------------------|-----------------------------------|
| 2.2 | Output power | |
| | FAR-3210/3310 | 12 kW |
| | FAR-3220/3320/3320W | 25 kW |
| | FAR-3220-NXT/3320-NXT | 600 W (500 W for Japanese vessel) |
| | FAR-3230S/3330S/3330SW | 30 kW |
| | FAR-3230S-SSD/3330S-SSD | 250 W |

- ### 2.3 Pulse Repetition Rate, Range scale and Pulselength, X/S-band Magnetron radar

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	72	96				
3000*	S1																					
3000*			S2																			
1500			M1																			
1200					M2																	
1000							M3															
600**										L												

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

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

X-band Solid state radar

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	72	96				
1500	S1																					
1500			S2																			
1200			M1																			
1000						M2																
1000									M3													
600										L												

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

S-band Solid state radar

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	72	96				
2400*	S1																					
2000*			S2																			
1500			M1																			
1060					M2																	
1000							M3															
600										L												

1/2/4/8/16/32/72 NM ranges: non-IMO 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 $\pm 1^\circ$
- 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	72	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	12	16
Number of rings	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6	6

- 3.7 Warm-up time 3 min. approx. (solid state radar excluded)
- 3.8 Orientation mode Head-up RM, STAB head-up RM, Course-up RM, North-up RM, North-up TM, Stern-up RM
- 3.9 Stabilization mode Ground or sea stabilization
- 3.10 Target tracking (TT)
 - Auto or manual acquisition: 200 targets in 32 NM,
 - Auto tracking on all acquired targets,
 - Past position: 5/10 pts on all activated targets
 - Vector time: Off, 30 s, 1-60 min
- 3.11 AIS
 - Capacity: 2000 targets
 - Past position: 5/10 pts on all activated targets
 - Vector time: Off, 30 s, 1-60 min
- 3.12 Radar map 10 maps, 4,000 pts per map
- 3.13 Acquisition zone 2 zones

4 MONITOR UNIT

- | | | |
|-----|---------------------|--|
| 4.1 | Screen type | |
| | MU-190/192, HD19T22 | 19-inch color LCD, 1280 x 1024 (SXGA) |
| | MU-231, JH23T14 | 23.1-inch color LCD, 1600 x 1200 (UXGA) |
| | MU-270W | 27-inch color LCD, 1920 x 1200 (WUXGA) |
| 4.2 | Brightness | |
| | MU-190 | 450 cd/m ² typical |
| | MU-192/231/270W | 400 cd/m ² typical |
| | HD19T22 | 350 cd/m ² typical |
| | JH23T14 | 500 cd/m ² typical |
| 4.3 | Visible distance | |
| | MU-190/192/231/270W | 1.02 m nominal |
| | HD19T22, JH23T14 | 1.01 m nominal |
| 4.4 | Video interface | DVI-D: DVI-standard, VESA-DDC2B |
| 4.5 | Brilliance control | RS-485, serial data control (DDC sentence) |

5 INTELLIGENT HUB (OPTION)

- | | | |
|------|--|---|
| 5.1 | Number of ports | 8 ports (10/100/1000BASE-T, 8P8C connector) |
| 5.2 | Switching method | Store and forward, non-blocking L2 switching |
| 5.3 | Capacitance of switching | 16 Gbps |
| 5.4 | Flow Control | Full-Duplex (IEEE802.3x flow-controlled at automatic mode) |
| 5.5 | Ring aggregation | 8 group max. |
| 5.6 | Spanning tree | STP(IEEE802.1D), RSTP(IEEE802.1w), MST(IEEE802.1s) |
| 5.7 | IGMP snooping | IGMP v1, v2, v3 |
| 5.8 | Other Network function excepted IEC61162-450 | HTTP: *.*.*.:80, Syslog: *.*.*.:512, SNMP: *.*.*.:161,162 |
| 5.9 | Operation control | PING, SNMPv1, v2c, v3 |
| 5.10 | VLAN | Port-base VLAN, IEEE802.1Q Tag VLAN supported, VLAN ID: 1 to 4094, VLAN registration: 128 group |
| 5.11 | Multiple VLAN | Communication between isolated ports is disabled |
| 5.12 | Cast control | Broadcast, Multicast suppression |

6 INTERFACE

- | | | |
|-----|-------------------------------|---|
| 6.1 | Processor unit (EC-3000) | |
| | Number of port | |
| | Serial | 7 ports (IEC61162-1/2: 4 ports, IEC61162-1: 3 ports) |
| | Alarm output | 6 ports: contact signal, load current 250mA |
| | | Normal close: 2, Normal open: 2, |
| | | System fail: 1 (n/c), Power fail: 1 (n/c) |
| | DVI output | 3 ports: DVI-D (2), DVI-I or RGB picture data (1 port for VDR) |
| | USB | 4 ports (3 ports for control units) |
| | LAN | 2 ports: Ethernet 1000Base-T for local communication |
| | Digital input | 1 port: contact signal, 100 ohm max. or 24VDC input |
| | Data sentences (IEC61162-1/2) | |
| | Input | ABK, ACN (ACM), ALC, ALF, ALR, ARC, CUR, DBT, DDC, DPT, DTM, EVE, GGA, GLL, GNS, HBT, HCR, HDT, MTW, MWD, MWV, NRM, NRX, NSR, RMC, RRT, SRP, THS, VBW, VDM, VDO, VDR, VHW, VLW, VSD, VTG, ZDA |

	Output	ABM, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT, OSD, RRT, RSD, RTE, SRP, TLB, TTD, TTM, VSD, WPL
6.2	Sensor adapter (option)	
	MC-3000S (serial)	8 ports: I/O, IEC61162-1/2: 4 ports, IEC61162-1: 4 ports
	MC-3010A (analog)	3 ports: Input, -10 to +10 V, 0 to 10 V or 4 to 20 mA
	MC-3020D (digital-in)	8 ports: relay contact, logics set from program
	MC-3030D (digital-out)	8 ports: relay contact, normal open and normal close available
6.3	Ethernet interface for IEC61162-450 (EC-3000)	
	Port (LAN2)	1000Base-T, IPv4, 8P8C connector
	Data sentences	Same as 5.1 sentences
	IEC61162-450 transmission group	
	Input	MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8, BAM1, BAM2, CAM1, CAM2, NETA, PGP1 to PGP4, PGB1 to PGB4
	Output	Arbitrary (default: TGTD)
	Multicast address	239.192.0.1 to 239.192.0.20, 239.192.0.56 to 239.192.0.64
	Destination port	60001 to 60020, 60056 to 60064
	Datagram header	UdPbC
	Non Re-transmittable binary image transfer	
	Multicast address	239.192.0.21 to 239.192.0.25
	Destination port	60021 to 60025
	Datagram header	RaUdP
	Maximum output rate	Adjustable from 0.8 to 16 Mbps (0.8 Mbps steps), default: 4.8 Mbps
	Re-transmittable binary image transfer	
	Multicast address	239.192.0.26 to 239.192.0.30
	Destination port	60026 to 60030
	Datagram header	RrUdP
	Maximum output rate	Adjustable from 0.8 to 16 Mbps (0.8 Mbps steps), default: 4.8 Mbps
	IGMP	Version 1
	Other network function excepted IEC61162-450	HTTP: *.*.*: 80, Syslog: 239.192.0.254: 514
	Note: These functions have little effect (total band-width is less than 100 kbps).	
6.4	Ethernet interface for IEC61162-450 (MC-3000S)	
	Port	100Base-TX, IPv4, 8P8C connector
	Maximum data rate	800 sps
	Data sentences	Output: XDR
	IEC61162-450 transmission group	
	Input	MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8, BAM1, BAM2, CAM1, CAM2, NETA, PGP1 to PGP4, PGB1 to PGB4
	Output	Arbitrary (default: MISC)
	Multicast address	239.192.0.1 to 239.192.0.20, 239.192.0.56 to 239.192.0.64
	Destination port	60001 to 60020, 60056 to 60064
	Datagram header	UdPbC
	IGMP	Version 1
	Other network function excepted IEC61162-450	HTTP: *.*.*: 80, Syslog: 239.192.0.254: 514
	Note: These functions have little effect (total band-width is less than 100 kbps).	

7 POWER SUPPLY

7.1 Power supply unit (w/ antenna and transceiver unit)

FAR-3210/3310 (X-band, 12 kW)

PSU-014 (24rpm) 100-230 VAC: 1.8-0.9 A, 1 phase, 50-60 Hz

PSU-014 (42rpm) 100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz

FAR-3220/3320/3320W (X-band, 25 kW)

PSU-014 (24rpm) 100-230 VAC: 2.0-1.0 A, 1 phase, 50-60 Hz

PSU-014 (42rpm) 100-230 VAC: 2.8-1.3 A, 1 phase, 50-60 Hz

FAR-3220-NXT/3320-NXT (X-band, SSD)

PSU-014-A (24rpm) 100-230 VAC: 1.8-0.9 A, 1 phase, 50-60 Hz

PSU-014-A (42rpm) 100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz

FAR-3230S/3330S/3330SW (S-band, magnetron)

PSU-014 (24rpm) 100-230 VAC: 2.8-1.3 A, 1 phase, 50-60 Hz

PSU-015 (42rpm) 100-230 VAC: 5.1-2.3 A, 1 phase, 50-60 Hz

FAR-3230S-SSD/3330S-SSD (S-band, SSD)

PSU-016 (24rpm) 100-230 VAC: 2.3-1.1 A, 1 phase, 50-60 Hz

PSU-018 (42rpm) 100-230 VAC: 4.7-2.1 A, 1 phase, 50-60 Hz

7.2 Processor unit (values changed from CPU board type)

ADP-556 100-115/220-230 VAC: 3.0/1.5 A, 1 phase, 50/60 Hz

ADP-219 100-115/220-230 VAC: 2.3/1.1 A, 1 phase, 50/60 Hz

7.3 Monitor unit

MU-190 100-230 VAC: 0.5-0.4 A, 1 phase, 50-60 Hz

MU-192 100-230 VAC: 0.4-0.3 A, 1 phase, 50/60 Hz

MU-231 100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz

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

HD19T22-FUD-MA4-FAGA (option, standard supply for FAR-3230S/3220-NXT HK config.)

100-240 VAC: 0.8-0.3 A, 1 phase, 50/60 Hz or 24VDC: 3.1 A

JH23T14-FUD-MR4-AOAA (standard supply for FAR-33x0 series HK config.)

100-240 VAC: 1.6-0.7 A, 1 phase, 50/60 Hz or 24VDC: 6.5 A

7.4 Sensor adapter (option) 24 VDC: 1.4 A (for 11 units), input to MC-3000S, the sources of other sensor adapters are fed from MC-3000S

7.5 Switching HUB (option)

HUB-3000 100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz

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

7.6 Transformer (option) 440 VAC: 1 phase, 50/60 Hz

7.7 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

8.2 Relative humidity 95% or less at +40°C

8.3 Degree of protection

Antenna unit IP56

Processor unit IP20 (IP22: option)

Transceiver unit IP20

Control/ power supply unit IP22

	Monitor unit	IP22 (MU-ser.), IP66 (front) or IP22 (rear) (HD19T22/ JH23T14)
	Sensor adapter	IP20 (IP22: option)
	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/ transceiver/ control unit	N2.5
9.4	Monitor unit	N2.5 (MU-190/231/270W), N1.0 (MU-192), RAL9011 (HD19T22/JH23T14)
9.5	HUB	N3.0 (HUB-100), N2.5 (HUB-3000)
9.6	Radar console	2.5GY5/1.5 (standard), 7.5BG7/2, 2.5G7/2, N7.5

10 PERFORMANCE MONITOR

10.1	PM-32 (X-band, MAG)	
	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-32B (X-band, SSD)	
	Frequency range	9423.75 ±1.6 MHz
	Input power	+6 dBm to +25 dBm
	Output power	-35 dBm (1 st pulse max. output), -66 dBm (1 st pulse min. output)
	Step level	8 to 12 dB (1 st pulse to last pulse)
10.3	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)
10.4	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

- | Radiator type | X-band | | | S-band | | |
|---------------------------------|-------------------|-------------------|-------------------|--------|--------|--------|
| | XN12AF/
XN12CF | XN20AF/
XN12CF | XN24AF/
XN12CF | 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 | |

- ## 2 TRANSCEIVER

- | | |
|----------------------|---|
| X-band (Magnetron) | 9410 MHz $\pm$ 30 MHz, P0N |
| X-band (Solid state) | CH1: 9403.75 MHz (P0N)/ 9423.75 MHz $\pm$ 5 MHz (Q0N) or
CH2: 9413.75 MHz (P0N)/ 9433.75 MHz $\pm$ 5 MHz (Q0N) |
| S-band (Magnetron) | 3050 MHz $\pm$ 30 MHz, P0N |
| S-band (Solid state) | CH1: 3043.75 MHz (P0N)/ 3063.75 MHz $\pm$ 5 MHz (Q0N) or
CH2: 3053.75 MHz (P0N)/ 3073.75 MHz $\pm$ 5 MHz (Q0N) |

- | | |
|---------------------|-----------------------------------|
| FAR-3015 | 12 kW |
| FAR-3025 | 25 kW |
| FAR-3025-NXT | 600 W (500 W for Japanese vessel) |
| FAR-3025-NXT-MARK-2 | 600 W (500 W for Japanese vessel) |
| FAR-3035S | 30 kW |
| FAR-3035S-NXT | 250 W |

- ### X/S-band Magnetron radar

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	72	96				
3000*	S1																					
3000*			S2																			
1500			M1																			
1200			M2																			
1000									M3													
600**											L											

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

X-band Solid state radar

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	72	96				
1500	S1																					
1500			S2																			
1200				M1																		
1000						M2																
1000								M3														
600										L												

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

S-band Solid state radar

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	72	96			
2400*	S1																				
2000*			S2																		
1500			M1																		
1060					M2																
1000							M3														
600									L												

1/2/4/8/16/32/72 NM ranges: non-IMO 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° (XN12AF/CF), 1.5° (XN20AF/CF), 1.2° (XN24AF/CF)
- S-band 2.8° (SN24CF), 2.5° (SN30CF), 2.0° (SN36CF)

- 3.5 Bearing accuracy $\pm 1^\circ$

- 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	72	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	12	16
Number of rings	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6	6

- 3.7 Warm-up time 3 min. approx. (solid state radar excluded)
- 3.8 Orientation mode Head-up RM, STAB head-up RM, Course-up RM, North-up RM, North-up TM, Stern-up RM
- 3.9 Stabilization mode Ground or sea stabilization
- 3.10 Target tracking (TT) Auto or manual acquisition: 200 targets in 32 NM, Auto tracking on all acquired targets, Past position: 5/10 pts on all activated targets, Vector time: Off, 30 s, 1-60 min
- 3.11 AIS Capacity: 2000 targets, Past position: 5/10 pts on all activated targets, Vector time: Off, 30 s, 1-60 min
- 3.12 Radar map 10 maps, 4,000 pts per map
- 3.13 Acquisition zone 2 zones

4 MONITOR UNIT

- | | | |
|-----|--------------------|--|
| 4.1 | Screen type | |
| | MU-190/192 | 19-inch color LCD, 1280 x 1024 (SXGA) |
| | MU-270W | 27-inch color LCD, 1920 x 1200 (WUXGA) |
| 4.2 | Brightness | |
| | MU-190 | 450 cd/m ² typical |
| | MU-192/270W | 400 cd/m ² typical |
| 4.3 | Visible distance | 1.02 m nominal |
| 4.4 | Video interface | DVI-D: DVI-standard, VESA-DDC2B |
| 4.5 | Brilliance control | RS-485, serial data control (DDC sentence) |

5 INTELLIGENT HUB (OPTION)

- | | | |
|------|--|--|
| 5.1 | Number of ports | 8 ports (10/100/1000BASE-T, 8P8C connector) |
| 5.2 | Switching method | Store and forward, non-blocking L2 switching |
| 5.3 | Capacitance of switching | 16 Gbps |
| 5.4 | Flow Control | Full-Duplex (IEEE802.3x flow-controlled at automatic mode) |
| 5.5 | Ring aggregation | 8 group max. |
| 5.6 | Spanning tree | STP(IEEE802.1D), RSTP(IEEE802.1w), MST(IEEE802.1s) |
| 5.7 | IGMP snooping | IGMP v1, v2, v3 |
| 5.8 | Other Network function excepted IEC61162-450 | |
| | | HTTP: *.*.*.:80, Syslog: *.*.*.:512, SNMP: *.*.*.:161,162 |
| 5.9 | Operation control | PING, SNMPv1, v2c, v3 |
| 5.10 | VLAN | Port-base VLAN, IEEE802.1Q Tag VLAN supported,
VLAN ID: 1 to 4094, VLAN registration: 128 group |
| 5.11 | Multiple VLAN | Communication between isolated ports is disabled |
| 5.12 | Cast control | Broadcast, Multicast suppression |

6 INTERFACE

- | | | |
|-----|-------------------------------|--|
| 6.1 | Processor unit (EC-3005) | |
| | Number of port | |
| | Serial | 7 ports (IEC61162-1/2: 4 ports, IEC61162-1: 3 ports) |
| | Alarm output | 6 ports: contact signal, load current 250mA
Normal close: 2, Normal open: 2,
System fail: 1, Power fail: 1 |
| | DVI output | 3 ports: DVI-D (2), DVI-I or RGB picture data (1 port for VDR) |
| | USB | 4 ports (3 ports for control units) |
| | LAN | 2 ports: Ethernet 1000Base-T for local communication |
| | Digital input | 1 port: contact signal, 100 ohm max. or 24VDC input |
| | Data sentences (IEC61162-1/2) | |
| | Input | ABK, ACN (ACM), ALC, ALF, ALR, ARC, CUR, DBT, DDC, DPT,
DTM, EVE, GGA, GLL, GNS, HBT, HCR, HDT, MTW, MWD, MWV,
NRM, NRX, NSR, RMC, RRT, SRP, THS, VBW, VDM, VDO, VDR,
VHW, VLW, VSD, VTG, ZDA |
| | Output | ABM, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT, OSD, RRT,
RSD, RTE, SRP, TLB, TTD, TTM, VSD, WPL |
| 6.2 | Sensor adapter (option) | |
| | MC-3000S (serial) | 8 ports: I/O, IEC61162-1/2: 4 ports, IEC61162-1: 4 ports |

- | | |
|------------------------|--|
| MC-3010A (analog) | 3 ports: Input, -10 to +10 V, 0 to 10 V or 4 to 20 mA |
| MC-3020D (digital-in) | 8 ports: relay contact, logics set from program |
| MC-3030D (digital-out) | 8 ports: relay contact, normal open and normal close available |
- 6.3 Ethernet interface for IEC61162-450 (EC-3005)
- | | |
|----------------|----------------------------------|
| Port (LAN2) | 1000Base-T, IPv4, 8P8C connector |
| Data sentences | Same as 5.1 sentences |
- IEC61162-450 transmission group
- | | |
|-------------------|--|
| Input | MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8, BAM1, BAM2, CAM1, CAM2, NETA, PGP1 to PGP4, PGB1 to PGB4 |
| Output | Arbitrary (default: TGTD) |
| Multicast address | 239.192.0.1 to 239.192.0.20, 239.192.0.56 to 239.192.0.64 |
| Destination port | 60001 to 60020, 60056 to 60064 |
| Datagram header | UdPbC |
- Non Re-transmittable binary image transfer
- | | |
|---------------------|--|
| Multicast address | 239.192.0.21 to 239.192.0.25 |
| Destination port | 60021 to 60025 |
| Datagram header | RaUdP |
| Maximum output rate | Adjustable from 0.8 to 16 Mbps (0.8 Mbps steps), default: 4.8 Mbps |
- Re-transmittable binary image transfer
- | | |
|---------------------|--|
| Multicast address | 239.192.0.26 to 239.192.0.30 |
| Destination port | 60026 to 60030 |
| Datagram header | RrUdP |
| Maximum output rate | Adjustable from 0.8 to 16 Mbps (0.8 Mbps steps), default: 4.8 Mbps |
- IGMP Version 1
- Other network function excepted IEC61162-450
- HTTP: *.*.*: 80, Syslog: 239.192.0.254: 514
- Note: These functions have little effect (total band-width is less than 100 kbps).
- 6.4 Ethernet interface for IEC61162-450 (MC-3000S)
- | | |
|-------------------|----------------------------------|
| Port | 100Base-TX, IPv4, 8P8C connector |
| Maximum data rate | 800 sps |
| Data sentences | Output: XDR |
- IEC61162-450 transmission group
- | | |
|-------------------|--|
| Input | MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8, BAM1, BAM2, CAM1, CAM2, NETA, PGP1 to PGP4, PGB1 to PGB4 |
| Output | Arbitrary (default: MISC) |
| Multicast address | 239.192.0.1 to 239.192.0.20, 239.192.0.56 to 239.192.0.64 |
| Destination port | 60001 to 60020, 60056 to 60064 |
| Datagram header | UdPbC |
- IGMP Version 1
- Other network function excepted IEC61162-450
- HTTP: *.*.*: 80, Syslog: 239.192.0.254: 514
- Note: These functions have little effect (total band-width is less than 100 kbps).

7 POWER SUPPLY

- 7.1 Power supply unit (w/ antenna and transceiver unit)
- FAR-3015 (X-band, 12 kW)

	PSU-014 (24rpm)	100-230 VAC: 1.7-0.8 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.5-1.1 A, 1 phase, 50-60 Hz
	FAR-3025 (X-band, 25 kW)	
	PSU-014 (24rpm)	100-230 VAC: 1.8-0.8 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz
	FAR-3025-NXT/ FAR-3025-NXT-MARK-2 (X-band, SSD)	
	PSU-014 (24rpm)	100-230 VAC: 1.8-0.9 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz
	FAR-3035S (S-band, magnetron)	
	PSU-014 (24rpm)	100-230 VAC: 2.8-1.3 A, 1 phase, 50-60 Hz
	PSU-015 (42rpm)	100-230 VAC: 5.1-2.3 A, 1 phase, 50-60 Hz
	FAR-3035S-NXT (S-band, SSD)	
	PSU-016 (24rpm)	100-230 VAC: 2.3-1.1 A, 1 phase, 50-60 Hz
	PSU-018 (42rpm)	100-230 VAC: 4.7-2.1 A, 1 phase, 50-60 Hz
7.2	Processor unit (EC-3005)	100-115/220-230 VAC: 2.3/1.1 A, 1 phase, 50-60 Hz
7.3	Monitor unit	
	MU-190	100-230 VAC: 0.5-0.4 A, 1 phase, 50-60 Hz
	MU-192	100-230 VAC: 0.4-0.3 A, 1 phase, 50/60 Hz
	MU-270W	100-230 VAC: 0.6-0.4 A, 1 phase, 50-60 Hz
7.4	Sensor adapter (option)	24 VDC: 1.4 A (for 11 units), input to MC-3000S, the sources of other sensor adapters are fed from MC-3000S
7.5	Switching HUB (option)	
	HUB-3000	100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz
	HUB-100	100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz
7.6	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
8.2	Relative humidity	95% or less at +40°C
8.3	Degree of protection	
	Antenna unit	IP56
	Processor unit	IP20 (IP22: option)
	Sensor adapter	IP20 (IP22: option)
	Control/ monitor/ power supply unit	IP22
	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/ control unit	N2.5
9.4	Monitor unit	N2.5 (MU-190/270W), N1.0 (MU-192)
9.5	HUB	N3.0 (HUB-100), N2.5 (HUB-3000)
9.6	Radar console	2.5GY5/1.5 (standard), 7.5BG7/2, 2.5G7/2, N7.5

10 PERFORMANCE MONITOR**10.1 PM-32 (X-band, MAG)**

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-32B (X-band, SSD)

Frequency range	9423.75 $\pm$ 1.6 MHz
Input power	+6 dBm to +25 dBm
Output power	-35 dBm (1 st pulse max. output), -66 dBm (1 st pulse min. output)
Step level	8 to 12 dB (1 st pulse to last pulse)

10.3 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)

10.4 PM-52B (S-band, SSD)

Frequency range	3063.75 $\pm$ 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)

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