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25. MAINTENANCE AND TROUBLE-SHOOTING

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 are permitted to 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 electro-magnetic waves, which can be harmful, particularly to the eyes.

Never look directly at a transmitting radar antenna.

WARNING

Before opening any unit, turn off the unit and turn off the power to the unit at the mains switchboard.

Hazardous voltage which can cause electrical shock exists inside the units of the system.

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, marine 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	Processor Unit, Transceiver 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 any unit; they may remove paint and markings.	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.	
5 years	Antenna Unit	If the grease dries out, the V-ring may break, allowing water to leak inside the antenna unit.	Have a qualified technician apply the grease oil to the antenna rotary.
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.
	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 fiberglass reinforced plastic. Therefore, do not used 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 Unit, Transceiver Unit	Check that all screws are tightly fastened.	Have a qualified technician check screws.

25.2 How to Replace the Fuses

The units listed in the table below have a fuse which protects them from overvoltage 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.

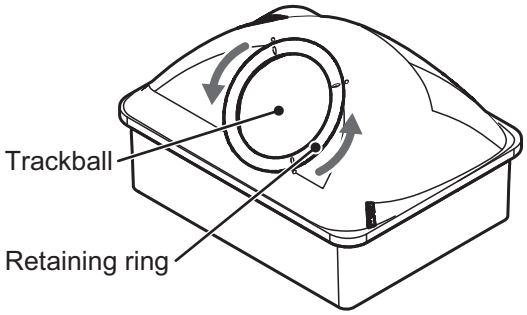
Use of a wrong fuse can damage the equipment or cause fire.

Unit	Power supply	Type	Code no.
Processor Unit EC-3000	100-115 VAC	FGMB 125V 10A PBF	000-157-470-10
	220-230 VAC	FGMB 250V 5A PBF	000-157-570-10
Transceiver Unit RTR-116	100-230 VAC	FGBO 250V 2A PBF	000-155-829-10

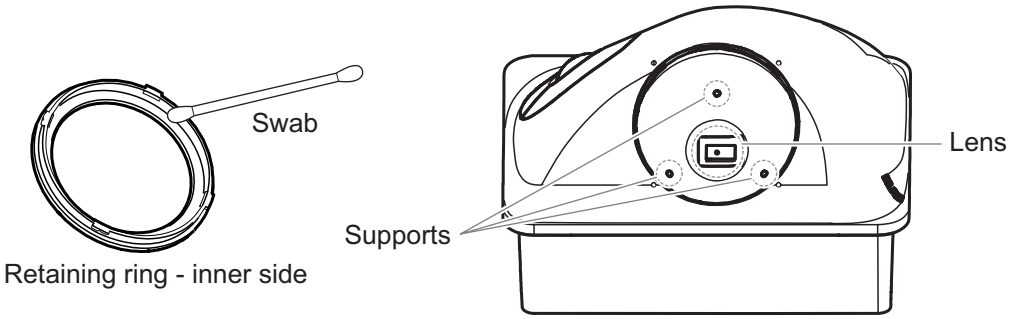
25.3 Trackball Maintenance

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

1. Referring to the figure below, turn the retaining ring on the trackball module in the direction of the arrows 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 a 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.



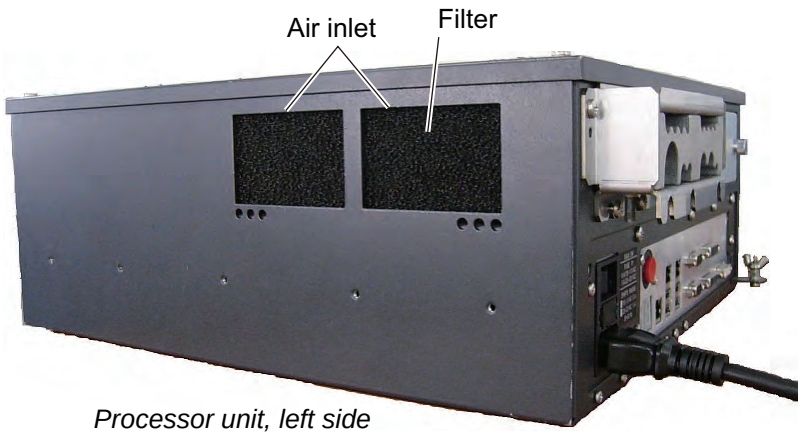
5. Make sure that the trackball, trackball housing and retaining ring are completely dry.
6. Re-set the ball and retaining ring. Be sure the retaining ring is not inserted reversely.

25.4 How to Clean and Replace the Air Inlet Filter in the 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

25.5 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 727 (ALF format: 194,8) "Radar Sensor COM Error" appears	check the connection between the EC-3000 and radar sensor.	Reconnect the cable (if loosened) then restart the equipment.
the alert 750 (ALF format: 10740,3) "EXT Radar COM Error" appears	• check the connection between the EC-3000 of this equipment and the EC-3000 in the LAN line. • check the connection between the EC-3000 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.
the equipment can be turned on but nothing appears on the display	• monitor brilliance is too low. • the ambient temperature is less than 0°C (32°F).	• Adjust monitor brilliance. • The heater is warming the EC-3000. 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.
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 2.22.3 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 691 (ALF format: 10800,1): RM Stop - Exceed Max XTE.** Own ship is too far away from the route. • **Alert 692 (ALF format: 10800,3): RM Stop - No Valid Sensor Data.** Chart radar internal error. • **Alert 693 (ALF format: 10800,2): RM Stop - Other Causes.** Required data (position, SOG/COG) not found.	• Steer the ship back to the route then restart route monitoring. • Request service. • Check sensor connections.
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 not connected.	• Open ENC chart from [Manage Charts] dialog box • Connect dongle.
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.

If…	then…	Remedy
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.
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.

25.6 Consumable Parts

The table below lists the consumable parts in the surveillance radar system. Replace the parts before their expected expirations.

Consumable parts

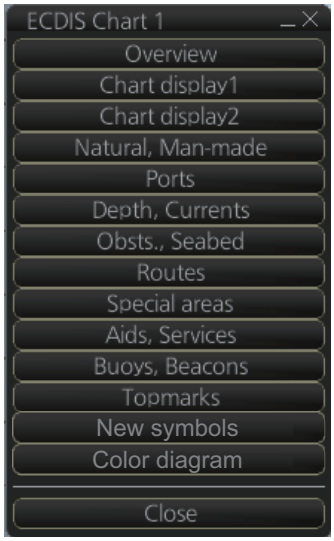
Part	Type	Lifetime	Remarks
Antenna Motor	D8G-516	10,000 hours	
Monitor	MU-231	50,000 hours	
Processor Unit CPU Fan	KTA-555-01	8.5 years	
Processor Unit Power Fan	109P0612H761	8.5 years	
Processor Unit Chassis Fan	109P0612H761	8.5 years	

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

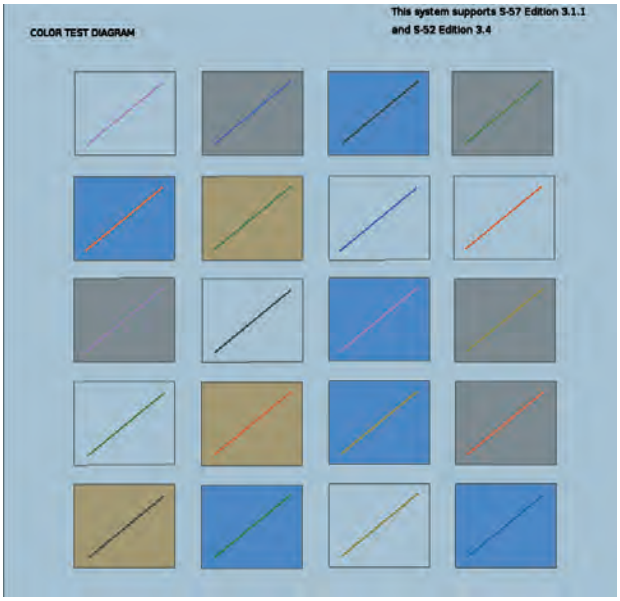
25.7 Color Differentiation Test for S57 Charts

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.

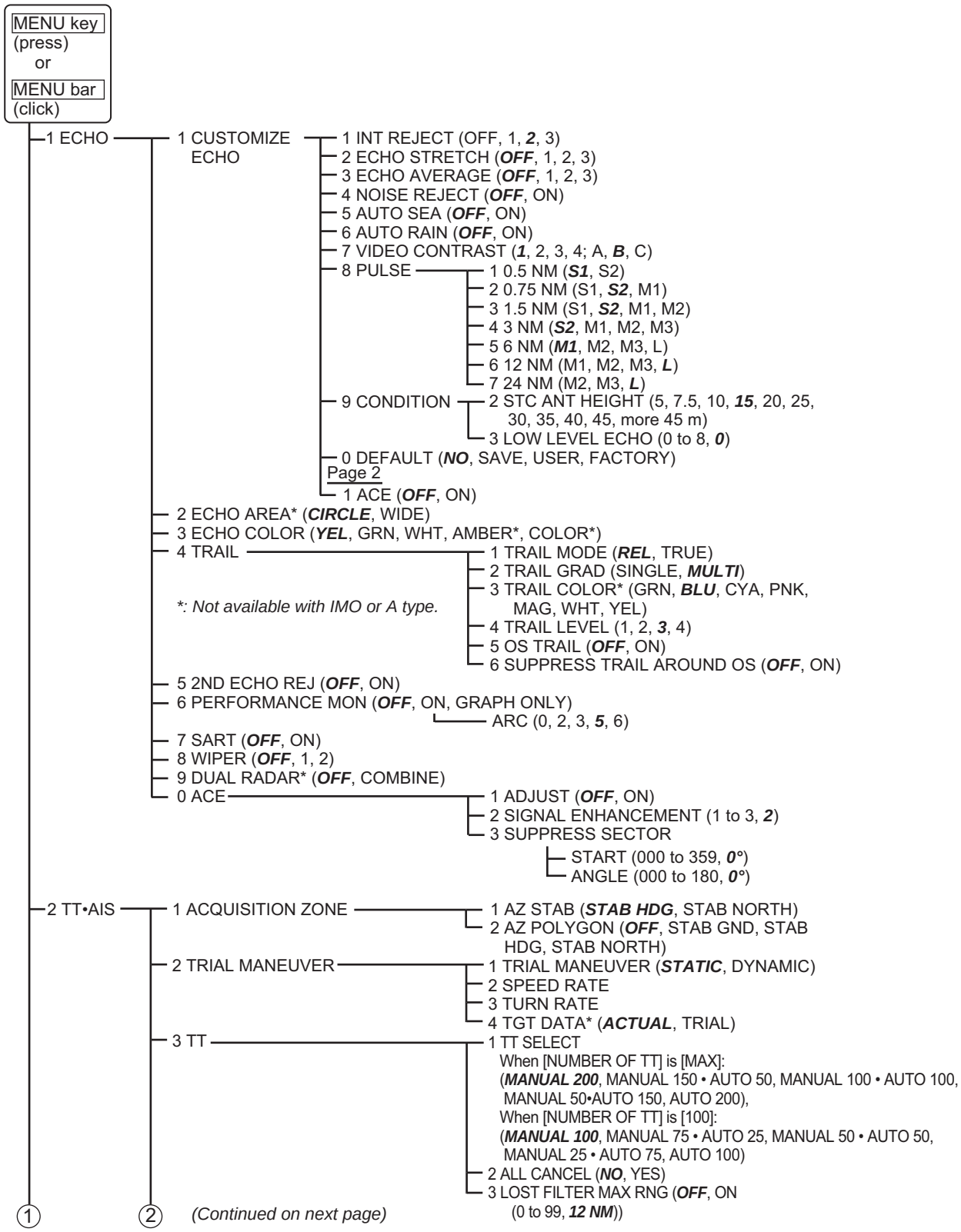
25.8 Fallback Arrangements

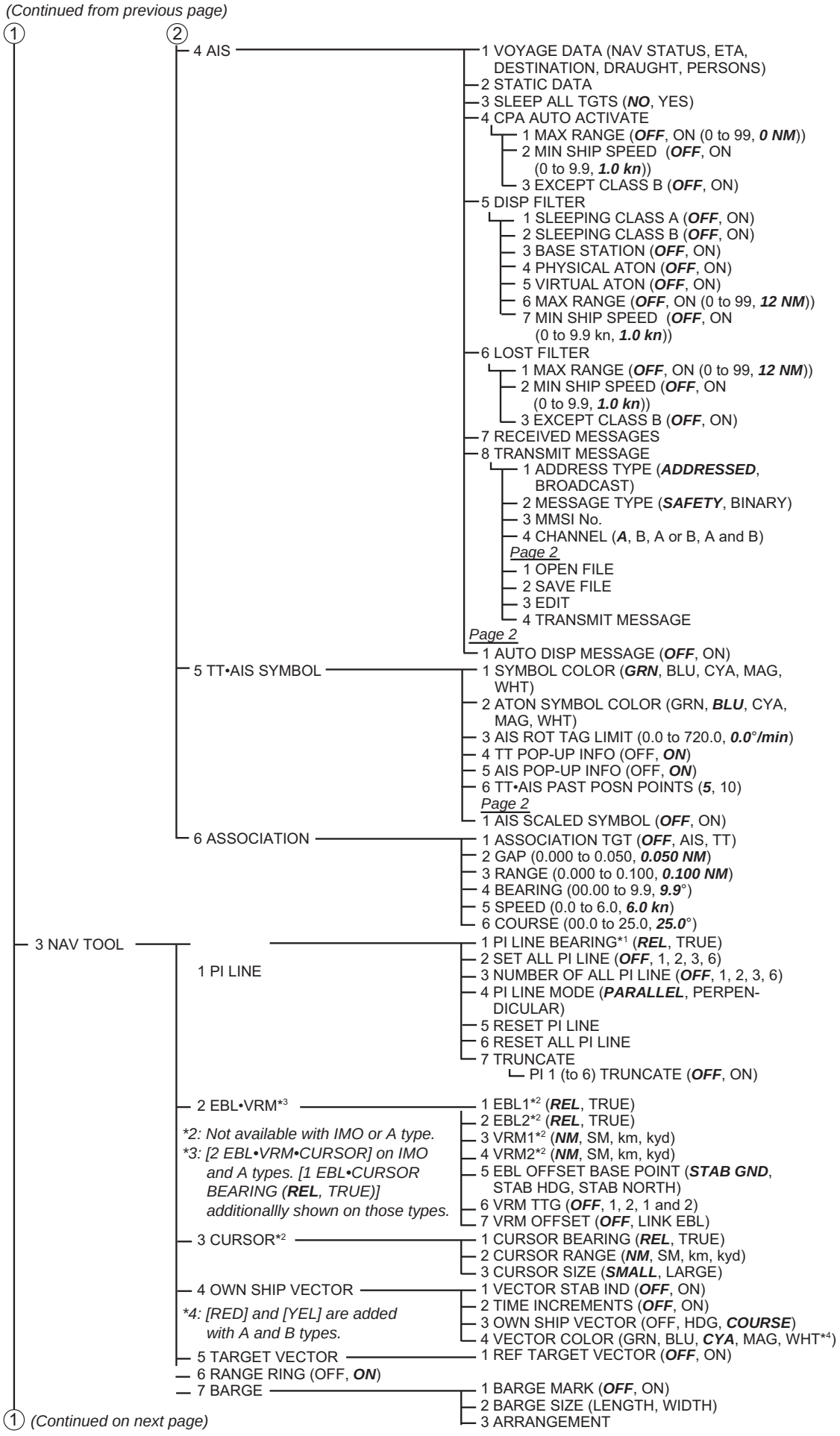
If the top priority sensor (e.g. GPS1) can not be used, this equipment automatically uses the second priority sensor (e.g. GPS2) when the multiple sensors (e.g. GPS1 and GPS2) are installed. When all sensors can not be used, each function is limited as follows:

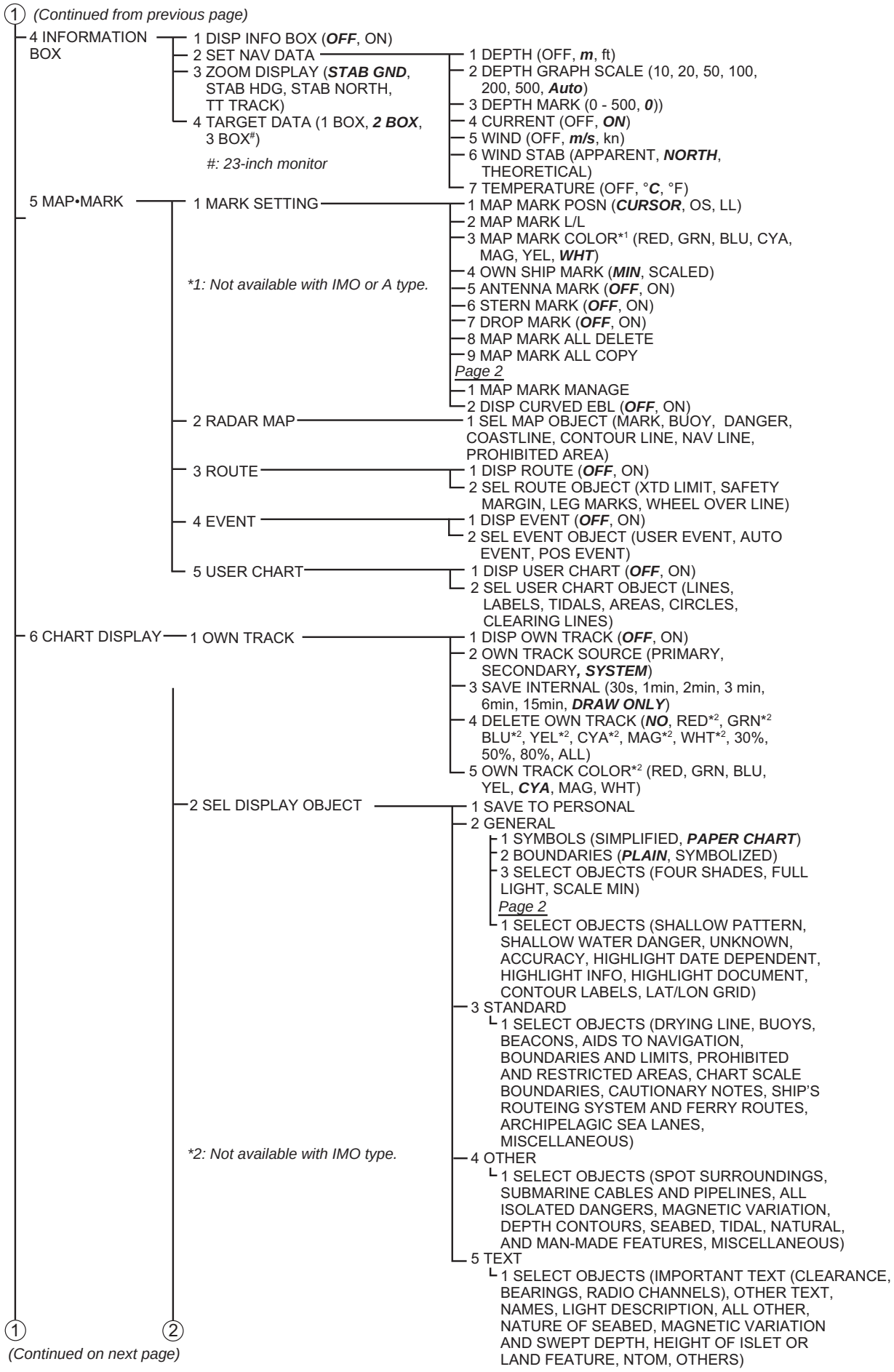
Sensor	Operation of this equipment
Heading sensor	• The HDG indication reads "***.*°". • The presentation mode is automatically set for head-up. • TT, AIS, radar map, chart and echo averaging (EAV) are disabled.
Speed sensor	When LOG(WT) is selected: • The sensor used is automatically switched in the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

APPENDIX 1 MENU TREE

Radar menu




(Continued from previous page)
1
2
4 AIS
1 VOYAGE DATA (NAV STATUS, ETA, DESTINATION, DRAUGHT, PERSONS)
2 STATIC DATA
3 SLEEP ALL TGTS (NO, YES)
4 CPA AUTO ACTIVATE
1 MAX RANGE (OFF, ON (0 to 99, 0 NM))
2 MIN SHIP SPEED (OFF, ON (0 to 9.9, 1.0 kn))
3 EXCEPT CLASS B (OFF, ON)
5 DISP FILTER
1 SLEEPING CLASS A (OFF, ON)
2 SLEEPING CLASS B (OFF, ON)
3 BASE STATION (OFF, ON)
4 PHYSICAL ATON (OFF, ON)
5 VIRTUAL ATON (OFF, ON)
6 MAX RANGE (OFF, ON (0 to 99, 12 NM))
7 MIN SHIP SPEED (OFF, ON (0 to 9.9 kn, 1.0 kn))
6 LOST FILTER
1 MAX RANGE (OFF, ON (0 to 99, 12 NM))
2 MIN SHIP SPEED (OFF, ON (0 to 9.9, 1.0 kn))
3 EXCEPT CLASS B (OFF, ON)
7 RECEIVED MESSAGES
8 TRANSMIT MESSAGE
1 ADDRESS TYPE (ADDRESSED, BROADCAST)
2 MESSAGE TYPE (SAFETY, BINARY)
3 MMSI No.
4 CHANNEL (A, B, A or B, A and B)
Page 2
1 OPEN FILE
2 SAVE FILE
3 EDIT
4 TRANSMIT MESSAGE
Page 2
1 AUTO DISP MESSAGE (OFF, ON)
5 TT•AIS SYMBOL
1 SYMBOL COLOR (GRN, BLU, CYA, MAG, WHT)
2 ATON SYMBOL COLOR (GRN, BLU, CYA, MAG, WHT)
3 AIS ROT TAG LIMIT (0.0 to 720.0, 0.0°/min)
4 TT POP-UP INFO (OFF, ON)
5 AIS POP-UP INFO (OFF, ON)
6 TT•AIS PAST POSN POINTS (5, 10)
Page 2
1 AIS SCALED SYMBOL (OFF, ON)
6 ASSOCIATION
1 ASSOCIATION TGT (OFF, AIS, TT)
2 GAP (0.000 to 0.050, 0.050 NM)
3 RANGE (0.000 to 0.100, 0.100 NM)
4 BEARING (00.00 to 9.9, 9.9°)
5 SPEED (0.0 to 6.0, 6.0 kn)
6 COURSE (00.0 to 25.0, 25.0°)
3 NAV TOOL
1 PI LINE
1 PI LINE BEARING*1 (REL, TRUE)
2 SET ALL PI LINE (OFF, 1, 2, 3, 6)
3 NUMBER OF ALL PI LINE (OFF, 1, 2, 3, 6)
4 PI LINE MODE (PARALLEL, PERPENDICULAR)
5 RESET PI LINE
6 RESET ALL PI LINE
7 TRUNCATE
PI 1 (to 6) TRUNCATE (OFF, ON)
2 EBL•VRM*3
1 EBL1*2 (REL, TRUE)
2 EBL2*2 (REL, TRUE)
3 VRM1*2 (NM, SM, km, kyd)
4 VRM2*2 (NM, SM, km, kyd)
5 EBL OFFSET BASE POINT (STAB GND, STAB HDG, STAB NORTH)
6 VRM TTG (OFF, 1, 2, 1 and 2)
7 VRM OFFSET (OFF, LINK EBL)
*2: Not available with IMO or A type.
*3: [2 EBL•VRM•CURSOR] on IMO and A types. [1 EBL•CURSOR BEARING (REL, TRUE)] additionallly shown on those types.
3 CURSOR*2
1 CURSOR BEARING (REL, TRUE)
2 CURSOR RANGE (NM, SM, km, kyd)
3 CURSOR SIZE (SMALL, LARGE)
4 OWN SHIP VECTOR
1 VECTOR STAB IND (OFF, ON)
2 TIME INCREMENTS (OFF, ON)
3 OWN SHIP VECTOR (OFF, HDG, COURSE)
4 VECTOR COLOR (GRN, BLU, CYA, MAG, WHT*4)
*4: [RED] and [YEL] are added with A and B types.
5 TARGET VECTOR
1 REF TARGET VECTOR (OFF, ON)
6 RANGE RING (OFF, ON)
7 BARGE
1 BARGE MARK (OFF, ON)
2 BARGE SIZE (LENGTH, WIDTH)
3 ARRANGEMENT
1
(Continued on next page)


(1) (Continued from previous page)
4 INFORMATION BOX
1 DISP INFO BOX (OFF, ON)
2 SET NAV DATA
1 DEPTH (OFF, m, ft)
2 DEPTH GRAPH SCALE (10, 20, 50, 100, 200, 500, Auto)
3 DEPTH MARK (0 - 500, 0))
4 CURRENT (OFF, ON)
5 WIND (OFF, m/s, kn)
6 WIND STAB (APPARENT, NORTH, THEORETICAL)
7 TEMPERATURE (OFF, °C, °F)
3 ZOOM DISPLAY (STAB GND, STAB HDG, STAB NORTH, TT TRACK)
4 TARGET DATA (1 BOX, 2 BOX, 3 BOX#)
#: 23-inch monitor
5 MAP•MARK
1 MARK SETTING
1 MAP MARK POSN (CURSOR, OS, LL)
2 MAP MARK L/L
3 MAP MARK COLOR*1 (RED, GRN, BLU, CYA, MAG, YEL, WHT)
4 OWN SHIP MARK (MIN, SCALED)
5 ANTENNA MARK (OFF, ON)
6 STERN MARK (OFF, ON)
7 DROP MARK (OFF, ON)
8 MAP MARK ALL DELETE
9 MAP MARK ALL COPY
Page 2
1 MAP MARK MANAGE
2 DISP CURVED EBL (OFF, ON)
*1: Not available with IMO or A type.
2 RADAR MAP
1 SEL MAP OBJECT (MARK, BUOY, DANGER, COASTLINE, CONTOUR LINE, NAV LINE, PROHIBITED AREA)
3 ROUTE
1 DISP ROUTE (OFF, ON)
2 SEL ROUTE OBJECT (XTD LIMIT, SAFETY MARGIN, LEG MARKS, WHEEL OVER LINE)
4 EVENT
1 DISP EVENT (OFF, ON)
2 SEL EVENT OBJECT (USER EVENT, AUTO EVENT, POS EVENT)
5 USER CHART
1 DISP USER CHART (OFF, ON)
2 SEL USER CHART OBJECT (LINES, LABELS, TIDALS, AREAS, CIRCLES, CLEARING LINES)
6 CHART DISPLAY
1 OWN TRACK
1 DISP OWN TRACK (OFF, ON)
2 OWN TRACK SOURCE (PRIMARY, SECONDARY, SYSTEM)
3 SAVE INTERNAL (30s, 1min, 2min, 3 min, 6min, 15min, DRAW ONLY)
4 DELETE OWN TRACK (NO, RED*2, GRN*2 BLU*2, YEL*2, CYA*2, MAG*2, WHT*2, 30%, 50%, 80%, ALL)
5 OWN TRACK COLOR*2 (RED, GRN, BLU, YEL, CYA, MAG, WHT)
2 SEL DISPLAY OBJECT
1 SAVE TO PERSONAL
2 GENERAL
1 SYMBOLS (SIMPLIFIED, PAPER CHART)
2 BOUNDARIES (PLAIN, SYMBOLIZED)
3 SELECT OBJECTS (FOUR SHADES, FULL LIGHT, SCALE MIN)
Page 2
1 SELECT OBJECTS (SHALLOW PATTERN, SHALLOW WATER DANGER, UNKNOWN, ACCURACY, HIGHLIGHT DATE DEPENDENT, HIGHLIGHT INFO, HIGHLIGHT DOCUMENT, CONTOUR LABELS, LAT/LON GRID)
3 STANDARD
1 SELECT OBJECTS (DRYING LINE, BUOYS, BEACONS, AIDS TO NAVIGATION, BOUNDARIES AND LIMITS, PROHIBITED AND RESTRICTED AREAS, CHART SCALE BOUNDARIES, CAUTIONARY NOTES, SHIP'S ROUTEING SYSTEM AND FERRY ROUTES, ARCHIPELAGIC SEA LANES, MISCELLANEOUS)
4 OTHER
1 SELECT OBJECTS (SPOT SURROUNDINGS, SUBMARINE CABLES AND PIPELINES, ALL ISOLATED DANGERS, MAGNETIC VARIATION, DEPTH CONTOURS, SEABED, TIDAL, NATURAL, AND MAN-MADE FEATURES, MISCELLANEOUS)
5 TEXT
1 SELECT OBJECTS (IMPORTANT TEXT (CLEARANCE, BEARINGS, RADIO CHANNELS), OTHER TEXT, NAMES, LIGHT DESCRIPTION, ALL OTHER, NATURE OF SEABED, MAGNETIC VARIATION AND SWEPT DEPTH, HEIGHT OF ISLET OR LAND FEATURE, NTOM, OTHERS)
*2: Not available with IMO type.
(1) (2)
(Continued on next page)

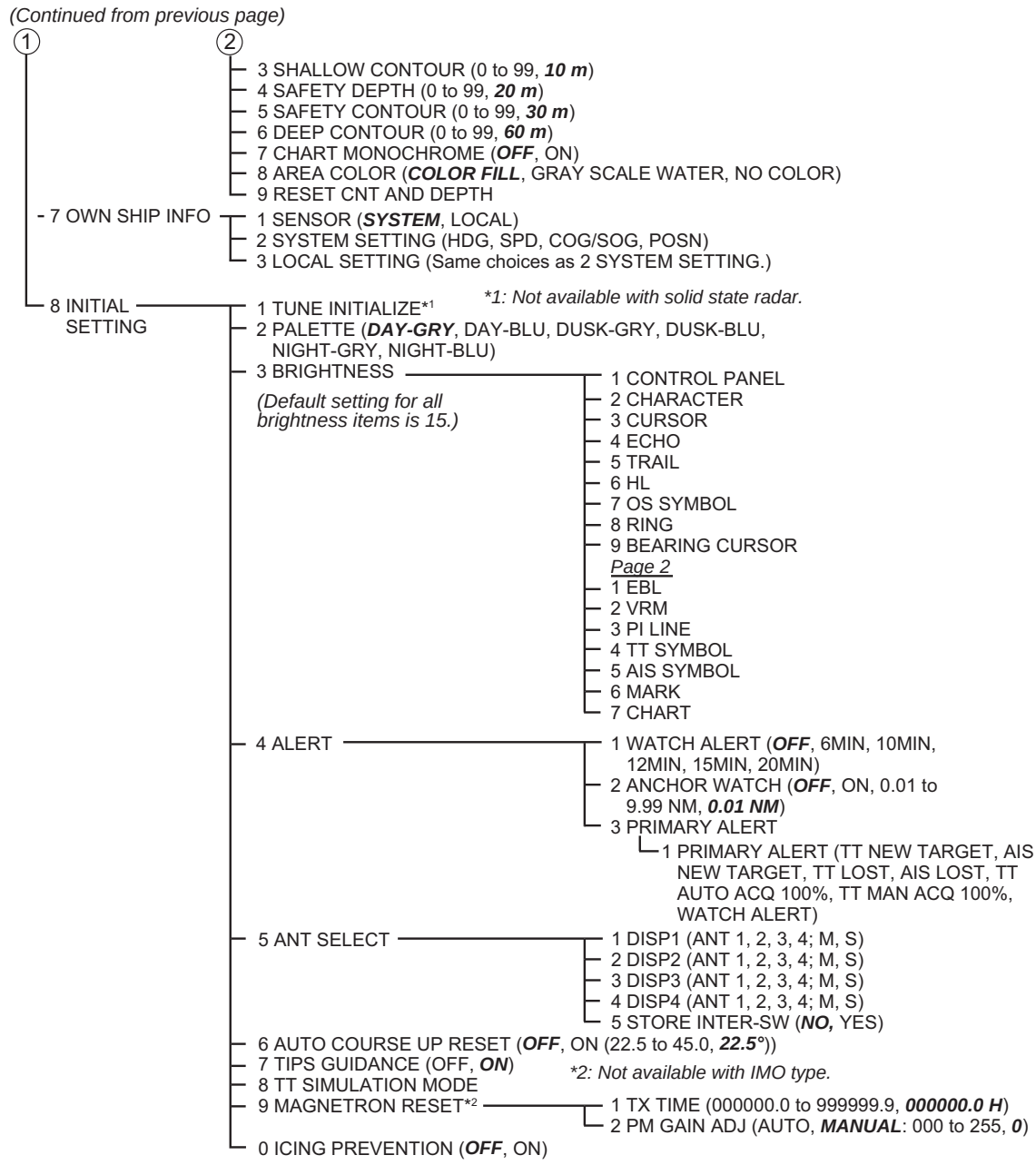
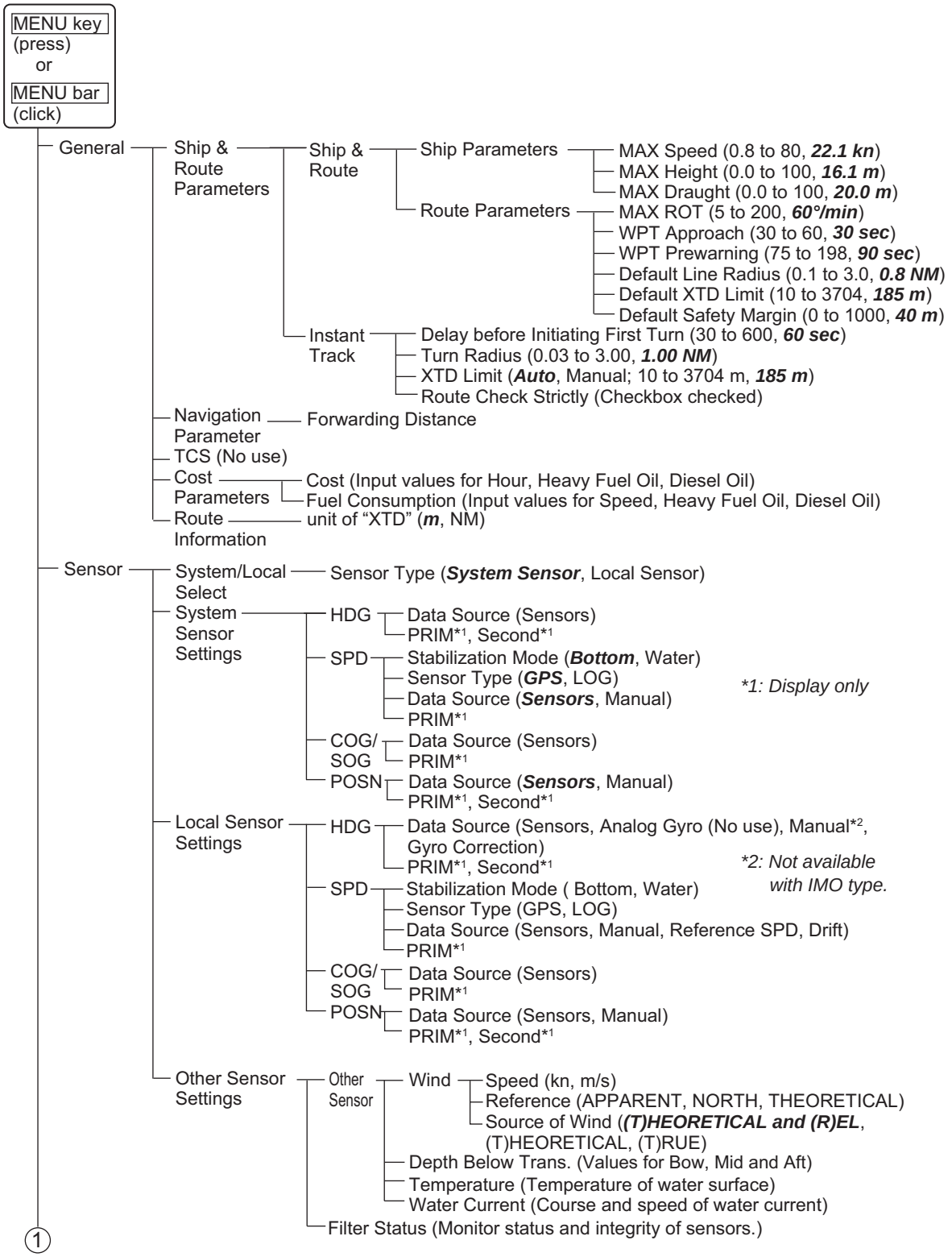

(Continued from previous page)
1
2
3 SHALLOW CONTOUR (0 to 99, 10 m)
4 SAFETY DEPTH (0 to 99, 20 m)
5 SAFETY CONTOUR (0 to 99, 30 m)
6 DEEP CONTOUR (0 to 99, 60 m)
7 CHART MONOCHROME (OFF, ON)
8 AREA COLOR (COLOR FILL, GRAY SCALE WATER, NO COLOR)
9 RESET CNT AND DEPTH
7 OWN SHIP INFO
1 SENSOR (SYSTEM, LOCAL)
2 SYSTEM SETTING (HDG, SPD, COG/SOG, POSN)
3 LOCAL SETTING (Same choices as 2 SYSTEM SETTING.)
*1: Not available with solid state radar.
8 INITIAL SETTING
1 TUNE INITIALIZE*1
2 PALETTE (DAY-GRY, DAY-BLU, DUSK-GRY, DUSK-BLU, NIGHT-GRY, NIGHT-BLU)
3 BRIGHTNESS
(Default setting for all brightness items is 15.)
1 CONTROL PANEL
2 CHARACTER
3 CURSOR
4 ECHO
5 TRAIL
6 HL
7 OS SYMBOL
8 RING
9 BEARING CURSOR
Page 2
1 EBL
2 VRM
3 PI LINE
4 TT SYMBOL
5 AIS SYMBOL
6 MARK
7 CHART
4 ALERT
1 WATCH ALERT (OFF, 6MIN, 10MIN, 12MIN, 15MIN, 20MIN)
2 ANCHOR WATCH (OFF, ON, 0.01 to 9.99 NM, 0.01 NM)
3 PRIMARY ALERT
1 PRIMARY ALERT (TT NEW TARGET, AIS NEW TARGET, TT LOST, AIS LOST, TT AUTO ACQ 100%, TT MAN ACQ 100%, WATCH ALERT)
5 ANT SELECT
1 DISP1 (ANT 1, 2, 3, 4; M, S)
2 DISP2 (ANT 1, 2, 3, 4; M, S)
3 DISP3 (ANT 1, 2, 3, 4; M, S)
4 DISP4 (ANT 1, 2, 3, 4; M, S)
5 STORE INTER-SW (NO, YES)
6 AUTO COURSE UP RESET (OFF, ON (22.5 to 45.0, 22.5°))
7 TIPS GUIDANCE (OFF, ON)
8 TT SIMULATION MODE
9 MAGNETRON RESET*2
*2: Not available with IMO type.
1 TX TIME (000000.0 to 999999.9, 000000.0 H)
2 PM GAIN ADJ (AUTO, MANUAL: 000 to 255, 0)
0 ICING PREVENTION (OFF, ON)

Chart menu



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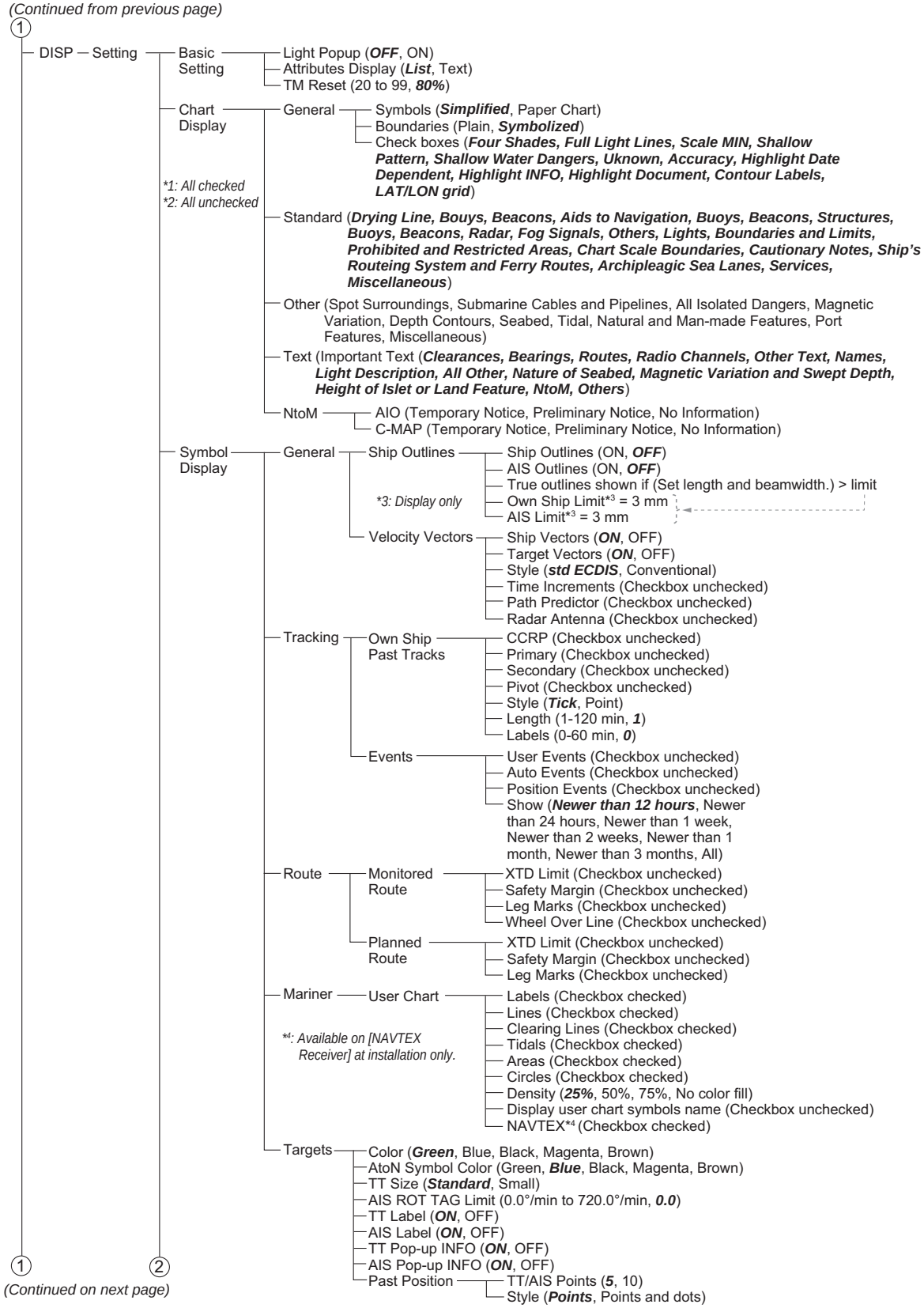

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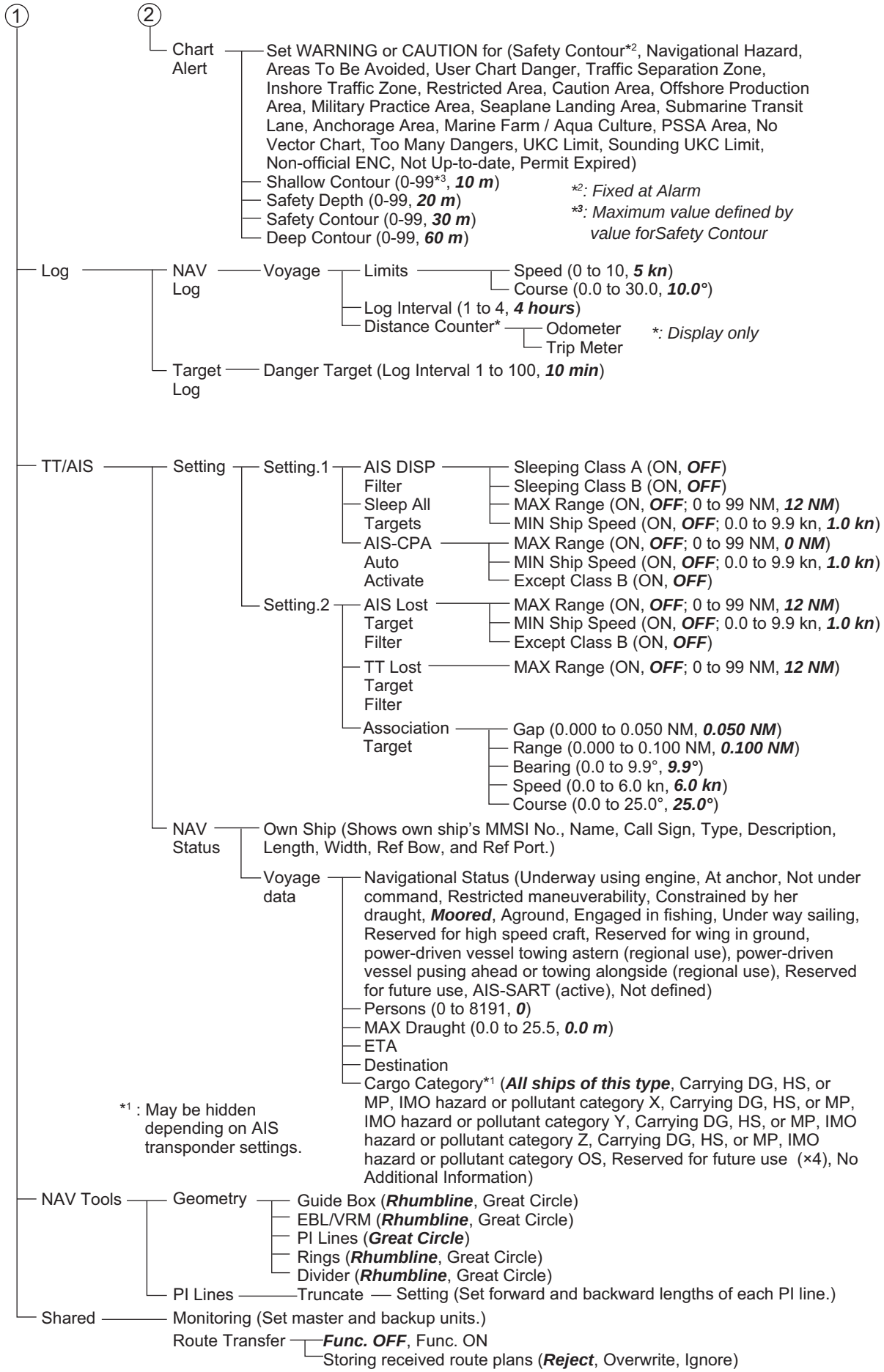
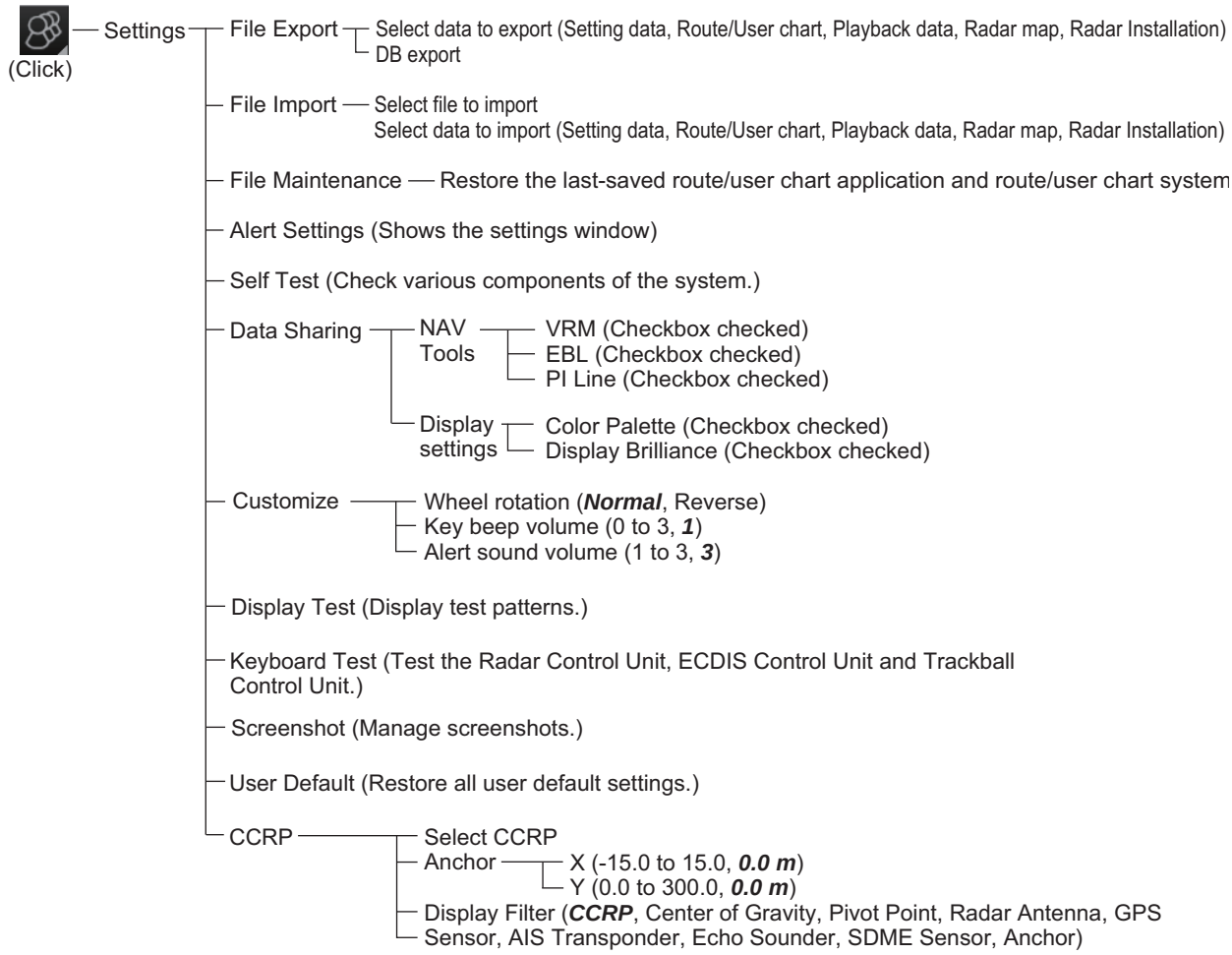


Settings menu



APPENDIX 2 ABBREVIATIONS, 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
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
CORRE	Correlation
CPA	Closest Point of Approach
CPU	Central Processing Unit
CSE	Course
CU/TM	Course-up/True Motion
CYA	CYAN
DATA	Data
Dec	December
DEMO	Demonstration
DISP	Display
DIST	Distance
DR	Dead Reckoning
E	English

Abbreviation	Meaning
E	East
EAV	Echo Average
EBL	Electronic Bearing Line
ENTER	Enter
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	Long (pulse length)
L/L	Latitude/Longitude
LAN	Local Area Network
LIST	List
LL	Latitude, Longitude
LO	Low
MAG	Magnetic or Magenta
MAN	Manual
Mar	March
MARK	Mark
MAX	Maximum
MENU	Menu
MID	Middle
min	minute
MIN	Minimum
MMSI	Maritime Mobile Service Identity
MOB	Man Overboard
MODE	Mode
MON	Monitor
MSG	Message
NAV	Navigation

Abbreviation	Meaning
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
PULSE	Pulse
R	Relative
RAD	Radius
RAIN	Rain
RANGE	Range
REF	Reference
Rel	Relative
RM	Relative Motion
RNG	Range
ROT	Rate of Turn
S	South
s	second
S1 (2)	Short1(2) (pulse length)
SAR	Search And Rescue
SART	Search And Rescue Transponder
SEA	Sea
SEL	Select
Sep	September
SM	Statute Miles
SOG	Speed Over the Ground
SPD	Speed
SPEC	Specification
SSD	Solid State Drive, Solid State Device
S.SRC	Sensor Source
STAB	Stabilization
STBY	Stand-by
STD	Standard
SW	Switch
T	True
TARGET	Target
TB	True Bearing

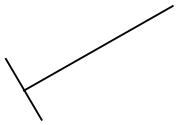
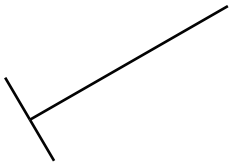
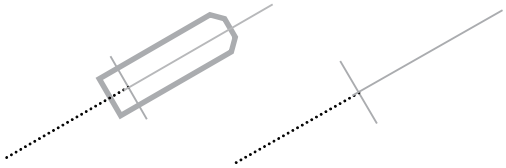
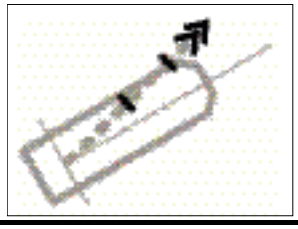
Abbreviation	Meaning
TCPA	Time to Closest Point of Approach
TEMP	Temperature
TGT	Target
TGT, TGTS	Target, Targets
TIME	Time
TM	True Motion
TRAIL	Trail
True-G	True-ground
True-S	True-sea
TT	Tracked Target or Target Tracking
TTD	Tracked Target Data
TTG	Time to go
TTM	Tracked Target Information
TUNE	Tune
TX	Transmit
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

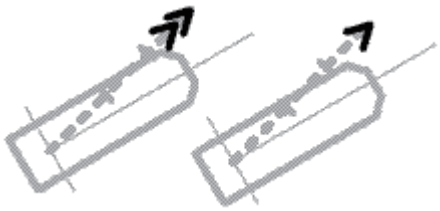
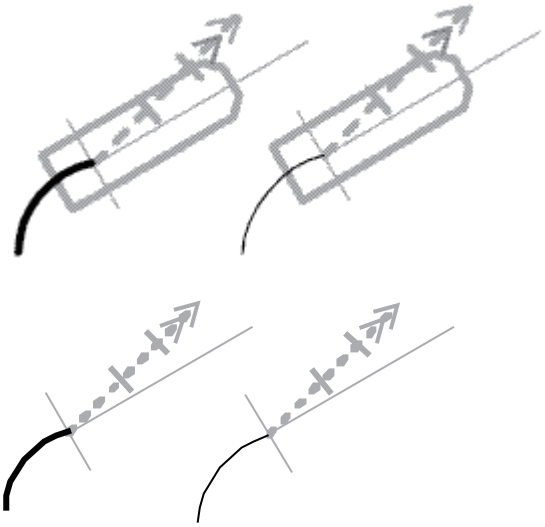
Symbols

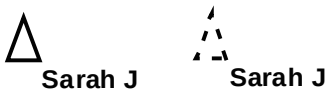
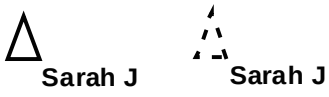
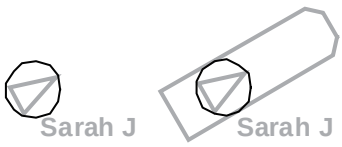
Symbols on Control Unit

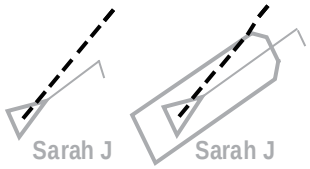
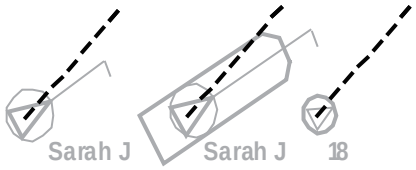
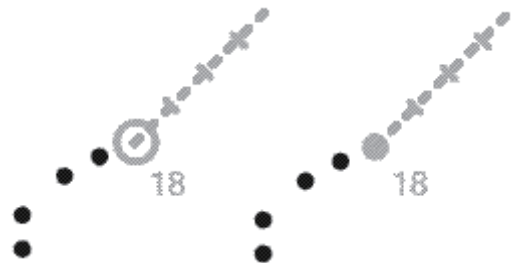
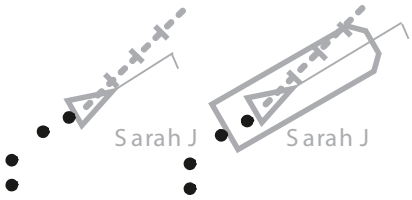
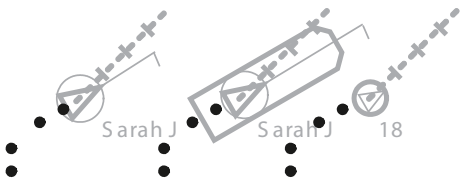
Symbol	Name
	Power switch
	Gain

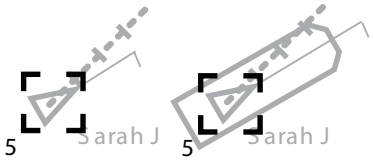
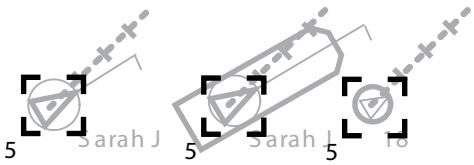
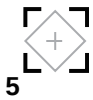
Symbols on display

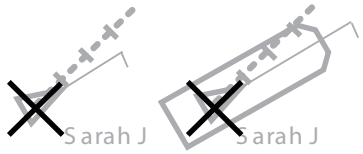
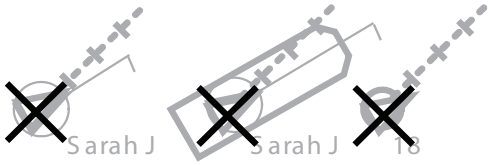
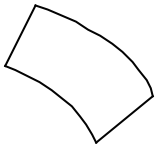
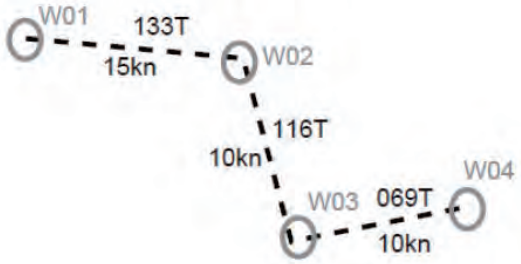
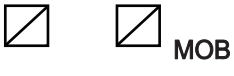
Symbol name and description	Symbol graphic(s)
Own ship - true scaled outline This can be displayed when based on user selection either beam width or length is more than 3 mm.	
Own ship - simplified symbol	
Own ship - minimized symbol	
Radar antenna position This symbol indicates location of the radar 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	

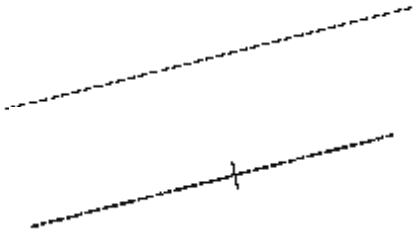
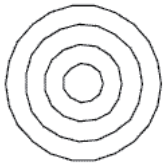
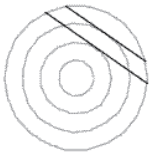
Symbol name and description	Symbol graphic(s)
Velocity vector - stabilization indicator Ground stabilization is indicated by double arrowhead and water stabilization is indicated as single arrowhead.	
Past track System past track is indicated by thick line. Raw sensor primary past track is indicated 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: Std or small user selection by Symbol Display.	R4 18
Sleeping AIS targets Orientation is towards heading (or COG if heading unknown). If both heading and COG are unknown the orientation is toward top of display.	Sleeping AIS target with neither reported heading nor COG

Symbol name and description	Symbol graphic(s)
Activated AIS targets Orientation is towards heading (or COG if heading unknown). If both heading and COG are unknown the orientation is toward top of display.	 Activated AIS target with neither reported heading nor COG 
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	
Activated AIS targets - dangerous targets Dangerous target symbol is red and it flashes until acknowledged.	 Activated AIS target with neither reported heading nor COG 
Activated AIS targets - alternative	Associated targets represented by AIS target symbols  Associated targets represented by radar target symbols
Activated AIS targets - heading lines	

Symbol name and description	Symbol graphic(s)
Activated AIS targets - heading lines - turn indicators	
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)
AIS aid to navigation (ATON) Physical (real) ATON is solid line and virtual ATON is dashed line. An ATON in off position is yellow.	
AIS search and rescue transmitter -SART	
AIS base station	
AIS SAR vessel	
AIS aircraft	
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			
Category	**Symbol**	**Color***	**Name**
Mark		Red	Buoy
		Green	Buoy
		Red	Buoy
		Green	Buoy
		Red	Buoy
		Green	Buoy
		Red	Buoy
		Green	Buoy
		Purple	Danger
		Purple	Danger
		Yellow-Orange	Mark
		Yellow-Orange	Mark
		Yellow-Orange	Mark
Line		Purple	Nav Line
		White	Coast Line
		Gray	Contour Line
		Purple	Prohibited Area
		Purple	Cable (Danger)
		Yellow-Orange	Line Mark
		Yellow-Orange	Line Mark

*Fixed

B-type			
Category	**Symbol**	**Color**	**Name**
Mark		7 colors	Buoy
		7 colors	Buoy
		7 colors	Buoy
		7 colors	Buoy
		7 colors	Danger
		7 colors	Danger
		7 colors	Mark
		7 colors	Mark
		7 colors	Mark
		7 colors	Mark
		7 colors	Mark
		7 colors	Mark
		7 colors	Mark
Line		7 colors	Mark
		7 colors	Mark
		7 colors	Nav Line
		7 colors	Coast Line
		7 colors	Contour Line
		7 colors	Prohibited Area
		7 colors	Cable (Danger)
		7 colors	Line Buoy
		7 colors	Line Mark
		7 colors	Line Mark
		7 colors	Line Mark

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
	Information (show program no., operator's manual)
	Undo, redo **Note:** This symbol is not displayed on a 19-inch monitor unit on radar mode or chart radar mode.
	Screenshot capture
	• Adjust the monitor brilliance • Adjust the control unit backlighting. (chart mode only)
	Color palette selection

APPENDIX 3 DATA COLOR AND MEANING

	Indication color	Sensor color	HDG	L/L	SPD	COG/SOG	Display example
SYSTEM/ LOCAL	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) *1	*All values in green.*
	YEL	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		RMC-A,D, F, P, R and (status: A) *2	*Position in yellow characters.*
	YEL-ORG	WHT		GNS-E,M,S GGA-6,7,8 GLL-E,M,S and (status: A) RMC-E,M,S and (status: A)	VBW (SOG: without either of Field 4 or 5)	VTG-E,M,S RMC-E,M,S and (status: A)	*SPD, COG, SOG and POSN values and pos. source name in yellow-orange.*
	GRN (***.*)	WHT	THS-E, M, S: Invalid HDT: Invalid No sentences	GNS-N: Invalid GGA-0: Invalid GLL-N or (status: V): Invalid RMC-N or (status: V): Invalid No sentences	VBW-V: Invalid VHW: Invalid No sentences	VTG-N: Invalid RMC-N or (status: V): Invalid No sentences	*HDG value shown with asterisks.*
	GRN	YEL (DR)		Internally calculated due to loss of communication with sensor. (Dead Reckoning)			*Position in green characters, DR in yellow characters.*
MANUAL	YEL	WHT (MAN) (DR)	Manual setting value (Type A or B) Correction setting value (Local setting)	Manual setting value (Dead Reckoning)	Manual setting value		*HDG, SPD and POSN values and "MAN"*3 in yellow characters.*

*1: Navigational status in RMC, GNS sentence shown in “S”, “V” only (IEC 61162-1 ed4).
*2: Navigational status in RMC, GNS sentence shown in “C”, “U”, “null” only (IEC 61162-1 ed4).
*3: “CORR1” replaces “MAN” in case of heading offset.

APPENDIX 4 ALERT LIST

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
115	-	115	Loss of System Communication	Warning/ B	Loss of communication between processor unit and external equipment.	Check that the device is securely connected.
150	-	150	Early Course Change	Warning/ A	Waypoint is soon being approached. Ship's position is less than set time of prewarning from WOL. Default: 90 seconds	Be careful that WPT is approaching.
170	-	170	Positioning System Failure	Warning/ B	All position data has been lost for more than 30 seconds.	Check the connection with all GPS.
171	-	171	Crossing Safety Contour	Alarm/A	When a check area is set, the vessel entered a shallower area than the threshold set in [Safety Contour].	Reconfirm Safety Contour setting or change the course.
172	-	172	Off Track Alarm	Alarm/A	Deviation is big between planning course and current heading. While monitoring route, ship position deviates XTD Limit.	Reconfirm XTD Limit or keep own ship inside of channel limit.
173	1	620	User Chart Danger Area	Warning/ A	A User Chart Danger Area that is set to Warning/Caution in chart alert is detected inside the check area.	Be careful of the object mentioned left, on ship's direction.
173	2	621	Traffic Separation Zone		A Traffic Separation Zone that is set to Warning/Caution in chart alert is detected inside the check area.	
173	3	622	Inshore Traffic Zone		An Inshore Traffic Zone that is set to Warning/Caution in chart alert is detected inside the check area.	
173	4	623	Restricted Area		A Restricted Area that is set to Warning/Caution in chart alert is detected inside the check area.	

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
173	5	624	Caution Area	Warning/ A	A Caution Area that is set to Warning/ Caution in chart alert is detected inside the check area.	Be careful of the object mentioned left, on ship's direction.
173	6	625	Offshore Production Area		An Offshore Production Area that is set to Warning/Caution in chart alert is detected inside the check area.	
173	7	626	Military Practice Area		A Military Protection Area that is set to Warning/Caution in chart alert is detected inside the check area.	
173	8	627	Seaplane Landing Area		A Seaplane Landing Area that is set to Warning/Caution in chart alert is detected inside the check area.	
173	9	628	Submarine Transit Lane		A Submarine Transit Lane that is set to Warning/Caution in chart alert is detected inside the check area.	
173	10	629	Anchorage Area		An Anchorage Area that is set to Warning/Caution in chart alert is detected inside the check area.	
173	11	630	Marine Farm/ Aquaculture		A Marine Farm/ Aquaculture that is set to Warning/Caution in chart alert is detected inside the check area.	
173	12	631	PSSA Area		A PSSA Area that is set to Warning/Caution in chart alert is detected inside the check area.	
173	13	632	Areas to be Avoided		An Areas to be Avoided that is set to Alarm in chart alert is detected inside the check area.	
173	14	633	Buoy		A Buoy is that set to Alarm in chart alert is detected inside the check area.	

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
174	-	174	WPT Approach	Warning/ A	If this radar is connected in the network to an FMD-3200/3300 ECDIS that is interfaced with an IEC 62065 Ed.2 compliant TCS (YOKOGAWA PT-900, Tokyo Keiki PR-9000, EMRI FAP-3000), this alert is generated at each waypoint if the TCS is not connected to the ECDIS in route monitoring.	Check ECDIS and network connections.
175	1	455	EPFS1 Invalid/ missing datum	Warning/ B	Ship position data from No.1 GPS has been discontinued for more than set time.(Set at installation) Default: 60 seconds No.1 GPS is turned off, or there is a problem with network.	Check the connection with No.1 GPS and network.
175	2	456	EPFS2 Invalid/ missing datum	Warning/ B	Ship position data from No.2 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 GPS is turned off, or there is a problem with network.	Check the connection with No.2 GPS and network.
175	3	457	EPFS3 Invalid/ missing datum	Warning/ B	Ship position data from No.3 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 GPS is turned off, or there is a problem with network.	Check the connection with No.3 GPS and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
175	4	458	EPFS4 Invalid/ missing datum	Warning/ B	Ship position data from No.4 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.4 GPS is turned off, or there is a problem with network.	Check the connection with No.4 GPS and network.
175	5	459	EPFS5 Invalid/ missing datum	Warning/ B	Ship position data from No.5 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.5 GPS is turned off, or there is a problem with network.	Check the connection with No.5 GPS and network.
175	6	460	EPFS6 Invalid/ missing datum	Warning/ B	Ship position data from No.6 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.6 GPS is turned off, or there is a problem with network.	Check the connection with No.6 GPS and network.
175	7	461	EPFS7 Invalid/ missing datum	Warning/ B	Ship position data from No.7 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.7 GPS is turned off, or there is a problem with network.	Check the connection with No.7 GPS and network.
175	8	462	EPFS8 Invalid/ missing datum	Warning/ B	Ship position data from No.8 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.8 GPS is turned off, or there is a problem with network.	Check the connection with No.8 GPS and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
175	9	463	EPFS9 Invalid/ missing datum	Warning/ B	Ship position data from No.9 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.9 GPS is turned off, or there is a problem with network.	Check the connection with No.9 GPS and network.
175	10	464	EPFS10 Invalid/ missing datum	Warning/ B	Ship position data from No.10 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.10 GPS is turned off, or there is a problem with network.	Check the connection with No.10 GPS and network.
190	1	531	AIS Target Display 100%	Warning/ A	100% of maximum number of target which can be displayed is used.	The number of AIS target became 100% of that can be displayed. Change the display number using filter function.
190	2	533	AIS Target Capacity 100%		100% of memory capacity for AIS targets is filled.	Memory for AIS targets is filled 100%. Cancel unnecessary targets.
190	3	535	AIS Target Activate 100%		100% of capacity for active AIS is used.	The number of active AIS target became 100% of its limit. Change the unnecessary targets to sleep mode.
190	4	523	TT Auto ACQ 100%		100% of capacity for automatically acquired TT is used.	The number of acquired TT target became 100% of its limit. Stop tracking unnecessary TT targets.
190	5	525	TT MAN ACQ 100%		100% of capacity for manually acquired TT is used.	
191	1	526	TT CPA/TCPA	Alarm/A	The system has detected a dangerous TT or AIS target.	Check the target details, avoid collision.
191	2	536	AIS CPA/TCPA			
192	1	521	TT New Target	Warning/ A	The system detected a new TT or AIS target.	Check the target details and take appropriate action.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
192	2	529	AIS New Target	Warning/ A	The system detected a new TT or AIS target.	Check the target details and take appropriate action.
193	1	527	TT Lost	Warning/ A	The system lost a TT, AIS or reference target.	Confirm that the target is lost, then acknowledge the alert. If the target was used as a speed reference, acquire a new reference target.
193	2	528	REF Target Lost			
193	3	537	AIS Lost			
194	1	720	No ANT Heading Signal	Warning/ B	There is a problem with the heading signal from the radar antenna.	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.
194	2	721	No ANT Azimuth Signal		There is a problem with the azimuth signal from the radar antenna.	
194	3	722	No ANT Trigger Signal		There is a problem with the trigger signal from the radar antenna.	
194	4	723	No ANT Video Signal		There is a problem with the video signal from the radar antenna.	
194	5	724	No RPU Gyro Signal		There is a problem with the gyro signal from the radar antenna.	
194	6	725	No ANT Echo Signal		There is a problem with the echo signal from the radar antenna.	
194	8	727	Radar Sensor COM Error		There is a problem communicating with the SPU board in the radar antenna.	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.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
194	9	770	SPU Error	Warning/ B	There is a problem with the SPU board in the radar antenna.	For detailed information, conduct a [Self Test].
194	10	771	MTR-DRV Error	Warning/ B	There is a problem communicating with the MTR-DRV board in the radar antenna.	For detailed information, conduct a [Self Test].
194	11	772	PM Error		There is a problem communicating with the PM board in the radar antenna.	For detailed information, conduct a [Self Test].
194	12	773	RF-Converter Error		There is a problem with the RF-Converter board in the radar antenna.	
194	13	774	PSU-Control Error		There is a problem with the PSU-Control board in the radar antenna.	
194	14	781	MTR-DRV COM Error		There is a problem communicating with the SPU board in the radar antenna.	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.
194	15	782	PM COM Error		There is a problem communicating with the MTR-DRV board in the radar antenna.	
194	16	783	RF-Converter COM Error		There is a problem communicating with the RF-Converter board in the radar antenna.	
194	17	775	HPA Error		There is a problem with the HPA board in the radar antenna.	For detailed information, conduct a [Self Test].

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
260	-	260	Emergency Call	Alarm/A	When not acknowledging alerts related to WPT approach or track control stop alert during track control, alert is forwarded to BNWAS by this signal on 30 seconds after passing WOL. This is not shown.	Acknowledge 152 Wheel Over Line alert or 153 Track Control Stop.
10001	1	001	Main Monitor Fan1 Rotation Speed Lowering	Caution/B	For MU-190/231: Connected to COM1(Main Monitor). Fan1 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10001	2	002	Main Monitor Fan2 Rotation Speed Lowering		For MU-231: Connected to COM1(Main Monitor). Fan2 rotation speed is below threshold.	
10001	3	003	Main Monitor Fan3 Rotation Speed Lowering		For MU-231: Connected to COM1(Main Monitor). Fan3 rotation speed is below threshold.	
10001	4	004	Main Monitor Fan4 Rotation Speed Lowering		For MU-190: Connected to COM1(Main Monitor). Fan4 rotation speed is below threshold.	
10001	5	014	Sub Monitor Fan1 Rotation Speed Lowering		For MU-190/231: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold.	
10001	6	015	Sub Monitor Fan2 Rotation Speed Lowering		For MU-231: Connected to COM2 (Sub Monitor). Fan2 rotation speed is below threshold.	
10001	7	016	Sub Monitor Fan3 Rotation Speed Lowering		For MU-231: Connected to COM2 (Sub Monitor). Fan3 rotation speed is below threshold.	

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10001	8	017	Sub Monitor Fan4 Rotation Speed Lowering		For MU-190: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold.	
10001	9	011	Main Monitor RS485 Communication Timeout	Caution/B	For MU-190/231: 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.)	Check the connection of brightness control cable.
10001	10	024	Sub Monitor RS485 Communication Timeout		For MU-190/231: Connected to COM2. There has been no communication from processor unit through RS485 for 180 seconds. (No communication implies incomplete sentence or checksum error.)	Check the connection of brightness control cable.
10001	11	012	Main Monitor No Signal		For MU-190/231: Connected to COM1. There has been no signal continuously for 60 seconds.	Check the connection of video cable.
10001	12	025	Sub Monitor No Signal		For MU-190/231: Connected to COM2. There has been no signal continuously for 60 seconds.	Check the connection of video cable.
10001	13	013	Main Monitor Sentence Syntax Error		For Main monitor, connected to COM1, value of externally input sentence is out of range that defined by sentence.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10001	14	026	Sub Monitor Sentence Syntax Error		For Sub monitor, connected to COM2, value of externally input sentence is out of range defined by sentence.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10001	15	027	Main Monitor COM Timeout		Communication with MU is interrupted. 60 seconds timeout.	Check the connection with the monitor.
10001	16	028	Sub Monitor COM Timeout	Caution/B	Communication with MU is interrupted. 60 seconds timeout.	Check the connection with the monitor.
10001	17	073	Processor Unit CPU Temp High		CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	18	074	Processor Unit GPU Temp High		GPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	19	075	Processor Unit CPU Board Temp High		CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	20	076	Processor Unit Remote 1 Temp High		CPU temperature in this processor remote control unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	21	077	Processor Unit Remote 2 Temp High		CPU temperature in processor2 remote control unit 1 exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	22	078	Processor Unit CPU Fan Rotation Speed Lowering		Rotation speed of CPU fan in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10001	23	079	Processor Unit Fan1 Rotation Speed Lowering		Rotation speed of fan1 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10001	24	080	Processor Unit Fan2 Rotation Speed Lowering		Rotation speed of fan2 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10001	25	081	Processor Unit Fan3 Rotation Speed Lowering		Rotation speed of fan3 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10001	26	089	Processor Unit CPU board Battery Power Error	Caution/B	CPU board battery voltage in processor unit is out of threshold.	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 core voltage in processor unit is out of threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
10001	28	070	RCU 1 COM Timeout		Communication error with this remote control unit is detected. 40 seconds timeout.	Check the connection with this remote control unit.
10001	29	071	RCU 2 COM Timeout		Communication error with No.2 remote control unit is detected. 40 seconds timeout.	Check the connection with No.2 remote control unit.
10001	30	072	RCU 3 COM Timeout		Communication error with No.3 remote control unit is detected. 40 seconds timeout.	Check the connection with No.3 remote control unit.
10001	31	400	Network Printer Not Available		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.	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.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10001	32	401	Local Printer Not Available		When executing printout, local printer is not recognized, local printer connection is interrupted, or printer error such as paper shortage, paper jam and run out of ink occurs.	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.
10002	1	005	Main Monitor LCD Unit Lifetime Over	Warning/ B	For MU-190: Connected to COM1. LCD unit operating time exceeds 50000 hours. For MU-231: Connected to COM1. LCD unit operating time exceeds 50000 hours.	LCD unit replacement is required. Contact FURUNO.
10002	2	018	Sub Monitor LCD Unit Lifetime Over		For MU-190: Connected to COM2 LCD unit operating time exceeds 50000 hours. For MU-231: Connected to COM2 LCD unit operating time exceeds 50000 hours.	LCD unit replacement is required. Contact FURUNO.
10002	3	006	Main Monitor High Temperature Inside Monitor		Internal temperature exceeds threshold. Monitor: Connected to COM1 (Main Monitor).	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10002	4	019	Sub Monitor High Temperature Inside Monitor		Internal temperature exceeds threshold. Monitor: Connected to COM2 (Sub Monitor).	
10002	5	007	Main Monitor Fan1 No Rotation		For MU-190/231: Connected to COM1 (Main Monitor). Fan1 rotation speed is below threshold.	
10002	6	008	Main Monitor Fan2 No Rotation		For MU-190/231: Connected to COM1 (Main Monitor). Fan2 rotation speed is below threshold.	

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10002	7	009	Main Monitor Fan3 No Rotation		For MU-231: Connected to COM1 (Main Monitor). Fan3 rotation speed is below threshold.	
10002	8	010	Main Monitor Fan4 No Rotation	Warning/ B	For MU-190: Connected to COM1 (Main Monitor). Fan4 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10002	9	020	Sub Monitor Fan1 No Rotation		For MU-190/231: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold.	
10002	10	021	Sub Monitor Fan2 No Rotation		For MU-190/231: Connected to COM2 (Sub Monitor). Fan2 rotation speed is below threshold.	
10002	11	022	Sub Monitor Fan3 No Rotation		For MU-231: Connected to COM2 (Sub Monitor). Fan3 rotation speed is below threshold.	
10002	12	023	Sub Monitor Fan4 No Rotation		For MU-190: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold.	
10002	13	082	Processor Unit CPU Fan No Rotation		Rotation speed of fan in processor unit is below threshold.	
10002	14	083	Processor Unit Fan1 Fan No Rotation		Rotation speed of fan1 in processor unit is below threshold.	
10002	15	084	Processor Unit Fan2 Fan No Rotation		Rotation speed of fan2 in processor unit is below threshold.	
10002	16	085	Processor Unit Fan3 Fan No Rotation		Rotation speed of fan3 in processor unit is below threshold.	
10002	17	086	Processor Unit CPU board 5V Power Error		5 V power voltage of CPU board in processor unit is out of threshold.	

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10002	18	087	Processor Unit CPU board 3.3V Power Error		3.3 V power voltage of CPU board in processor unit is out of threshold.	
10002	19	088	Processor Unit CPU board 12V Power Error	Warning/ B	12 V power voltage of CPU board in processor unit is out of threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10050	1	320	Processor Unit Ch.01 COM Timeout	Caution/B	Input from EC-3000 serial ch.1 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.1.
10050	2	321	Processor Unit Ch.02 COM Timeout		Input from EC-3000 serial ch.2 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.2.
10050	3	322	Processor Unit Ch.03 COM Timeout		Input from EC-3000 serial ch.3 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.3.
10050	4	323	Processor Unit Ch.04 COM Timeout		Input from EC-3000 serial ch.4 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.4.
10050	5	324	Processor Unit Ch.05 COM Timeout		Input from EC-3000 serial ch.5 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.5.
10050	6	325	Processor Unit Ch.06 COM Timeout		Input from EC-3000 serial ch.6 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.6.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10050	7	326	Processor Unit Ch.07 COM Time-out	Caution/B	Input from EC-3000 serial ch.7 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.7.
10050	8	327	Processor Unit Ch.08 COM Time-out		Input from EC-3000 serial ch.8 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.8.
10173	1	634	UKC Limit	Warning/ A	Measured depth from echo sounder is less than set UKC limit value.	Be careful that measured depth is less than UKC limit.
10173	2	635	Non-official ENC		When Non-official ENC is set to Warning/Caution in chart alert, the non-official chart area is detected inside the check area.	Be careful of the object mentioned left, on ship's direction.
10173	3	636	No Vector Chart		When No Vector Chart is set to Warning/Caution in chart alert, the No Vector Chart area is detected inside the check area.	Be careful of the object mentioned left, on ship's direction.
10173	4	637	Not Up-to-date		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.	Be careful of the object mentioned left, on ship's direction.
10173	5	638	Permit Expired		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.	Be careful of the object mentioned left, on ship's direction.
10190	1	530	AIS Target Display 95%	Caution/B	95% of maximum number of target which can be displayed is used.	The number of AIS target became 95% of that can be displayed. Change the display number using filter function.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10190	3	534	AIS Target Activate 95%	Caution/B	95% of capacity for active AIS is used.	The number of active AIS target became 95% of its limit. Change the unnecessary targets to sleep mode.
10190	4	522	TT Auto ACQ 95%		Appears when capacity for automatically tracked targets is full.	Remove TT symbol manually because the capacity for TT is 95%.
10190	5	524	TT MAN ACQ 95%		Appears when capacity for manually tracked targets is full.	Remove TT symbol manually because the capacity for TT is 95%.
10300	1	030	Sensor Adapter 1 COM Timeout	Caution/B	Communication error with this sensor adapter is detected. 30 seconds timeout. This sensor adapter is turned off, or there is a problem with network.	Check the connection with this sensor adapter and network.
10300	2	031	Sensor Adapter 2 COM Timeout		Communication error with No.2 sensor adapter is detected. 30 seconds timeout. No.2 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.2 sensor adapter and network.
10300	3	032	Sensor Adapter 3 COM Timeout		Communication error with No.3 sensor adapter is detected. 30 seconds timeout. No.3 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.3 sensor adapter and network.
10300	4	033	Sensor Adapter 4 COM Timeout		Communication error with No.4 sensor adapter is detected. 30 seconds timeout. No.4 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.4 sensor adapter and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10300	5	034	Sensor Adapter 5 COM Timeout	Caution/B	Communication error with No.5 sensor adapter is detected. 30 seconds timeout. No.5 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.5 sensor adapter and network.
10300	6	035	Sensor Adapter 6 COM Timeout		Communication error with No.6 sensor adapter is detected. 30 seconds timeout. No.6 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.6 sensor adapter and network.
10300	7	036	Sensor Adapter 7 COM Timeout		Communication error with No.7 sensor adapter is detected. 30 seconds timeout. No.7 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.7 sensor adapter and network.
10300	8	037	Sensor Adapter 8 COM Timeout		Communication error with No.8 sensor adapter is detected. 30 seconds timeout. No.8 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.8 sensor adapter and network.
10300	9	038	Sensor Adapter 9 COM Timeout		Communication error with No.9 sensor adapter is detected. 30 seconds timeout. No.9 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.9 sensor adapter and network.
10300	10	039	Sensor Adapter 10 COM Timeout		Communication error with No.10 sensor adapter is detected. 30 seconds timeout. No.10 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.10 sensor adapter and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10300	11	094	Sensor Adapter 11 COM Timeout	Caution/B	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.	Check the connection with No.11 sensor adapter and network.
10300	12	095	Sensor Adapter 12 COM Timeout		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.	Check the connection with No.12 sensor adapter and network.
10300	13	096	Sensor Adapter 13 COM Timeout		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.	Check the connection with No.13 sensor adapter and network.
10300	14	097	Sensor Adapter 14 COM Timeout		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.	Check the connection with No.14 sensor adapter and network.
10300	15	098	Sensor Adapter 15 COM Timeout		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.	Check the connection with No.15 sensor adapter and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10300	16	099	Sensor Adapter 16 COM Timeout	Caution/B	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.	Check the connection with No.16 sensor adapter and network.
10310	-	510	IAS COM Timeout	Warning/ B	Connection to the IAS (MODBUS) is lost or interrupted.	Check connection.
10331	-	331	Selected Gyro status missing	Warning/ B	When connected with Double Gyro System, instrument produced by Yokogawa Electric, "Double Gyro" status cannot be acquired.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10380	131	380	AIS COM Error	Warning/ B	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.	Check the connection with AIS and network.
10400	1	255	Gyro 1 COM Error	Caution/B	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.	Check the connection with this gyro and network.
10400	2	256	Gyro 2 COM Error			
10400	3	257	Gyro 3 COM Error			
10400	4	258	Gyro 4 COM Error			
10400	5	259	Gyro 5 COM Error			
10400	11	391	ROT Gyro 1 COM Error		Data from this ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds	Check the connection with this ROT gyro.
10400	12	392	ROT Gyro 2 COM Error			
10400	13	393	ROT Gyro 3 COM Error			

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10400	21	290	EPFS 1 COM Error	Caution/B	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.	Check the connection with this GPS and network.
10400	22	291	EPFS 2 COM Error		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.	Check the connection with this GPS and network.
10400	23	292	EPFS 3 COM Error			
10400	24	293	EPFS 4 COM Error			
10400	25	294	EPFS 5 COM Error			
10400	26	295	EPFS 6 COM Error			
10400	27	296	EPFS 7 COM Error			
10400	28	297	EPFS 8 COM Error			
10400	29	298	EPFS 9 COM Error			
10400	30	299	EPFS 10 COM Error			
10400	41	280	SDME 1 COM Error		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.	Check the connection with this SDME sensor and network.
10400	42	281	SDME 2 COM Error			
10400	43	282	SDME 3 COM Error			
10400	51	235	Echo Sounder 1 COM Error		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.	Check the connection with this echo sounder and network.
10400	52	236	Echo Sounder 2 COM Error			
10400	53	237	Echo Sounder 3 COM Error			

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10400	61	300	Rudder 1 COM Error	Caution/B	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.	Check the connection with this rudder sensor and network.
10400	62	301	Rudder 2 COM Error			
10400	63	302	Rudder 3 COM Error			
10400	71	303	HCS 1 COM Error		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.	Check the connection with this HCS and network.
10400	72	304	HCS 2 COM Error		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.	Check the connection with this HCS and network.
10400	81	305	VDR COM Error		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.	Check the connection with VDR and network.
10400	91	306	BNWAS COM Error		Caution Sentence from BNWAS 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.	Check the connection with BNWAS and network.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10400	101	360	Wind Sensor 1 COM Error	Caution/B	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.	Check the connection with this wind sensor.
10400	102	361	Wind Sensor 2 COM Error			
10400	103	362	Wind Sensor 3 COM Error			
10400	111	370	Water Current COM Error		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.	Check the connection with water current and network.
10400	121	371	Water Temp COM Error		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.	Check the connection with water temp and network.
10400	141	390	NAVTEX COM Error		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	Check the connection with NAVTEX and network.
10431	-	431	HUB-3000 LinkUP Error	Warning/ B	A network error has occurred between the HUB-3000 and one or more connected units.	Check network connections between the EC-3000 and networked units.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10450	-	330	Double Gyro Status Conflict	Warning/ B	When connected with Double Gyro System, instrument produced by Yokogawa Electric, two gyro has been displayed "Selected" status for 3 seconds.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10499	-	500	Watch Alert	Warning/ B	Watch alert interval reached.	ACK the alert, check the radar display.
10500	1	851	EPFS 1 Sensor Banned	Caution/B	Own ship position data from this GPS is determined abnormal by integrity check.	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.
10500	2	852	EPFS 2 Sensor Banned	Caution/B		
10500	3	853	EPFS 3 Sensor Banned			
10500	4	854	EPFS 4 Sensor Banned			
10500	5	855	EPFS 5 Sensor Banned			
10500	6	856	EPFS 6 Sensor Banned			
10500	7	857	EPFS 7 Sensor Banned			
10500	8	858	EPFS 8 Sensor Banned			
10500	9	859	EPFS 9 Sensor Banned			
10500	10	860	EPFS 10 Sensor Banned			
10500	11	871	Gyro 1 Sensor Banned	Caution/B	Heading data from this Gyro is determined abnormal by integrity check.	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.
10500	12	872	Gyro 2 Sensor Banned			
10500	13	873	Gyro 3 Sensor Banned			
10500	14	874	Gyro 4 Sensor Banned			
10500	15	875	Gyro 5 Sensor Banned			

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10500	21	861	SDME 1 Sensor Banned	Caution/B	Own ship speed data from this SDME is determined abnormal by integrity check.	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.
10500	22	862	SDME 2 Sensor Banned			
10500	23	863	SDME 3 Sensor Banned			
10500	31	881	ROT Gyro 1 Sensor Banned	Caution/B	Heading data from this ROT Gyro is determined abnormal by integrity check.	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.
10500	32	882	ROT Gyro 2 Sensor Banned			
10500	33	883	ROT Gyro 3 Sensor Banned			
10510	1	900	No Filter Source of Position	Warning/ B	No valid position sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
10510	2	901	No Filter Source of COG/SOG		No valid COG/SOG sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
10510	3	902	No Filter Source of CTW/STW		No valid CTW/STW sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
10510	4	903	No Filter Source of Heading	Warning/ B	No valid heading sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
10510	5	904	No Filter Source of ROT		No valid position sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
10520	-	689	Drift comp error	Warning/ B	An excessively high drift is detected.	-
10540	1	539	AIS Message Received	Caution/B	AIS message is received.	-
10540	2	541	AIS Message Transmit Error		AIS message transmission failed.	Check the connection with AIS.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10540	3	542	AIS Transmitting	Caution/B	AIS transponder is transmitting.	-
10560	-	560	Association	Caution/B	TT and AIS target pair meet the conditions of association.	Check the association target.
10601	1	272	UTC Time Not Available	Caution/B	Time data of all available GPS sensor has been not available for more than 3 seconds.	Check the connection with all GPS.
10601	2	277	Wind Speed/Direction Not Available		Wind speed/direction data of all available WIND sensors has been not available for more than 3 seconds.	Check the connection with all wind sensors.
10601	3	279	COG/SOG Not Available		COG/SOG data of all available GPS sensor has been not available for more than 3 seconds.	Check the connection with all GPS.
10601	4	284	SOG Not Available		There is no SOG sensor data or the SOG sentence is invalid.	Check that the sensor is powered.
10601	5	450	Heading Sensor Not Available		Heading data of all available gyro has been not available for more than 2 seconds.	Check the connection with all gyro.
10601	6	453	SDME Sensor Not Available		Speed data from all available SDME has been not available for more than 3 seconds.	Check the connection with all SDME.
10602	1	472	Position Source Change	Caution/B	Position sensor used in system (distributed by own ship's information management) is changed.	-
10602	2	473	Heading Source Change		Heading sensor used in system (distributed by own ship's information management) is changed.	-
10602	3	474	COG/SOG Source Change		COG/SOG sensor used in system (distributed by own ship's information management) is changed.	-

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10602	4	475	CTW/STW Source Change	Caution/B	CTW/STW sensor used in system (distributed by own ship's information management) is changed.	-
10602	5	470	Datum Change		Current datum of EPSF is changed. Acquisition timing: Once in 60 seconds or when position sensor is changed.	Check the operator's manual of GPS.
10603	1	273	Depth(Bow) Not Available	Caution/B	Depth data of all available depth sensor(Bow) has been not available for more than 3 seconds.	Check the connection with all echo sounders.
10603	2	274	Depth(Mid) Not Available		Depth data of all available depth sensor(Midship) has been not available for more than 3 seconds.	
10603	3	275	Depth(Stern) Not Available		Depth data of all available depth sensor(Stern) has been not available for more than 3 seconds.	
10603	4	278	STW Not Available		STW data of all available SDME sensors has been not available for more than 3 seconds.	Check the connection with all SDME.
10603	5	285	Heading Magnetic Not Available		Heading data of all available magnetic gyro has been not available for more than 3 seconds.	Check the connection with all magnetic gyro.
10718	-	728	Radar Sensor SW Version Error	Warning/ B	Software version not correct.	Update the radar software. If the problem persists, consult your dealer.
10740	1	730	EXT Radar STBY	Warning/ B	The antenna unit selected with the Interswitch is in stand-by	Set the antenna unit to transmit state.
10740	2	740	EXT Radar No Signal		No video signal from the antenna unit selected with the Interswitch.	Check the antenna unit.

ALF		ALR	Alert name	Priority/ Category	Meaning	Remedy
No.	Inst.*	No.				
10740	3	750	EXT Radar COM Error	Warning/ B	No communication from the antenna unit selected with the Interswitch.	Check that both the antenna unit and the processor unit are powered. Also check the wiring between the antenna unit and the processor unit.
10760	-	760	Datum Mismatch	Caution/B	Datum mismatch between EPFS and chart.	Match the datum.
10800	1	691	RM Stop - Exceed Max XTD	Alarm/A	Route monitoring is stopped because distance from route is more than set value of Max XTE.	Start route monitoring after approaching the monitoring route.
10800	2	692	RM Stop - Sensor lost		Error occurs inside of route monitoring function.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
10800	3	693	RM Stop - Internal Error	Alarm/A	Required data for route monitoring such as position, SOG/COG cannot be acquired.	Check the connection with GYRO, GPS and SDME.
10801	-	485	Depth Limit	Alarm/A	Seabed has been less than set depth for more than 3 seconds.	Be careful of risk of grounding.
10802	-	495	Anchor Watch	Warning/ A	While anchor watch alert function is enabled, ship's position has been outside of alarm area centering certain position for more than 3 seconds.	Be careful of dragging anchor.
10803	-	640	Chartalign: Over 30 min	Caution/B	Own ship position has been offset for more than 30 minutes.	Reset offset.
10807	-	820	NAVTEX Message Received	Caution/B	NAVTEX message is received.	-
10850	-	652	End of track	Warning/ A	Ship will reach last waypoint in 30 seconds.	Be careful that last waypoint is approaching.
10999	-	999	Alert setting file read error	Warning/ B	-	-

*: “Inst.” denotes the instance number, where applicable, for the alert.

APPENDIX 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.

SPECIFICATIONS OF SURVEILLANCE RADAR
FAR-3220Z

1 TRANSCEIVER UNIT

1.1 Tx frequency and modulation

X-band (solid state) CH1: 9403.75 MHz (P0N)/ 9423.75 MHz ±15 MHz (Q0N),
CH2: 9413.75 MHz (P0N)/ 9433.75 MHz ±15 MHz (Q0N) or
CH3: 9423.75 MHz (P0N)/ 9443.75 MHz ±15 MHz (Q0N)

1.2 Output power 200 W

1.3 Pulse Repetition Rate and Range scale

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*1	S1																	
2000*2			S2															
1500				M1														
1060						M2												
1000								M3										
600										L								

*1: 1800 Hz (S1) with TT range on 32 NM.

*2: 1500 Hz (S2) with TT range on 32 NM.

2 PROCESSOR UNIT

2.1 Minimum range 35 m

2.2 Range discrimination 25 m (Less than 5 NM), 75 m (5 NM to 20 NM)

2.3 Range accuracy 1% of the maximum range of the scales in use or 10 m, which is the greater

3 POWER SUPPLY

Transceiver unit 100-230 VAC: 1.5-0.7 A, 1 phase, 50-60 Hz

4 ENVIRONMENTAL CONDITIONS

4.1 Ambient temperature -15°C to +55°C

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

4.3 Degree of protection

Transceiver unit IP20

4.4 Vibration IEC 60945 Ed.4

5 UNIT COLOR

Transceiver unit N2.5

E3667S01B
180111

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