

FURUNO

OPERATOR'S MANUAL

MARINE RADAR

FAR-1513

FAR-1518

FAR-1523

FAR-1528

FAR-1513-BB

FAR-1518-BB

FAR-1523-BB

Model FAR-1528-BB

ECF

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

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Nishinomiya, 662-8580, JAPAN

• FURUNO Authorized Distributor/Dealer

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IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.
- Compliant with IMO MSC.302(87) "Bridge Alert Management".

How to discard this product

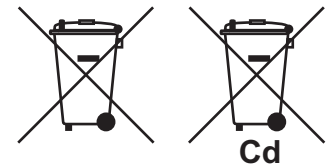
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

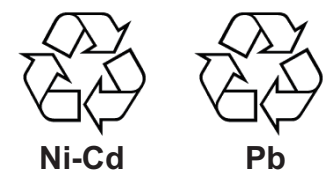
In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.






In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.



SAFETY INSTRUCTIONS

The operator and installer must read the applicable safety instructions before attempting to install or operate the equipment.

 DANGER	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

 Warning, Caution	 Prohibitive Action	 Mandatory Action
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WARNING








Radio Frequency Radiation Hazard


The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance. Distances at which RF radiation level of 100, 50 and 10 W/m² are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible. Ask your FURUNO representative or dealer to provide this feature.

Radar model	Transceiver	Magnetron	Antenna *1	100W/m ²	50W/m ²	10W/m ²
FAR-1513(-BB)	RTR-086A	MAF1565N	XN12A	N/A		2.1 m
			XN13A	N/A		1.9 m
FAR-1523(-BB)	RTR-087A	M1458F	XN12A	0.6 m		4.6 m
			XN13A	0.4 m		3.1 m
FAR-1518(-BB)	RTR-100	MAF1615B	XN12AF	0.3 m	0.7 m	4.1 m
			XN20AF	0.2 m	0.5 m	3.1 m
FAR-1528(-BB)	RTR-101	MG5436	XN20AF	0.6 m	1.2 m	6.1 m
			XN24AF	0.3 m	0.8 m	4.0 m

*1 XN12AF: 120cm, XN20AF: 198cm, XN24AF: 243cm

 WARNING	
	<p>ELECTRICAL SHOCK HAZARD Do not open the equipment.</p> <p>Only qualified personnel should work inside the equipment.</p>
	<p>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.</p>
	<p>Prevent the potential risk of being struck by the rotating antenna and exposure to RF radiation hazard.</p>
	<p>Wear a safety belt and hard hat when working on the antenna unit.</p> <p>Serious injury or death can result if someone falls from the radar antenna mast.</p>
<p>Do not disassemble or modify the equipment.</p> <p>Fire, electrical shock or serious injury can result.</p>	
<p>Immediately turn off the power at the ship's mains switchboard if water leaks into the equipment or the equipment is emitting smoke or fire.</p> <p>Continued use can cause fatal damage to the equipment.</p>	

 WARNING	
<p>Use the proper fuse.</p> <p>Use of a wrong fuse can result in damage to the equipment or cause fire.</p>	
<p>Keep heater away from equipment.</p> <p>Heat can alter equipment shape and melt the power cord, which can cause fire or electrical shock.</p>	
<p>Do not place liquid-filled containers near the equipment.</p> <p>Fire or electrical shock can result if a liquid spills into the equipment.</p>	
<p>Do not operate the equipment with wet hands.</p> <p>Electrical shock can result.</p>	
<p>Before servicing the radar, turn off the appropriate external breaker.</p> <p>Power is not removed from the radar simply by turning off its power switch.</p>	

⚠ WARNING

No one navigational aid should be relied upon for the safety of vessel and crew. The navigator has the responsibility to check all aids available to confirm position. Electronic aids are not a substitute for basic navigational principles and common sense.

- ◆ This TT automatically tracks automatically or manually acquired radar targets and calculates their courses and speeds, indicating them by vectors. Since the data generated by the auto plotter are based on what radar targets are selected, the radar must always be optimally tuned for use with the auto plotter, to ensure required targets will not be lost or unwanted targets such as sea returns and noise will not be acquired and tracked.
- ◆ A target does not always mean a land-mass, reef, ships or other surface vessels but can imply returns from sea surface and clutter. As the level of clutter changes with environment, the operator should properly adjust the A/C SEA, A/C RAIN and GAIN controls to be sure target echoes are not eliminated from the radar screen.

⚠ CAUTION

The plotting accuracy and response of this TT meets IMO standards. Tracking accuracy is affected by the following:

- ◆ Tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after an abrupt course change. (The actual amount depends on gyrocompass specifications.)
- ◆ The amount of tracking delay is inversely proportional to the relative speed of the target. Delay is on the order of 15 - 30 seconds for high relative speed; 30 - 60 seconds for low relative speed.
- ◆ Display accuracy is affected by the following:
 - Echo intensity
 - Radar transmission pulsewidth
 - Radar bearing error
 - Gyrocompass error
 - Course change (own ship and target)

The data generated by TT, AIS and video plotter are intended for reference only.

Refer to official nautical charts for detailed and up-to-date information.

WARNING LABEL

Warning labels are attached to the equipment. Do not remove any label. If a label is missing or damaged, contact a FURUNO agent or dealer about replacement.

⚠ WARNING ⚠
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.
⚠ 警告 ⚠
感電の恐れあり。 サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が数多くあり、万一さわると危険です。

DISPLAY UNIT, PROCESSOR UNIT

Name: Warning Label (1)
 Type: 86-003-1011-3
 Code No.: 100-236-233-10

	⚠ DANGER
	Electrical shock hazard. Do not touch parts inside this cover.
	⚠ 危険
	感電の恐れあり。 カバーの内部には、絶対に触れないで下さい。

ANTENNA UNIT

Name: Warning Label
 Type: 14-055-4202-1
 Code No.: 100-245-221-10

PROGRAM NUMBERS

Software	Program No.	Remarks
SPU	0359344-01.**	Processor Unit
KEY	0359348-01.**	Control Unit
PM	0359296-01.**	Performance Monitor

** denotes minor modifications.

For further software information, please access the following URL:

http://www.furuno.com/en/business_product/merchant/product/radar/popup.html

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FOREWORD

A Word to the Owner of FAR-1513/FAR-1518 Series

Congratulations on your choice of the FURUNO FAR-1513/FAR-1518 Series. We are confident you will see why FURUNO has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your radar is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

We would appreciate hearing from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO equipment.

Features

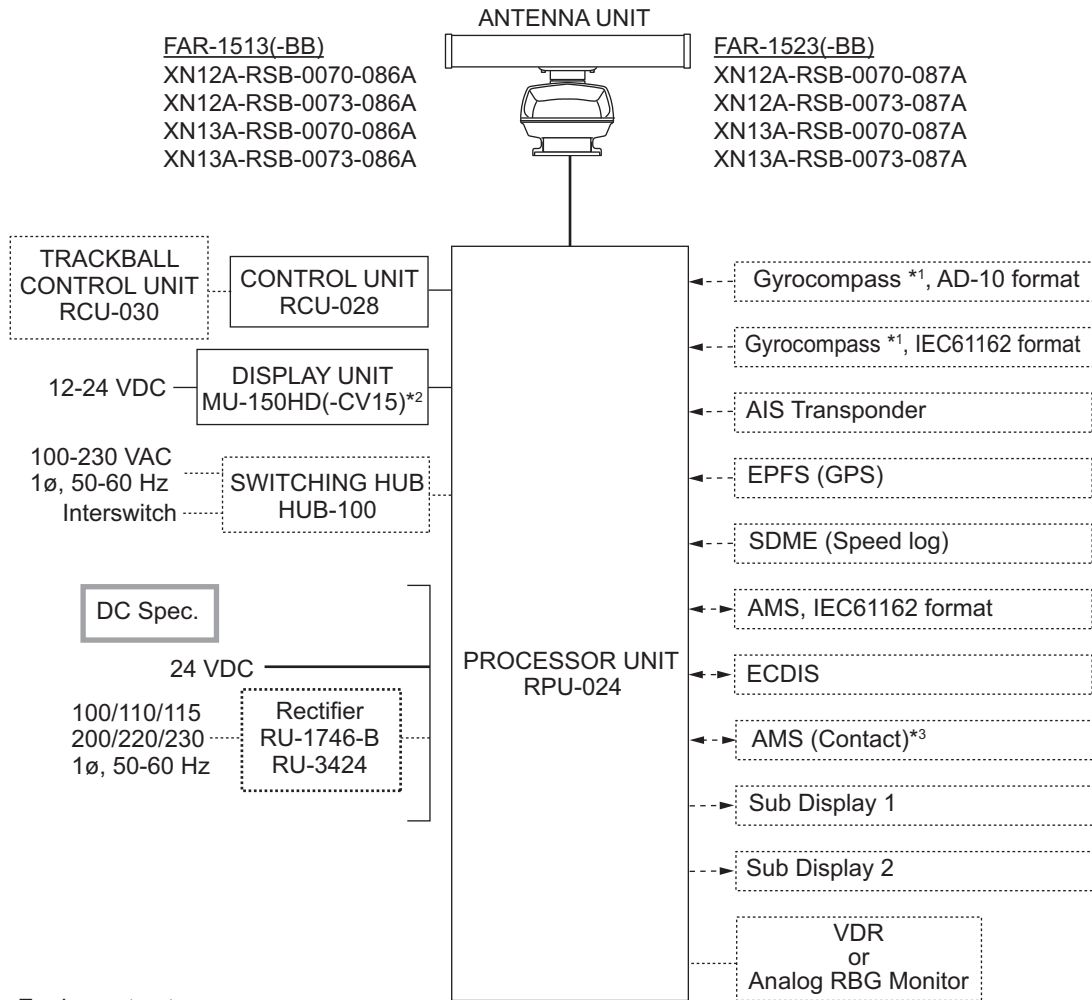
- Two methods of operation are available: RCU-028 (standard supply control unit) and RCU-030 (optional trackball unit). The ergonomically designed palm rest on the RCU-030 makes it easy to use.
- Simple operation with “point-and-click” menu functionality.
- All functions can be accessed using only the trackball unit.
- TT, AIS, Radar Map and Interswitch are supplied as standard.
- CPA/TCPA alarms.
- Targets activate the user-set alarm zone when entering or exiting the zone.
- The target analyzer function helps to find targets in high noise areas (rain/snow) or where there is interference from surface reflections.
- Compliant with the following directives: IEC62388, IEC 62288, IMO MSC. 192(79).
This radar also complies with MED 96/98/EC and its amendment 2002/75/EC of September 2, 2002 and also complies with the R&TTE Directive 1999/5/EC. In accordance with Article 6-3 of the above-mentioned R&TTE directive, FURUNO intends to put this radar on the market of the following countries in EU as well other markets.

Signal processing functions

This radar has the signal processing functions listed in the table below.

Function	Description	Section
Interference rejector	Suppresses interference by other radars. Interference received simultaneously from multiple radars may be difficult to reduce.	section 1.21
Echo stretch	Enlarges target echoes, especially small echoes. Suppress interference, sea clutter and rain clutter before using echo stretch, to prevent enlargement of unwanted echoes.	section 1.22
Echo averaging	The radar samples echoes with each scan. Targets that show a large change with each scan are judged as clutter and are reduced to display only echoes from legitimate targets.	section 1.23
Automatic clutter elimination	Discriminates clutter from the radar echo, then reduces the clutter automatically.	section 1.24
Noise rejector	Reduces white noise then improves the on-screen S/N ratio by processing the weighted moving average filter for the received echoes in the range direction. Use this function with caution. Weak target echoes may disappear from the screen or the range resolution may worsen.	section 1.25

SYSTEM CONFIGURATION



Equipment category

Unit	Category
Antenna	Exposed to the weather
Other units	Protected from the weather

***1:** The gyrocompass must also have an update rate that is adequate for the ship's rate of turn. The update rate must be better than 40 Hz (HSC) or 20 Hz (conventional vessel).

***2:** This monitor has been approved by the IMO, MU-150HD(-CV15) for CAT 3. If a different monitor is to be used on IMO vessels, its effective diameter must meet the applicable Category requirements (CAT 3: Effective diameter 180 mm or higher). For installation, operation and viewing distance of other monitors, see their respective manuals. For BB types, a monitor is to be prepared by the user.

***3:** Characteristics of contact output for AMS (Alert Management System):

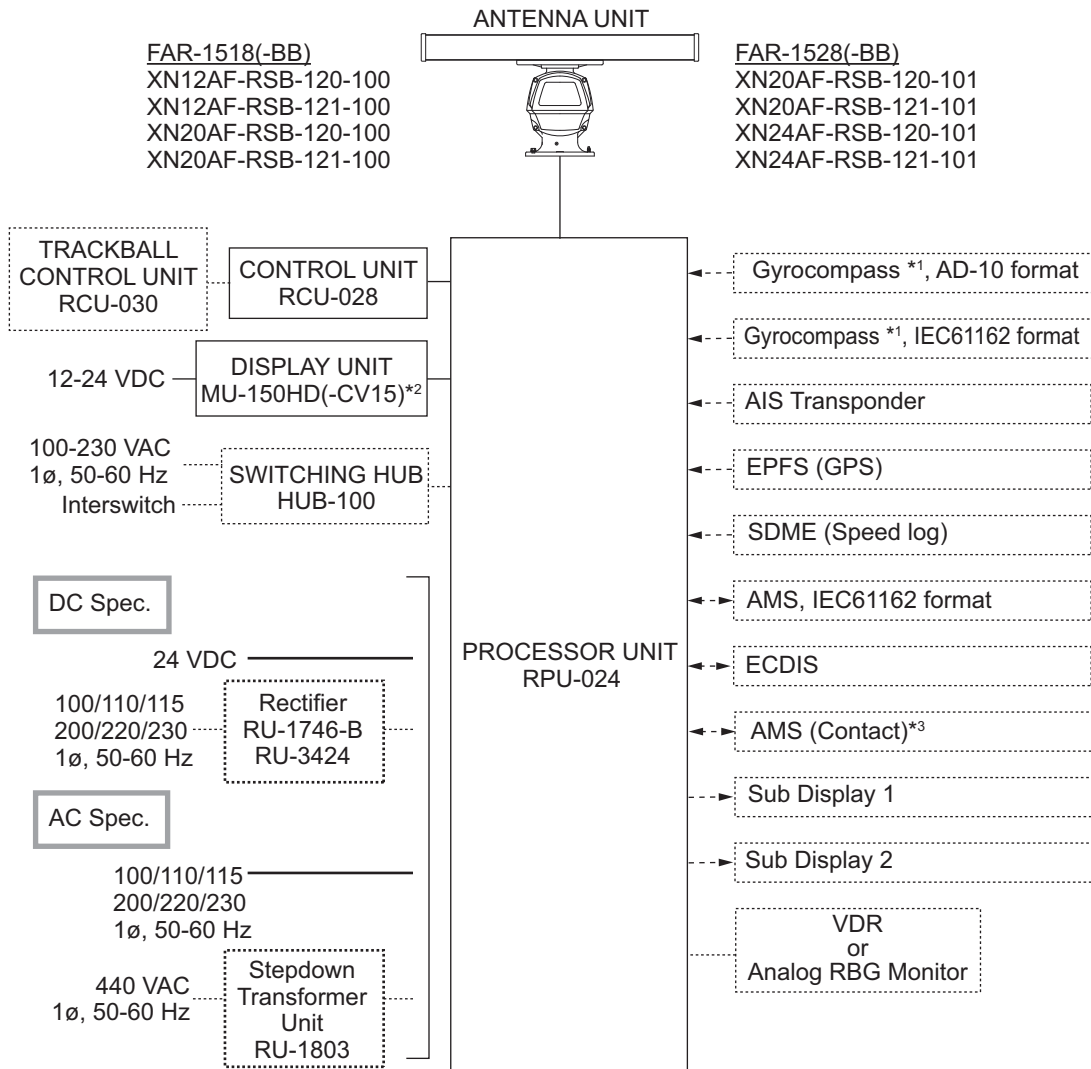
- (Load current) 250 mA
- (Polarity) Normally Open: 2 ports, Normally Close: 2 ports

NOTICE FOR FAR-1518(-BB)/FAR-1528(-BB)

The radar(s) must be interconnected to the following type approved sensors:

- Gyrocompass meeting requirements of the IMO resolution A.424(XI).
- EPFS meeting the requirements of the IMO resolution MSC.112(73).
- SDME meeting the requirements of the IMO resolution MSC.96(72).

The radar may be interconnected via HUB-100 to other FURUNO processing units having approved LAN ports.



Equipment category

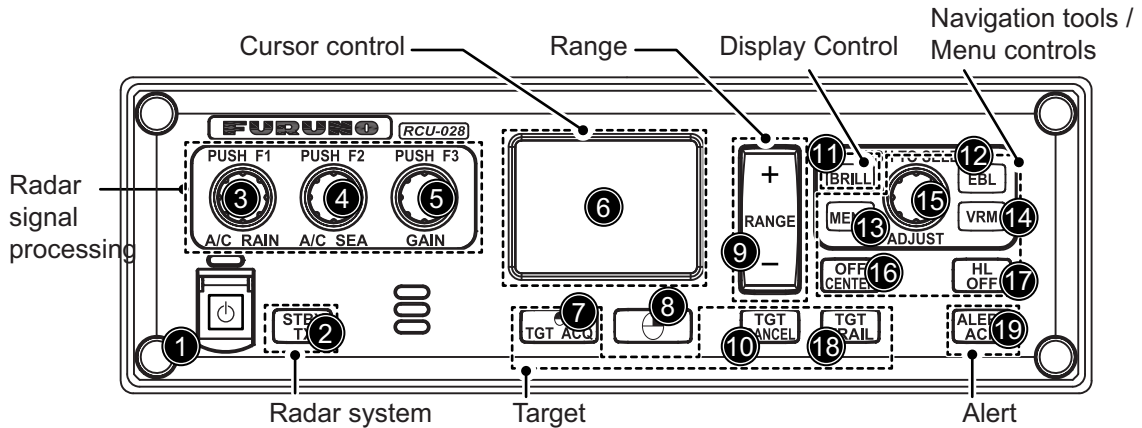
Unit	Category
Antenna	Exposed to the weather
Other units	Protected from the weather




- *1: The gyrocompass must also have an update rate that is adequate for the ship's rate of turn. The update rate must be better than 40 Hz (HSC) or 20 Hz (conventional vessel).
- *2: This monitor have been approved by the IMO, MU-150HD(-CV15) for CAT 3. If a different monitor is to be used on IMO vessels, its effective diameter must meet the applicable Category requirements (CAT 3: Effective diameter 180 mm or higher). For installation, operation and viewing distance of other monitors, see their respective manuals. For BB types, a monitor is to be prepared by the user.
- *3: Characteristics of contact output for AMS (Alert Management System):
- (Load current) 250 mA
 - (Polarity) Normally Open: 2 ports, Normally Close: 2 ports

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1. OPERATIONAL OVERVIEW

1.1 Controls

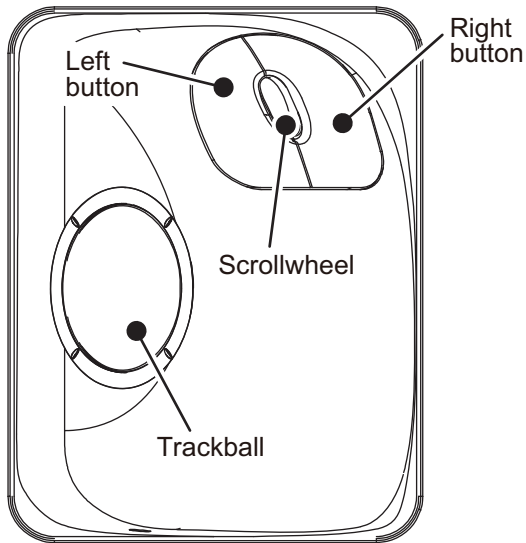


No.	Key	Description
1	Power switch	Press to turn the radar on/off. Shown as  in procedures.
2	STBY/TX	Press to switch between STBY (Stand-by) and TX (Transmit) modes.
3	A/C RAIN/F1	<ul style="list-style-type: none"> Press: Activates the F1 registered function. Rotate: Adjusts rain clutter manually (default setting).
4	A/C SEA/F2	<ul style="list-style-type: none"> Press: Activates the F2 registered function. Rotate: Adjusts sea clutter manually (default setting).
5	GAIN/F3	<ul style="list-style-type: none"> Press: Activates the F3 registered function. Rotate: Adjusts gain manually (default setting).
6	Touchpad	Moves the cursor.
7	Left button  /TGT ACQ	<ul style="list-style-type: none"> Selects menu item. Changes menu box item. Used in TT mode: Acquires the selected echo as a target. Used in AIS mode: Activates the selected echo.
8	Right button 	Opens the cursor-selected context menu, closes open menus.
9	Range +/-	Selects the display range.
10	TGT CANCEL	<ul style="list-style-type: none"> TT mode: Deactivates tracking for the cursor-selected target. AIS mode: Sleeps the selected target.
11	EBL	Activates/deactivates the EBL cursor.
12	VRM	Activates/deactivates the VRM cursor.
13	MENU	Open the main menu, close all open menus.
14	BRILL	Adjusts the screen brilliance.
15	ADJUST (Rotate)	<ul style="list-style-type: none"> Rotate: Adjusts settings for the cursor-selected box/icon. Highlights menu item. Press: Selects highlighted menu item, applies settings, moves the cursor to the next character/digit.
16	OFF CENTER	Moves the radar display off center.
17	HL OFF	Hides heading line when pressed and held.
18	TGT TRAIL	<ul style="list-style-type: none"> Press: Changes the trail time. Long press: Erases trails.
19	ALERT ACK	Acknowledges alerts.

1. OPERATIONAL OVERVIEW

1.1.1 Trackball unit RCU-030 (Option)

The optional trackball unit can be used to control most features of this radar.



Trackball

- Moves cursor.
- Highlights an object (target echo, menu item, etc.)

Scrollwheel

- Selects menu options.
- Sets numeric data.
- Sets menu box slide bars (GAIN, etc.)

Note: The scrollwheel does not have a “push” function

Left Button

- Does the operation related to the selected object.
- Confirms the operation for the selected object.

Right Button

- Cancels current action.
- Opens/closes menu boxes.

1.1.2 Terminology used in this manual

This manual uses the following terminology:


Terminology	Meaning
Select	<ul style="list-style-type: none"> • Using the touchpad or trackball, move the cursor over the item to be “selected”. • Rotate the ADJUST knob to highlight the item to be “selected”.
Left-click	Press the left button on the RCU-030 unit.
Right-click	Press the right button on the RCU-030 unit.
Left button	Refers to the left button (⊖) on the RCU-028 control unit.
Right button	Refers to the right button (⊕) on the RCU-028 control unit.
Control unit	Refers to the RCU-028 control unit.
Trackball	Refers to the RCU-030 control unit.
Open the [MAIN MENU].	<ul style="list-style-type: none"> • Press the MENU key to open the main menu. • Select the [MENU] box, then press the left button or left-click.
Close the menu.	<ul style="list-style-type: none"> • Press the MENU key to close the menu. (Closes all open menus.) • Select the operational display area, then press the right button or right-click. • Select the [MENU] box, then press the left button or left-click.

For the sake of brevity, procedures in this manual use the terms “Open the [MAIN MENU].” and “Close the menu.”

All operations can be done with either the RCU-030 trackball unit or the RCU-028 control unit.

Throughout this manual, procedures are outlined using the RCU-028 control unit, unless otherwise specified.

1.2 How to Turn the Radar On/Off

The **POWER** switch  is located at the bottom left corner of the control unit. Open the **POWER** switch cover and press the switch to turn the radar system on. To turn the system off, press the **POWER** switch again. The screen shows the bearing scale and digital timer for approximately 30 seconds after power is applied. The timer counts down three minutes of warm-up time. During this period, the magnetron (transmitter tube) is warmed for transmission. When the timer has reached 0:00, the indication "ST-BY" appears at the screen center, meaning the radar is now ready to transmit pulses.

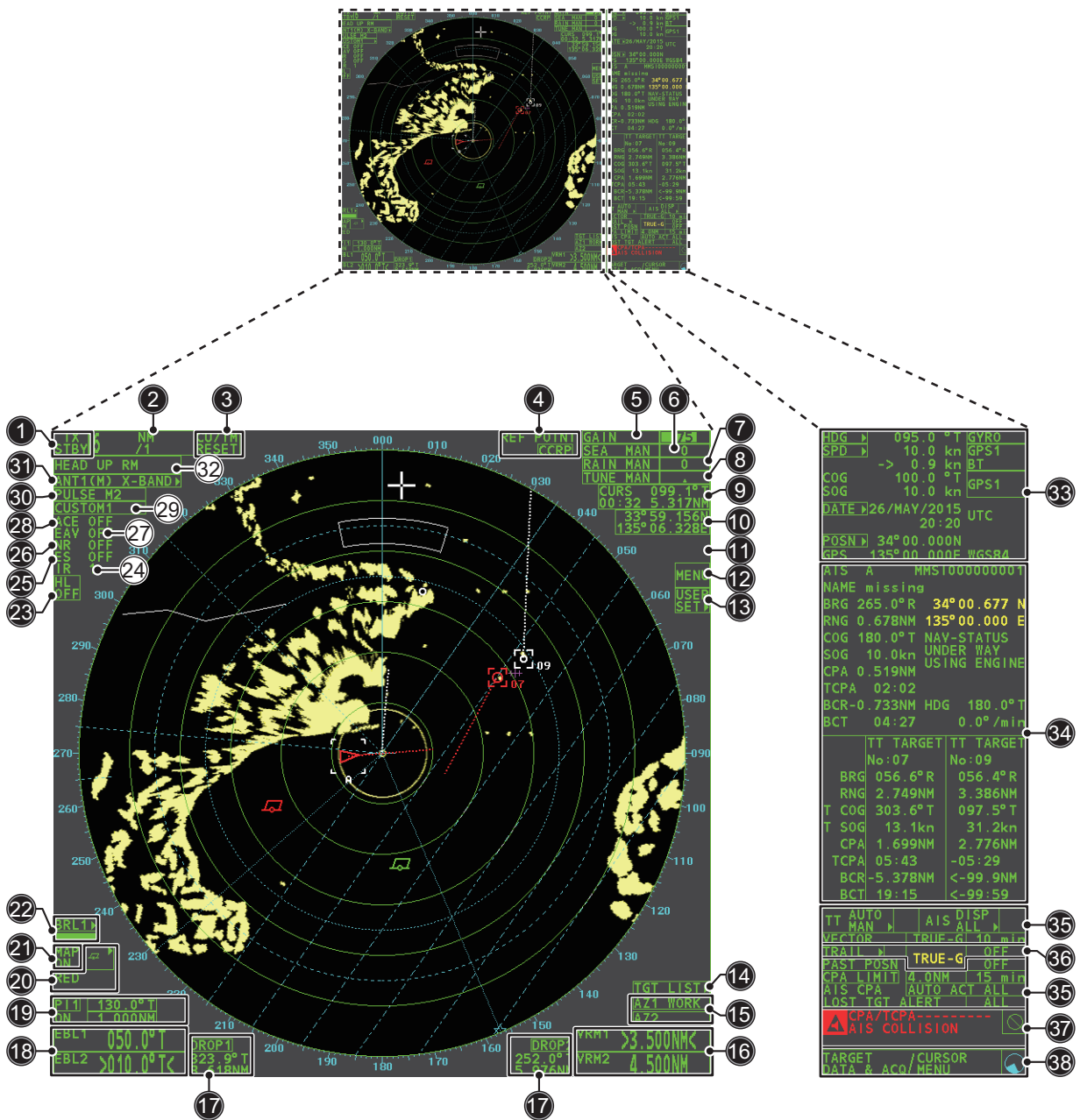
In the stand-by condition, markers, rings, maps, etc. are not shown. Further, TT and AIS are not shown. In the warm-up and stand-by conditions, [ON TIME] and [TX TIME] are counted in hours and tenths of an hour, appearing at the screen center.

Note 1: Do not turn on the power directly after it has been turned off. Wait several seconds before you reapply the power, to be sure the radar starts up properly.


Note 2: Parameters set on the menus are stored in a non-volatile memory (flash memory), and are preserved when the power is turned off.

Note 3: The screen refreshes slower in low ambient temperature.

1.3 Display Indications



No.	Name	Description
1	STBY/TX box	Switches between standby and transmit mode.
2	Range box	Changes the radar range.
3	CU/TM Reset box	Resets display when using Course Up/True Motion presentation mode.
4	REF POINT box	Changes the reference point.
5	GAIN box	Adjusts the GAIN level.
6	SEA box	Adjusts the A/C SEA settings.
7	RAIN box	Adjusts the A/C RAIN settings.
8	TUNE box	Adjusts the tuning for the receiver.
9	Cursor information box	Displays the range, bearing and TTG to cursor position.
10	Cursor position box	Displays the cursor's current co-ordinates.
11	MAP ALIGN box	Enable/disable radar map alignment.
12	MENU box	Opens the [MAIN MENU].

No.	Name	Description
13	USER SET ►	Load/save user specific settings.
14	TGT List ►	Displays the target list, displays the [TARGET LIST] menu.
15	AZ box	Activates/deactivates the acquisition zone(s).
16	VRM box	Activate/deactivate the VRM.
17	DROP box	Displays drop mark data.
18	EBL box	Activate/deactivate the EBL
19	PI Line box	Activate/deactivate the PI lines.
20	MARK boxes	Select mark icons, displays mark information.
21	MAP box	Activate/deactivate the radar map.
22	BRILL box	Adjust screen brilliance, opens the [BRILLIANCE] menu.
23	HL OFF box	Hides the heading line.
24	IR box	Activate/deactivate the interference rejector function.
25	ES box	Activate/deactivate the echo stretch function.
26	NR box	Activate/deactivate the noise reduction function.
27	EAV box	Activate/deactivate the echo averaging function.
28	ACE box	Activate/deactivate the ACE function.
29	CUSTOMIZE ECHO box	Cycle through echo filtering customizations, open the [CUSTOMIZE ECHO] menu.
30	PULSE box	Cycle through pulse settings.
31	ANTENNA SELECT box	Selects the antenna to use. Only antennas connected to the same network are displayed and selectable.
32	PRESENTATION MODE box	Cycle though display presentation modes.
33	Own ship details box.	Shows various data regarding own ship. Contains speed*, heading and position context menus. *: Speed is displayed as a negative value when the vessel is using reverse thrust.
34	Information box	<ul style="list-style-type: none"> • Displays currently open menu. • Displays various information, such as received messages, TT/AIS target information and navigational data.
35	TT/AIS box	<ul style="list-style-type: none"> • Activate/deactivate TT/AIS functions. • Access TT/AIS functions such as filters and association. • Access the [AIS TARGET MENU]. • Access the [TT MENU]. • Displays/sets target vector time and orientation.
36	TRAIL box	<ul style="list-style-type: none"> • Set target trail time. • Set past position plotting interval. • Erases trails • Opens [TRAIL] menu.
37	Alert box	Displays alert information and icons.
38	Guidance box	Displays operational guidance for selected item. <ul style="list-style-type: none"> • Left side: guidance for left button/left-click. • Right side: guidance for right button/right-click.
	Working indicator 	Rotates clockwise when the system is working properly. <u>Picture freeze</u> If the picture freezes, the picture is not updated. Restart (turn off, then on) the unit to restore normal operation.

Display specifications


- Nominal viewing distance: 0.75 m
- Text height: 2.67 mm
- Text width: 2.08 mm

1.4 How to Adjust the Brilliance

The screen brilliance can be adjusted as shown below. To adjust color tones, see "How to adjust color palettes" on page 1-61.

Note: External monitor brilliance is not adjustable from the radar. Refer to the external monitor's Operator's Manual for how to adjust brilliance.

From the control unit

1. Press the  key. The cursor is automatically moved to the [BRILL] box.



Brilliance bar
Shows brilliance level.

2. Use the **ADJUST** knob to adjust the brilliance as appropriate. Turn clockwise to increase the brilliance, counter-clockwise to reduce the brilliance. Press the **ADJUST** knob to complete the adjustments.

From the on-screen box

1. Use the Touchpad to select the [BRILL] box, then press the **left button**.
2. Use the **ADJUST** knob to adjust the brilliance as appropriate. Turn clockwise to increase the brilliance, counter-clockwise to reduce the brilliance. Press the **ADJUST** knob to complete the adjustments.

1.5 Menu Operations

1.5.1 How to access the main menu

The main menu can be accessed from the control unit or from the on-screen box. The [MAIN MENU] is displayed in the text area on the right side of the screen.

From the control unit

Press the  key on the control panel.

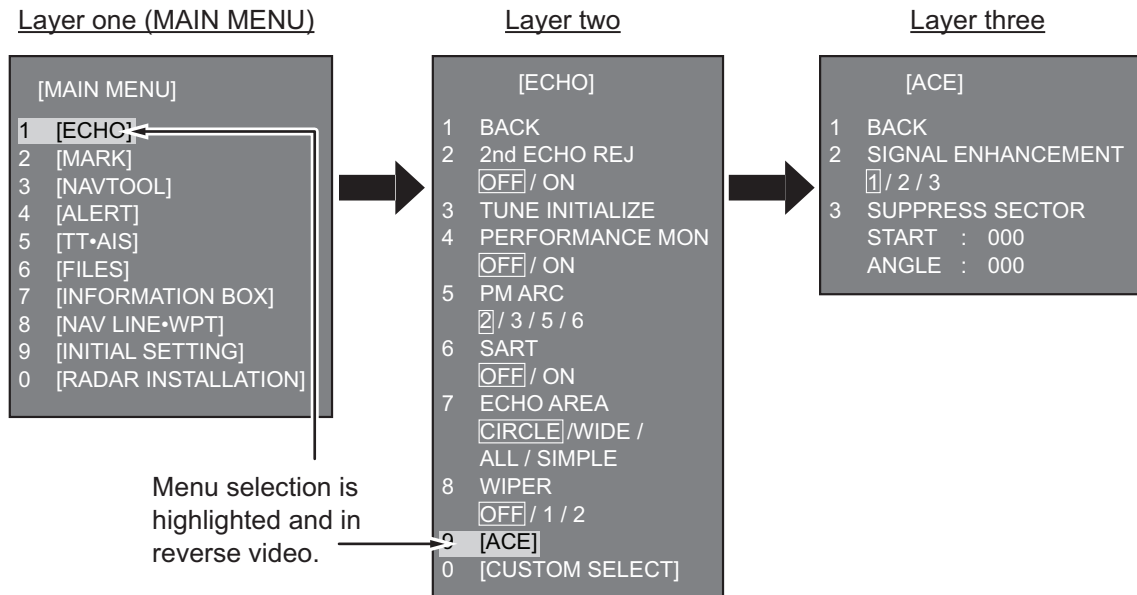
From the on-screen box

Select the [MENU] box, then press the **left button**.

[MAIN MENU]	
1	[ECHO] — Echo processing functions
2	[MARK] — Mainly turns markers on/off.
3	[NAVTOOL] — Navigation tools (PI lines/EBL/VRM)
4	[ALERT] — Sets target alarm functions; outputs alert signal.
5	[TT•AIS] — Sets TT and AIS functions.
6	[FILES] — Manages stored data.
7	[INFORMATION BOX] — Sets data display box items.
8	[NAV LINE•WPT] — Processes nav lines and waypoints.
9	[INITIAL SETTING] — Sets up the radar, changes function key settings.
0	[RADAR INSTALLATION] — Used by technicians and service personnel.

1.5.2 How to operate the menus

1. Open the [MAIN MENU].
2. Rotate the **ADJUST** knob to select a layer one ([MAIN MENU]) menu item, then press the **ADJUST** knob. The menu item currently selected is highlighted and shown in reverse video.



3. Rotate the **ADJUST** knob to select the layer two menu item, then press the knob.
Repeat this step to access the layer three menu. In the above example, [ACE] is selected, which opens the layer three [ACE] menu.
4. Rotate the **ADJUST** knob to adjust the selected setting, then press the knob.
5. Close the menu.

1.6 How to Use the On-screen Box Menus

Some radar functions can be accessed using the on-screen box menus. A “▶” at the right side of an on-screen box which indicates that there is a box menu.



There are two methods for on-screen box menu selection.

- Use the Touchpad to select the on-screen box, then press the **right button**.
- Use the trackball unit (RCU-030) to select the on-screen box, then right-click.

The procedure outlined below uses the RCU-028 control unit.


To operate the radar using the on-screen boxes, do the following:

1. Select the desired box.

Note: The cursor changes shape according to its location. It is an arrow  when placed outside the operational display area and when inside the operational display area, it is a cross .

For the purpose of this example, select the [BRILL] box, at the bottom left corner of the display.

When a box is correctly selected, its color changes and the guidance box at the bottom right corner shows operational guidance. The operational guidance shows the function of the **left button** and **right buttons**, with a diagonal line separating the information.

Place cursor here,  then press the **left button** to change brilliance preset, **right button** to open the [BRILL] menu.



The [BRILL] box, for example, displays the operational guidance "BRILL SELECT / BRILL MENU". In this case you would press the **left button** to select a preset palette (See "How to adjust color palettes" on page 1-61) or press the **right button** to open the [BRILL] menu.

2. Press the **left button** to cycle through preset palettes.
3. Rotate the **ADJUST** knob to adjust the display brilliance.
4. The box menu attached to the [BRILL] box is the [BRILL] menu. To open the box menu, press the **right button**.
5. Select the desired menu item, then press the **ADJUST** knob.
6. Select the appropriate option, then press the **ADJUST** knob.
7. Close the menu.

1.7 How to Use the CURSOR Menu

Functions that require the use of the cursor, such as EBL offset and zoom, can be activated directly from the guidance box or from the [CURSOR] menu, either method with the cursor inside the operational display area. Below is the procedure for choosing cursor-related functions from the [CURSOR] menu.

1. Select the operational display area, then press the **right button**.
The [CURSOR] menu is displayed.
2. Select the desired function, then press the **ADJUST** knob.
3. The guidance box shows "XX / EXIT" (XX = function selected). Use the Touchpad to place the cursor where desired.
4. Press the **ADJUST** knob to execute the function selected at step 3.
5. To quit the selected function, press the **right button** when the guidance box shows "XX / EXIT" (XX = function selected).

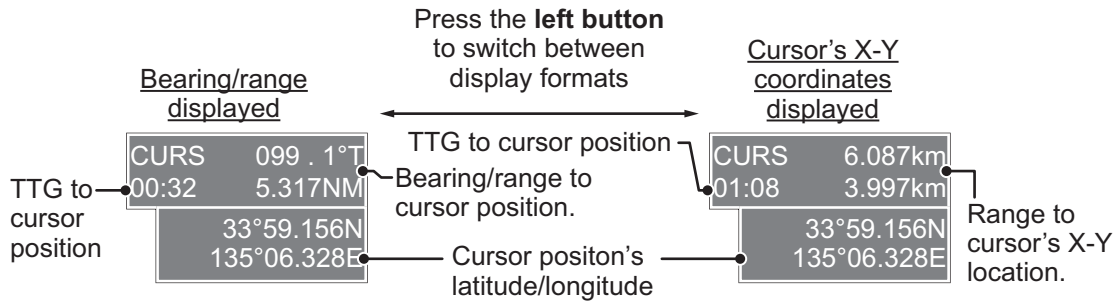
[CURSOR MENU]
TARGET DATA & ACQ
TARGET CANCEL
TT TGT DATA & ACQ
REF MARK
EBL OFFSET
OFFCENTER
ZOOM
MARK DELETE
OWN TRACK DELETE
MAP ALIGN
TRAIL ERASER
CURSOR SIZE
TARGET DATA/ACQ SETTING
TARGET CANCEL SETTING

Menu Item	Description
TARGET DATA & ACQ	TT: Acquires target; displays data for selected tracked target. AIS: Activates sleeping AIS target; display data for selected AIS target.
TARGET CANCEL	TT: Cancels tracking on selected tracked target. AIS: Sleeps selected AIS target.
TT TGT DATA & ACQ	Acquires selected echo as tracked target.
REF MARK	Inscribes reference mark, for target-based speed input.
EBL OFFSET	Offsets EBL to measure range and bearing between two targets.
OFFCENTER	Shifts screen center to selected location.
ZOOM	Zooms selected location.
MARK DELETE	Deletes selected mark (plotter mark, origin mark or waypoint mark).
OWN TRACK DELETE	Deletes own ship's tracks.
MAP ALIGN	Aligns charts (maps) with the radar picture.
TRAIL ERASER	Erases trails.
CURSOR SIZE	Selects cursor size.
TARGET DATA/ACQ SETTING	Adjust target tracking settings.
TARGET CANCEL SETTING	Adjust target cancel settings.

1.8 Cursor Data

Cursor data can be shown in latitude and longitude position or the cursor's X-Y coordinates.

Place cursor on the [CURSOR DATA] box at the right side of the display then press the **left button**. The data box shows the cursor information in the upper half and cursor location (latitude/longitude) is shown in the lower half.



Note 1: For the X-Y coordinates display, the Y-axis is the heading line, the upper half of the screen is “plus” and the lower part of the screen is “minus”. The X-axis is the port/starboard direction, starboard is “plus”, port is “minus”.

Note 2: When displaying latitude and longitude position and the cursor has been aligned (on the [CURSOR] menu), the indication "MAP ALIGN" appears at the right side of the screen (in yellow).

Note 3: Cursor data reads "- - -" when the cursor is placed outside the operational display area.

1.9 How to Set Up Function Keys

Some menu functions and menus can be assigned to a function key. This allows one-touch access to the assigned function or menu.

To activate an assigned function, press the corresponding function key (**F1**, **F2** or **F3**).

The **function keys** are preset with the following functions:

F1: A/C RAIN, **F2**: A/C SEA, **F3**: ACE (Gain).

You can customize the function set to each key using the following procedure.

1. Open the [MAIN MENU].
2. Select [INITIAL SETTING], then press the **ADJUST** knob.
3. Select [FUNCTION KEY], then press the **ADJUST** knob.
4. Select [F1], [F2] or [F3] as appropriate, then press the **ADJUST** knob.
5. Referring to the table of available functions below, select a function category, then press the **ADJUST** knob.

Function category	Available function
ECHO	CUSTOM MENU, IR, ES, EAV, NOISE REJ, ANT SELECT, PULSE LENGTH, AUTO-SEA, AUTO-RAIN, TUNE SELECT, 2ND ECHO REJ, PM, SART, ECHO TRAIL, TRAIL T/R, WIPER, ACE, ACE HIGH SENSITIVITY
STD KEY	ALERT ACK, STBY TX, EBL OFFSET, PRESENTATION MODE, CU-TM RESET, VECTOR TIME, VECTOR MODE, TARGET LIST, BRILL, MARK-CURSOR, MARK-OS, MENU, RANGE UP, RANGE DOWN, ACQ, TARGET DATA, TARGET CANCEL
TT•AIS	TT-DISP, AIS-DISP, PAST POSN INTERVAL, REF MARK, CPA LIMIT, CPA, TCPA, AZ1, AZ2, AIS SCALED SYMBOL
DELETE DATA	MARK DELETE, MARK ALL DELETE, OWN TRACK DELETE, OWN TRACK ALL DELETE
OPERATION	ECHO AREA*, ECHO COLOR, RING(ON/OFF), ZOOM, MOB, ALARM1, ALARM2, TLL, MAP ALIGN

*: Non-IMO radars only.

6. Select the appropriate function to be assigned, then press the **ADJUST** knob.
7. Close the menu. Repeat the procedure as necessary to set up other function keys.