



KODEN

OPERATION MANUAL

PLOTTER / SOUNDER

CVG-200

This product is specifically designed to be installed on boats and other means of maritime transport. If your country forms part to the EU, please contact your dealer for advice before attempting to install elsewhere.



Declaration of Conformity

(As required by Article 7 (1) of Directive 89/336/EEC)

Declares under his sole responsibility that the produced Plotter/Sounder manufactured by

Koden Electronics Co., Ltd.

**5278 Uenohara,
Uenohara City,
Yamanashi-Ken
409-0112, Japan**

Telephone +81 554 20 5865

Telefax +81 554 20 5880

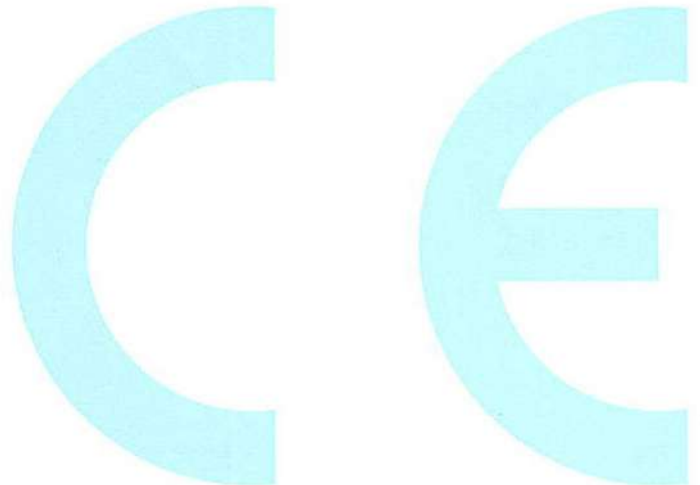
Identified by the type number **CVG-200** to which this declaration refers conforms to the requirements of Directive 89/336/EEC amended by 92/31/EEC and 93/68/EEC and is in conformity with the EMC, Health and Safety standards of

EN60945

A handwritten signature in blue ink, appearing to read "Heinz Hoghoff".

Signed
Heinz Hoghoff,

**Dated 06 April 2005
Koden Elektronik GmbH.
Am Gewerbepark 15
D-64823, Gross-Umstadt
Germany.
Phone +49 6078 2056
Telefax +49 6078 73824**



N.B. As this product is for Maritime use compliance with Directive 72/23/EEC is not required.

CVG-200 OPERATION MANUAL
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Amendment History

No.	Document No & Rev No.	Revised Date	Amendments
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9	0093132802-09	2011/06/16	Chapter 1, Chapter 2, Chapter 3, Chapter 4
10			

Amendment Policy

When any change is applied in the document, only the document numbers of the relevant sheet(s) and cover sheet are modified. The rest of the sheets are not changed. The document number is shown in the footer area, either in the right or left of each sheet.

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Getting Started

Using the Main Text	Please guard against losing or damaging this text. In the event of reselling or handing over this device to someone else, please be sure to include this manual to the new owner. In addition, it is advisable to have this text nearby while this device is in operation.
---------------------	--

Important Safety Items
Symbols used in this manual

The following symbols are used in this manual. You are requested to be fully aware of the meaning of each symbol before carrying out inspection and maintenance of this equipment.

Warning mark



Alarm

Operating this equipment while ignoring this sign may lead to physical injury or damage to the equipment.

Caution mark



Caution

Operating this equipment while ignoring this sign may lead to a malfunctioning of the equipment.

High Voltage mark






Operating this equipment while ignoring this sign may lead to electrical shock.

Prohibition mark







This sign indicates that a specified action is prohibited. The prohibited action will be shown in the vicinity of the mark.

Types of Operational Warnings

<p>Warning</p> 	<p>This device aids in navigation. For decision making in sound navigation, please be sure to use other widely used resources in addition to this device: land maps, sea maps, GPS devices, landmarks, water depth, obstacles, and other devices.</p>
<p>Warning</p> 	<p>This devices uses voltage levels which are potentially life threatening. Even if the power is shut-off, live electricity may remain within the circuits. Warning labels and protective covers have been added to prevent carelessly touching high-voltage circuits. For the sake of safety, switch off the power before performing any inspection of the inside of this device. Then, please proceed to properly discharge any remaining voltage from the condenser. Proper inspection must be carried out by a qualified technician.</p>
<p>Caution</p> 	<p>This GPS (Global Positioning System) functions using 28 satellites. Should there be no obstacles, and should the sky be clear, the user should be able to find his position anywhere in the world. However, this group of satellites are operated and managed by the US Pentagon, and we have no control over the quality of reception or the policy of the US government. Without prior notice, the accuracy of position, bearings, speed measurements may deteriorate, or, adjustments, testing, and course corrections, etc. may be necessary. Signals from the satellites may be disrupted at certain times.</p>

Types of Cautions During Maintenance

<p>Warning</p> 	<ul style="list-style-type: none">● Be certain to turn off your boat's power Carelessly switching on the power during inspection may result in electrical shock. In order to prevent such accidents, be sure to switch off the power of this device as well as the power of the boat. Furthermore, a warning sign saying "In operation" closely placed to the power switch can also help ensure safety.
	<ul style="list-style-type: none">● Warning of Remaining High Voltage Regarding transmitting circuits using the condenser, high voltage may remain in the circuit for a few minutes after switching the power off. When inspecting a part of the device with this mark, be sure to wait a few minutes after the power has been switched off. Also, be sure to properly discharge any remaining voltage.
<p>Caution</p> 	<ul style="list-style-type: none">● Dust Caution Dust can induce injury to the lungs. When cleaning the inside of this device, be careful not to breathe in dust. Please use a safety mask or other equipment to ensure your safety.
<p>Caution</p> 	<ul style="list-style-type: none">● Countermeasures towards Static Electricity The flooring of the boat can cause static electricity when in contact with carpet or synthetic clothing fibers. This static electricity can in turn destroy electronics. Install proper countermeasures towards static electricity to protect your equipment.

How to use this manual

Scope of this manual

This manual contains general information as well as system composition, installation, operation and maintenance of the CVG-200 Plotter/Sounder

Structure of this manual

This manual is divided into sections according to the contents as outlined below. This allows for the overview of the entire manual as well accessing detailed information for your specific requirement.

Chapter 1: General Information

- About the GPS
- Applicable Standards
- Applicable Standards
- Software Type Name
- Equipment Configuration

Chapter 2: Equipment Composition

- Standard Equipment List
- Spare Parts List
- Optional Items List
- Available Transducers List
- Transducers

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- Unpacking of The System
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- Proper Location for Setup
- Cable Routing and Connections
- Display Installation
- Internal Connections of The System
- Post-installation Inspections

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- Displaying the Images
- Plotter Screen
- Operation of Sounder Display

Chapter 6: Using the Menu

- Menu Functions
- Sounder Menu
- Plotter Menu
- Setting of other Menus (ETC)

Chapter 7: Trouble Shooting and Maintenance

- Information Required for Service
- Trouble Shooting

Chapter 8: Maintenance

- Periodical Inspection and Cleaning

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- Details of Input Serial Data Sentence
- Details of Output Serial Data Sentence
- Connecting to An External Sounder
- Connecting to Water Temperature/Speed Sensor
- Serial Data Input/Output
- Data input/output serial line
- Signal Output for External Buzzer

Annex Sheets:

- Menu Tree
- LOLAN C CHAINS
- DECCA CHAINS

Annex B Sheets:

- COLOR PALETTE

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Chapter 1 General Information

1.1 About GPS

1.1.1 GPS Satellite Arrangement

GPS (Global Positioning System) is a navigation system using 24 satellites (21 plus 3 in service) orbiting above the earth once every 11 hours 58 minutes at an altitude of about 20,000 km.

1.1.2 GPS Organization

Your position is determined by calculating the distance from more than three satellites to your position. Your position (latitude, longitude and altitude) is determined at the intersection point of four spheres formed by four satellites.

Note: The GPS system is based on a geodetic system called the WGS (World Geodetic System). In a conventional world map, one coordinate system differs from others by region. This causes the position fix made on the map and GPS measurement to differ to a certain extent.

1.1.3 On Proper Use

In the following circumstances, your GPS receiver takes more time to fix your position:

- When you first turn on the GPS receiver.
- After having the unit turned for a long time, the previously stored orbital data is not suitable for the current satellite.
- When you turn the power back on after having not used it over a long distance.

The GPS navigation device, within a useful locality, through available data from orbiting satellites, will record and speed your position data to you. When the GPS receiver is first turned on, it starts to store the orbital data sent from the satellite. The first data becomes available after about 15 minutes. After this, the receiver can fix your position within a minute by using the previously stored data.

In the case of abnormal or adverse conditions, or if foreign substance enter the device, turn off the power immediately, and contact your nearest sales or service store.

1.2 Outline of The Equipment

The CVG-200 is a plotter/sounder device, consists of a plotter unit with a GPS sensor and a sounder equipped with transmission/receiver.

The available power output is two kinds, 600W and 1kW. It carries two frequencies, 50 kHz and 200 kHz.

1.3 Applicable Standard

The CVG-200 is designed and tested to comply with the international standard of IEC60945 (3rd edition) that defines general requirements of electronic maritime equipment.

1.4 Software Type Name

The following software type is used in the CVG-200.

Software type	Application
KMC-101	System control
KM-D91	Echo Sounder system control

1.5 Equipment Composition

The equipment composition of CVG-200 is shown in Figure 1.1.

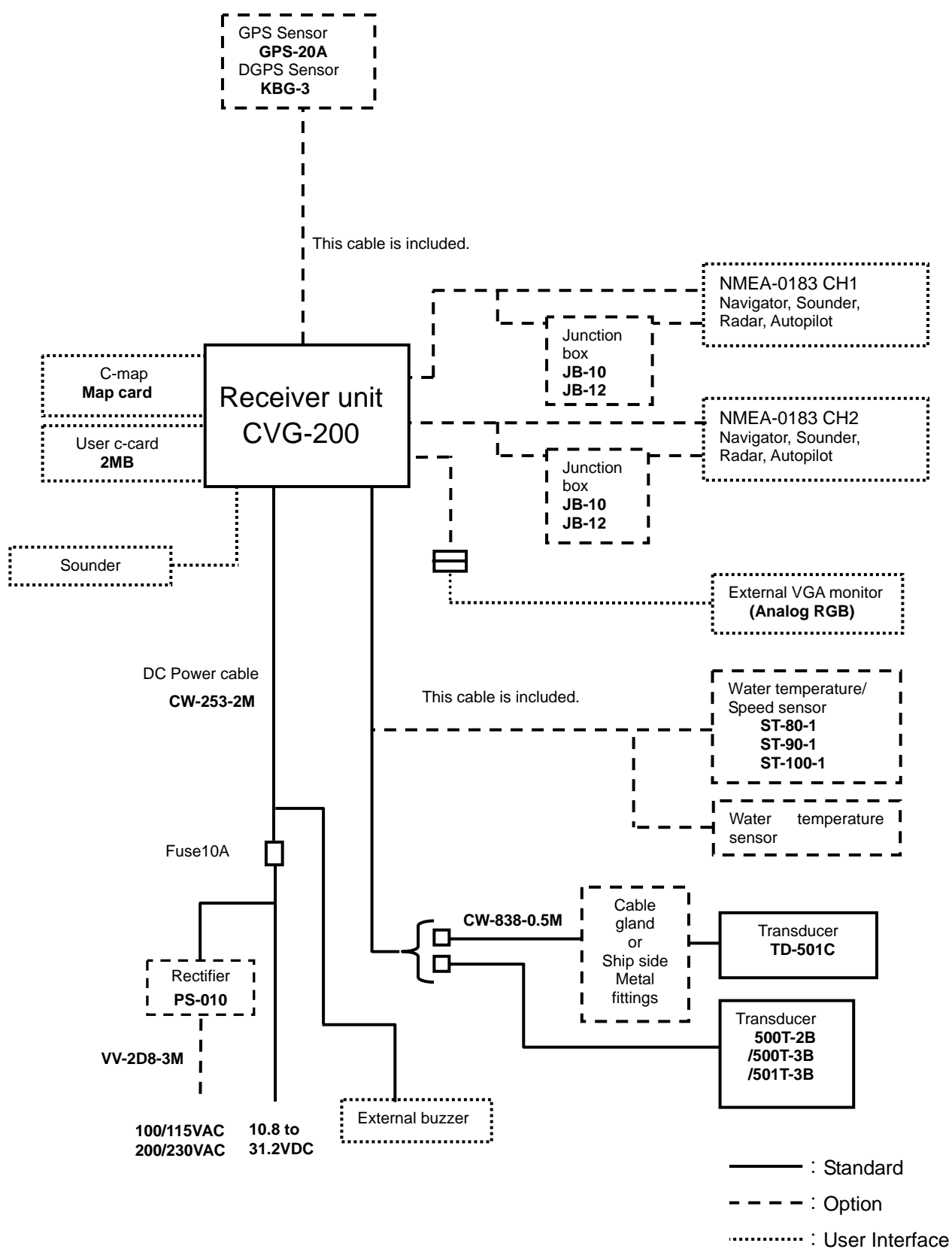


Figure 1.1 Configuration of CVG-200

Chapter 2
Equipment Composition

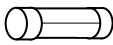
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Chapter 2 Equipment Composition

2.1 Standard Equipment List

No	Item name	Type name	Remarks	Weight/ Length	Q'ty
1	Receiver unit	CVG-200	With base mount and hard cover	6.8 kg	1
2	DC Power cable	CW-253-2M	For Receiver unit	2 m	1
3	Transducer	Detail in 2.4 Transducer			
4	Cable for transducer	CW-840-0.3M (for TD-501C)			1
5	Spare parts	SP-101 (2.2 Refer to Spare parts list)			1set
6	Operation manual	English			1

2.2 Spare Parts List

No	Item name	Type name	Remarks	Weight/ Length	Q'ty
1	Fuse 	F-7161-10A /N30C-125V	For Receiver unit	6.4φ x 30mm	1

2.3 Option Items List

No	Item name	Type name	Remarks	Weight/ Length
1	Water temperature/ Speed sensor	ST-80-1	Transom (Plastic, with cable)	0.3 kg/9m
		ST-90-1	Inner hull (Plastic, with cable)	0.6 kg/9m
		ST-100-1	Through hull (Bronze, with cable)	1.2 kg/9m
2	Water temperature sensor	T-81with cable	Inner hull (Plastic, with cable)	0.2kg
3	DGPS sensor	KBG-3	For DGPS positioning Power & Signal cable with connector	0.76kg 15m
4	GPS sensor	GPS-20A-10M-3	For GPS positioning Power & Signal cable with connector	0.25kg 10m
5	GPS antenna holder	RAH-29	Ratchet mount	
6	Water thermometer scupper	MFB-11	Water temperature sensor T-81with cable	
7	Inner hull kit	MFB-04	Hard vinyl chloride, applicable to 600W only	1.2kg
8	Inner hull kit	MFB-04W	Resin, 1KW only	1.5kg
9	Kingston kit	MFB-05W	Applicable to 1KW only	0.83kg
10	AC/DC Rectifier	PS-010	With 2 pcs of 5A fuse attached	3.5kg
11	AC Power cable	VV-2D8-3M	Both ends fly lead (for power supply)	3m
12	Junction box (For navigator unit)	JB-10	1input, 3output x 2circuits	0.4kg
		JB-12	1input, 3output, 3 input, 1output	0.42kg
13	Connecting cable	CW-373-5M	6 pin waterproof connectors (LTW) both ends	5m

Equipment Composition

No	Item name	Type name	Remarks	Weight/ Length
13	Connecting cable	CW-374-5M	6 pin connector/6 pin waterproof connector (LTW)	5m
		CW-376-5M	Fly leads/6 pin waterproof connector (LTW)	5m
		CW-381-5M	Half-pitched/6 pin waterproof connector (LTW)	5m
		CW-154A-5M	6 pin connector (Nisshin)/Fly leads	5m
14	Connector (female)	LTWBD-06BFFA-L180	6 pin waterproof connector (LTW) for NMEA0183	
		LTWBD-07BFFA-L180	7 pin waterproof connector (LTW) (For external sounder)	
		LTWBD-08BFFA-L180	8 pin waterproof connector (LTW) (For water temperature and speed sensor)	
		LTWBU-12BFFA-L180	12 pin waterproof connector (LTW) (For external monitor)	
15	Cable gland	CG-1	For steel hull	1.5kg
		CG-3	For wooden hull	2.5kg
		CG-16	For FRP hull	0.9kg
		CG-19	For FRP /wooden hull	1.0kg
16	Metal fittings	SL-2	Stainless, 1 1/2 inch	2.5kg
17	Operation manual	CVG-200. OM.E	English	

2.4 Transducers

Output	Type name	Frequency	Weight
600W	TD-500T-2B	50/200 kHz	0.7kg
	TD-500T-3B	50/200 kHz	1.5kg
1kW	TD-501C	50/200 kHz	4.2kg
	TD-501T-3B	50/200 kHz	3.6kg

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Specifications

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Chapter 3 Specifications

3.1 Specifications


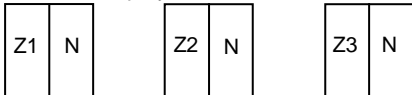




Specifications are subject to change without notice.

3.1.1 General Specifications

Display	10.4 inch color TFT LCD(480 x 640 dots)
Display mode	Plotter Echo Sounder (Single frequency normal image/Single frequency normal/zoom images/Dual frequency dual images) Plotter + Echo Sounder: Dual screen (Vertical split/Horizontal split) Compass Highway

3.1.2 Specifications of Sounder

TX frequency	50 kHz/200kHz Dual frequency
Output power	600W, 1kW
Sounding range Select either Auto range or 8 range scales from the scaling group listed to the right.	(meter / Japanese fathom / fathom / Italian fathom) 5, 7.5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1100, 1200 ----- (feet) 15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 440, 480, 520, 560, 600, 640, 680, 720, 760, 800, 840, 880, 920, 960, 1000, 1040, 1080, 1120, 1160, 1200, 1240, 1280, 1320, 1360, 1400, 1440, 1480, 1520, 1560, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200, 3400, 3600, 3800, 4000
Zoom range Select 1 range scale from the scaling group listed to the right.	(meter / Japanese fathom / fathom / Italian fathom) 2.5, 5, 7.5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200 ----- (feet) 10, 15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 320, 360, 400, 450, 500, 550, 600, 650
Shift Automatic or manual	(meter / Japanese fathom / fathom / Italian fathom) 0 to 3000 (feet) 0 to 8000
Display color	16 colors (red, orange, yellow, green, light green, white, light blue, blue and neutral colors) (Color pallet can be changed.) Background (9 colors)

<p>Picture mode N: Normal (incl. SHIFT) Z1: (Zoom1) Bottom Lock Z2: (Zoom2) Bottom Discrimination Z3: Bottom Zoom BZ: Bottom Zoom (H): High frequency (L): Low frequency</p> <p>In a split display, the screen positions can be swapped. The display can also be switched in-between vertical and horizontal partitioning.</p>	<p>• High/Low frequency</p> <p>Single display</p>  <p>Dual display</p>  <p>• High/Low freq. : Normal</p>  <p>• High/Low freq.: Bottom Zoom</p>  <p>A-scope display can be added to each of the above display modes.</p>
Interference rejection	3 steps (OFF, 1, 2)
Color rejection	15 steps (one out of 15colors)
Alarm	Fish alarm, Depth alarm
Image speed	Fixed 12 speed (4/1, 3/1, 2/1, 1/1, 1/2, 1/3, 1/4, 1/6, 1/8, 1/12, 1/16) and Stop
Output reduction	2 steps (Standard and reduced)
Pulse width	4 steps (Very narrow, Narrow, Middle, Wide)
Color tone	3 steps (1, 2, 3)
Background color	9 steps (1, 2, 3, 4, 5, 6, 7, 8, 9)
Depth display	4 steps (Off, Large, Middle, Small)
Depth display position	2 steps (Down or Up)
Depth scale display	3 ways (Off, One, All)
Scale position	2 ways (Edge or Center)
Scale numeral display	2 ways (Large or Small)
Time mark	3 ways (Off, 10 sec, 1 min)
Image feed direction	2 ways (← ← ← →)
Image split	
Image swap	
Water temperature	3 ways (Off, °C, °F)
Auto function	Depth range, shift, gain
Depth unit	5 kinds (m, J.fm, fm, I.fm, ft)
Bottom detection range	2 ways (Within or outside the sonar display)
Depth sounding	3 ways (Auto, High frequency, Low frequency)
Marker	Depth marker (VRM) 2 Line, Scale, Zoom range marker, Alarm range marker, Time maker, Color pattern
Key (used only for the following functions)	GAIN (Gain, Enhancement, STC) SHIFT, VRM, RANGE, MODE
Other functions	Enhancement, White line, A scope, Water Temperature graph, Draft, Bottom detection start position, Sonic correction, Temperature correction, Speed correction, INT/EXT sync switching, PRR, Color change, INT/EXT Water temperature switching, Bottom detection threshold

3.1.3 Specifications of Plotter

Map mode		Mercator projection
Display mode		North-up, East-up, South-up, West-up, Course-up (Waypoint), Head-up and Centered North-up
Zooming range		0.01 to 3,600 nm(0.02 to 6,600 km) around Equator
Effective map creation area		Below the latitude 75 degree
Plotting interval	Time	1, 2, 5, 10, 20, 30, 60, 120, 300, 600 sec
	Distance	0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0 nm (km)
Number of plots		2,000, 4,000, 7,000 (maximum plot) x 7 blocks
Track color		7 colors(Normal/Depth/Temperature : changeable)
Position data display		Lat/Lon, Loran C LOP, Decca LOP
Navigation data display		Own ship's position, Own ship's course, Own ship's speed, Waypoint position, Waypoint bearing, Waypoint distance, POB position, POB bearing, POB distance, Cursor position, Cursor bearing, Cursor distance
Position registration		8,300points (All points can be registered as waypoint)
Mark color		7 colors
Mark shape		○ □ ▽ × ☆ ◇ △ (The mark ☆ ◇ △ are only useable in Mark Editing mode)
Route		50 routes(1route 50 waypoints), user can add comments (up to 12 characters)
Graphics	Drawing nodes	3,500 points(500 points x 7blocks)
	Display color	7colors
Alarm		Arrival, POB, Cross track error, Grounding, Depth , Fish
Position correction		By cursor
Magnetic compass correction		Auto, Manual
Tracking other ships track *1		Track up to 10 other ships. Each ship's course can be tracked and recorded for a course consisting of up to 1000 points.
Memory backup		By Lithium battery (for SRAM backup) and Non-volatile ROM
Other function		Displays names of places, Ring markers, stores landmark data, calculates the distance between two points, Draw Parallel Lines, information windows, stores/retrieves memory card data.

*1 : ATA information from a radar unit required.

3.2 Serial Data

Input data

Type: NMEA0183 Ver.2.0/1.5
Sentence: GPS/DGPS(J5) : HDT, GGA, GLL, MSK, MSS, PKODA, PKODG, RMC, VTG,
CH1(J2), CH2(J6) : HDT, MTW, TLL, TTM

Output data

Type: NMEA0183 Ver,2.0
Sentence: CH1(J2) : APB, BWC, BOD,GGA, GLL, GTD, VTG, WPL, XTE, ZDA
CH2(J6) : APB, BWC, GGA, GTD, VTG, WPL, ZDA
Choice : RMB,DBT,DPT,MTW

3.3 Power Requirements

Input voltage: 10.8 to 31.2 VDC

Power consumption: Less than 45W (at 24 VDC)

AC Operation: AC/DC rectifier PS-010 is required.

Input voltage range: 100/115 VAC or 200/230 VAC

Voltage fluctuation allowance: +/- 10%

Frequency fluctuation allowance: 47 to 63 Hz

3.4 Environmental Conditions

(1) Temperature and humidity

Operation temperature: -15°C to +55°C

Storage temperature: -30°C to +70°C

Humidity: 93% +/-3% @+40°C

(2) Vibration

The equipment operates normally under the following vibrating conditions:

5 Hz - 13.2 Hz: Amplitude +/-1mm+/-10% (Maximum acceleration of 7m/s² at 13.2 Hz)

13.2 Hz-60 Hz: Maximum acceleration of 7 m/s² being applied

(3) Water proof

IPX5 (Water jet proof)

3.5 External Dimensions and Weight

External dimensions: Width x Depth x Height unit (mm)

Dimensions: 380 x 138 x 340

Weight : 6.8 Kg

Dimensions:

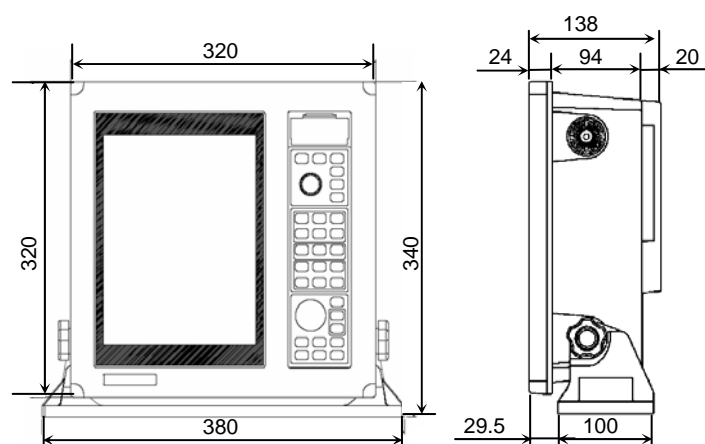


Figure 3.1 External dimensions of CVG-200

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Chapter 4 Installation

4.1 Installation Considerations

Qualified service technicians should perform the installation of CVG-200 that comprises of the following operations:

- (1) Unpacking each component of the system.
- (2) Inspection of the exterior of each component unit and accessory.
- (3) Checking the ship's mains voltage and current capacity.
- (4) Determining the installation site.
- (5) Installing the Display unit.
- (6) Mounting the accessories.
- (7) Planning the cable routing and connections.
- (8) Adjustment and setups.

4.2 Unpacking of The Box

Unpack your package and check if all of the items stated in the packing list are contained in the package. If not, report this to an insurance agent for tracing missing goods or refund.

4.3 Inspection of The Equipment

Carefully check the exterior of each component unit for dents, damage, etc. In particular, the LCD is vulnerable to physical damage. During transportation, the LCD is liable to breakage despite its protective packing.

4.4 Proper Location for Setup

To achieve best operational performance, the following factors must be considered.

- (1) The display unit should be positioned in the location where the external situation can be viewed.
- (2) This unit should be positioned where the navigator or operator can easily see the screen.
- (3) Select a position safe and free from dampness, water spray, rain and direct sunlight.
- (4) Provide enough space for servicing. Consider access to the rear panel for connecting various cables.
- (5) Position the display unit as far away as possible away from other radio equipment.

4.5 Cable Routing and Connections

- (1) The transducer cables should be securely fastened to the display using cable clamps and run separately away from other cables such as, radio antenna feeder, power cables, etc. Under no circumstances should it be in parallel arrangement with other cables. These precautions are essential to avoid radio interference to/from other equipment installed on the ship. If this arrangement is not possible, either cable set should be screened with a metal conduit or another form of shielding.

- (2) The display unit should be grounded to the hull with a wire cut as short as possible. We recommend using a wide and heavy copper braid or plate to be connected to a grounding stud at the rear of the display unit.
- (3) The power supply cable should be connected directly to the ship's battery to avoid RF noise conducted from other equipment on board.

4.6 Display Installation

The display unit is designed for table mount and flush mount. Refer to the following description for installation (Refer to Figure 4.1 to 4.4)

4.6.1 Table mounting

- (1) Remove the two knurled fixing knobs that fix the display unit to the mounting bracket.
- (2) Remove the display unit from the bracket and place it on a flat and safe area.
- (3) Place the mounting bracket to the place where the display unit is to be installed, and fix the bracket with four (4) M5 tapping screws. Provide enough space for servicing. (Refer to Figure 4.2)
- (4) Reset the display unit on to the bracket and fix it using the two knobs that were removed in step (1)

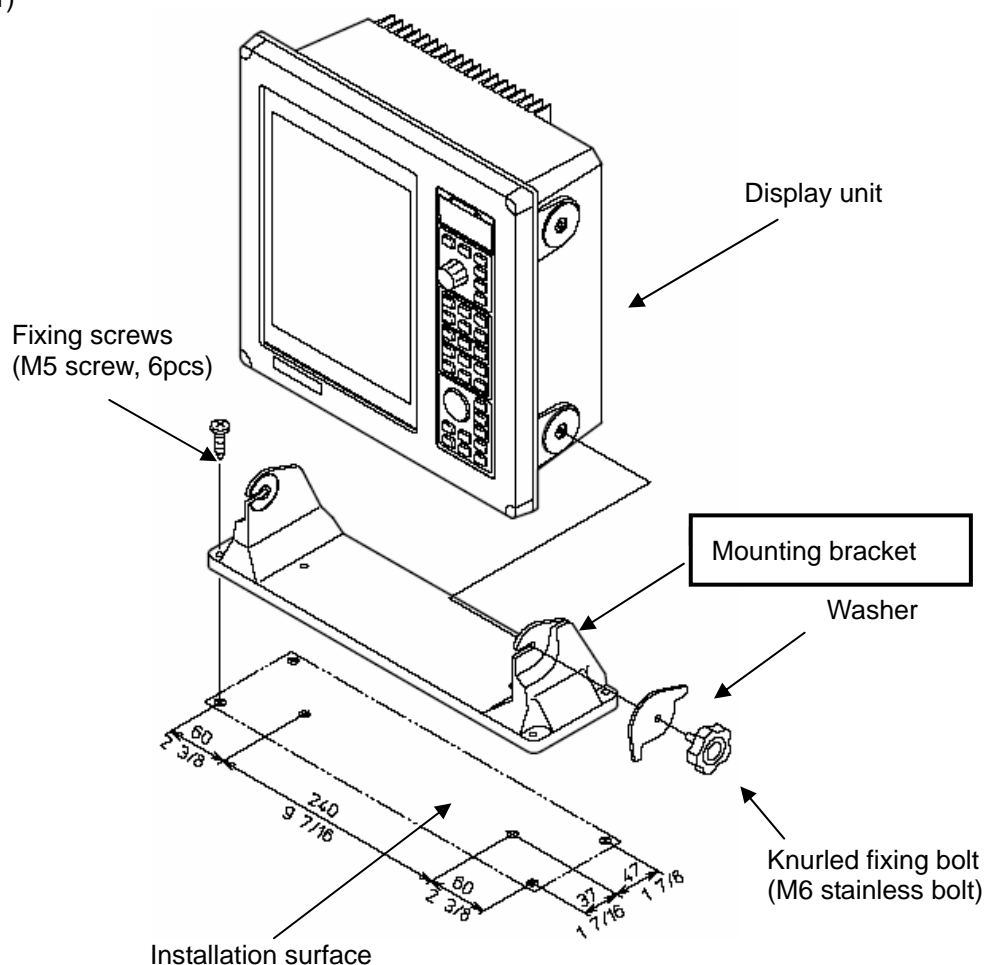
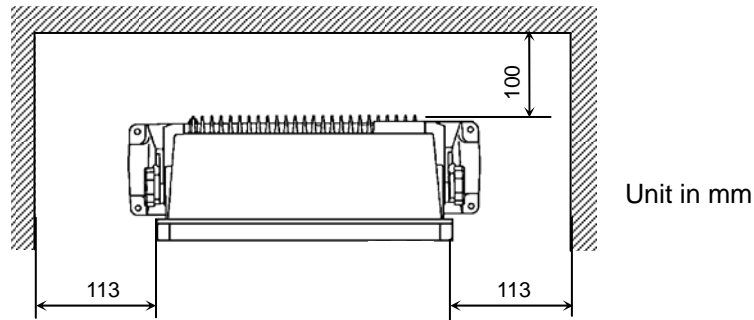
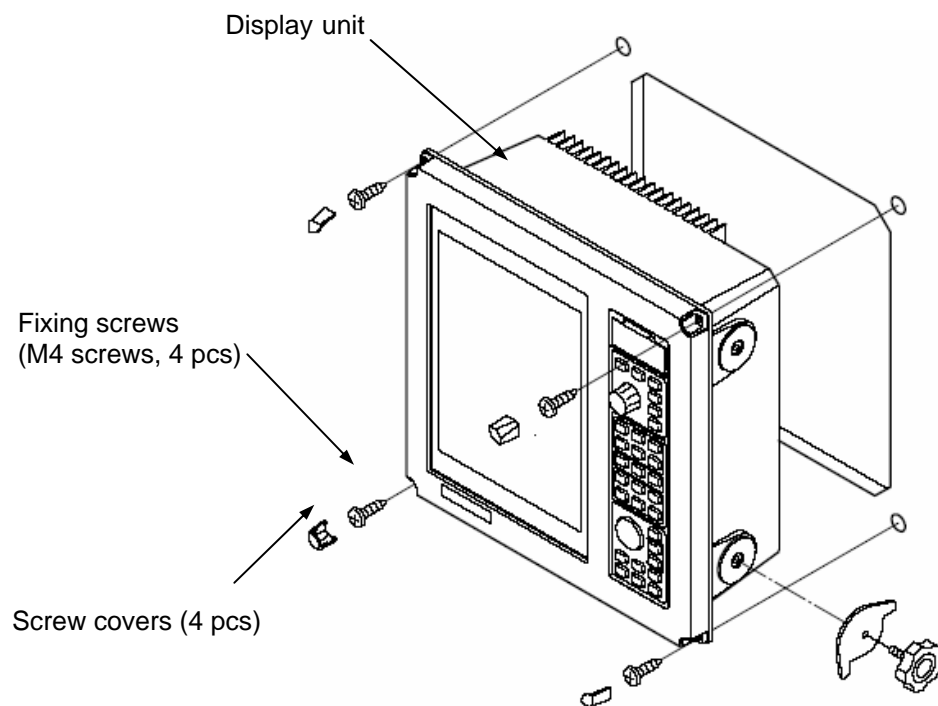


Figure4.1 Fitting detail

**Figure 4.2 Servicing Access space required**

4.6.2 Flush mounting

- (1) Cut a rectangle opening. (Refer to Figure 4.4)
- (2) Loosen two (2) fixing bolts that fasten the display unit on to the mounting bracket.
- (3) Remove four (4) plastic screw covers, which are fitted on each corner of the display front face. (Pull up and out for easy removal.) Do not lose these screw covers.
- (4) Put the display on the opening and fix with four (4) tapping screws. In case you use M4 screws to fix the display, select an appropriate screw length that best suits fixing the unit to the panel thickness.
- (5) Refit the covers removed in step (3).

**Figure 4.3 Flush mounting**

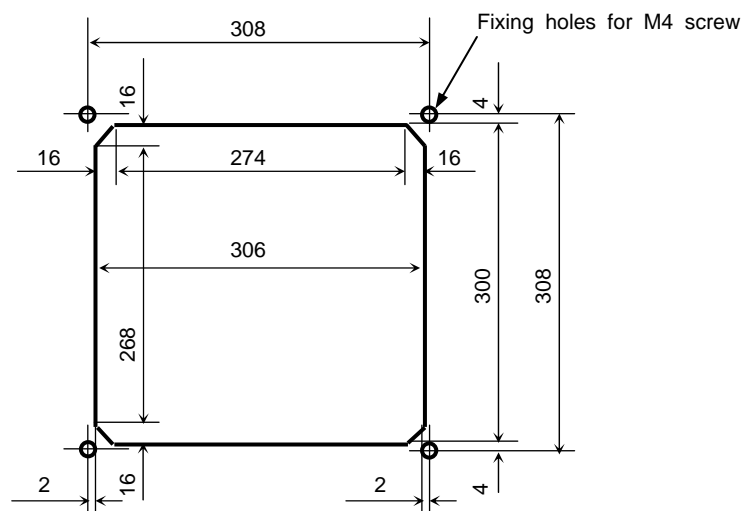


Figure 4.4 Dimensions of opening and fixing holes for flush mounting

4.7 Inter-connections of The System

As pictured in Figure 4.5, connect the various cables to their prescribed locations on the rear panel of the display unit.

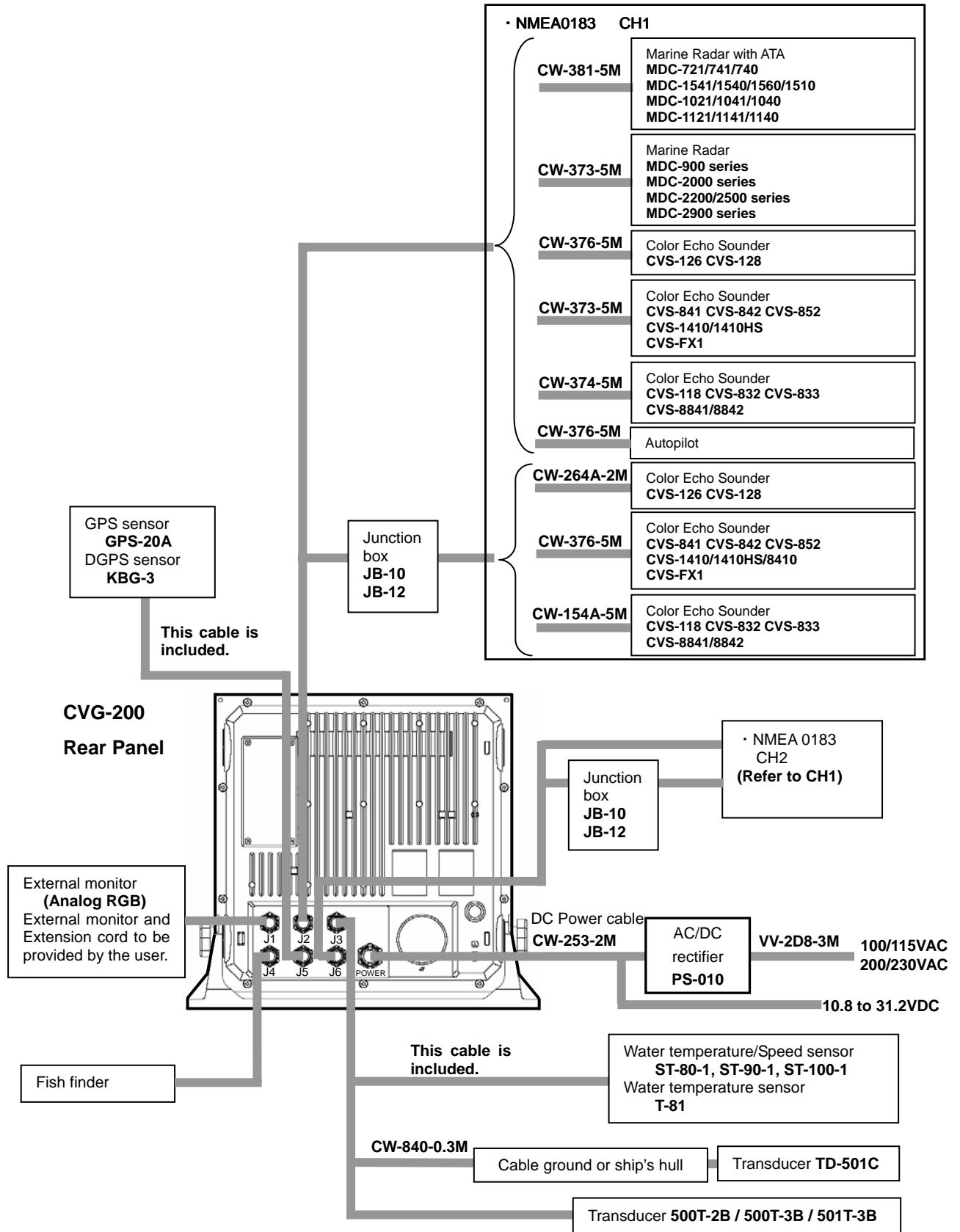
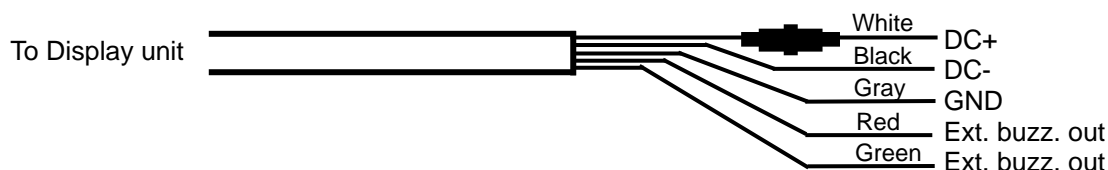


Figure 4.5 Inter-connections

4.7.1 Preparation of DC Power cable (CW-253-2M)



4.7.2 Connecting the Transducer and Temperature/Speed Sensor

The connectors for TD-500T-2B/500T-3B/501T-3B transducer are equipped with 8-pin water resistant connector (LTW). The 8-pin water resistant connector (LTW) of the TD-500T-2B/500T-3B become 5 lead wires. These lead wires are utilized when connecting the optional Temperature/Speed Sensors (ST-80-1, ST-90-1, ST-100-1 and T-81). Also, the TD-501T-3B transducer is equipped with a water temperature sensor.

4.7.2.1 Connecting the Transducer

1) TD-500T-2B/500T-3B

Connect to the J3 connector on the back of the receiver display unit. Use the blue, purple, green, red and black wires when connecting the temperature/speed sensor.

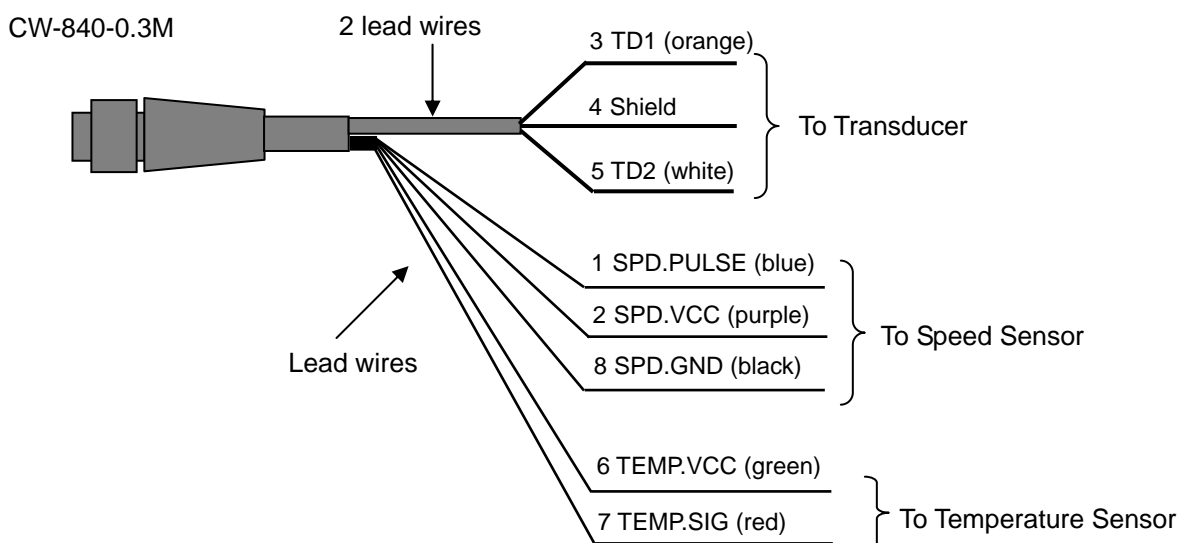
2) TD-501T-3B (with Water Temperature Sensor)

Connect to the J3 connector on the back of the receiver display unit.

3) TD-500T-2/500T-3/501T-3/501C

The user must have the cable. CW-840-0.3M (option) for the transducer.

Solder the transducer to CW-840-0.3M while referring to the table on connecting transducers. After soldering is completed, please be sure to add water-resistance and insulation by applying electrical tape (or other such tape) onto the soldered part of the cable.



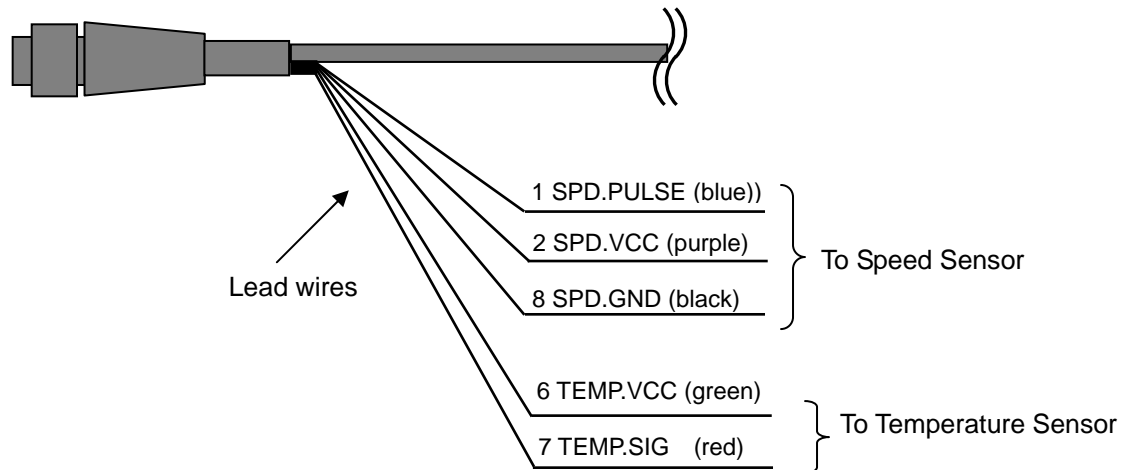
Transducer Connection Table

Transducer Cable		Transducer	
2 lead shield wire number	2 lead shield wire color	TD-500T-2 TD-500T-3	TD-501T-3 TD-501C
3	orange	red	black
4	shield	shield	shield
5	white	white	white

4.7.2.2 Connecting Water Temperature/Speed Sensors

Solder the wire protruding from TD-500T-2B/500T-3B or CW-840-0.3M, while referring to the table on connecting water temperature/speed sensors.

After soldering is completed, please be sure to add water-resistance and insulation by applying electrical tape (or other such tape) onto the soldered part of the cable.



Water Temperature/Speed Sensor Connection Table

CW-840-0.3M TD-500T-2B TD-500T-3B		Water Temperature/Speed Sensor				
Lead Wire Number	Lead Wire Color	T-81 Note1	ST-80 ST-80-1	ST-90 ST-90-1	ST-100 ST-100-1	TD-501T-3
1	blue	-	green	green	green	-
2	purple	-	red	red	red	-
6	green	gray	white	white	white	green
7	red	gray	brown	brown	brown	red
8	black	-	shield	shield	shield	-

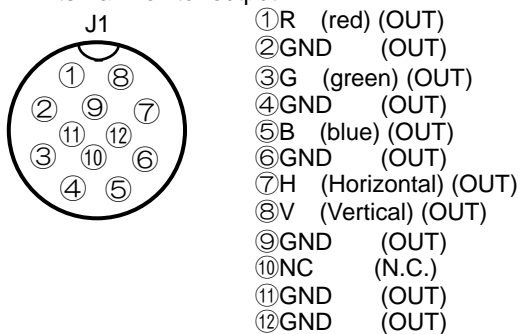
Note 1: 2 gray colored wires protrude from T-81.

Please connect the proper wires to the green and red wires of CW-840-0.3M.

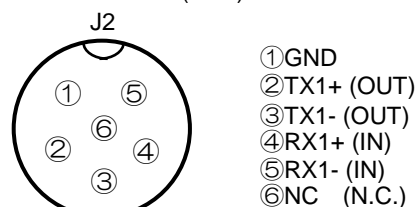
4.7.3 Layouts of the Pin Connections

The connector pin layouts pictured in J1 to J6, POWER shows a view from the rear of the receiver display unit. (The views of the plugs are shown from the soldered side of the plug.)

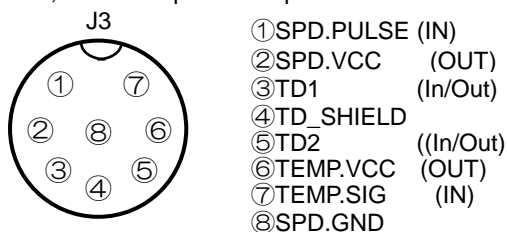
• External Monitor output



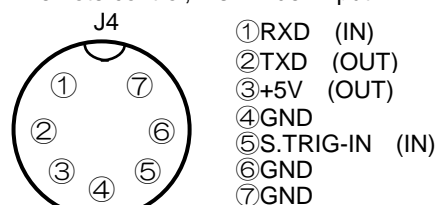
• NMEA In/Out (CH1)



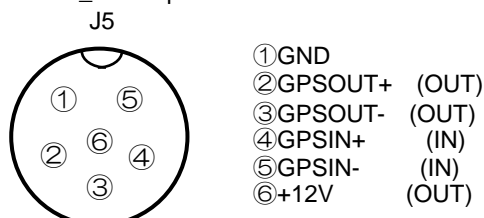
• TD, Water temperature/Speed sensor



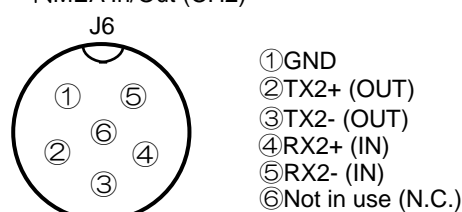
• Remote control, Fish finder Input



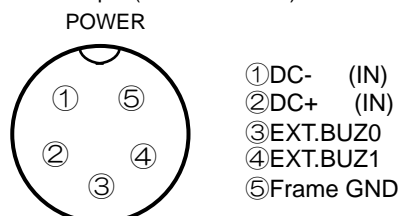
• GPS_ANT Input



• NMEA In/Out (CH2)



• DC Input (10.8~31.2VDC)



4.8 Post-installation Inspections

Before you turn the CVG-200 on, check the following points to make sure the CVG-200 operates properly:

(1) Is the ship's supply voltage and current within the proper range?

Input voltage: 10.8 to 31.2 VDC at POWER connector

(2) Are the cables routed and connected properly? No wrong connections, no short circuits, etc?

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Basic Operation

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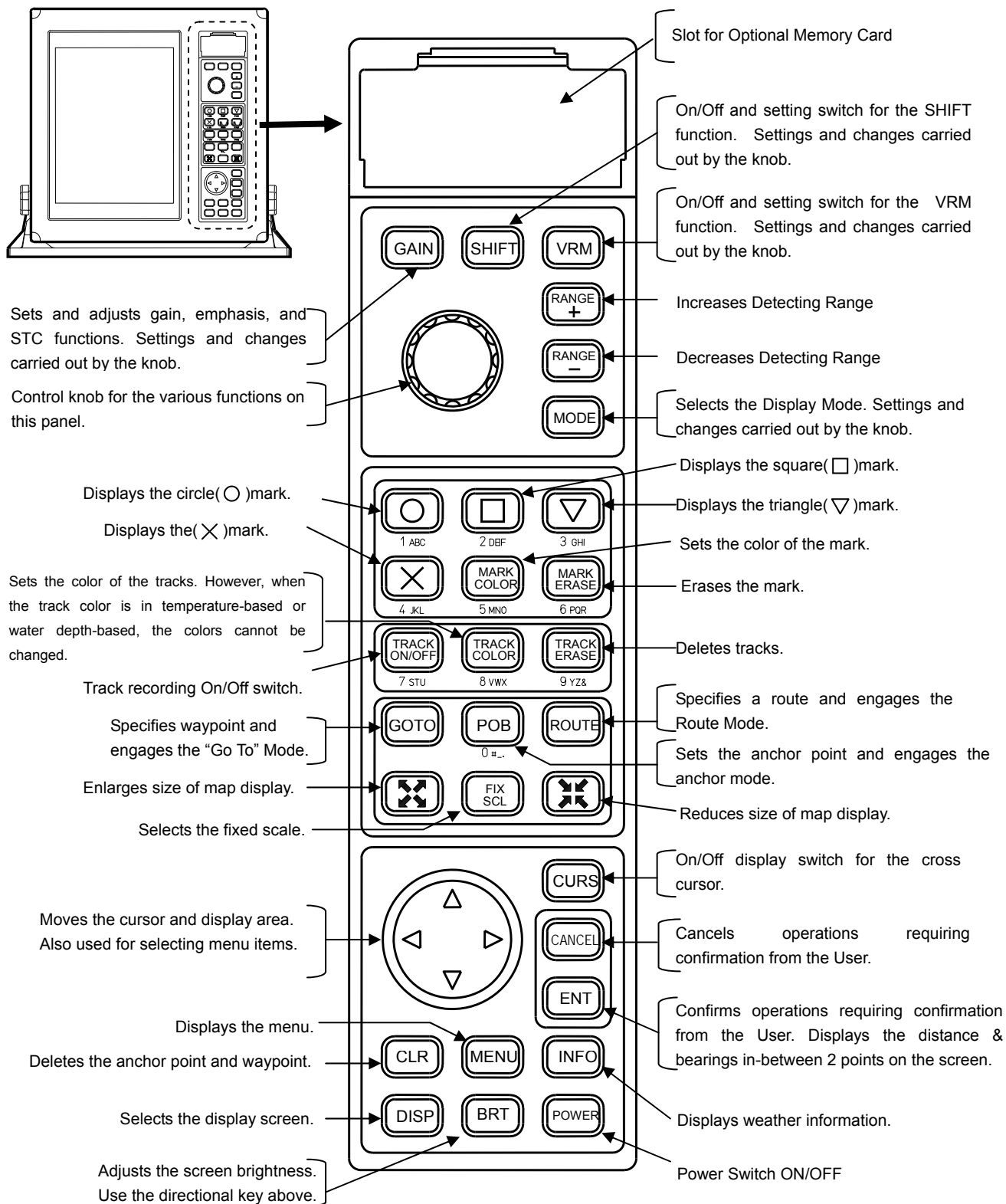
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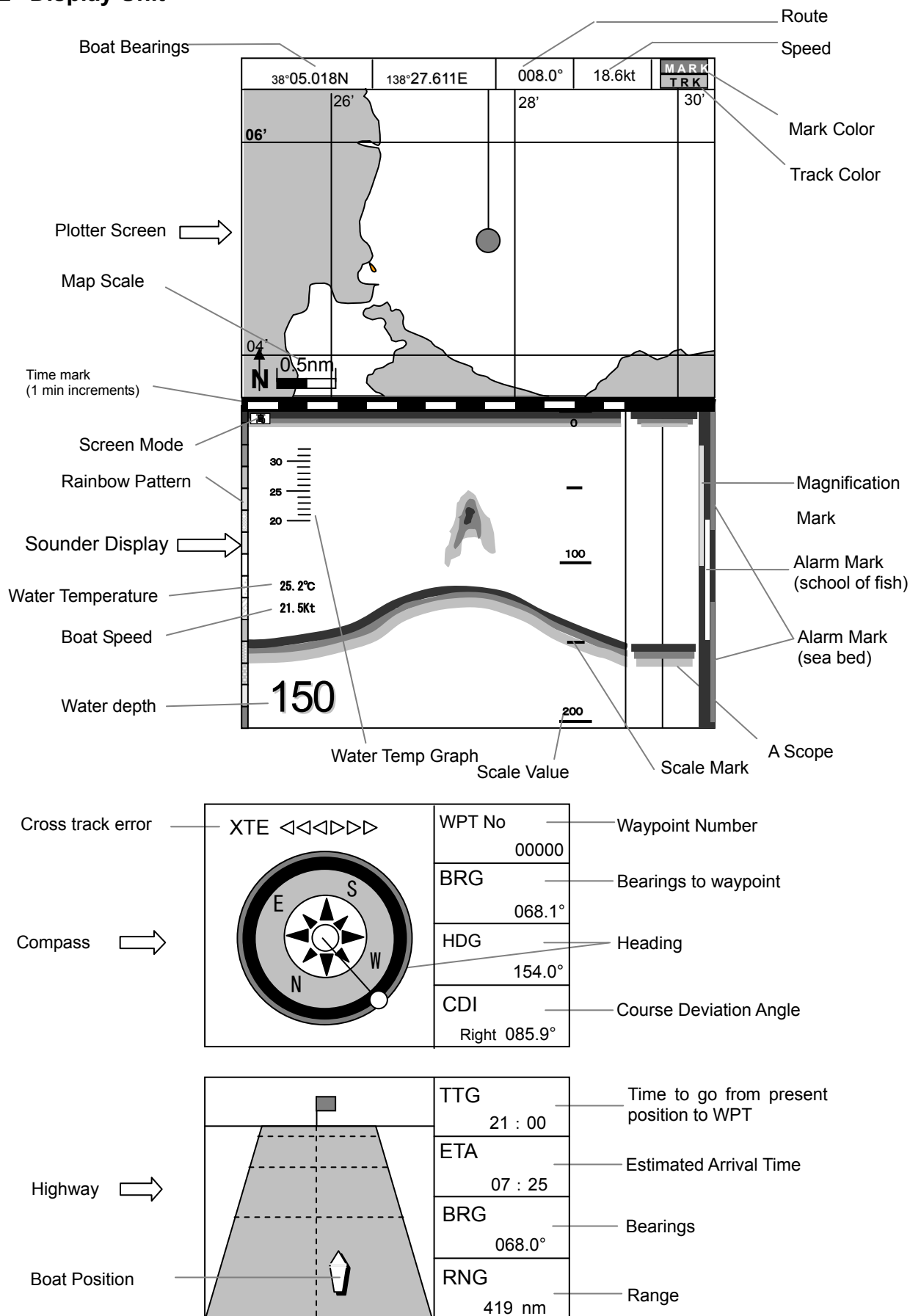
Chapter 5 Basic Operation

5.1 Name and Function of Parts

5.1.1 Control Panel



5.1.2 Display Unit



5.2 C-MAP NT MAX INFORMATION

MAX is a major evolution of NT/NT+ product technology. The key points are:

New Data Features

Tides and Currents (Intuitive arrows show direction and strength)

World Background Charts with terrestrial data

Value Added Data (Pictures and Diagrams. Land Data)

Enhanced Port Info

New Presentation Features

Clear View (advanced legibility techniques providing chart data on the screen)

Dynamic Nav-Aids (an innovative and dynamic presentation mode)

Dynamic Elevation Data (optimized palettes for chart plotter with more than 256 colors; includes new NOAA palette)

Perspective view ("Real World" perspective view of the chart, Updated real-time during navigation)

MAX and NT/NT+ C-CARD coexistence

When NT+ data and MAX data cover different areas, the chart plotter gets data from both charts (depending on the current position).

When NT+ data and MAX data cover the same area, the chart plotter gets data only from the MAX chart.

This is for the World Wide Background as well.

5.3 Displaying the Image

5.3.1 Power On/Off

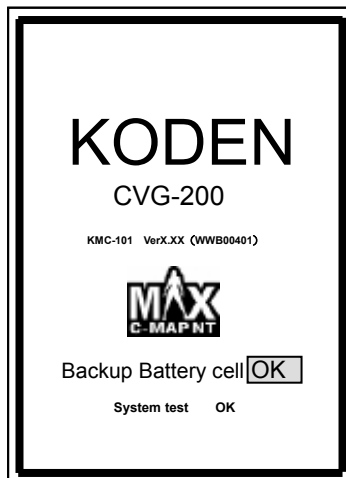
When the power is off, press to



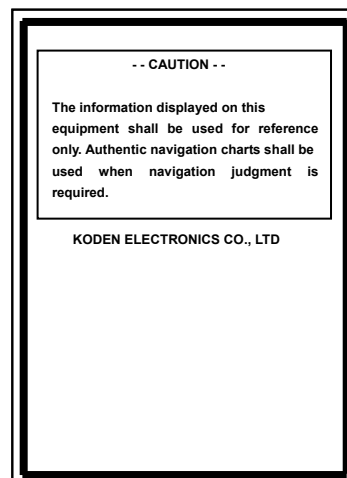
turn the power on.

Also, when the power is on,

pressing turns the power off.



This display appears when the power is switched on.



Caution display

5.3.2 Brightness Setting

Push , and the brightness display shall appear.

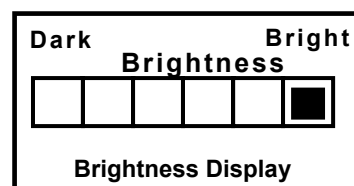
Push the directional key or to set the brightness.

You can also adjust the brightness one increment at a time by pressing repeatedly. A brightness setting left without adjustment for over 5 seconds will be taken as the current setting.

The user may alter the preset factory brightness.

To record the user's brightness setting, follow the procedure outlined below:

→ "etc" → "Maintenance" → "System Test" →
"Brightness" → [Set] →



5.3.3 Choosing the Display

Push repeatedly to pull up various pre-stored display screens.

The user can store or delete displays according to the procedure outlined below:

→ "etc" → "Screen Display Registration" → [set] →

Caution



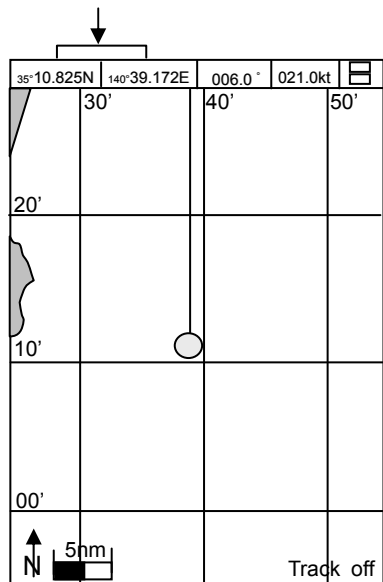
On Head up and Own ship center fix mode, sounder and plotter combined screen cannot be selected.

5.4 Plotter Screen

5.4.1 Discovering Current Position

The current position of the user's boat is displayed through the latitude and longitude (appearing in the upper left hand corner of the display) or by the LOP.

Current Position





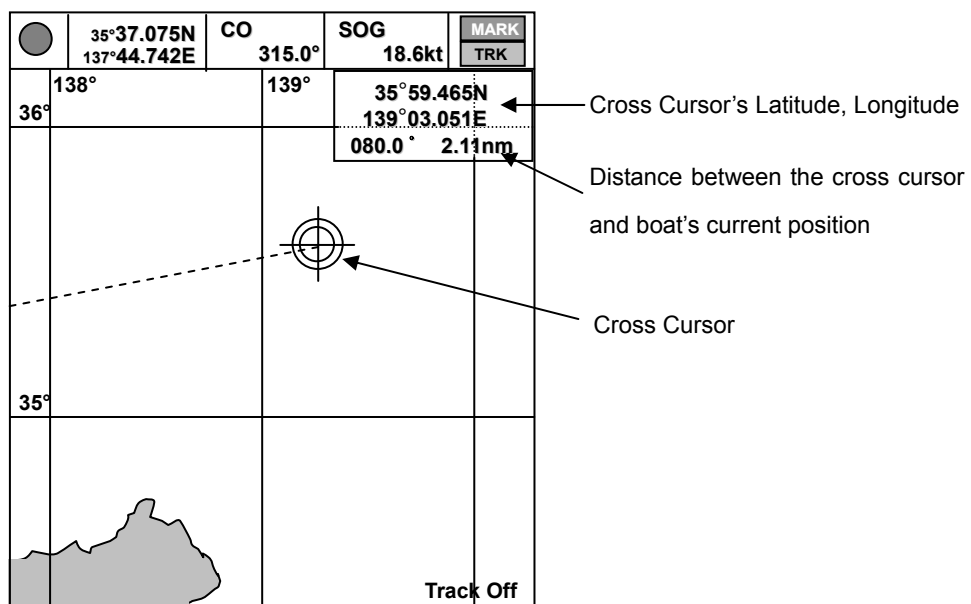
Displaying the LOP allows the user to choose between LORAN C or DECCA.

Displaying the current position is done by the following procedure:

[MENU] → **“Plotter”** → **“Display Settings”** → **“Position Data Display”** →
[set] → **[MENU]**

5.4.2 Moving the Display with the Cross Cursor

Using the cross cursor allows for free movement of the screen. Push  and the cross cursor will appear on the plotter screen. Push the directional key and the cross cursor will move in the same direction. While the cross cursor is displayed, its latitude and longitude as well as the cursor's distance to the user's boat is displayed in a transparent window in the upper right-hand part of the screen. With the cross cursor displayed, pressing  once more causes the transparent window to disappear.



5.4.3 Moving the Display without the Cross Cursor

The user can move the display using the directional key.

There are two types of display movements: "viewpoint" and "chart."

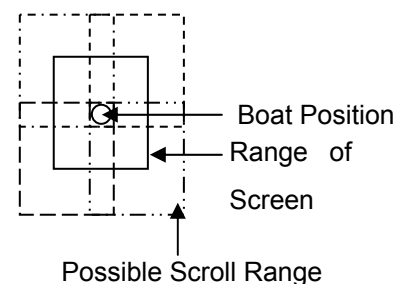
Choose "viewpoint," and the map moves in the opposite direction that the user pushes the directional key.

Chose "chart," and the map moves in the same direction that the user pushes the directional key.

When the cross cursor is not displayed, the limit of map movement coincides with the display limit of the scope of the boat's position.

Settings for screen scrolling are set as follows:

 → **"Plotter"** → **"System Settings"** → **"Screen Direction"** →
[Set] → 

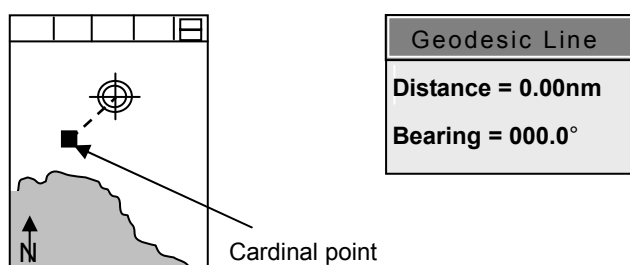


5.4.4 Display of Distance between Two Points and Bearings

Using the cross cursor enables the user to calculate the distance between two points as well as bearing.

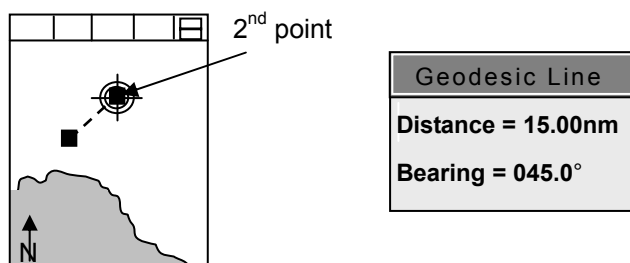
Push **CURS** and the cross cursor shall appear on the plotter.

Move the cross cursor to the desired cardinal point, and press **ENT**. A screen showing the distance between two points shall appear.



Move the cross cursor to where you want to measure distance and bearings in relation to the cardinal point and press **ENT**.

On the “Two-Point Display” the distance and bearings shall appear.




Move the cross cursor once again, and the distance between the cardinal point and this new point can be displayed.

Press any key except for **ENT**, and the “Two-Point Display” shall close.


5.4.5 Altering Scale of Map Display

5.4.5.1 Magnification of Map Display

Press  and the user can magnify the map display.


Normally, magnification takes place with the boat being in the center. When the cross cursor is displayed, rather than the boat being the center-point, the cross cursor is taken as the center-point.

5.4.5.2 Reduction of Map Display



Press  and the user can reduce the map display.

Normally, reduction takes place with the boat being in the center. When the cross cursor is displayed, rather than the boat being the center-point, the cross cursor is taken as the center-point.

5.4.5.3 Fixed Scale

Press  repeatedly and the user can choose from three pre-set fixed scales. Normally, magnification/reduction takes place with the boat being in the center. When the cross cursor is displayed, rather than the boat being the center-point, the cross cursor is taken as the center-point.

Using the Fixed Scale option enables the user to quickly choose from three frequently used display scales. To create and store a new fixed scale, follow the procedure outlined below:

 → “Plotter” → “System Settings” →
“Fixed Scales 1-3” → [Set] → 


Note: About C-MAP chart

When a C-MAP chart card for a special area is used, there are cases where no chart could be displayed at some positions or at some ranges.

This is because that there is no most appropriate chart information and not because of the failure. In those cases, please try to change the range to get the chart.

5.4.6 Settings of Tracks

5.4.6.1 Display of Tracks

Press  recording of tracks can be activated or deactivated.

Activating track recording causes “Turns on a ship’s track display.” to appear on the display. The number of tracks shall appear on the lower right-hand corner of the plotter.

Deactivating track recording causes “Turns off a ship’s track display.” to appear on the display. Only the mark showing the boat’s current position shall move. The lower right-hand corner of the plotter shall display “Track Display Suspended.” Activating track recording shall once again commence track recording from the boat’s current position.

To set the interval for track recording, follow the procedure outlined below:

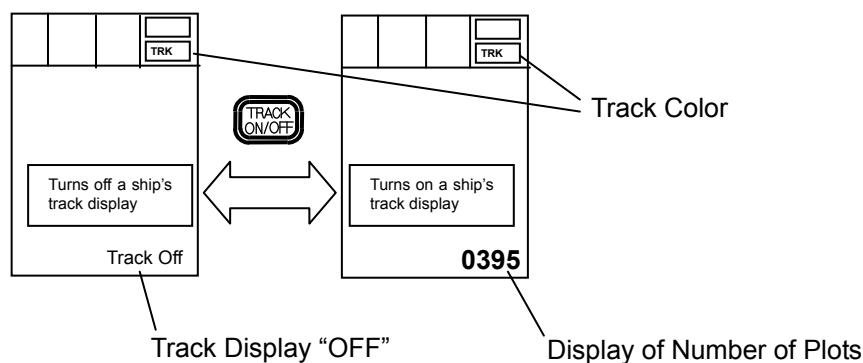
 → “Plotter” → “System Settings” → “Plot Interval” → [Set]
→ 

The number of plotting points for track recording are set as follows: 2000, 4000, and 7000. You can change the setting by the following procedure:

 → “Plotter” → “System Setting” → “Number of Plot” → [Set] → 

Should the number of plotting points exceed the setting, the previous plotting points shall be overwritten with the new data, starting with the oldest data being overwritten first. Important data can be stored by the following procedure:

 → “Plotter” → “Track Store” → [Set] → 



5.4.6.2 Track Color Settings

There are 3 types of Settings for Track Color: “**Normal**”, “**Sounding RESP**”, and “**W_Temp RESP**.”

Normal: Manually choose from 7 colors in this setting.


Sounding RESP: Based on the depth of the water, the color of the tracks shall be automatically colored. When the water depth cannot be measured, the tracks are automatically assigned a green color.

W_Temp RESP : Based on the water temperature, the color of the tracks shall be automatically colored. When the water temperature cannot be measured, the tracks are automatically assigned a green color.



Procedure for selecting settings is as follows:

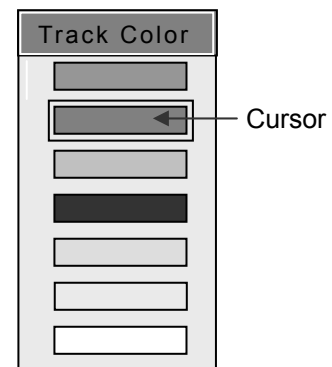
 → “**Plotter**” → “**Track Color**” → [Set] → 

5.4.6.2.1 Normal Track Coloring


Push  and the track color selection window shall appear.

The cursor in the selection window indicates which color is the current setting.

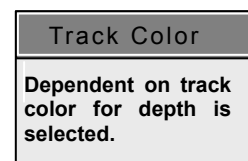
The cursor may be moved up or down using the directional keys:  or . Should the setting remain unaltered for more than 5 seconds, the color upon which the cursor is resting shall be designated as the current color setting.



5.4.6.2.2 Depth-based Coloring

When the track colors are determined by depth, pressing  shall cause the window at the right to appear.


In these cases, the track colors cannot be changed.

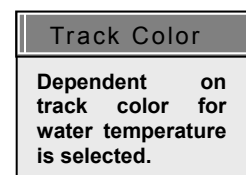


Setting track coloring to depth-based coloring can be done as follows:

 → “**Plotter**” → “**Track Color**” → [Set] → 

5.4.6.2.3 Water Temperature-Based Coloring

When the track colors are determined by water temperature, pressing  shall cause the window at the right to appear. In these cases, the track colors cannot be changed.



Setting track coloring to water temperature based coloring can be done as follows:

 → “**Plotter**” → “**Track Color**” → [Set] → 


5.4.6.3 Deleting Tracks



Deleting tracks depends on the state of the cross cursor.


Cross Cursor not displayed.....Deletion based on color

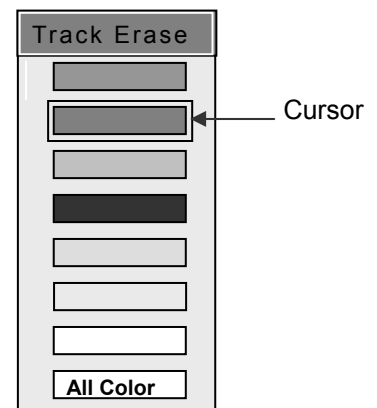
Cross Cursor displayed.....Deletion based on specified range

5.4.6.3.1 Procedure for Color-Based Track Deletion

With the cross cursor not displayed, press  and the window to the right shall appear.


Choose the color of tracks to be deleted by using the directional keys:  or .

Press  to delete the tracks with the color specified by the cursor. When "All Colors" is specified by the cursor, all tracks shall be deleted.




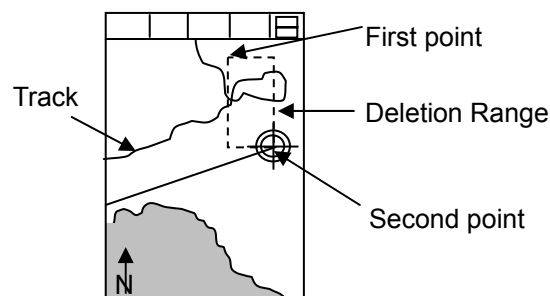
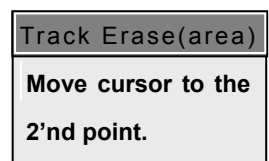
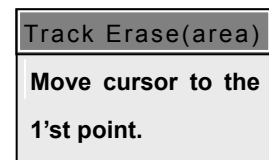
5.4.6.3.2 Procedure for Range-Based Deletion

With the cross cursor displayed, press  and the track/range deletion window shall appear.

Using the directional key, move the cross cursor to your designated first point and press .

Next, using the directional key, designate a second point in order to form a deletion range in the shape of a rectangle.

Press  to delete the tracks within the rectangle.




Caution




Deleted tracks cannot be recovered. Please confirm before deletion.

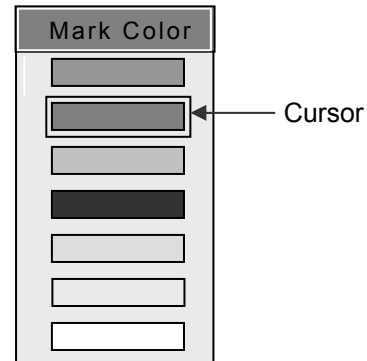
5.4.7 Mark Settings

5.4.7.1 Mark Color Settings

Press  and the mark color setting window shall appear.

Use the directional keys to specify the mark color:  or 

Press  to choose the color specified by the cursor.



5.4.7.2 Registering Marks

Registering marks depends on the state of the cross cursor.

Cross Cursor not displayed.....Current position registered

Cross Cursor displayed.....Cross Cursor's current position registered

Mark numbers are displayed beginning from lowest number first within the selected block of marks.

When the selected block of marks is not empty, marks cannot be registered.

Choosing a block of marks is carried out by the following procedure:

 → “Plotter” → “Mark Block Number” → [Set] → 

5.4.7.2.1 Registration of Current Position

When the cross cursor is not displayed, push one of the following mark keys:



Doing so will leave a mark in the current position.

5.4.7.2.2 Registration of Cross Cursor Current Position

With the cross cursor displayed, push one of the following mark keys:



A mark is left in the cross cursor's current position.


5.4.7.3 Mark Deletion





Mark deletion depends on the state of the cross cursor.


Cross Cursor not displayed.....Deletion based on color and shape of mark

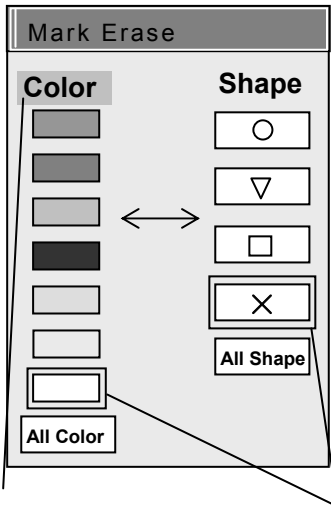
Cross Cursor displayed.....Deletion by Cross Cursor

5.4.7.3.1 Deletion Based on Color and Shape of Mark

With the cross cursor not displayed, press  and the mark deletion window shall appear.

Push  and choose among color to delete. Choose among shapes to delete by pressing:  Choose which specific colors and shapes to delete by pressing the following keys:  or .

Press  in order to delete the marks of the specified colors and shapes.




Color/Shape category cursor

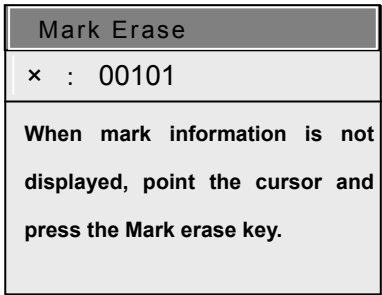
Cursor

5.4.7.3.2 Deletion by Cross Cursor


Move the cross cursor onto the mark to be deleted.

Press  and the mark erase window shall appear.
Confirm which mark within the mark erase window is to be erased.

Press  and the selected mark shall be deleted.



Caution








Deleted marks cannot be recovered. Please confirm before deletion.

5.4.7.4 Storing Events

Storing events may be labeled as Mark 00 to Mark 99. This information can be displayed on the top of the screen. The number of the mark being reported on can be changed.

To utilize this function, the procedure outlined below must be done beforehand:

- (1)  → "Plotter" → "Mark Block Number" →
"Choose 00000" → [Set] → 
- (2)  → "Plotter" → "System Settings" →
"Event Store" → "Choose 0 ~ 99" → [Set] → 


After performing the procedure above, pressing the mark registration button  or shall cause the event information window to appear in the upper right-hand corner of the plotter.

Information on the specified mark shall appear in the event information window.

When a mark is registered, the following information is displayed: bearings and distance from the boat, mark shape, mark number, and the latitude/longitude of the mark. Also, when date and time are added from an external source, this information is also displayed.



Bearing ---.°
Distance ---- nm
00 --/--/--
--:--:--
--°--.---
---°--.---

Mark not registered

Bearing ---.°
Distance ---- nm
 00 04/07/01
05:30:00
36°00.000N
138°00.000E

Mark registered

When the event information window's frame is red, the number of the mark can be altered.

Pushing  on the directional key increases the mark number, while pressing  on the directional key lowers the mark number. Any number between 00 and 99 are valid. When a displayed mark appears on the plotter, it shall blink. Should 5 seconds pass without further changes, the window frame shall turn black, signaling that changes to the mark number are no longer possible.

To once again change the mark number, press . The window frame shall turn red, and the mark number can again be altered. Also, to remove the event information window, press .


When entering information regarding an event, external fish finder entries and NMEA0183TLL sentences from POB from radars are acceptable. A red star mark (☆) is displayed when a TLL sentence signal is received. When the user wishes to only accept TLL sentences, set the Mark Block number to something besides 00000.

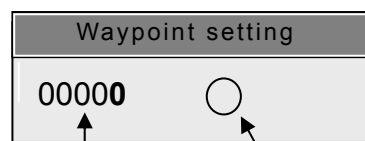
5.4.8 Setting Waypoints

To set waypoints, the user can use a registered mark or move the cursor to the destination.

5.4.8.1 Setting a Registered Mark as Waypoint

In Waypoint mode, a specified point becomes the waypoint. In the operation shown below, Waypoint mode begins with using the current position as a reference point.



- (1) Confirm that the cross cursor is not displayed anywhere on the screen.
- (2) Press  and the Waypoint Setting Window shall appear.

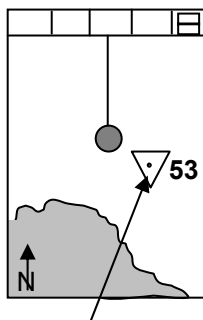


Mark Number

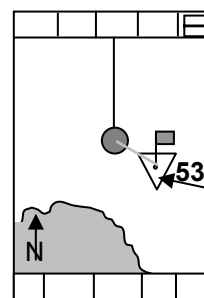
Shape of registered mark

(When no mark is registered, nothing shall appear here.)

- (2) Using the  key to choose the mark designated to be the waypoint. If the selected mark is on the screen, it shall blink.
- (3) Press  and the position of the selected mark shall become the waypoint.




This mark is chosen as the waypoint.



Mark No. 53 has been designated as the waypoint.

Information on the position of the waypoint is displayed here.

- When the waypoint is set, the bottom of the plotter shall display information pertaining to it.

	35°16.289N	139°45.569E	277.3°	44.1nm
---	------------	-------------	--------	--------


Waypoint Mark

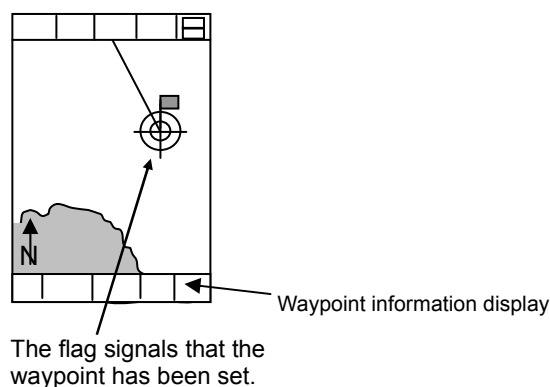
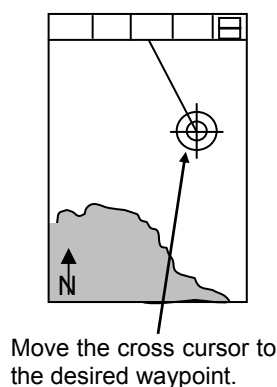
Waypoint Latitude / Longitude

Waypoint Bearings

Distance from boat to waypoint

5.4.8.2 Using the Cursor to Register Waypoints

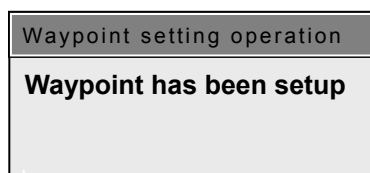
- (1) Confirm that the cursor appears on the screen.
- (2) Press **GOTO**.
- (3) Use the  key to move the cross cursor to your designated waypoint. Should a mark enter the circular marks of the cross cursor, that mark shall be taken to be the waypoint.
- (4) Press **ENT** to set the cross cursor's current position as the waypoint.




5.4.8.3 Switching the Waypoint

The waypoint can be switched to other marks that have been previously designated as waypoints.

- (1) Confirm that the cross cursor is not displayed on the screen.
- (2) Press **GOTO** and the Waypoint Operation Window shall appear.





- (3) Press the  key and choose mark number corresponding with the new waypoint.
- (4) Press **ENT** and the selected mark number shall be designated as the new waypoint.

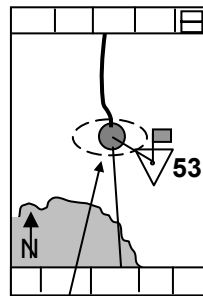
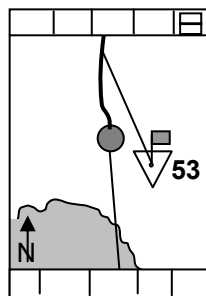
When switching between multiple waypoints, follow this procedure:

Beforehand, write down on paper which marks you desire to become waypoints.

5.4.8.4 Resetting the Starting Point of the Waypoint

At the start point of the waypoint mode, the current position is taken to be the waypoint. The procedure below allows for the establishment of a new starting point.



- (1) Press .
- (2) Press . The current position is now set as the new starting point.

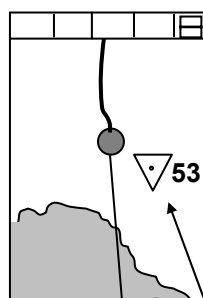
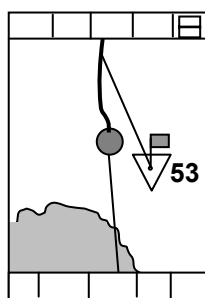


Start point has been reset.

5.4.8.5 Removing Waypoints

The procedure below outlines how to remove waypoints:

- (1) Press .
- (2) Press . The waypoint shall be removed.





Waypoint removed.

5.4.9 POB Settings

This is an emergency event function to mark the location of an accident such as a person overboard.


5.4.9.1 PCB Position Settings



Press  and the POB position shall be set at the current position.

As soon as the POB key is pushed, the anchor mark () shall appear and the movement of the boat shall be monitored.

The POB mode takes priority and overrides the waypoint mode and route mode.



5.4.9.2 Resetting the POB

The POB position is set when  is pushed. The procedure below shows the way to set a new anchor position.

- (1) Push  .
- (2) Push  . The new POB position is now set.

5.4.9.3 Deleting the POB

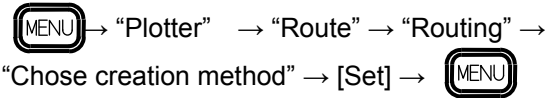
Use the procedure below to delete the POB.

- (1) Push  .
- (2) Push  . The anchor mode is now deleted.

5.4.10 Route Setting

In order to determine settings for the route mode, a pre-registered route is required.

Routes may be registered by the following procedure:



The procedure for setting the route depends on the state of the cross cursor.

Cross cursor not displayed.....user must choose from a list

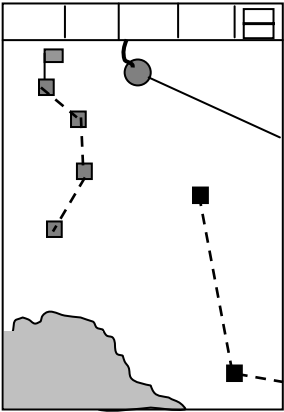
Cross cursor displayed.....set the route directly using the cross cursor

5.4.10.1 Choosing Routes from List



With the cross cursor not being displayed, press ROUTE, and the route window shall appear.




Route Execute		
Route No	Comment	F/R
--	-----	---
01	6.30_AM	RVS
02	RTE ---.---	FWD
03		FWD
04		FWD
05		FWD
06		FWD
07		FWD
08		FWD
09		FWD
10		FWD

Cursor

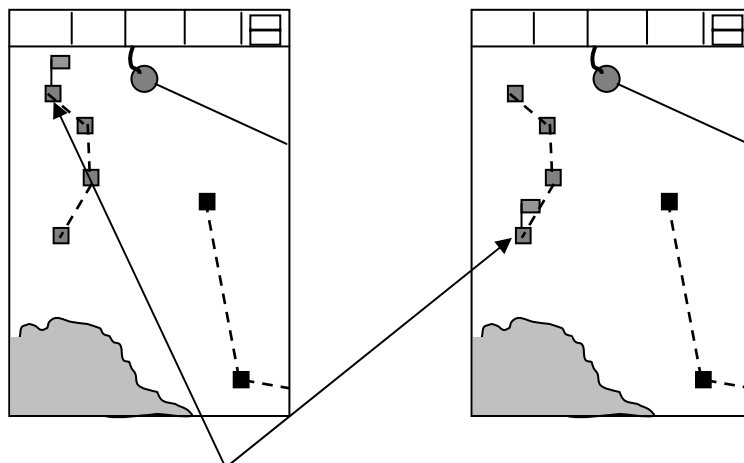


Routes that fall within the scope of the plotter shall be displayed. The route corresponding with the cursor's current position is highlighted in red.



Use the directional keys  or  to move the cursor and select the number corresponding to the desired route.

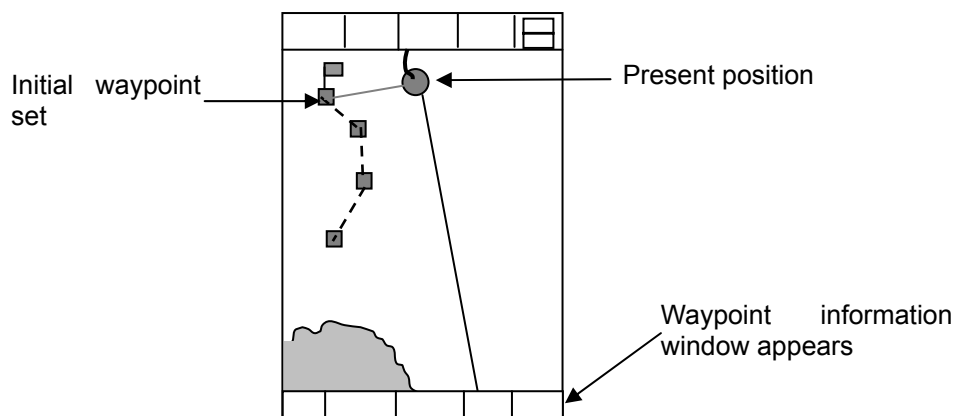
- Push  and the next route's route window shall appear.
- Push  and the previous route's route window shall appear.
- Push  and switch in-between the forward route and return route of the route highlighted by the cursor's current position.

The turn-around point of the route (shown by the flag) depends upon the route being either a forward route or a return route.




The boat's initial turn-around point is designated by a flag.

Press  to set the route. If no route is registered, nothing will occur even if the user presses the key. 



• Set the route and a waypoint information window like the one pictured below shall appear.

	35°16.289N	139°45.569E	277.3°	44.1nm
Route mode Waypoint mark	Waypoint latitude/longitude		Waypoint bearings	Distance to waypoint

5.4.10.2 Setting Route by Cross Cursor

With the cross cursor displayed, press **ROUTE** to bring up the route window pictured to the right.

Move the cross cursor onto the route desired from the route mode and press **INFO**.

Once the route is recognized, the route number, comments, and forward/reverse route settings are displayed in the route window. With the route number displayed, press **ROUTE** to switch in-between forward and reverse routes.

Press **ENT** to set the route mode. If no route is registered, nothing will occur even if the user presses the **ENT** key.

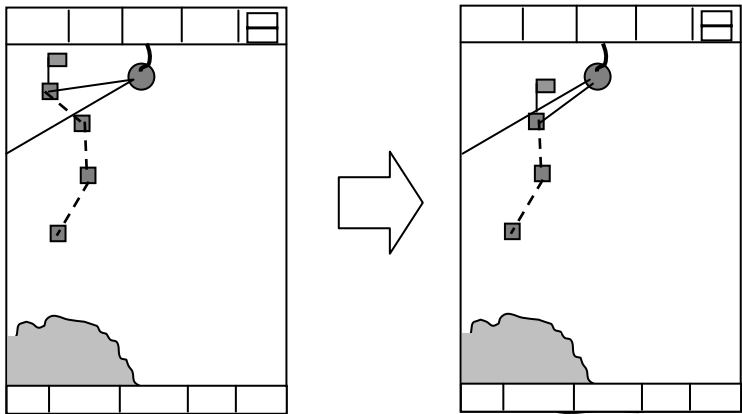
Route Execute
Route No
Comment
F/R
CANCEL : Cancel
When point information is not displayed, point the cursor and press INFO key

Route Execute
Route No
Comment
F/R
ROUTE : FWD/RVS
ENT : Execute
CANCEL : Cancel

5.4.10.3 Switching the turn-around point

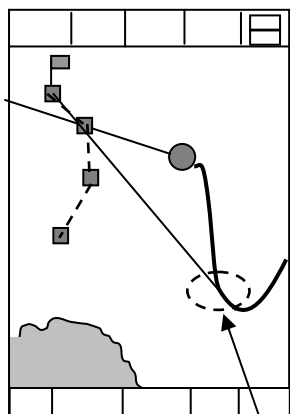
With the route mode in effect, pressing **ROUTE** shall bring up the “Route Operation” window. With the route operation window displayed, pressing **ROUTE** shall switch the turn-around point of the route. Press **ROUTE** again and the next turn-around point shall be recognized as the waypoint, and the previous turn-around point's flag shall disappear.

If only 1 turn-around point remains, pressing **ROUTE** shall display all turn-around points, and the first turn-around point shall be recognized as the waypoint.

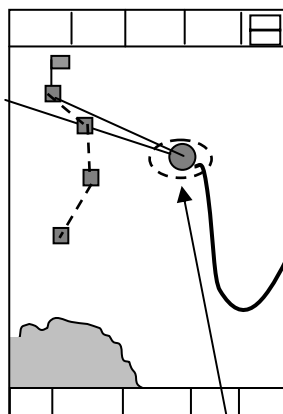


5.4.10.4 Resetting the Route Start Point

With the route mode in effect, press **ROUTE** and the route operation window shall appear. With the route operation window visible, press **ENT** to designate the current position as the new start point.



Start point position



New Start point

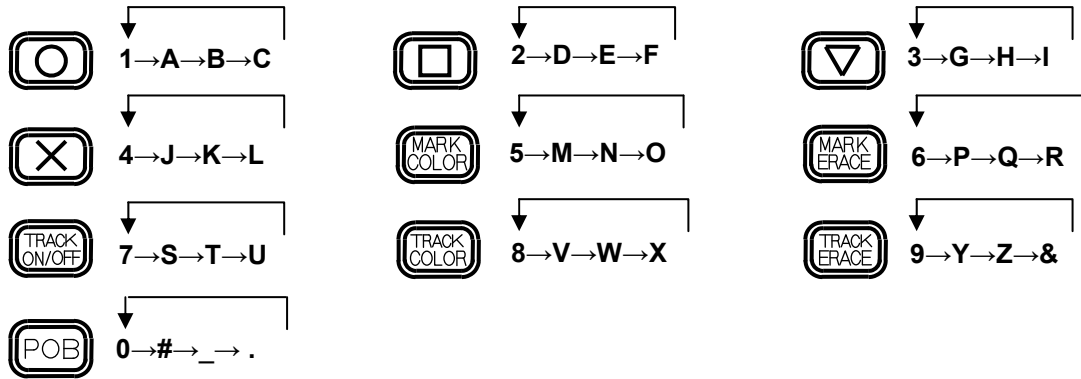
5.4.10.5 Deleting Routes

Delete routes using the procedure given below:

- (1) Press **ROUTE**
- (2) Press **CLR** to delete the route.

5.4.11 Entering Values and Comments

The user can enter comments (numbers and letters) through a specified, related plotter menu. The keys corresponding to various characters are arranged as shown below:



Pressing a given key repeatedly will bring up the various characters shown next to that key, according to the order indicated by the arrows. Pressing the directional key or pressing another of the keys pictured above shall move the cursor. The cursor moves one place to the right when numbers are entered into menus where only numerical input is permitted from the keys pictured above. From this point on, the keys pictured above shall be collectively referred to as the numeric key pad.

5.4.12 Quick Info

The Quick Info shows information simply when the cursor is placed on points on the map (such as Ports, Tide, Lighthouse, Buoys, Beacons, Obstructions, Landmarks etc.)

- (1) Make "Quick Info" function effective by the MENU setting. Press MENU key.
- (2) Move the highlight to "DISPLAY SETTING" using the joystick.
- (3) Operate the joystick right. The submenu "DISPLAY SETTINGS" will be displayed.
- (4) Move the highlight to "SCREEN DISPLAY SETTING" using the joystick.
- (5) Operate the joystick right. The submenu "SCREEN DISPLAY SETTING" will be displayed.
- (6) Move the highlight to "QUICK INFO" using the joystick.
- (7) Move the highlight to "ON" by operating the joystick to the right.
- (8) End MENU by pushing the MENU key 3 times.

Operation of Quick Info

- (1) Display the cursor pushing the CUR key.
- (2) Using the joystick, place the cursor on the icon to which you want to refer.

The information will be displayed about one second after you position the cursor. If there is no information at that point, nothing will be displayed. If you carry out other operations while the Quick Info window is displayed, the information will disappear.



Quick Info

5.4.13 Object Information

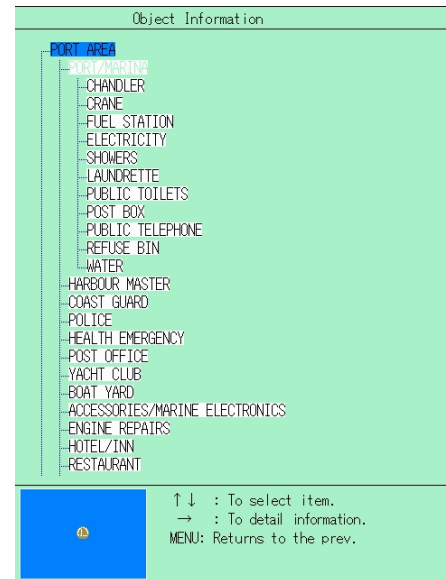
Using this function, information on objects shown on the chart can be displayed. Available information differs depending on whether the cross cursor is displayed or not as shown below:

With the cross cursor OFF: The object information around the ship is shown in the OBJECT INFORMATION window.

With the cross cursor ON: The object information around the cross cursor is shown in the OBJECT INFORMATION window.

To display the object information:

- (1) Press the INFO key. The OBJECT INFORMATION window will appear, showing the object item.
- (2) Move the joystick to highlight the item you wish to select.



Object Info

5.4.13.1 Detailed information display

Detailed information on selected items is displayed in the window at the right of the screen. When the detailed information amounts to many pages, it can be accessed by the following method.

- (1) Operate the joystick right. The frame of the detailed information window will change to yellow.
- (2) You can then select the page of the detailed information window by scrolling the joystick up and down.
- (3) Operate the joystick left when you want to return to the item selection operation.

5.4.13.2 Photograph display

Among the items of OBJECT INFORMATION, photographs are included in the MULTIMEDIA CONTENT and PORT/MARINA section. The color of the items which can display photographs is mint green.

Press the ENT key after the mint green item has been highlighted.

Then, photographs will start appearing. It takes several tens of seconds for photographs to be transmitted in full. A transmission progress bar is displayed in the lower screen section.

Press the MENU key to end the photograph display.

5.4.14 Tidal Info

5.4.14.1 Tidal information display

TIDE HEIGHT STATION and TIDE STREAM STATION contain Tide graph data.



The color of items that can display Tide graphs is brown.

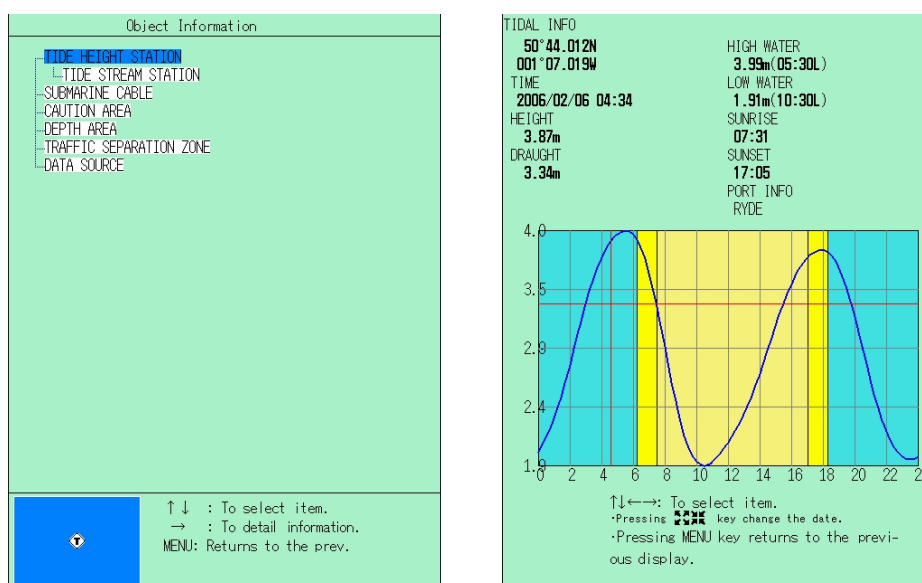
Press the ENT key after highlighting a brown item.

The Tide graph screen will be displayed.

The operation of Tide graphs will be explained in detail in the next section.

Press the MENU key to end the Tide graph display.


- (1) The horizontal red line in the graph is the cursor to read the draught. By operating the joystick, this cursor can be moved up and down and the draught can be displayed on a particular graph point.
- (2) The vertical red line in the graph is the cursor to read the time and the rise of the tide. By operating the joystick, this cursor can be moved right and left and the time and tide rise can be displayed on a particular graph point.
- (3) When  key is pressed, the graph gives previous day-by-day information updates. If the key is pressed at length, previous month-by-month reports can be accessed.
- (4) When  key is pressed, the graph gives updated forecasts for the following days, day by day. If the key is pressed at length, it advances month-by-month.
- (5) Press the MENU key to return to the Object Information display




Tidal Info

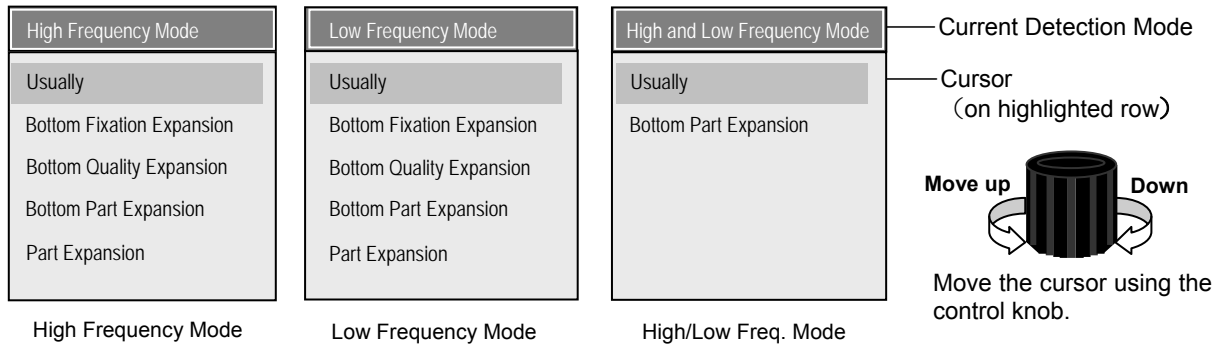
NOTE : Tide graphs are an approximation of the tide and they should be used in conjunction with traditional tide tables and navigational methods.

5.5 Operation of Sounder Display

Push  to display the Sounder Display.

5.5.1 Sounder Display Options

Push  to bring up the Mode menus.



With the Mode menus displayed, push the  button repeatedly in order to switch in-between the various modes.

The position of the cursor indicates what is selected.

Move the cursor using the control knob.

Turn the knob counter-clockwise to move the cursor up the menu, and clockwise to move the cursor down the menu.

5.5.1.1 About The Modes

(1) High Frequency Mode

Displays images based upon received high frequency signals. In this mode, the user can choose from the following five types of images: **Normal**, **Bottom Fixation Expansion**, **Bottom Quality Expansion**, **Bottom Part Expansion** and **Part Expansion**. Except for Normal and Bottom Part Expansion, each type of signal is displayed side-by-side with the Normal in a dual screen.

(2) Low Frequency Mode

Displays images based upon received low frequency signals. In this mode, the user can choose from the following five types of images: **Normal**, **Bottom Fixation Expansion**, **Bottom Quality Expansion**, **Bottom Part Expansion** and **Part Expansion**. Except for Normal and Bottom Part Expansion, each type of signal is displayed side-by-side with the Normal in a dual screen.

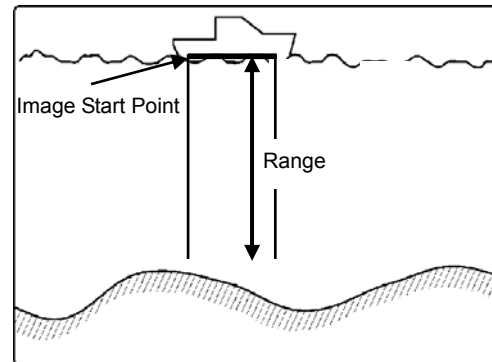
(3) High and Low Frequency Mode

Displays images based upon received high and low frequency signals together. In this mode, the user can choose from following two types of images: **Normal** and **Bottom Part Expansion**.

5.5.1.2 Regarding Display Images

(1) Normal

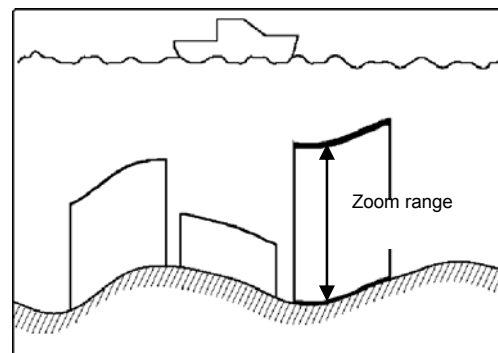
Displays from the start point of the image to the limit of the range. Generally, the bottom of the ship is the designated starting point. Utilizing the various functions (such as Shift, Draft, etc.) the user can alter the start point.



(2) Bottom Fixation Expansion

Even though the depth of the sea bottom changes, the bottom is displayed as a flat surface in order to serve as a reference. This results in being able to see small details on the sea bottom more clearly.

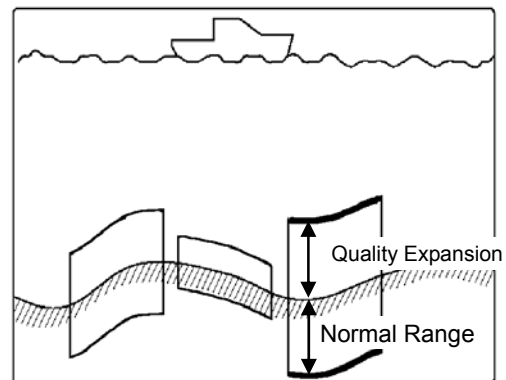
Schools of fish in the nearby area can be monitored closely.



(3) Bottom Quality Expansion

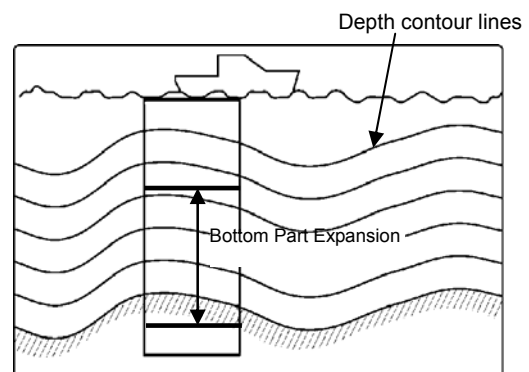
Even though the sea bottom depth changes, the top surface of the sea bottom is displayed as a flat surface in order to serve as a reference. A range of measurement is also taken underneath the reference.

This results in being able to distinguish school of fish and bottom quality that may be at the sea bottom.



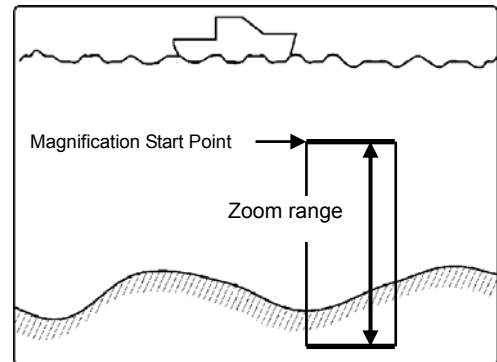
(4) Bottom Part Expansion

The bottom is displayed as is, with its true shape depicted. The distance from the bottom is depicted using (solid) depth contour lines, making schools of fish near the bottom easy to see.



(5) Part Expansion

Rather than using the sea bottom as the reference point, a mid-water Magnification Start Point is designated and the region below is magnified.



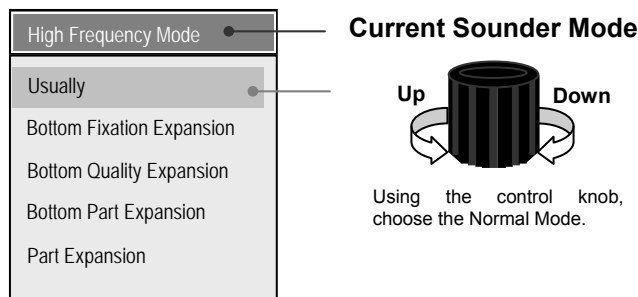
The zoom range is set through the value assigned in the menu. The setting chosen shall be shared by all expansion images. The zoom range is set by following the procedure below:

[MENU] → **“Sounder”** → **“Display”** → **“Zoom Range”** → **[Set]** → **[MENU]**

5.5.1.3 Procedures for the Sounder Display

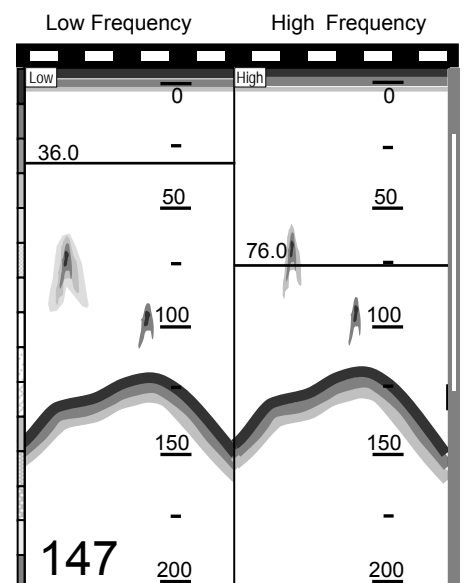
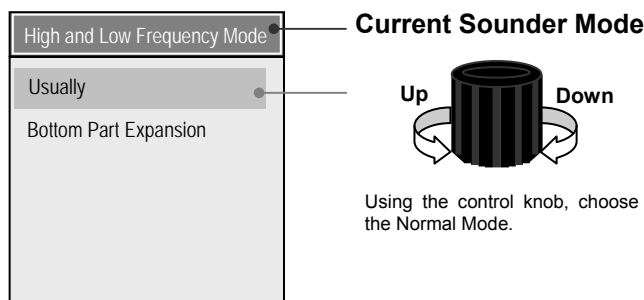
5.5.1.3.1 Normal Display Procedure

- (1) Display either the High Frequency or Low Frequency Modes using **[MODE]**.
- (2) Using the control knob, choose the Normal Mode.



5.5.1.3.2 Procedure for Displaying High and Low Frequency Mode together

- (1) Display High and Low Frequency Mode using **[MODE]**.
- (2) Using the control knob, choose the Normal Mode.



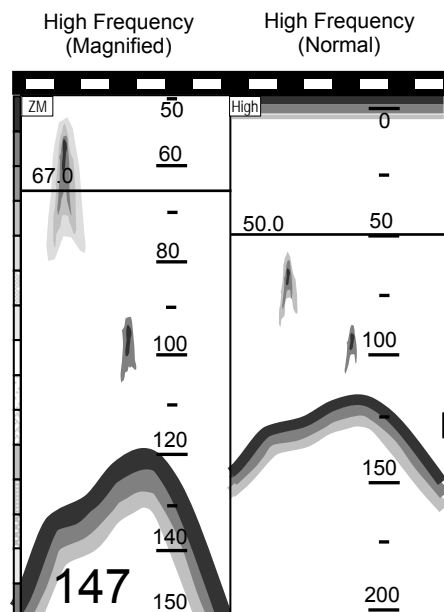
5.5.1.3.3 Procedure for Displaying Magnified High Frequencies

- (1) Display High Frequency Mode using



- (2) Using the control knob, the user can choose:
Bottom Fixation Expansion, Bottom Quality Expansion, Bottom Part Expansion, and Part Expansion.

Note : Bottom Part Expansion is displayed as a single screen.



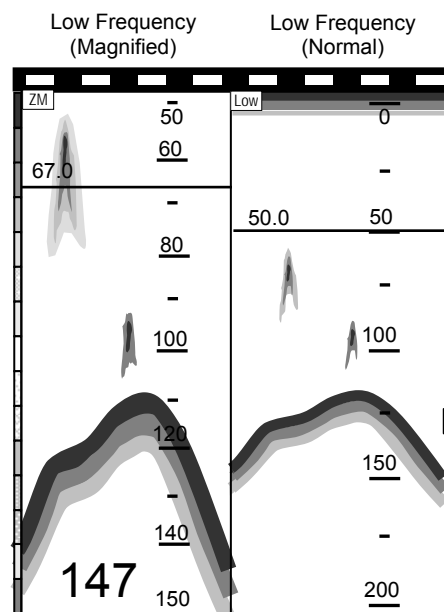
5.5.1.3.4 Procedure for Displaying Magnified Low Frequencies

- (1) Display Low Frequency Mode using



- (2) Using the control knob, the user can choose:
Bottom Fixation Expansion, Bottom Quality Expansion, Bottom Part Expansion, and Part Expansion.

Note : Bottom Part Expansion is displayed as a single screen.



5.5.2 Range (Sounding Range) Selection

Factory Preset Ranges are as follows:

Range	1	2	3	4	5	6	7	8
m/J.fm /fm/l.fm	20	50	80	100	200	300	1000	1200
Ft.	50	160	280	360	720	1600	3600	4000

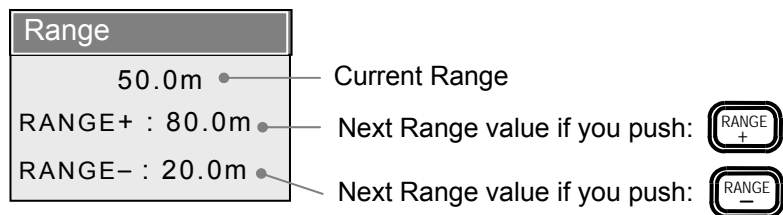


or



keys can be used to adjust the Range values.

Simultaneously, the screen depicted below will display the Range values.



While the Range display is shown, pushing the following keys shifts the Range values as listed in the display.

Choose the Range that allows for the best view (from sea level to sea bottom).

To register a range, follow the procedure below:

→ "Sounder" → "Depth Range Preset" → "Choose from Depth Range1 to 8" → [Set] →

Or, when the "Auto Range" option has been selected, pushing the and buttons will bring up the following screen:

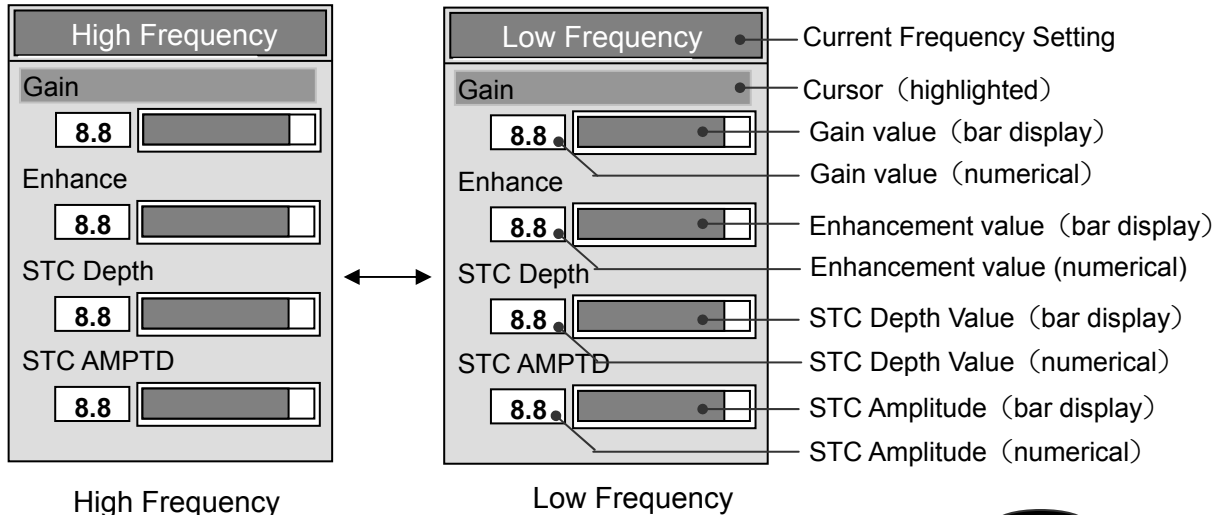


Perform the following procedure to select the automatic range mode:

→ "Sounder" → "Sounder Menu" → "Auto Setting" → [Range] →

5.5.3 Adjustment of Gain and STC

Push **GAIN** to bring up the image adjustment menu.



When using the High Frequency mode, Adjustment Menu will appear.

When using the Low Frequency mode, Adjustment Menu will appear.

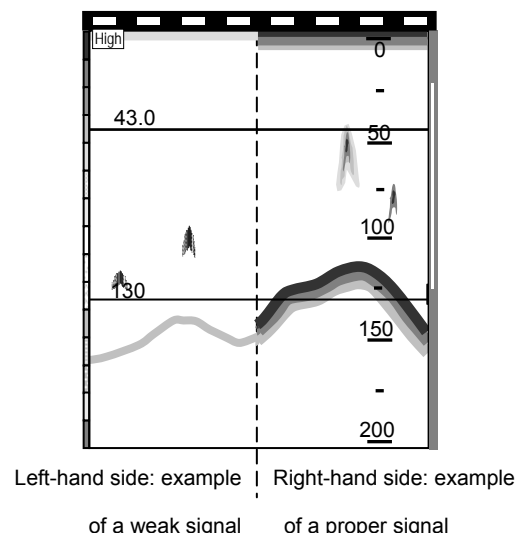
When using the High/Low Frequency mode, pressing the **GAIN** button will alternate in-between the High and Low Frequency Adjustment Menus.

The user can determine settings for the option where the cursor appears. The cursor can be moved up and down using the directional key or . The settings for the High and Low Frequency Modes can be specified totally separate from one another. Turn the control knob clockwise to increase setting values, and counter-clockwise to decrease setting values. Press the Menu button **MENU** in order to close the Adjustment Menu.

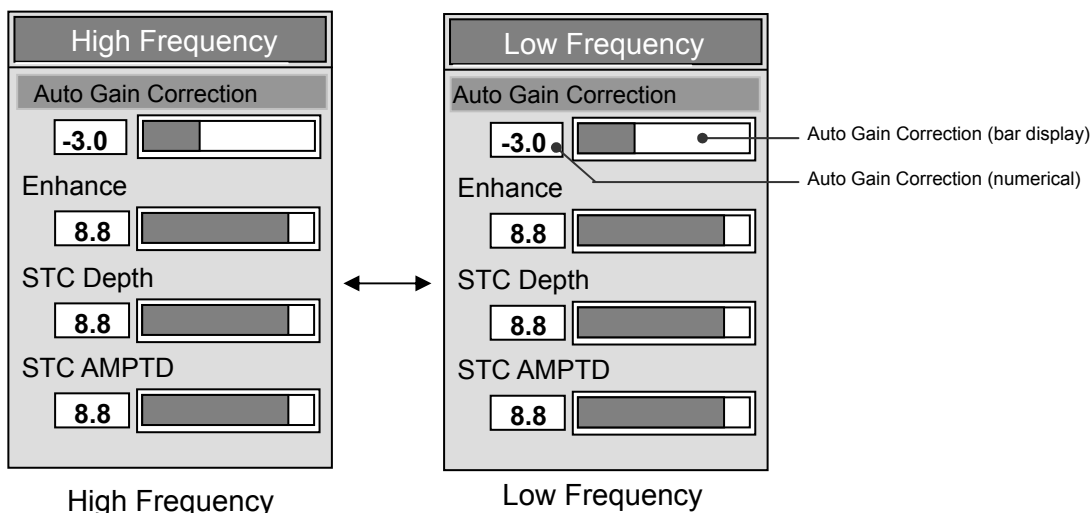
5.5.3.1 GAIN

The user can adjust the sensitivity by adjusting its value.

Setting Range : 0.0 to 10.0



When automatic gain is in operation, pressing  will activate the automatic gain correction in the Adjustment Menu.



Follow the procedure below to activate Automatic Gain:

 → **“Sounder”** → **“Sounder Menu”** → **“Auto Gain”** → **[ON]** → 

Due to the characteristics of the sea bottom (rocky, sandy, algae, etc.), the strength of the signal may vary, resulting in varying effectiveness of the Automatic Gain Mode. When the surface of the sea bottom is not displayed as red, obtain a proper signal by adjusting the value of the Auto Gain Correction option.

Setting Range : -10.0 to +10.0

-10.0(weak) to +10.0(strong)

5.5.3.2 Noise Rejection / Enhance Mode (EM)

Select either Noise Rejection or Enhance upon use.

- By changing the setting on the noise rejection, the blue color (noise) of the fish image will be reduced.
- The noise rejection is used by combining with “Image”(6.2.2.2.1 paragraph).

Setting Range : **0.0 to 10.0**

- By changing the settings on the enhancement (EM) mode, the red color (school of fish) of the fish image will be displayed with emphasis.

“Image”(6.2.2.2.1 paragraph) cannot be used.

Setting Range : **0.0 to 10.0**

5.5.3.3 STC

If the nearby waters are comparatively shallow, and there is considerable trash, plankton or other drifting material, the screen may appear reddish or yellowish. Should a school of fish be among the drifting material, distinguishing between the fish and the drifting material would prove difficult. In these situations, adjusting the STC restricts unnecessary echoes and makes it easier to identify actual schools of fish. STC can be adjusted in terms of depth and amplitude.

Setting Range : 0.0 to 10.0

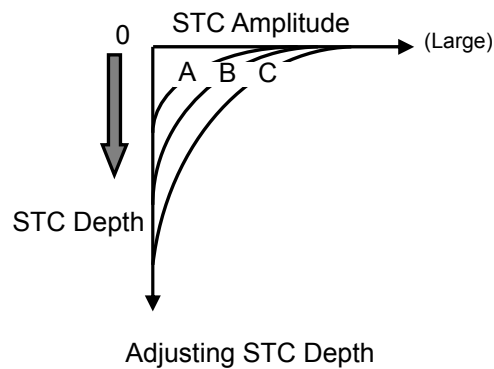
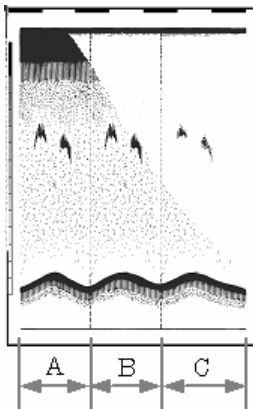
(a) STC Depth

The graph to the right depicts the change in the image below. STC Amplitude is kept at a constant.

A : Since the STC Depth value is too small, only drifting material is removed from the image.

B : STC Depth value is at its optimal setting.

C : Since the STC Depth value is too large, causing the echoes from the fish school to be reduced too much.



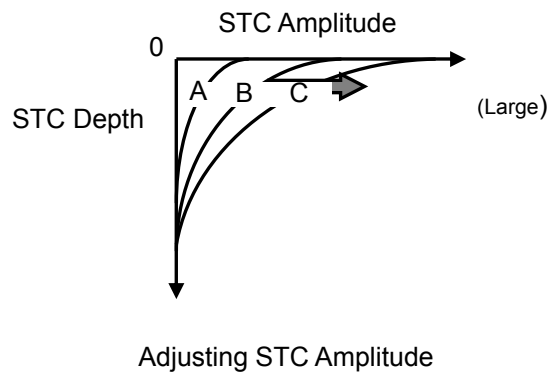
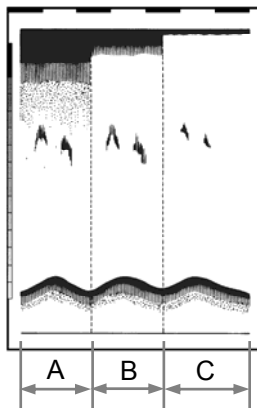
(b) STC Amplitude

The graph to the right depicts the change in the image below. STC Depth is kept at a constant.

A : Since the STC Amplitude value is 0, the noise is displayed.

B : STC Amplitude value is at its optimal setting.

C : Since the STC Amplitude value is too large, causing the echoes from the fish school to be reduced too much.



Adjust the STC Depth and STC Amplitude values in order to obtain the best image.


5.5.4 Operation of the [Shift] Key

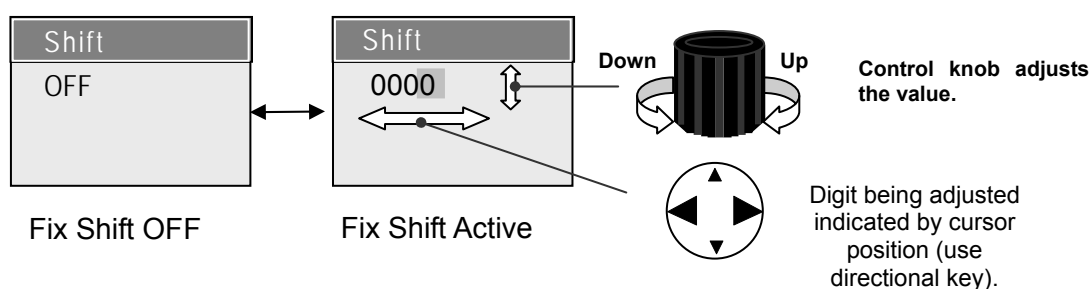
There exist 2 kinds of shifts: "Fix Shift" and "Auto Shift".


Fix Shift: From Pre-determined depth(Shift start depth), the range is set and displayed.




Auto Shift: Should there be a sudden change in depth of the bottom engaging the Auto Shift ensures that 30-90% of the scope of the sea bottom is displayed at all times.

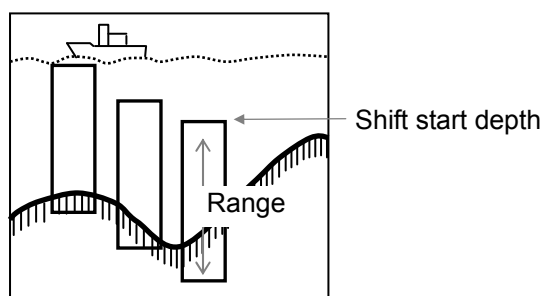
5.5.4.1 Fix Shift Settings

Push  to bring up the display shown below.





With the Shift Setting Menu displayed, pressing  will switch the Fix Shift option off or on.


With the Fix Shift option on, the user can specify the amount of shift. Pressing the directional keys left or right ( or ) moves the cursor, and the control knob sets the values. Turn the control knob right to increase the values, and left to decrease the values. While the Fix Shift option is active, the right of the display will show the following: 

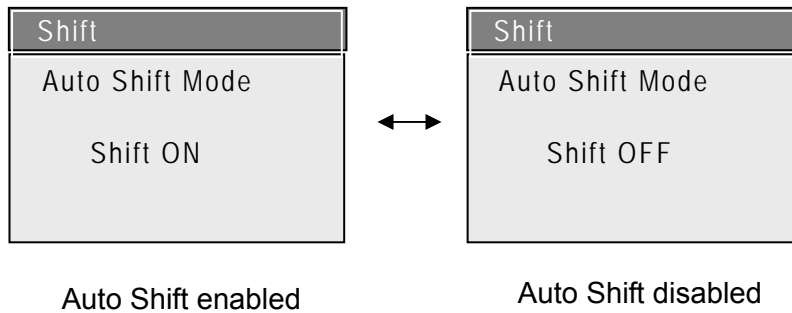


5.5.4.2 Auto Shift Settings

Displaying the Auto Shift function requires the following procedure beforehand. The procedure is as follows:

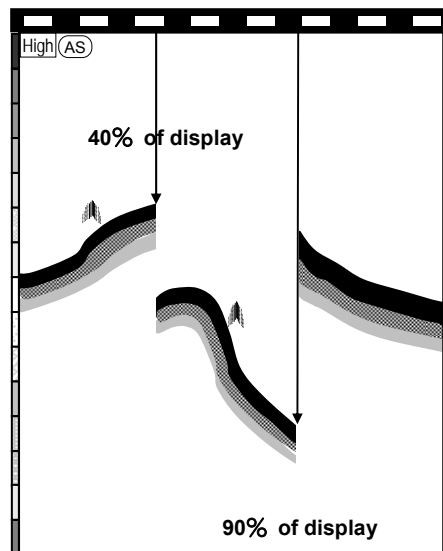
 → “**Sounder**” → “**Sounder Menu**” → “**Auto Setting**” → [Shift] → 

Push , and the Shift menu appears.




Pushing  switches back and forth in-between enabling and disabling the Auto Shift function.

With the Auto Shift enabled, the following appears in the upper left of the screen: 



5.5.5 Operation of Variable Range Markers (VRM)

The Variable Range Markers (VRM) enable for the operation of the Sounder screen. The VRM allow for moving up and down within the screen. Matching up the schools of fish with the depth markers indicate their depth. The VRMs are green and yellow. Push  and the user can alternate operations. When Part Expansion is done, the green VRM is utilized at the part expansion starting depth.

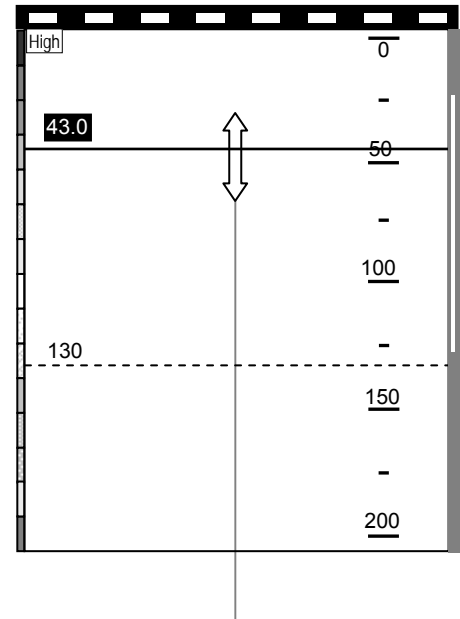
(Refer to section 5.4.7)

5.5.5.1 Normal Image Mode


Push .

With the previous operation, the (green or yellow) VRM in operation shall have their values displayed in reverse display (white with a black surrounding block).

Move up or down using the control knob.

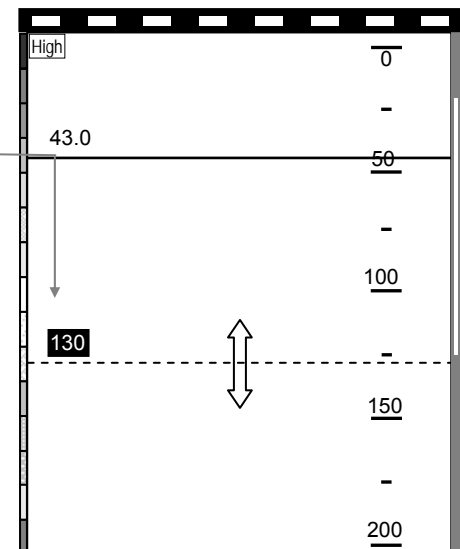



As the VRM is moved up or down, the numerical value and depth are displayed.

With the numerical values reversed, push .

VRM can be changed within operational parameters.

Numerical values displayed in reverse display.



Caution: As a VRM operation finishes, returning to the prior numerical value becomes impossible after 5 seconds. To begin operations once again, press .

5.5.5.2 Combined Imaging

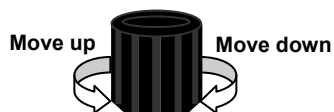
5.5.5.2.1 Vertical Partitioning

(1) Dual Frequency mode

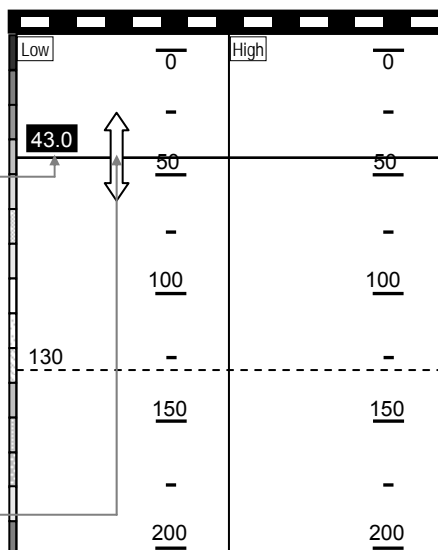
Push .

Turn over the numerical value displayed. The VRM is displayed across the entire screen.

Move up or down using the control knob.



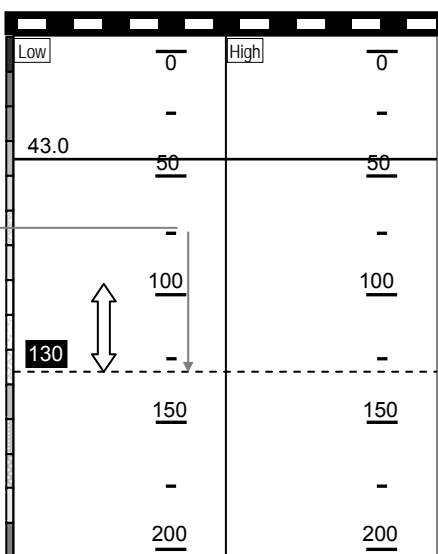
As the VRM moves, the numerical value displayed changes accordingly.



With the numerical value reversed, press the

 button.

VRM color can be changed.

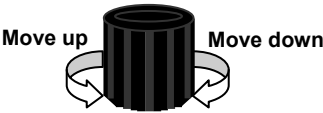


(2) Normal/ Expansion mode

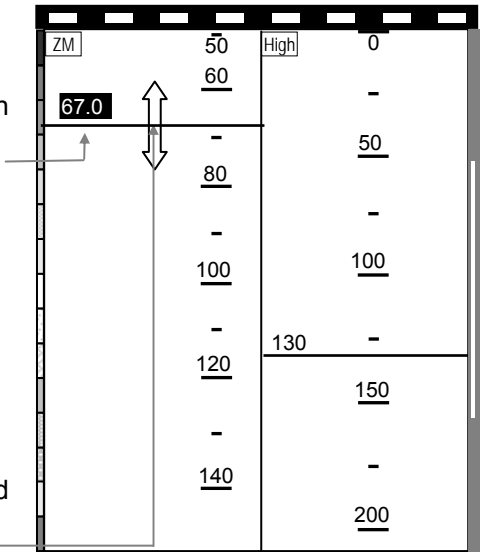
Push .


The numerical value turns over. A VRM appears on one side of the partitioned screen.


Move up or down using the control knob.

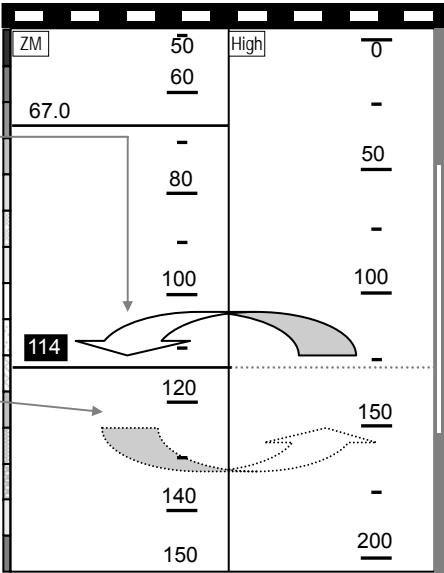


As the VRM moves, the numerical value displayed changes accordingly.



Push the directional button left , and the display of the numerical value moves the VRM over to the left side of the display.

Push the directional button right , and the display of the numerical value moves the VRM over to the right side of the display.



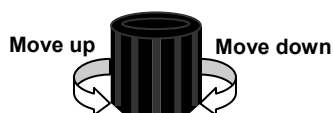
5.5.5.2.2 Horizontal Partitioning

(1) Dual Frequency mode

Push **VRM**.

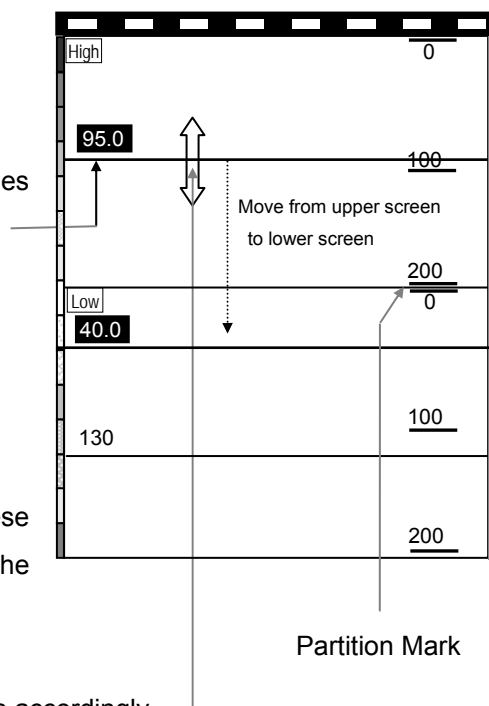
Numerical value display turns over. The VRM stretches across the entire width of the screen.

Move up or down using the control knob.



The VRM may move beyond the partition mark. In these cases, the depth values become the depth values for the display depicted here.

As the VRM moves, the numerical value displayed changes accordingly.

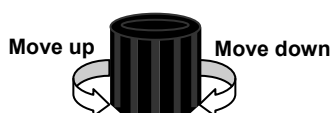


(2) Normal/ Magnified mode

Push **VRM**.

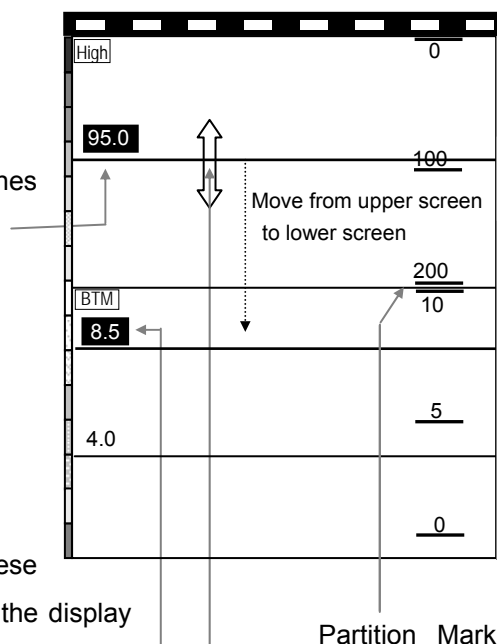
Numerical value display turns over. The VRM stretches across the entire width of the screen.

Move up or down using the control knob.



The VRM may move beyond the partition mark. In these cases, the depth values become the depth values for the display depicted here.

As the VRM moves, the numerical value displayed changes accordingly.

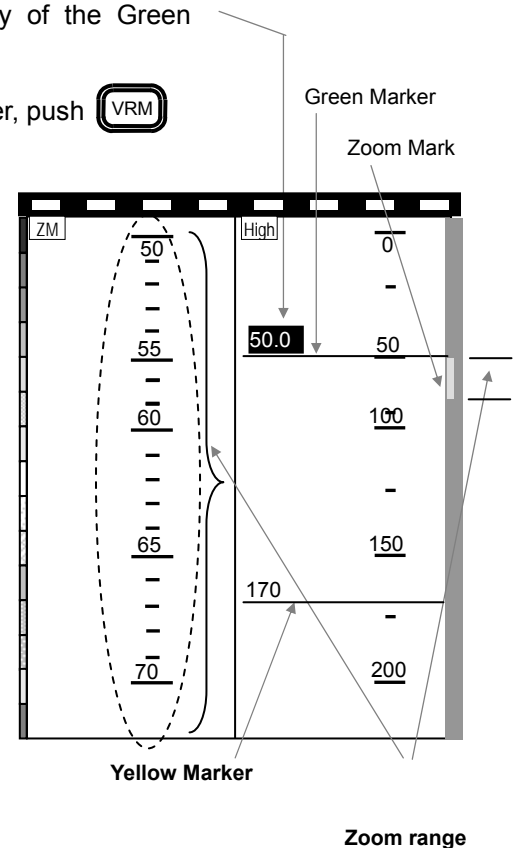


5.5.6 Setting Positions for Part Expansion mode**5.5.6.1 Vertical Partitioning**

- (1) Push **MODE** and select Part Expansion of High (or Low) Frequency Mode.
(Refer to Sounder Imaging Display Procedure, section 5.4.1.3.)
- (2) Set the zoom range.
(Refer to Imaging, section 5.4.1.2.)
- (3) Push **VRM** and turn over the numerical display of the Green Marker.
(To change the numerical display of the Yellow Marker, push **VRM** once again.)

Operate the Green Marker by the Control knob, and set the upper depth of the zoom range.

In the right figure, the high (or low) frequency normal imaging is on the right-hand side, and the left-hand side displays the part expansion image. The position of the magnification pictured here is 50, while the zoom range is set at 20.

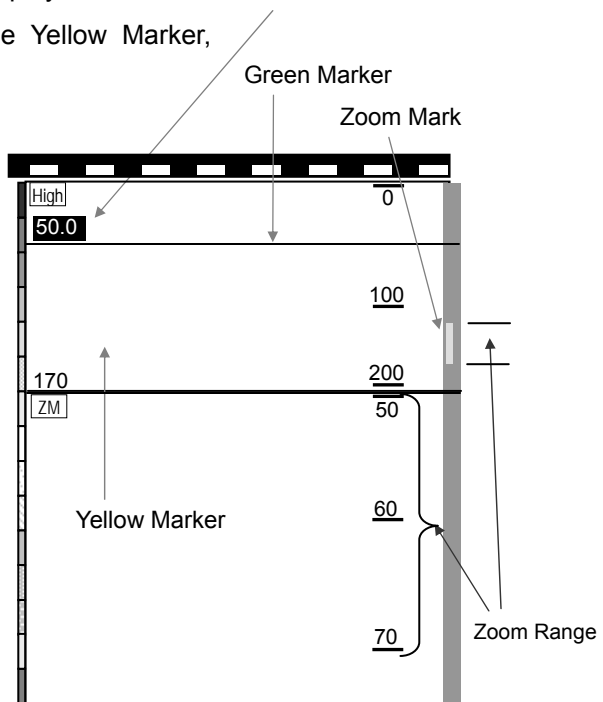


5.5.6.2 Horizontal Partitioning

- (1) Push **MODE** and select Part Expansion of High (or Low) Frequency Mode.
(Refer to Sounder Imaging Display Procedure, section 5.4.1.3.)
- (2) Set the zoom range.
(Please refer to Imaging, section 5.4.1.2.)
- (3) Push **VRM** and turn over the numerical display of the Green Marker.
(To change the numerical display of the Yellow Marker, push **VRM** once again.)

Operate the Green Marker by the Control knob, and set the upper depth of the zoom range.

In the right figure, the high (or low) frequency normal imaging is on the upper side, and the lower side displays the part expansion image. The position of the magnification pictured here is 50, while the zoom range is set at 20.



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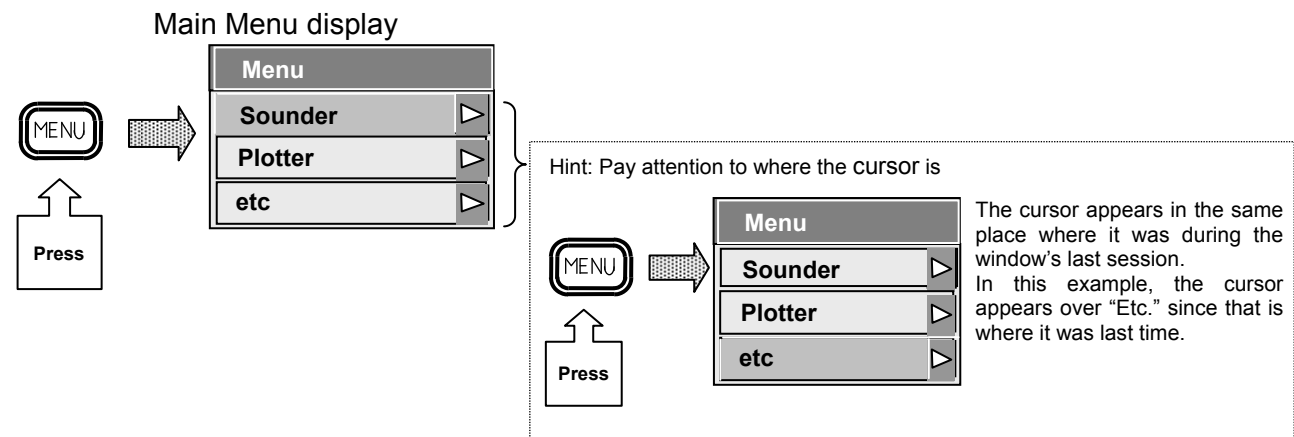
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Chapter 6 Using the Menu

6.1 Menu functions

The main menu has three categories: Sounder, Plotter, and “etc.” (others).
From these categories, other sub-menus and categories shall appear.
These sub-menus are explained from page 6-3 onward.



6.1.1 Menu Operation

Press the menu key, and the menu window (main menu) shall appear. The directional key and the control knob can adjust numerical values as well as move the cursor.

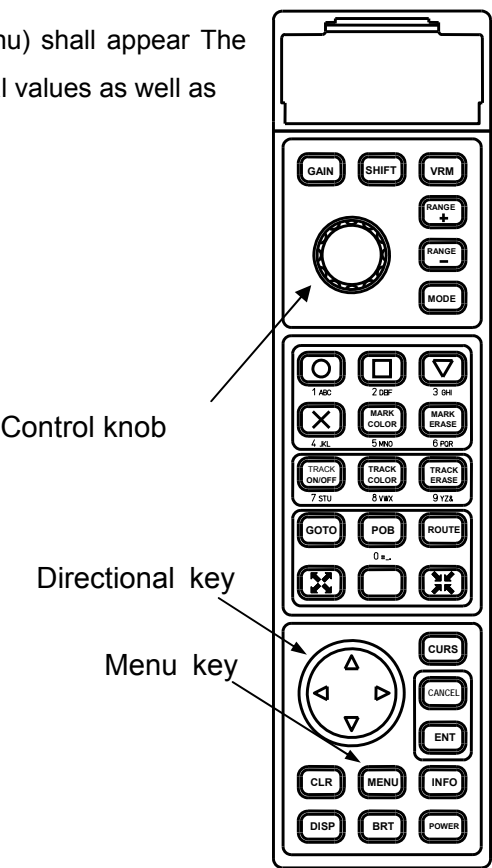
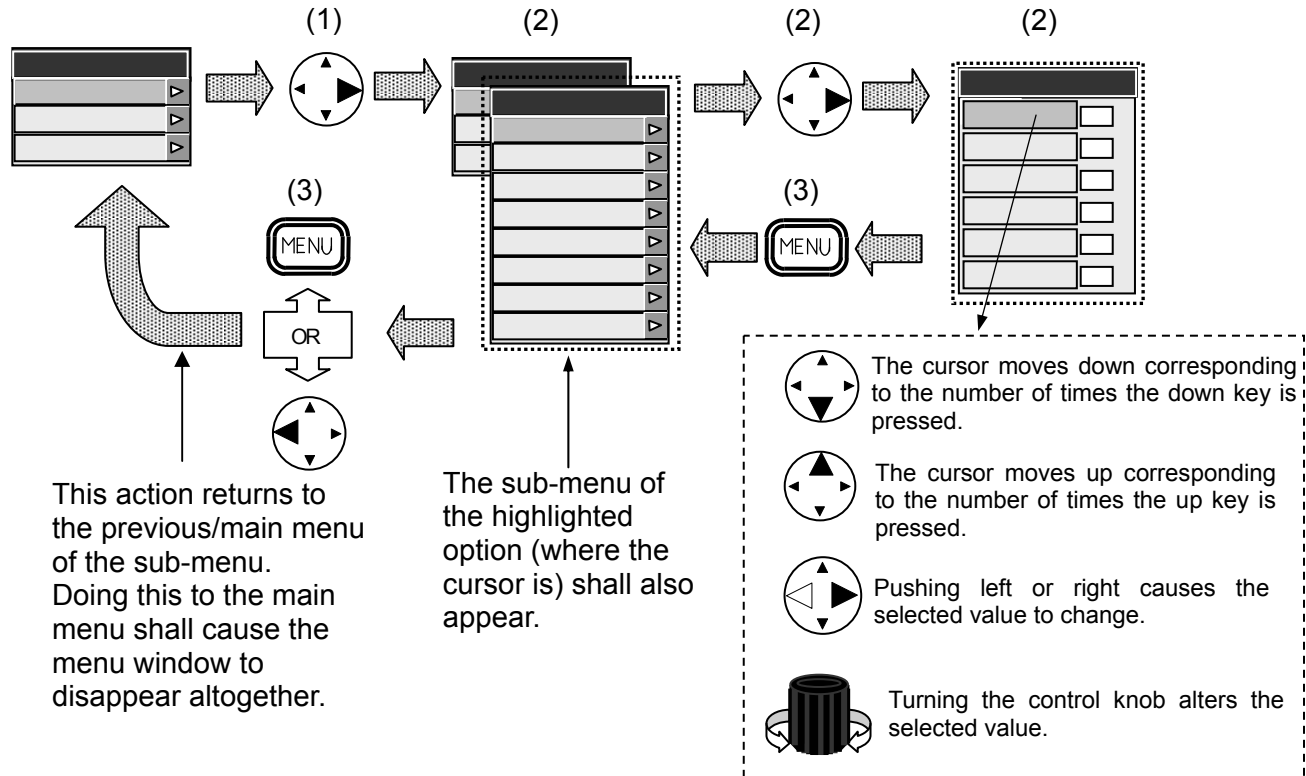


Figure 6.1 Operation Panel

6.1.2 Choosing Menus

[Example of Choosing a Menu]




Note:

The operations listed below may not apply to all menus. Please pay attention to any messages that may appear in each menu.



[Example of using keys]

- (1) : Press to the right.
- (2) OR as well as pressing the up and down keys shall move the cursor and confirm the selected value for that category.
- (3) OR } Press either the menu key or the left directional key. (This shall return the user to the previous/main menu.)

6.1.3 Menu Table**6.1.3.1 Sounder Menu**

Sounder Menu	Setting Menu	Setting Range
Transmission	Pulse Width (H)	Super short, Short, Middle, Long
	Pulse Width (L)	Super short, Short, Middle, Long
	Output	Normal, Low
	PRF	1 to 10
Image	Interference rejection	OFF, 1, 2
	Noise Rejection/EM	Noise Rejection, Enhance Mode
	Enhance	25, 35, 45, 55, 65
	TVG	OFF, 1 to 4
	White line	OFF, 1 to 5, Auto
	Color tone	1 to 3
	Background color	1 to 9
	Color rejection	Reject specified colors from the Sounder Image. (Replaces the background color)
Display	A scope	OFF, Small, Large
	Zoom range	2.5 to 200 (m, fm, l.fm, J.fm) 10 to 650 (ft)
	Depth value size	OFF, Small, Middle, Large
	Depth value position	Bottom, top
	Scale	OFF, Single, All
	Scale position	Side, Center
	Scale value	Small, Large
	Time mark	OFF, 10 sec, 1min
	Image speed	4/1, 3/1, 2/1, 1/1, Stop, 1/2, 1/3, 1/4, 1/6, 1/8, 1/12, 1/16
	Image direction	← ←, ← →
	Image partition	
	Image swap	A B, B A
	Color bar scale	OFF, ON
	Water temp display	OFF, °C, °F
	Water temp graph	OFF, ON
Automatic	Auto setting	OFF, Range, Shift
	Auto gain	OFF, ON
Depth range preset	Depth range 1	Refer to 6.2.5.1
	Depth range 2	Refer to 6.2.5.1
	Depth range 3	Refer to 6.2.5.1
	Depth range 4	Refer to 6.2.5.1
	Depth range 5	Refer to 6.2.5.1
	Depth range 6	Refer to 6.2.5.1
	Depth range 7	Refer to 6.2.5.1
	Depth range 8	Refer to 6.2.5.1
System setting	Depth unit	m, J.fm, fm, l.fm, ft
	Draft setting	0.0 to 25.5(ft: 00 to 85.0)
	Bottom start	0.0 to 20.0(ft: 00 to 65.0)

Using the Menu

Sounder Menu	Setting Menu	Setting Range
	Bottom detection	Inside range (in-screen) Outside range (off-screen)
	Depth measurement	Auto, High freq., Low freq.
	Sonic correction	-7 to +2%
	Water temp correction	-10.0 to +10.0
	Boat speed correction	-10.0 to +10.0
	Water temp data	INT, EXT
	EXT trigger type	OFF,  , 
Bottom detection Adjust	High frequency	-80 to 0
	Low frequency	-80 to 0

Note: (H) : High frequency (L) : Low frequency

6.1.3.2 Plotter Menu Functions

Plotter Menu	Sub Menu 1	Sub Menu 2	Setting Range
Mark Block Number			00000, 00100, 01000, 02000, 03000, 04000, 05000, 06000, 07000, 08000
Display Setting	Position data display	L/L	
		LORAN C	
		DECCA	
	CHART DISPLAY	MAP COLOR	NORMAL, SUN LIGHT, NIGHT VISION, NOAA
		MIXING LEVELS	ON, OFF
		BOUNDLINES	ON, OFF
		GRID	ON, OFF
		VALUE-ADDED DATA	ON, OFF
		ANTI-CLUTTER	ON, OFF
		PERSPECTIVE VIEW	ON, OFF
	MARINE DISPLAY	PLACE NAME	ON, OFF
		OBJECT ITEM	DETAILS, SIMPLE
		LIGHT ANIMATION	ON, OFF
		LANDMARKS	ON, OFF
		LIGHTHOUSE	ON, OFF
		LIGHT SECTORS	ON, OFF
		BUOYS	ON, OFF
		BUOYS NAME	ON, OFF
		LAKE & RIVER	ON, OFF
		CAUTION AREA	ON, OFF
		TIDES & CURRENTS	ON, OFF
		PORTS	ON, OFF
		SIGNALS	ON, OFF
		TRACKS & ROUTES	ON, OFF
		SEABED	ON, OFF
		UNDERWATER OBJECT	ON, OFF
	LAND DISPLAY	LAND ELEVATION VALUE	ON, OFF
		CULTURAL FEATURES	ON, OFF
		ROADS	ON, OFF
		ROAD NAME	ON, OFF
		RAILWAY	ON, OFF
		AIRPORT	ON, OFF
		POI	ON, OFF

Plotter Menu	Sub Menu 1	Sub Menu 2	Setting Range
	DEPTH DISPLAY	SOUNDINGS	ON, OFF
		SOUNDING RANGE MIN	0 TO 9999
		SOUNDING RANGE MAX	0 TO 9999
		ROCKS MIN	0 TO 9999
		ROCKS MAX	0 TO 9999
		DEPTH CONTOUR LABEL	ON, OFF
		DEPTH UNIT	M, FM, D.FM, FT, OFF
		DEPTH AREA HIGHLIGHTS	ON, OFF
		HIGHLIGHTS RANGE MIN	0 TO 9999
		HIGHLIGHTS RANGE MAX	0 TO 9999
		REVERSE CONTOUR COLOR	ON, OFF
	Screen Display Setting	Course line	Long Line, SPD RESP, OFF
		Course display	True, Magnetic
		Position mark	Large Circle, Small Circle, Dot, Ship (Large), Ship(Small)
		Track line	Thick, Thin
		Mark size	Large, Small
		Mark Store Info	W_Temp, Depth
		Cursor type	Standard, Long Line
		Info window	OFF, L/L, DPT/W_TEMP, TIME/ETA, Speed
		Position info window	Large, Small, OFF
		Ring marker	OFF, ON
		Map rotation speed	High Speed, Low Speed
		Safety Status Bar	OFF, ON
		Quick Info	OFF, ON
NAV			North Up, East Up, South Up, West Up, Course Up, Head Up, Own Ship Center Fix Mode

Plotter Menu	Sub Menu 1	Sub Menu 2	Setting Range
Mark Edit	Edit		
	Transfer		
	Delete		
	Operation of blocks	Display of blocks Transfer of blocks Erase of blocks	
Route	Routing	Cursor	
		Value	
	Route erase	Cursor	
		Value	
Route edit		Cursor	
		Value	
Track Store			1, 2, 3, 4, 5, 6, 7
Track Recall			1, 2, 3, 4, 5, 6, 7
Track Color	Normal		
	Depth RESP		Green, Red, Yellow, Deep Blue, Blue, Pink, White
	W_Temp RESP		Green, Red, Yellow, Deep Blue, Blue, Pink, White
Drawing	Drawing block		1, 2, 3, 4, 5, 6, 7
	Drawing Line Thickness		Thin, Thick
	Input method		Cursor, Value
Drawing Edit	Cursor		
	Value	Drawing block 1	
		Drawing block 2	
		Drawing block 3	
		Drawing block 4	
		Drawing block 5	
		Drawing block 6	
		Drawing block 7	
Drawing Erase			
Drawing Recall	Block 1 DISP		YES, NO
	Block 2 DISP		YES, NO
	Block 3 DISP		YES, NO
	Block 4 DISP		YES, NO
	Block 5 DISP		YES, NO
	Block 6 DISP		YES, NO
	Block 7 DISP		YES, NO

Plotter Menu	Sub Menu 1	Sub Menu 2	Setting Range
System Setting	Distance/Speed		nm, kt km, km/h
	Plot interval		Time, Distance
	Time interval		1, 2, 5, 10, 20, 30, 60, 120, 300, 600 (second)
	Distance interval		0.01, 0.02, 0.05, 0.10, 0.20, 0.50, 1.00, 2.00, 5.00, 10.00(nm/km)
	Number of plot		2000, 4000, 7000
	Average speed		ON, OFF
	Average number		1 to 60
	Fix scale 1		
	Fix scale 1		
	Fix scale 1		
	Auto scroll		Screen Edge, Within Screen
	Scroll direction		View Point, Chart
	Event store		OFF, 0 to 99
	Correction		ON, OFF
	Correction Start		
	Compass correction		-90.0 to +90.0
	Local time correction		-13.5 to +13.5
	Navigation mode		Rhumb Line Great Circuit
Other Ship Track	Other ship 0	Ship mark	ON, OFF
		Marl	L_Circle, S_Circle, Dot
		ID No.	ON, OFF
		Track display	ON, OFF
		Track line	Thin, Thick
		Color	Choose from among 7 colors
		Plot limit	50, 100, 200, 500, 1000
		Course line	SPD RESP, OFF
	Other ship 1	Same as other ship 0	Same as other ship 0
	Other ship 2	Same as other ship 0	Same as other ship 0
	Other ship 3	Same as other ship 0	Same as other ship 0
	Other ship 4	Same as other ship 0	Same as other ship 0
	Other ship 5	Same as other ship 0	Same as other ship 0
	Other ship 6	Same as other ship 0	Same as other ship 0
	Other ship 7	Same as other ship 0	Same as other ship 0
	Other ship 8	Same as other ship 0	Same as other ship 0
	Other ship 9	Same as other ship 0	Same as other ship 0

Plotter Menu	Sub Menu 1	Sub Menu 2	Setting Range
Geodesic Line	Start position		0°00.000N to 90°00.000N, 0°00.000S to 90°00.000S 0°00.000E to 180°00.000E, 0°00.000W to 180°00.000W
	End position		0°00.000N to 90°00.000N, 0°00.000S to 90°00.000S 0°00.000E to 180°00.000E, 0°00.000W to 180°00.000W
Draw Parallel Lines			Invalid, Valid
	Start position		0°00.000N to 90°00.000N, 0°00.000S to 90°00.000S 0°00.000E to 180°00.000E, 0°00.000W to 180°00.000W
	Direction		0.0 to 359.9 (°)
	Line length		0.1 to 999.9
	Line interval		0.001 to 9.999
	Line number		1 to 99
	Base point		Left, Center, Right
Nearest Port Info			

Using the Menu

6.1.3.3 ETC. Menu

etc. Menu	Sub Menu 1	Sub Menu 2	Setting Range
GPS/DGPS Setting	Datum		TOKYO, WGS-84
	Average		1 to 3
	DGPS mode		OFF, BEACON, SBAS
	Beacon select		AUTO, MANUAL
	Frequency		283.5 to 325.0
	Baud rate		50, 100, 200
	GPS INIT		NO, YES
GPS Monitor			
User C-Card	Store		Mark, Route, Track, Drawing, Other Ship Track, System
	Recall		Mark, Route, Track, Drawing, Other Ship Track, System
	Erase		Mark, Route, Track, Drawing, Other Ship Track, System
	Format		
Screen Display Registration			Register displays in use from 12 types
Alarm	Depth alarm	Alarm settings	OFF, ON
		Upper alarm	0 to 3000(m), 0 to 6000(ft)
		Lower alarm	0 to 3000(m), 0 to 6000(ft)
	Fish alarm	Alarm settings	OFF, ON
		Upper alarm	0 to 3000(m), 0 to 6000(ft)
		Lower alarm	0 to 3000(m), 0 to 6000(ft)
		Alarm length	Short, Middle, Long
		Upper color	Choose from among 15 colors for upper positions
		Lower color	Choose from among 15 colors for lower positions
	Arrival alarm	Alarm settings	OFF, ON
		Alarm range	0.05 to 5.00(unit)
	POB alarm	Alarm settings	OFF, ON
		Alarm range	0.05 to 5.00(unit)
	XTE alarm	Alarm settings	OFF, ON
		Alarm range	0.05 to 5.00(unit)
	Alarm Zone	Zone settings	OFF, ON
	Depth Limit Alarm	Alarm settings	OFF, ON
		Limit range	0 to 999(m)
	Grounding Alarm	Alarm Settings	OFF, ON
		Grounding Depth Limit	0 to 99(m)

etc. Menu	Sub Menu 1	Sub Menu 2	Setting Range
		Grounding Alarm Range	0.25, 0.50, 1 (m)
		Grounding Alarm Report	LAND AREA,, NO DATA AVAILABLE
Language			English, Spanish, French Korean, Greek
Maintenance	Simulation	Sounder	OFF, ON
		Plotter	OFF, ON
		Start LAT	00°00.000 to 90°00.000N, 00°00.000 to 90°00.000S
		Start LON	000°00.000 to 180°00.000E, 000°00.000 to 180°00.000W
		Speed	0 to 50(kt)
		Steering	0 to 359 (°)
		Course	0 to 359 (°)
		Mode	Normal, WPT, Type A, Type B
	System test	LCD test	
		RAM test	
		Key test	
		Brightness	
		COM port test	CH0, CH1, CH2, CH3
		Buzzer test	High Tone Test, Low Tone Test
		System information	
	Color palette Operation		Set color palette (ranging from Palette No. 1-254 (red/blue/green)) for Sounder Image. Each palette contains 255 colors.
	Data Communication		
	Flash ROM erase		
	Format		Sounder, Plotter, COLOR PALETTE
	NMEA		

6.2 Sounder Menu

6.2.1 Transmission

6.2.1.1 Pulse Width(H), Pulse Width(L)

Choose from 4 pulse widths: super short, short, middle, long

Selection: Super Short, Short, Middle, Long

Resolution and detectable depth of a sounder varies depending on the pulse width.

Super Short: Image resolution is very good but detectable depth is extremely shortened.

Short: Image resolution is good but detectable depth is shortened.

Middle: Image resolution and detectable depth are improved compared with the Short

Long: Image resolution is poor but detectable depth is lengthened.

6.2.1.2 Output

Output reduction can be induced on high and low frequencies.

Selection: Normal, Low

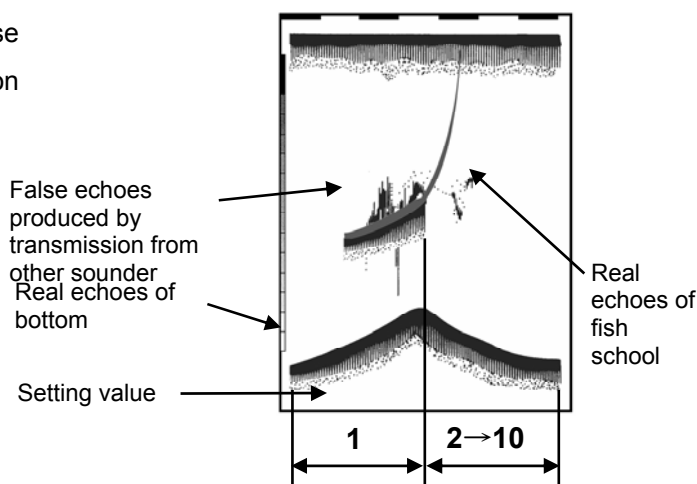
Choosing the “low” option will reduce output and enables various inspections to be carried out during maintenance.

6.2.1.3 PRR (Pulse Repetition Rate)

The Pulse Repetition Rate can be set for each range.

Setting Range: 1(Normal) to 10(Slowest)

Using this function, you can eliminate the false echoes caused by other sounder's transmission working on nearly the same PRR.



6.2.2 Image

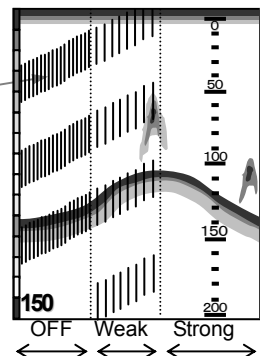
6.2.2.1 Interference Rejection

Image interference from other boats can be removed through this function.

Selection: OFF, 1(Weak), 2(Strong)

Based on the level of interference, choose either weak or strong levels of Interference Rejection.

Interference
from other ship



6.2.2.2 Noise Rejection / Enhance (EM)

This function selects whether to use the noise rejection mode or the enhance mode.

(Refer to 5.4.3 Adjustment of Gain and STC)

Selection: Noise Rejection, Enhance mode

Only when noise rejection is selected, "Enhance" can be changed.

6.2.2.2.1 Enhance

Enhances the picture presentation by changing the dynamic range of sonar video.

Setting Range: 25db, 35db, 45db, 55db, 65db

As the values increase, the image can become more detailed.

As the values decrease, the image becomes more less detailed.

6.2.2.2.2 TVG

Make the sensitivity of the image with deep depth strong.

Setting Range: OFF, 1, 2, 3, 4

6.2.2.3 White Line

The white line is drawn on the edge of the seabed echo.

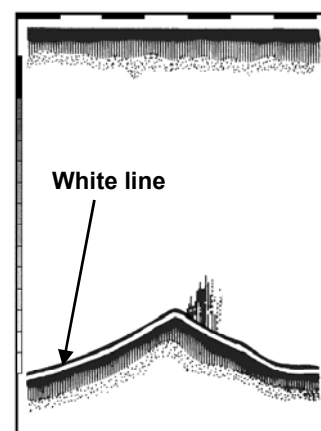
Setting Range: OFF, 1, 2, 3, 4, 5, Auto

OFF: White line not displayed

1(Thin) to 5(Thick)

Automatic: The seabed (displayed in red) is about half the thickness of the displayed white line.

Images of school of fish near the seabed can be distinguished.



6.2.2.4 Color Tone

Select color tone.

Selection: 1, 2, 3(3 steps)

6.2.2.5 Background Color

Select background color.

Setting Range: 1 to 9

1: Pale Blue 2: Marine Blue 3: Blue 4: Dark Blue 5: Black

6: Pale Greenish Blue 7: Greenish Blue 8: Dark Blue 9: White

This functions to make the image easier to see.

6.2.2.6 Color Rejection

Specified image colors can be made into the background color.

Setting Range: 1 to 15

This functions to limit colors, making schools of fish easier to see.

6.2.3 Display

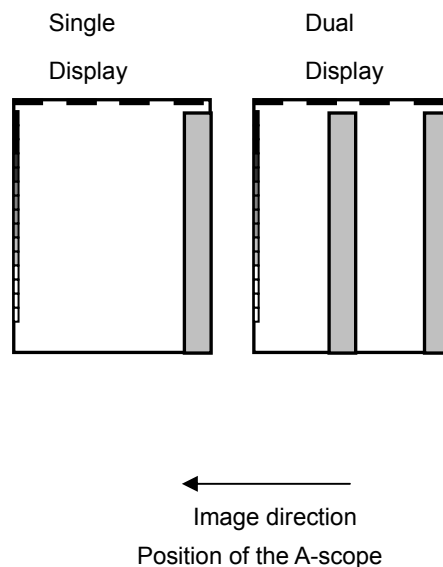
6.2.3.1 A Scope

Select A-scope display.

Setting Range: OFF, Small, Large

The most current images are displayed in real-time using A-Scope, thus functioning to reveal where schools of fish may be as soon as possible.

※ If the vertically partitioned screen is displaying objects in the following fashion “← | →”, the A-Scope does not display.



6.2.3.2 Zoom Range

Selection of zoom ranging for Bottom Fixation Expansion, Bottom Quality Expansion, Bottom Part Expansion and Part Expansion can be done in this function.

*The same zoom range is utilized to each type of magnification display.

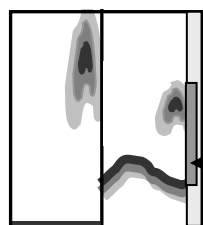
Setting Range:

m, J.fm, fm, l.fm:

2.5, 5, 7.5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200

ft:

10, 15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 320, 360, 400, 450, 500, 550, 600, 650



Zoom/Normal

Zoom range is specified by the orange bar on the right-hand side of the normal screen.

Functions to magnify the set range.

6.2.3.3 Depth Display Size

This function selects Depth value/OFF or when ON, size of characters displayed.

Selection: OFF, Small, Middle, Large

OFF: Depth value not displayed.

This functions to control the display of the water depth on the sounder screen.

6.2.3.4 Depth Value Position

Select the position of depth value.

Selection: Bottom, Top

Top: Water depth displayed on the upper left part of the sounder display.

Bottom: Water depth displayed on the lower left part of the sounder display.

6.2.3.5 Scale

This determines the settings for whether or not to display the scale

Selection: OFF, Single, All

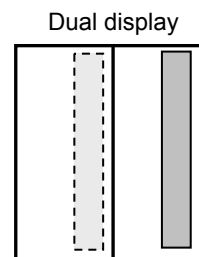
OFF: Scale not displayed

Single: • In dual frequency mode, the scale is displayed on the right-hand side screen.

- When displaying in horizontal partitioning, determines settings for displaying the scale in other modes.

All: • In the dual frequency mode, the scale is displayed on the right-hand side of both screens.

- When displaying in horizontal partitioning, determines settings for displaying the scale in other modes.



Vertically split screen

6.2.3.6 Scale Position

Sets the display position of the scale

Selection: Side, Center

Side: Sets the display position of the scale to the right-hand side of the screen.

Center: Sets the display position of the scale to the center of the screen.

6.2.3.7 Scale Value

Selects the size of the scale value.

Selection: Small, Large

Small: Small character size

Large: Large character size

6.2.3.8 Time Mark

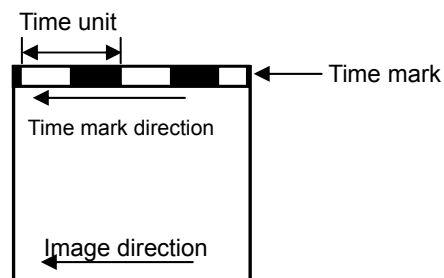
Selects the time mark ON or OFF or time unit (every 10 seconds, 1 min).

Selection: OFF, 10 sec, 1min

OFF: time marks not displayed

10 sec: Every 5 seconds, white (or green) and black marks are shown to show the passage of time.

1min: Every 30 seconds white (or green) and black marks are shown to show the passage of time.



Sounder screen

Time marks show the passage of time, and are displayed in the same direction as the image and speed. When the image is interrupted, the time marks cease to advance. Time increments are

depicted using white (or green) and black marks.

6.2.3.9 Image Speed

Sets the speed for sounder imaging.

Setting Range : 4/1, 3/1, 2/1, 1/1, Stop, 1/2, 1/3, 1/4, 1/6, 1/8, 1/12, 1/16

1/1: For each transmission signal sent out, 1 line is displayed.

Stop : Sending of sounder images is stopped.

*1: For each transmission signal sent out, * lines are displayed.

1/*: For * transmissions signal sent out, 1 line is displayed.

When multiple lines are displayed for 1 transmission signal, received signal lines are widened to detect even small schools of fish. This function helps to prevent schools of fish being overlooked. Conversely, when 1 line is displayed for multiple transmissions, small schools of fish are intentionally overlooked.

6.2.3.10 Image Direction

Selects the direction of image movement.

Selection: ← | ← | , ← | →

← | ← | : Images begin on the right-hand side and are displayed leftward.

← | → : Images begin in the center and are displayed outward.

In the dual frequency mode, this direction setting is only applicable in normal and vertical partitioned screen settings. In all other cases, imaging flows to the left.

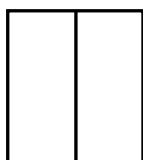
6.2.3.11 Image Partition

Sets the direction of image partitioning.

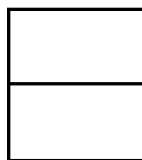
Selection: Vertical, Horizontal

Vertical : The screen is split vertically, creating a left-hand side and a right-hand side.

Horizontal : The screen is split horizontally, creating upper and lower screens.



Vertically split



Horizontally split

6.2.3.12 Image Swap

This function allows the swapping of the dual images: left side and right side, or upper and lower.

Selection: A|B, B|A

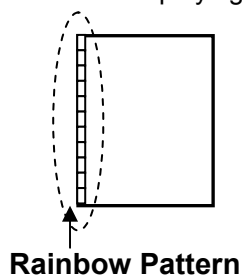
6.2.3.13 Color Bar Scale

Sets whether the rainbow pattern is displayed or not.

Selection: ON, OFF

ON : Display

OFF : Un-displaying



6.2.3.14 Water Temp Display

This function sets: (1) if the water temperature shall be displayed or not, and (2) the units of display.

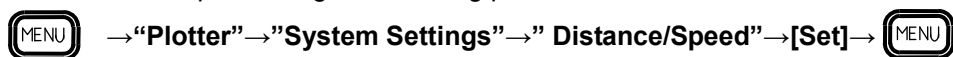
Setting Range: OFF, °C, °F

OFF : Water temperature, and boat speed are not displayed.

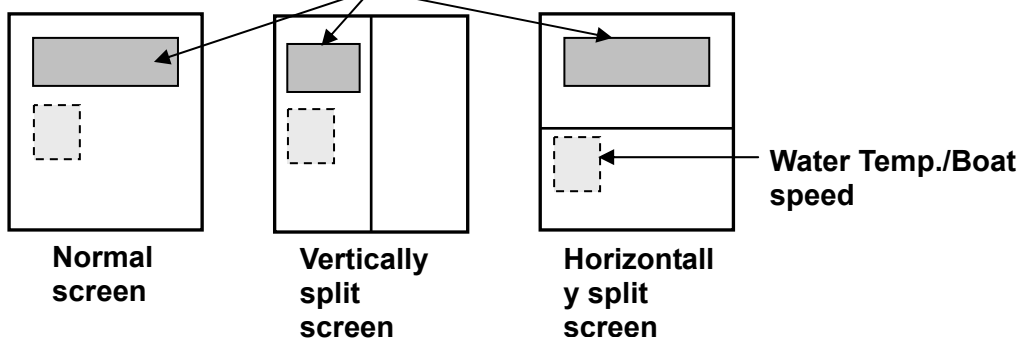
°C: Water temperature and graph units are displayed in °C.

°F: Water temperature and graph units are displayed in °F

When the water temperature unit is set, the boat speed is also displayed. Set the units of measurement for boat speed using the following procedure:



Water temp. graph



6.2.3.15 Water Temp Graph

This function sets: (1) if the water temperature graph shall be displayed or not.

Setting Range: OFF, °C, °F

OFF : Water temperature graph are not displayed.

ON: Water temperature graph are displayed.

6.2.4 Automatic

6.2.4.1 Auto Setting

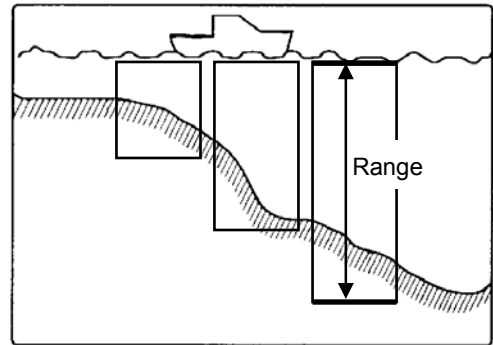
Sets the functions for auto ranging.

Selection: OFF, Range, Shift

OFF: Auto ranging is turned off.

Range: This mode displays everything from the sea bottom to the surface.

Shift: This key switches in-between engaging and turning off the auto shift.



When the depth range is set, the device automatically adjusts itself in order to always display the sea bottom. The shift key switches in-between engaging and turning off the auto shift.

6.2.4.2 Auto Gain

Determines whether or not the Auto Gain function is utilized.

Setting Range: OFF, ON

OFF: Auto Gain is not utilized.

ON: Auto Gain is utilized.

The Auto Gain function adjusts the gain so that the image is easy to see and understand.

6.2.5 Depth Range Preset

6.2.5.1 Depth Range1 to 8

Sets the maximum depth range for each of the normal modes. Depth ranges (1-8) can be set to the same value, even for varying modes.

Setting Range:

m, J.fm, fm, l.fm:

5, 7.5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1100, 1200

ft:

15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 440, 480, 520, 560, 600, 640, 680, 720, 780, 800, 840, 880, 920, 960, 1000, 1040, 1080, 1120, 1160, 1200, 1240, 1280, 1320, 1360, 1400, 1440, 1480, 1520, 1560, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200, 3400, 3600, 3800, 4000

Depth units are set by the procedure outlined in section 6.2.6.1, "Depth Units" of this manual.

6.2.6 System Setting

6.2.6.1 Depth Unit

Selects the depth unit of measure.

Selection: m, fm, J.fm, l.fm, ft

6.2.6.2 Draft Setting

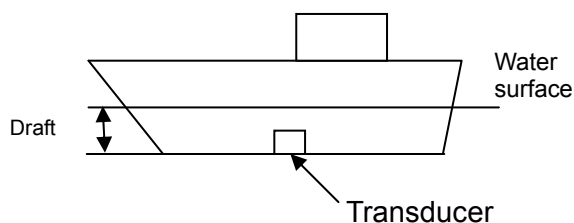
Sets up the depth of draft line.

Setting Range:

0.0 to 25.5(m, fm, J.fm, l.fm)

0.0 to 85.0(ft)

Depth units are set by the procedure outlined in section 6.2.6.1.



By doing so, the target depth equals the actual depth from the water surface.

6.2.6.3 Bottom Start

Sets up the starting depth of the seabed detection.

Setting Range: 0.0 to 20.0(m, fm, J.fm, I.fm)

0.0 to 65.0(ft)

Depth units are set by the procedure outlined in section 6.2.6.1.

Once set, a seabed echo (received signal) shallower than the set up depth will not be detected. Due to this, confusing the transmission line for the seabed will not happen. Should the Bottom Detection Start setting be deeper than the actual sea bottom depth, the sea bottom shall not be properly detected.

6.2.6.4 Bottom Detection

Sets the range for sea bottom detection.

Selection : Inside range (Inner side of the screen), Outside range(Outside of the screen)

Inside range: Detects sea bottoms within the set range displayed.

Outside range: Detects sea bottoms at twice the range of the set range displayed.

6.2.6.5 Depth Measurement

Sets sea bottom measurement at Auto, High, or Low frequency settings.

Selection : Auto, High frequency, Low frequency

Auto: Usually detects sea bottoms at high frequency. Automatically switches to low frequency with sea bottom is not detected at high frequencies.

High frequency: Detects sea bottoms at high frequency.

Low frequency: Detects sea bottoms at low frequency.

6.2.6.6 Sonic Correction

Compensates the deviation of sonic velocity.

Setting Range: -7 to +2%

A depth indication may deviate from a true value because of the water temperature difference or salt concentration in the water. Corrects the depth indicator value to a known true value.

6.2.6.7 Water Temperature Correction

Compensates the deviation of a temperature value supplied from the speed/temperature sensor.

Setting Range: -10.0 to +10.0 (°C or °F)

Sets water temperature data values when connected to: Water temperature sensor (T-81) or water temperature/speed sensor (one of these: ST-80-, ST-90-1, ST-100-1).

Using the Menu

6.2.6.8 Boat Speed Correction

Compensates the deviation of a boat speed value supplied from the speed/temperature sensor.

Setting Range: -10.0 to +10.0 (kt or km/h)

Sets the correction for boat speed data when connected to: water temperature/speed sensor(one of these: ST-80-1, ST-90-1, ST-100-1)

6.2.6.9 Water Temperature Data

Sets input for water temperature data.



Selection: INT , EXT

INT: Displays input data for water temperature from: Water temperature sensor(T-81)or
Water temperature /Speed sensor(ST-80-1/ST-90-1/ST-100-1)


EXT: Displays input data for water temperature from external serial data.


6.2.6.10 EXT Trigger Type

Sets priority settings for external trigger signals from external sounders.

Selection: OFF,  (Triggered on the leading edge) ,  (Triggered on the trailing edge)

OFF: No external sounder to be connected.

 : Transmission synchronizes a sync trigger on the leading edge from an external sounder.

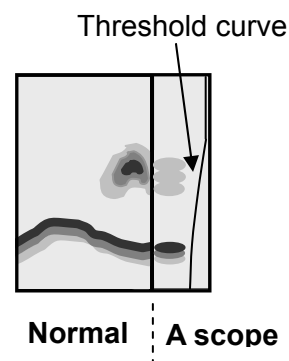
 : Transmission synchronizes a sync trigger on the trailing edge from an external sounder.

6.2.7 Bottom Detection Adjust**6.2.7.1 High Frequency, Low Frequency**

Adjust the bottom detection position.

Setting Range: -80 to 0

The bottom detection position moves to the surface of bottom of the sea of the image when a set value is lowered.
When the A-Scope is displayed, the threshold curve shall be displayed on the screen.



6.3 Plotter Menu

6.3.1 Mark Block Number

Sets the starting numbers for mark blocks.

Setting Range: 00000, 00100, 01000, 02000, 03000, 04000, 05000, 06000, 07000, 08000

Please use mark block numbers to signify the fishing season, fishing methods, waypoints, position of sunken ships, and the position of other dangerous items. Specifying mark block number 00000 allows the user to utilize usual marks as well as event memory.

6.3.2 Display Settings

6.3.2.1 Position Data Display

6.3.2.1.1 L / L

Latitude and longitude are displayed as detected.

In this menu, the following settings can be made:

- (1) Latitude correction: Detected latitudes can be corrected.

Setting Range: -0.300 to +0.300(minutes)

- (2) Longitude correction: Detected longitudes can be corrected.

Setting Range: -0.300 to +0.300(minutes)

6.3.2.1.2 LORAN C

Detected latitude and longitude data is converted to LORAN C LOP and displayed.

In this menu, the following settings can be made:

- (1) LORAN C Station GRI

Setting Range: Refer to Table 2 LORAN C CHAINS

- (2) LORAN C Slave station1 to 5

Setting Range: Refer to Table 2 LORAN C CHAINS

- (3) Slave station 1 Correction

Setting Range: -30.0 to +30.0us

- (4) Slave station 2 Correction

Setting Range: -30.0 to +30.0us

6.3.2.1.3 DECCA

Detected latitude and longitude data is converted to DECCA LOP and displayed.

In this menu, the following settings can be made:

- (1) Chain

Selection: Refer to Table 3 DECCA CHAINS

- (2) Decca Slave Station 1

Selection: Red, Green, Purple

- (3) Decca Slave Station 2

Selection: Red, Green, Purple

Using the Menu

(4) Slave Station 1 Correction

Setting Range: -03.00 to +03.00(Lane)

(5) Slave Station 2 Correction

Setting Range: -03.00 to +03.00(Lane)

6.3.2.2 Chart Display

Selects or changes the colors of land or ocean, Value-Added Data, Perspective View, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Items	Detail	Initial Setting
Map Color	Selects the arrangement of color in the map from 4 settings (Normal / Sunlight / NightVision / NOAA)	Normal
Mixing Levels	Superimposes and displays where the reduced scale level is different on the map	OFF
Bound Lines	The range of the map data is shown with the frame	OFF
Grid	Displays the latitude longitude line In the Perspective View mode, the depth of the screen is shown in the grid	ON
Value-Added Data	Displays Value-Added Data (VAD) on the map	OFF
Anti-Clutter	Makes anti-clutter effective	OFF
Elevation Value	Displays elevation value	ON
Perspective View	Displays the map with perspective view In the Perspective View mode, Mixing Levels becomes invalid. Some other functions might be restricted	OFF

6.3.2.3 MARINE DISPLAY

Selects or changes the various marine markers such as lighthouse, ports, buoys, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Items	Detail	Initial Setting
Place Name	Displays the place name	ON
Object Item	Selects the display form of a lighthouse or a buoy (Simple / Detail)	Detail
Light animation	Displays a light mark on the lighthouse or buoy blinking. Typically this function is used to show the visible lighthouses from the actual ship's position Black light: The light of the lighthouse is not visible from the point of observation Grey light: The light of the lighthouse is off (Red/Green/Yellow) light: Color of the lighthouse	OFF
Landmarks	Displays landmarks	OFF
Light marks	Displays the light mark on a lighthouse or buoy	ON
Light sectors	Displays light sectors	OFF
Buoys	Displays buoys	ON
Buoys Name	Displays name of the buoy	OFF
Lake & River	Displays a lake or river	OFF
Attention Areas	Displays areas for attention (Fishing facility, Anchor berth, etc.)	ON
Tides & Currents	Displays tides and currents	OFF
Ports	Displays ports	ON
Signals	Displays signals	OFF

Tracks & Routes	Displays tracks and routes	OFF
Seabed	Displays seabed (sand waves, weed, kelp, etc)	OFF
Underwater objects	Displays underwater objects (Obstruction, Wreck, Cable, etc.)	OFF

6.3.2.4 LAND DISPLAY

Selects or changes the various marks on land such as landmarks, roads, airports, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Items	Detail	Initial Setting
Cultural Features	Displays cultural features	OFF
Roads	Displays roads	OFF
Road Name	Displays road names	OFF
Railway	Displays railways	OFF
POI	Displays points of interest	OFF

6.3.2.5 DEPTH DISPLAY

Selects or changes the depth range, depth contour, depth unit, which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Items	Detail	Initial Setting
Soundings	Selects the setting for the display of soundings (ON/OFF)	OFF
Sounding Range Min	Sets the minimum value for the Sounding Range setting	0m
Sounding Range Max	Sets the maximum value for the Sounding Range setting	9999m
Rocks	Selects the setting for the display of Rocks (ON/OFF)	OFF
Depth Contour Labels	Selects the setting for the display of Depth Contour Labels. (ON/OFF)	OFF
Depth Unit	Selects the setting for the display of Depth Unit (m, fm, D.fm, ft)	m
Depth Area Highlights	Selects the setting for the display of Depth Area Highlights. (ON/OFF)	OFF
Highlights Range Min	Sets the minimum value for the Highlights Range setting	0m
Highlights Range Max	Sets the maximum value for the Highlights Range setting	0m
Reverse Contour Color	Reverses the order of the contour coloring	OFF

6.3.2.6 Screen Display Setting

Changes made shall be reflected in this menu upon exiting.

6.3.2.6.1 Course Line

Determine if user's boat course line is displayed or not.

Selection: Long line, Speed Response, OFF

Long line: Displays a straight line from the boat to the edge of the screen.

Speed based: Displays a straight line, whose length depends on the speed of the boat.

None: Course line is not displayed.

Using the Menu

6.3.2.6.2 Course Display

Set the form of the bearings.

Selection: True, Magnetic

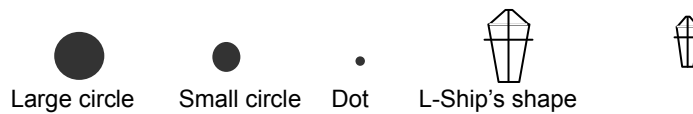
True: Bearings where the course and the direction on the screen match.

Magnetic : Bearings that have undergone correction using the onboard compass.

6.3.2.6.3 Position Mark

Set the mark to represent the user's ship on the display.

Selection : Large circle, Small circle, Dot, Large Ship's shape, Small Ship's shape



Should the user choose the L-ship or S-ship's shape, the "bow" of the mark shall appear in alignment with the course.

6.3.2.6.4 Track Line

Sets the thickness of track lines.

Selection: Thick, Thin

6.3.2.6.5 Mark Size

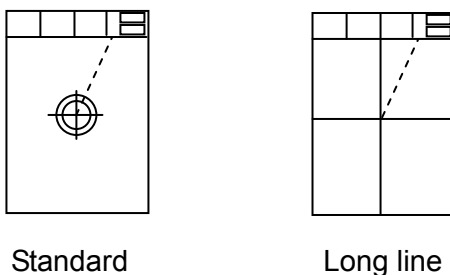
Sets the size of marks.

Selection: Large, Small

6.3.2.6.6 Cursor Type

Sets the type of cross cursor to be used.

Selection : Standard, Long line



6.3.2.6.7 Info Window

Sets up the information window.

Selection: OFF, L/L, Depth/Water temp, TIME/ETA, Speed

Information windows shall appear in the upper right-hand section of the plotter as long as the setting for information windows is not set to "OFF". Should the cross cursor be in operation, the information window shall display the cursor's present position on the left side of the window.

6.3.2.6.8 Position Info Window

This window gives the position information of the user's ship. This setting determines the size of the Position Information Window and whether or not this window shall be displayed.

Selection : Large, Small, OFF

6.3.2.6.9 Ring Marker

This function places a series of equidistant rings around the user's ship on the display. This setting determines the scale of the rings and whether or not the rings (and the accompanying scale bar) shall be displayed

Selection: OFF, ON

6.3.2.6.10 Map Rotation Speed

Determine the rotation speed of the map through this setting.

Selection: High speed, Low speed

6.3.2.6.11 SAFETY STATUS BAR

This feature displays a status bar with six boxes showing the status of certain functions. Any warning or alarm condition is identified by the color red to indicate possible risk.

①	②	③	④	⑤	⑥
Normal Zoom	Best Map	Data Off	Declutter	Dangers	Cautions

① Zoom

Normal Zoom	When the chart is displayed at normal scale
Under Zoom	Red when the chart is under-zoomed out more than twice the normal scale. Otherwise white
Over Zoom	Red when the chart is over-zoomed in more than twice the normal scale, Otherwise white

② Best Map

Red when a more detailed chart is available under the own ship's position.

③ Data Off

Red when at least one of the following objects or layers is turned off (by the user): Depth*, Attention Areas, Track & Routes, Lighthouse, Buoys, Signals, Light animation, Underwater Objects.

(*Depth Range Min setting is more than 20m, or Depth Range Max setting is less than 20m)

④ Declutter

Red when Anti clutter function is ON.

⑤ Dangers

Red when “Guardian Technology” detects one of the following objects: Land, Intertidal, Depth Area, Rocks, Obstruction, Shoreline Constructions, Fishing Facility, Wrecks, Dragged area, Diffuser, Mooring/Warping facility, Pingo, Production instruction

⑥ Cautions

Red when “Guardian Technology” detects a cautionary or restricted area.

6.3.2.6.12 QUICK INFO

The type of Quick info is user selectable.

OFF	Disabled, no Quick Info shown at all	
ON	Only one point	Port Service, Tides, Lighthouse, Wrecks, Rocks, Buoys, Beacons, Obstructions, Landmarks, etc.

Refer to chapter 5.9 “Quick Info” for the operation explanation.

6.3.3 NAV

Determine which direction shall face upwards on the plotter through this setting.

Selection: N-Up, E-Up, S-Up, W-Up, Course Up, Head Up, Own Ship’s Center

North Up: True north is set at the top of the screen.

East Up: True east is set at the top of the screen.

South Up: True south is set at the top of the screen.

West Up: True west is set at the top of the screen.

Course Up: True waypoint position is set at the top of the screen.

Head Up: Own ship’s heading is always set at the top of the screen. When the cross cursor is shown, the cursor position is prioritized and the map movement is suspended. When the cross cursor is turned off, the map starts to move according to own ship’s movement.

Own Ship’s Center Mode: Picture is stabilized as North up, however, the map moves while own ship stays in the center of the screen. When the cross cursor is shown, the cursor position is prioritized and the map movement is suspended. When the cross cursor is turned off, the map starts to move according to own ship’s movement.

6.3.4 Mark Edit

6.3.4.1 Edit

The user may determine "Mark No. "and edit the following parameters: "Mark Shape", "Mark Color", "No. Display", "Display", "Latitude/Longitude", and "Comment".

Mark No. Setting Range: 00000 to 8299

Mark Shape Setting Range: ○, □, ▽, ×, ☆, △, ◇

Mark Color Setting Range: Green, Red, Yellow, Dark Blue, Blue, Pink, White

Number display Setting Selection: OFF, ON

Display Setting Selection: OFF, ON

Latitude Setting Range: 00 ° 00.000 to 90 ° 00.000N, 00 ° 00.000 to 90 ° 00.000S

Longitude Setting Range: 000 ° 00.000 to 180 ° 00.000E, 000 ° 00.000 to 180 ° 00.000W

Comment Setting Range: 12 letters (0 to 9, A to Z, &, #, _, .)

6.3.4.2 Transfer

Transfers the contents of designated mark number registration to a specified mark number.

Transferring Mark Number Setting Range: 00000 to 8299

Receiving Mark Number Setting Range: 00000 to 8299

Once the transfer is completed, the original data will be deleted.

Should data exist in the mark receiving data, that data shall be overwritten by the incoming data.

The transferring mark and receiving mark cannot have the same number.

The user may find it convenient to designate the waypoint and other sites with consecutive mark Numbers.

6.3.4.3 Delete

Deletes the contents of designated mark number registration.

Range of mark numbers that may be deleted: 00000 to 8299

Marks without data cannot be selected.

6.3.4.4 Operation Of Blocks

6.3.4.4.1 Display of Blocks

Determine whether or not the mark number for each mark block shall be displayed. Also determine whether or not the mark itself shall be displayed.

Mark Number Display Setting Selection: NO, YES

Mark Display Setting Selection: NO, YES

Marks and their corresponding numbers can be arranged and displayed according to the following parameters: fishing methods, fish species, fishing localities, etc.

6.3.4.4.2 **Transfer of Blocks**

Specify a mark block number and transfer one block to another.

Transferring one block to another shall erase any pre-existing data from the receiving block.

6.3.4.4.3 **Erase of Blocks**

Specify a mark block number and all the data within that block may be deleted through this function.

Caution



Deleted data cannot be recovered. Please delete data with caution.

6.3.5 Route

6.3.5.1 Routing

Routes may be created by using the cross cursor, latitude and longitude coordinates, or by using a mark number.

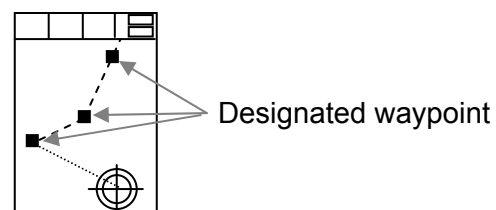
The user may create up to 50 separate routes.

6.3.5.1.1 Cursor

The procedure for creating a route using the cross cursor is as follows:

- (1) Enter route number and comment. Data input may also be done using the numerical keypad.
- (2) Push **ENT** to confirm the inputted route number and comment.
- (3) Using the directional keypad, move the cross cursor to points the user would like to designate as waypoint (intermediate waypoints) and press **ENT**.
The user may designate as many as 50 different intermediate waypoints. Also, a mark may be changed into a waypoint by moving the cross cursor on top of it and pressing **ENT**.
- (4) Press **MENU** to complete creation of the route.

Routing (waypoint registration)	
Route No	01
Comment	RTE --.--
Number of registration: 03/50	
----- : --	
Position	35°03.557N 140°09.819E



6.3.5.1.2 Value

Creating a route through the use of numerical input is done as follows:

- (1) Enter the route number and comments. Data input may also be done using the numerical keypad.
- (2) Push **ENT** to confirm the inputted route number and comment.
- (3) Enter the number of the mark to be designated as a waypoint, or enter the latitude and longitude of the position to be designated and press **ENT**.
- (4) Press **MENU** to complete creation of the route.

Using the Menu




6.3.5.2 Route Erase

Routes may be deleted by using the cross cursor, or by using the route number.

A route in current operation cannot be deleted.



6.3.5.2.1 Cursor

Delete a route through the cross cursor by the following method:

- (1) All registered routes are displayed on the plotter image. Move the cross cursor onto the route to be deleted and press .
- (2) Press  to delete the selected route.
- (3) Press  to complete the deletion of the route.

6.3.5.2.2 Value

Delete routes through the use of numerical input by the following procedure:

- (1) Select a route to be deleted from the list.
- (2) Press  and delete the selected route.
- (3) Press  to complete the deletion of the route.

Caution



Deleted routes cannot be recovered. Please delete routes with caution.




6.3.5.3 Route Edit

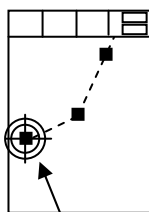
Routes may be edited by using the cross cursor, the route number, or the waypoint.

6.3.5.3.1 Cursor

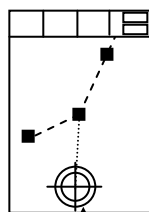
6.3.5.3.1.1 Waypoint Movement

Waypoints may be moved via the cross cursor by the following procedure:

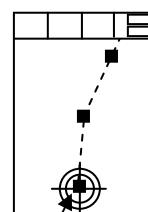
- (1) Move the cross cursor onto the waypoint to be moved and press .
- (2) Move the cross cursor onto the new position.
- (3) Press  to confirm the new waypoint position.
- (4) Press  to complete the change in position.



Move the cross cursor
onto the waypoint to be
moved






Move the cross cursor
onto the new position.



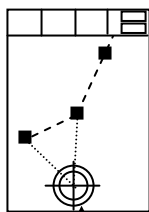
Waypoint position now
changed.

6.3.5.3.1.2 Waypoint Addition

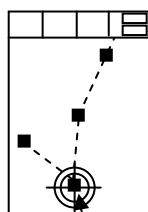
Adding waypoints may be done using the cross cursor by the following procedure:

- (1) Move the cross cursor onto the waypoint and press .
- The new waypoint shall be added behind the selected waypoint.
- (2) Move the cross cursor to the position of the new waypoint.
- (3) Press  to confirm the position of the new waypoint.
- (4) Press  to complete the adding of waypoints.

Additional waypoints cannot be added if there already exist 50 waypoints. The user must either delete one or more waypoints, or establish a new route altogether.






Move the cross cursor
to the position of the
new waypoint.

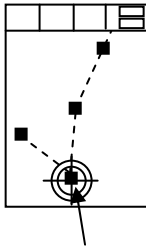


Waypoint has been added.

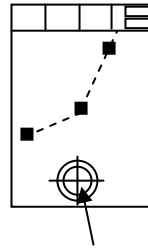
6.3.5.3.1.3 Waypoint Erase

Intermediate waypoints within a route may be deleted using the cross cursor by the following procedure:

- (1) Move the cross cursor onto the waypoint to be deleted and press .
- (2) Press  to confirm the deletion of the selected waypoint.
- (3) Press  to complete the deletion of waypoints.



Select the waypoint to be deleted.






The waypoint has been deleted.

6.3.5.3.2 Value




6.3.5.3.2.1 Waypoint Movement

Select a route number and the waypoint to be moved, and move it by the following procedure:

- (1) Select the number of the route containing the waypoint to be moved and press: .
- (2) Select the number of the waypoint to be moved.
- (3) Enter the latitude and longitude of the destination.
- (4) Press  to confirm the destination.
- (5) Press  to complete the moving of the waypoint.

6.3.5.3.2.2 Waypoint Addition




Select a route number and the waypoint to be added, and follow procedure below:

- (1) Select the number of the route containing the waypoint to be added and press: .
- (2) Select the waypoint number right before the area where the new waypoint is to be added.
- (3) Enter the latitude and longitude of the position of the new waypoint.
- (4) Press  to confirm the position of the new waypoint
- (5) Press  to complete the adding of the waypoint

Additional waypoints cannot be added if there already exist 50 waypoints. The user must either delete one or more waypoints, or establish a new route altogether.




6.3.5.3.2.3 Waypoint Erase

Select a route number and the waypoint to be deleted, and delete it by the following procedure:

- (1) Select the number of the route containing the waypoint to be deleted and press: 
- (2) Select the number of the waypoint to be deleted.
- (3) Press  to confirm the deletion of the waypoint.
- (4) Press  to complete the deletion of the waypoint.

6.3.5.3.2.4 Comment Edit

Editing a comment corresponding to a selected route number can be done by the following procedure:

- (1) Select the route number of the comment you wish to edit and press: 
- (2) Enter a new comment or revise the already existing one.
- (3) Press  to confirm the edit.
- (4) Press  to complete the edit and exit.

6.3.6 Track Store

The current track shall be stored in a designated block.

Setting Range: Block 1-Block 7

Up to 7000 track plots may be stored in each of the Blocks 1-7. Once stored in the memory, this data will not be lost even should the batteries for the memory unit run out.

The user is advised to erase any unwanted or unnecessary tracks before commencing any track storage.

6.3.7 Track Recall

Recall data that has been stored from one of the blocks (1-7) selected by the user.

Setting Range: Block 1-Block 7

Please re-designate the block from which you recalled the data from should this data not be the one you wanted. This unwanted track can be deleted from the screen.

6.3.8 Track Color

Set the display method for track color through this function.

Selection : Normal, Depth Based Coloring, Temperature Based Coloring

(1) Normal: Displays the color selected by the track color key located on the operation panel.

(2) Depth Based Coloring: Depicts track color based on differing water depth values.

(3) Temperature Based Coloring: Depicts track color based on differing water temperature values.

6.3.8.1 Depth Response

Sets the water depth values based upon which the track colors shall change.

Setting Range: 0.1 to 999.9

Increasing water depth is depicted by the following order of colors: green, red, yellow, dark blue, blue, pink, and white. Please note that this sequence of colors cannot be altered.

6.3.8.2 Water Temperature Response

Sets the water temperature values based upon which the track colors shall change.

Setting Range: -1.0 to 50.0

Increasing water temperature is depicted by the following order of colors: green, red, yellow, dark blue, blue, pink, and white. Please note that this sequence of colors cannot be altered.

6.3.9 Drawing

6.3.9.1 Drawing Block

This function sets the drawing block number.

Setting Range: 1 to 7

Up to 500 points may be stored in the memory allotted for each block.

Drawings may be created and sorted according to their purposes.

6.3.9.2 Drawing Line Thickness

This function sets the thickness of drawing lines.

Selection: Thin, Thick


Please note that this setting is applied to all data existing within the designated block.

6.3.9.3 Input Method







This function sets the method of creating the user's drawing.

Selection : By cursor, By numerical input

6.3.9.3.1 Cursor Input


After selecting "By cursor input" (under "Input Method" of the "Drawing" menu), push  to activate the creation of drawings via the cross cursor.







Create drawings via the cross cursor by the method shown below:

- (1) Move the cross cursor to the starting point of the drawing to be created and press .
- (2) Continue to move to consecutive points and press  each time.
- (3) If a point is created by mistake, press . Each time  is pressed, the last point previously created shall be deleted.
- (4) Press  when you wish to change the color of the drawing lines.
- (5) Press  to end the drawing session and exit.

A single drawing may contain no more than 500 points. Should the user wish to continue to draw beyond 500 points, the current drawing block must be closed, and the drawing may be continued in a new block.

6.3.9.3.2 Value Input

After selecting "By numerical input" (under "Input Method" of the "Drawing" menu), push  to activate the creation of drawings via numerical input.

- (1) Enter latitude and longitude coordinates into the data input column.
- (2) After entering the values, if the current position is your desired start point, press . Continue to move to new consecutive points and press  each time.
- (3) Entered data may be deleted by pressing . Each time  is pressed, the last point previously created shall be deleted.
- (4) Press  when you wish to change the color of the drawing lines.
- (5) Press  to end the drawing session and exit.

A single drawing may contain no more than 500 points. Should the user wish to continue to draw beyond 500 points, the current drawing block must be closed, and the drawing may be continued in a new block.

6.3.10 Drawing Edit

Graphic drawings may be edited by using the cross cursor key or by directly entering numerical values such as latitude and longitude.

6.3.10.1 Cursor

6.3.10.1.1 Movement

Move graphic nodes in the drawing via the cross cursor by the following method:

- (1) Select cross cursor as the method by which to move a node.
- (2) Move the cross cursor to the new position (destination) of the node.
- (3) Press **ENT** to confirm the move. Press **CANCEL** to cancel the move.

6.3.10.1.2 Addition

Add nodes to the drawing via the cross cursor by the following method:

- (1) Designate a node using the cross cursor. The new node shall appear behind the node designated by the user.
- (2) Move the cross cursor to the position of the newly added node.
- (3) Press **ENT** to confirm the addition of this new node. Press **CANCEL** to cancel this addition.

6.3.10.1.3 Erase

Delete nodes from the drawing via the cross cursor by the following method:

- (1) Designate the node to be deleted using the cross cursor.
- (2) Press **ENT** to confirm the deletion of this node. Press **CANCEL** to cancel this deletion.

6.3.10.2 Value

6.3.10.2.1 Movement

Move nodes in the drawing by the following method:

- (1) Select or input the number corresponding to the node to be moved.
- (2) Enter the latitude and longitude of the new node.
- (3) Press **ENT** to confirm this move. Press **CANCEL** to cancel the move.



6.3.10.2.2 Addition

Add nodes to the drawing by the following method:

- (1) Select the number corresponding to the node directly in front of the node for the new point to be added.
- (2) Enter the latitude and longitude of the new node.
- (3) Press **ENT** to confirm this addition. Press **CANCEL** to cancel the addition.

6.3.10.2.3 Erase

Delete nodes from the drawing by the following method:

- (1) Select the number corresponding to the node to be deleted.
- (2) Press  to confirm the deletion of this point. Press  to cancel this deletion.

6.3.11 Drawing Erase

This function deletes an already existing drawing. Select the drawing to be deleted via the cross cursor. Not only this drawing, but all data in the corresponding block shall be deleted.

6.3.12 Drawing Recall

This function allows the user to choose if the data corresponding to a drawing block shall be displayed or not, block by block.

6.3.13 System Setting

System settings contain the following categories listed below.

6.3.13.1 Distance/Speed

Selects the units of measure for distance and speed. Nautical miles and knots are necessarily selected together. Likewise, metric units would be selected together as a set.

Selection : nm, kt (OR) km, km/h

6.3.13.2 Plot Interval

Selects either time interval or distance interval.

Selection: Time, Distance

6.3.13.2.1 Time Interval

This function sets the time intervals for recording tracks.

Setting Range: 1, 2, 5, 10, 20, 30, 60, 120, 300, 600(sec)

The user may set "Track Recording Interval" to "Time" only.

The smaller the value, the finer the plots are, but this consumes memory. Conversely, the larger the values, the longer the user can record tracks, but the data becomes less precise.

6.3.13.2.2 Distance Interval

This function sets the distance intervals for recording tracks.

Setting Range: 0.01, 0.02, 0.05, 0.10, 0.20, 0.50, 1.00, 2.00, 5.00, 10.00

The settings for units of measure are described in section 6.3.13.1, "Distance/Speed Units".

The user may set "Track Recording Interval" to "Distance" only. The smaller the value, the finer the plots are, but this consumes memory. Conversely, the larger the values, the user can record tracks over a longer distance, but the data becomes less precise.

6.3.13.3 Number of Plot

Set the upper limit for the number of track plots to be recorded.

Setting Range: 2000, 4000, 7000

This function is used to set up the upper limit of track plots. Plots are overwritten on a first-in first-out basis. If previous track plots are not necessary, the user is recommended to select the 4000 or 2000 point limit setting.

6.3.13.4 Average Speed

This function determines if the user's boat shall have an average speed or not.

Selection: YES, NO


6.3.13.4.1 Average Number

The user may set "Average Speed" to "Yes".

Setting Range: 1 to 60

The higher the average number setting, the greater the stability in displayed speed. However, the user may notice that higher average number sacrifices the response to the speed variation.

6.3.13.5 **Fix Scale 1, 2, 3**

Pressing  on the operation panel jumps to the fixed scales 1, 2, and 3. The values corresponding to Fix Scales 1,2 and 3 can be set to have identical values.

Setting Range: 0.01 to 3600(nm), 0.02 to 6600(km)

6.3.13.6 **Auto Scroll**

Sets up the position of the auto scroll within the screen.

Selection: Screen edge, Within screen

Screen edge: When the user's ship reaches the edge of the screen, the screen shall automatically scroll in order to keep the ship within view.

Within screen: When the user's ship nears the edge of the screen, the screen shall automatically scroll in order to keep the ship within view.

6.3.13.7 **Scroll Direction**

Sets the movement method for scrolling on the screen using the directional key.

Selection: Viewpoint, Map

Viewpoint: The directional keypad determines which direction the viewpoint of the screen moves, thus causing the user's ship to appear to be moving in the opposite direction.

Map: In this mode, the directional key moves the map as a whole, including the boat. Thus, the boat moves in the same direction as the directional keypad.

6.3.13.8 **Event Store**

Sets whether or not to engage the event storage function.

Setting Range: NO, 0 to 99


An arbitrary mark number is assigned (ranging from 00 to 99) and shall always appear on the screen in this function.



6.3.13.9 **Correction**

The user selects whether or not to use position correction.

Selection: YES, NO

6.3.13.9.1 Correction Start

The user may set "Position Correction" to "YES" only. If the boat's position (based on GPS data) and the position based on the map do not match, the displayed position on the screen can be corrected. (Though the position depicted on the display will change, the numerical position shall not. To change the numerical position data, go to: "Display Settings"→"Position Data Display" and edit the numerical position data.) Using the cross cursor, move the boat mark to the corrected position and press .

Press  and the correction shall be aborted. Positional correction may take place within a 2nm radius from the boat position. Should the distance exceed 2nm, a correction cannot be made even if the user presses .

6.3.13.10 Compass Correction

This function sets the compass correction when the GPS is receiving signals and the course bearings are set to "Magnetic Bearings" (section 6.3.2.3.2).

Setting Range: -90.0° to +90.0°

6.3.13.11 Local Time Correction

This function allows you to set up the local time by modifying the UTC (Universal Standard Time) supplied from a GPS receiver. Entering the time difference between your local time and the UTC makes the correction to set up the local time. After completion of this correction, the following time displays will be available.

The time when the Mark and Route are registered.

The current time display in the Information window.

Selection: -13.5 to +13.5 (hours)

6.3.13.12 Navigation Mode

You can select a navigation mode from the following modes.

RHUMB LINE: A straight line on a Mercator projection.

GREAT CIRCLE: The intersection of the spherical surface and a plane containing the two points A and B and the center of the sphere.

6.3.14 Other Ship Track

This function allows the user to independently keep track of up to 10 other ships, numbered 0-9.

6.3.14.1 Ship Mark

Selects whether or not the marks of other ships shall be displayed.

Selection: YES, NO

When externally provided data on other ships is available, these ships shall be displayed on the plotter. When no such data is available, these other ships shall not appear on the plotter even if the above setting is "YES".

6.3.14.2 Mark

Sets the appearance of the mark representing other ships.

Selection: Large circle, Small circle, Dot

6.3.14.3 ID Number

Selects whether or not to display ID numbers corresponding to other ships.

Selection: YES, NO

6.3.14.4 Track Display

Selects whether or not to display track lines of other ships.

Selection: YES, NO

6.3.14.5 Track Line

Set the line thickness for the track lines of other ships.

Selection: Thick, Thin

6.3.14.6 Color

Set the color for the track lines of other ships.

Setting Range: Green, Red, Yellow, Dark blue, Blue, Pink, White

6.3.14.7 Plot Limit

Set the upper limit for the number of track plots of track lines of other ships.

Setting Range : 50, 100, 200, 500, 1000

6.3.14.8 Course Line

Sets whether or not to display the course line for other ships.

Selection: Speed RESP, NO

6.3.15 Geodesic Line

By entering the latitude and longitude coordinates for cardinal point position and final point position, the distance and bearings between the two points can be calculated. Should either the cardinal point or final point appear on the plotter during the time of calculation, a gray line shall appear and connect the two points on the screen. Inputting the latitude and longitude may be done by either the directional key or the numerical keypad.

6.3.16 Draw Parallel Lines

Activates or deactivates the parallel line drawing function.

Selection: NO, YES

Useful especially when fishing with a fleet of boats. Parallel drawing offers the following functions listed below. These settings can be altered when the parallel drawing function is engaged. Also, while the parallel drawing function is engaged, it is possible alter settings without seeing the menus based on special operational keys.

6.3.16.1 Position

This function sets the latitude and longitude coordinates for cardinal points of parallel lines. The directional key as well as the numerical keypad may be used to enter data.

Setting Range: 0°00.000N to 90°00.000N, 0°00.000S to 90°00.000S,
0°00.000E to 180°00.000E, 0°00.000W to 180°00.000W

6.3.16.2 Direction

This function sets the angle for the parallel lines.

Setting Range: 0.0° to 359.0°

6.3.16.3 Line Length

This function sets the length for the parallel lines.

Setting Range: 0.1 to 999.9(nm)

6.3.16.4 Line Interval

This function sets the distance in-between consecutive parallel lines. This function is not in operation when there is only one line being used.

Setting Range: 0.001 to 9.999(nm)

6.3.16.5 Line Number

Sets the number of parallel lines.

Range of Setting: 1 to 99 (line)



6.3.16.6 Base Point


Sets cardinal points of parallel lines.

Setting options: Left, Center, Right


6.3.16.7 Altering Settings of Parallel Line Drawings without Menus

With parallel line drawings "in effect" mode, cardinal points, cardinal line bearings, and cardinal line length or intervals can be altered via a specialized key without the use of menus. Use the following procedure:

- (1) Push  and the parallel line drawing display shall appear. The following mark  shall appear in the upper right-hand corner of the plotter:


- (2) Push  and the cardinal point of the parallel line shall enlarge, and a permeating window shall appear in the upper right-hand corner of the plotter. The position of the parallel line's cardinal point, cardinal line bearings and intervals shall be displayed within this window.

- (3) The position of the cardinal point can be altered using the directional key.

- (4) Using the following key enlarges the intervals between parallel lines: 


The following key narrows the interval between parallel lines: 


- (5) Cardinal line bearings can be altering using the control knob. Turning the knob to the right increases the value, and turning the knob to the left decreases the value.

- (6) Push  and cause the cardinal point to jump to the boat's position.

Push  once more and the cardinal point shall return to its previous position.

- (7) Push  to confirm the changes made.

- (8) Push  to cancel the changes just made.

Pushing the enter or  shall undo the operational status of this function. Push the cancel key once more to continue operation of the parallel line function.

6.4 Settings of Other Menus (etc)

6.4.1 GPS/DGPS setting (KODEN products only)

Item	Description
DATUM	The Tokyo and WGS-84 datum are available. Select a suitable datum that agrees with your chart. Take note that there is a positional difference between Tokyo and WGS-84 that amounts to a few hundreds of meters. Initial setting: WGS-84
AVERAGE	Selections: 1, 2, 3 This index may be set to 1 for better speed tracking when a GPS/DGPS sensor is used on a slow moving ship like a trawler. Initial setting: 3(The fastest response to the ship's movement)
DGPS MODE	Selections: OFF, Beacon, SBAS Please confirm that the "Beacon" is set when utilizing the DGPS function. Please see below for details on the "SBAS" function. Initial setting: OFF
BEACON SELECT	Manually determine various settings (using "Manual" setting) when the beacon frequency and baud rate are known. Initial setting: Auto
GPS INIT	This function is not normally used. Use this function to initialize the GPS when, for example, abnormal data is received from a satellite, causing the GPS to behave abnormally.

About SBAS(WAAS, EGNOS, MSAS)

The SBAS is a system designed to strengthen the precision and quality of GPS data feeding off of geosynchronous satellites (currently developed by the US, Europe, and Japan). Developing systems include the WAAS (US), the EGNOS (Europe), and MSAS (Japan). The WAAS and EGNOS systems are already in the testing phase, as they are broadcasting positional correction information at the same frequency as GPS satellites. Positional correction information can be received over a very large area due to the use of geosynchronous satellites. It should be noted however, that the quality of data may be questionable at times due to the fact that these satellites are still in the testing phase.

6.4.2 GPS Monitor

Shows at a glance the current reception condition of the GPS.

6.4.3 User C-Card

A brand new c-card must be initialized before use. There are 2 slots for c-cards (when not using map cards). When cards are inserted in both slots, the slot on the left-hand side (Slot #0) shall take precedence. Should the User C-Card become full, please delete unnecessary data before continuing to store data.

Caution



User C-Card of 1 M, 2 M, 4 M can be used.

6.4.3.1 Store**6.4.3.1.1 Store Mark**

Storing blocks for marks are divided into nine groups of one thousand each, and the marks are numbered for storage from 0000 to 8299.

6.4.3.1.2 Store Route

Fifty routes, numbered from 01 to 50 are available for storing route information.

6.4.3.1.3 Store Track

Storage tracks are numbered 1 through 8, with up to seven tracks being available for storage and one track for current use.

6.4.3.1.4 Store Drawing

Stored drawings are numbered 1 through 7.

6.4.3.1.5 Store Other Ship Track

Stored tracks of other ships are numbered 0 through 9, for a total of ten tracks.

6.4.3.1.6 Store System

When this menu is in use, the system settings can be stored in order to protect the user's personalized settings (for settings that may be altered by the user).

6.4.3.2 Recall**6.4.3.2.1 Recall Mark**

The desired block of data may be recalled from stored files in a User Memory Card (1 block is comprised of 1000 points) via block number.

6.4.3.2.2 Recall Route

The desired route may be recalled from stored files in a User C-Card (1 route) via route number.

6.4.3.2.3 Recall Track

The desired track may be recalled from stored files in a User C-Card (1 track) via track number.

6.4.3.2.4 Recall Drawing

The desired drawing may be recalled from stored files in a User C-Card (1 drawing) via drawing number.

Using the Menu**6.4.3.2.5 Recall Other Ship Track**

The desired track of other ships may be recalled from stored files in a User C-Card (1 track) via track number.

6.4.3.2.6 Recall System

The desired system (user's personalized) settings may be recalled from stored files in a User C-Card.

6.4.3.3 Erase**6.4.3.3.1 Erase Mark**

A designated block of marks may be erased from stored files in a User C-Card (1 block, 1000 points).

6.4.3.3.2 Erase Route

A designated route may be erased from stored files in a User C-Card (1 route).

6.4.3.3.3 Erase Track

A designated track may be erased from stored files in a User C-Card (1 track).

6.4.3.3.4 Erase Drawing

A designated drawing may be erased from stored files in a User C-Card (1 drawing).

6.4.3.3.5 Erase Other Ship Track

A designated track from another ship may be erased from stored files in a User C-Card (1 track).

6.4.3.3.6 Erase System


A designated set of system (user's personalized) settings may be erased from stored files in a User C-Card.

6.4.3.4 Format

Initializing a User C-Card will delete all stored data within.

6.4.4 Screen Display Registration

Sets parameters for screen displays. Choose from among the twelve types of displays below.

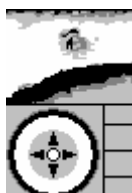
Press  repeatedly to choose from among the types of display below.



Plotter



Sounder

Plotter/Sounder
Horizontally splitPlotter/Sounder
Upper/Lower
screen split
ratio 3:1Sounder/Plotter
Horizontally splitSounder/Plotter
Upper/Lower
screen split
ratio 1:3Plotter/Sounder
Vertically splitPlotter/Sounder
Left/Right
screen split
ratio 3:1Plotter/Compass
Horizontally splitPlotter/Highway
Horizontally splitSounder/Compass
Horizontally splitSounder/Highway
Horizontally split

6.4.5 Alarm


6.4.5.1 Depth Alarm

This function activates/deactivates sea bottom alarm and alarm range.

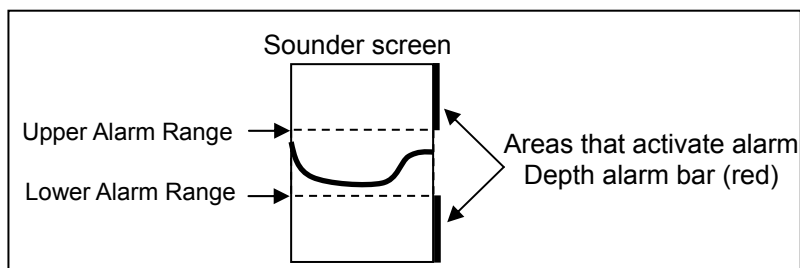
Selection: OFF, ON

Upper Alarm Range : 0 to greatest value of the lower alarm range

Lower Alarm Range : lowest value of the upper alarm range to 3000 (m, fm, l.fm, J.fm) or 6000(ft)

The Depth alarm(audio) is activated when the sea bottom becomes shallower or deeper than a preset depth range. Press  to mute this depth alarm.

“Depth Alarm!” shall appear on the screen.



When this alarm is active, the red alarm bars shall appear on the right edge of the Sounder screen.

6.4.5.2 Fish Alarm

This function activates/deactivates fish alarm and alarm range.

Selection: OFF, ON

Upper Alarm Range : 0 to greatest value of the lower alarm range

Lower Alarm Range : lowest value of the upper alarm range to 3000(m, fm, l.fm, J.fm) or 6000(ft)

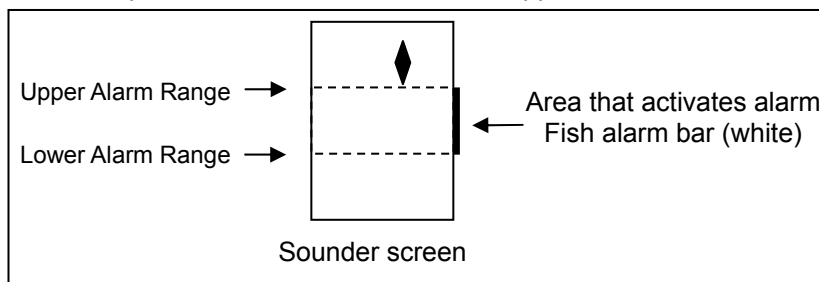
Alarm Signal Length : Short, Middle, Long

Upper Alarm Color Range: Deep Blue to Color of lower alarm color range

Lower Alarm Color Range: Color of upper alarm color range to Deep Red

The Depth alarm (audio) is activated when fish echoes enter a predetermined depth range or fulfill the predetermined threshold in terms of its signal intensity and length.

Press  to mute this depth alarm. “Fish Alarm!” shall appear on the screen.



When this alarm is active, a white alarm bar shall appear on the right edge of the Sounder screen.


6.4.5.3 Arrival Alarm

This function activates/deactivates the arrival alarm and its range.

Selection: OFF, ON

Setting Range: 0.05 to 5.00

This alarm (audio) is activated when the user's ship enters a preset alarm range.


Press  to mute this alarm. "Arrival Alarm!" shall appear on the screen. This alarm operates in conjunction with the waypoint being set.

6.4.5.4 POB (Person Over Board) Alarm

This function activates/deactivates the anchor alarm and its range.

Selection: OFF, ON

Setting Range :0.05 to 5.00

This alarm (audio) is activated when the user's ship leaves a preset alarm range. Press  to mute this alarm. "Anchor Alarm!" shall appear on the screen. This alarm operates in conjunction with the anchor point being set.


6.4.5.5 XTE (Cross Track Error) Alarm

This function activates/deactivates the XTE alarm and its range.

Selection: OFF, ON

Setting Range: 0.05 to 5.00

This alarm (audio) is activated when own ship deviates from a preset course deviation width.

Press  to mute this alarm. "XTE Alarm!" shall appear on the screen. This alarm operates in conjunction with the waypoint being set.

6.4.5.6 Alarm Zone

This function activates/deactivates the arrival alarm, anchor alarm and XTE alarms.

Zone Setting: OFF, ON

The ranges for the Arrival alarm, and anchor alarm are displayed on the screen as solid red lines. The range for the XTE alarm is displayed on the screen as a dotted red line.

6.4.5.7 DEPTH LIMIT ALARM

This alarm (audio) is activated when the depth value of own ship's position becomes shallower than the set value.

Setting range (depth): 0 to 999 m, fm or ft

Initial setting: 5 m, fm or ft

6.4.5.8 GROUNDING ALARM

This alarm (audio) is activated when the danger of running aground is detected. This function has been achieved by regularly scanning the map data forward of own ship's position. The execution interval of the scanning is 2 seconds. The Figure below shows the range of scanning.

Detected dangerous items are as follows.

shallow water, land, rocks, obstructions, shoreline constructions

When the alarm is activated, the source of the grounding can be confirmed by the GROUNDING ALARM REPORT menu.

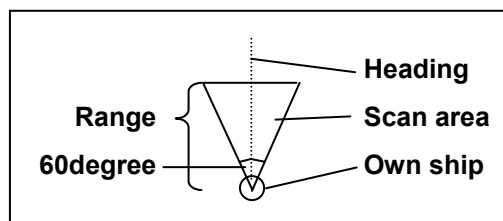
When the GROUNDING ALARM is set to ON, a warning message window is displayed. Operate it after it agrees to the content of the warning.

Setting range (depth): 0 to 99 m, fm or ft

Initial setting: 5 m, fm or ft

Setting range (front distance): 0.25, 0.5, 1 nm or km

Initial setting: 0.25 nm or km



NOTE: The GROUNDING ALARM function only operates with the new C-CARDS. It also affects the speed of the redraw of the screen. If this function is not used it maybe disabled.

6.4.6 Language

This function sets the language of the display text.

Selection: English, Spanish, French, Korean, Greek

6.4.7 Maintenance

This is the maintenance menu.

6.4.7.1 Simulation

This function allows the user to test and practice working with various functions such as the sounder and plotter.

6.4.7.2 System Test

This function tests if the device is operational or not.

6.4.7.3 Color Palette Operation

This function allows the user to select from colors 1 to 254 for the color. Designate a palette number, and the corresponding name as well as primary color levels (for red, green and blue) shall appear. The three primary colors can be individually adjusted.

6.4.7.4 Data Communication

This function allows for communication with another CVG-200 unit.

6.4.7.5 Flash ROM Erase

This function is not normally used.

6.4.7.6 Format

It initializes the Sounder, Plotter, COLOR PALETTE item.

6.4.7.7 NMEA

It chooses the sentence of NMEA.

Chapter 7
Trouble Shooting

7.1 Information required for service7-1

7.2 Fault diagnosis7-1

Chapter 7 Trouble Shooting

In this chapter, specific explanations are given for diagnosing problems and what information the user must give addressing such problems.

7.1 Information required for service

Please provide the following details when reporting a problem:

- (1) Name of vessel or mobile phone number.
- (2) Equipment type name and serial number
- (3) Software version (shown on the standby screen)
- (4) Next port of call and agent's name (Phone number, fax number, e-mail address)
- (5) Faulty description (as detailed as possible) and the result of on board check.

7.2 Fault diagnosis

Carry out the necessary procedure(s) to locate the source of the problem using the following tables.

If the problem cannot be fixed, please contact your local KODEN dealer for repair.

Table 7.1 Problem Diagnosis Table-1

Trouble detected	Possible cause	Remedial action
Equipment does not turn on.	<ol style="list-style-type: none"> 1. The fuse is blown. 2. The power supply voltage lies outside the rated range (10.8 to 31.2 VDC). 3. The power cable is not firmly connected to the battery. 	<ol style="list-style-type: none"> 1. Remove the power connector and check the fuse. 2. Use a proper rated main supply. 3. Reconnect the power cable firmly to the battery.
Equipment turns on but nothing is displayed.	LCD unit may be faulty, or the LCD's peripheral circuits may be behaving abnormally.	Call for service.
When the power is switched on, the memory batteries read, "change battery".	Memory batteries lack charge.	<p>This device's non-volatile memory protects mark data or track data, so all memory shall not be lost.</p> <p>However, new mark data and track data will not be able to be added, so consult a service shop or retail store, and have the batteries replaced.</p>

Table 7.2 Problem Diagnosis Table -2 (Plotter)

Trouble detected	Possible cause	Remedial action
Own ship's position is not shown in the screen.	Is the cursor displayed?	Press the cursor key, and then proceed to and from the center of the cursor screen, return to the center of the boat position on the screen.
After while the boat position mark does not blink, and information on the position does not display.	Look at: "Menu"→"Other"→"Monitor"→"GPS reception condition". It should read, "BAD".	Confirm the condition of the GPS antenna and connection cable.
Own ship's position is deviated from actual position on the chart.	1.Datum does not agree with the chart in use. 2.The position correction mark is shown.	1. "Menu"→"Other"→"GPS/DGPS" and confirm the datum. 2. "Menu"→"Plotter"→"System" and confirm the position correction.
Own heading course is not correct.	1."Course bearings" may be incorrect. 2.Ship is cruising too slowly.	1. Go to: "Menu"→"Plotter"→"Display Settings"→"Screen Settings"→"Course Bearings". Within "Course Bearings", confirm that the "True Bearings" or "Magnetic Bearings" are correct. 2.In case the ship speed is less than 1 knot, the heading bearing tends to fluctuate.
Speed response is too slow.	1."Average speed" option is engaged. 2.Stabilizing setting may be too low.	1. Go to: "Menu"→"Plotter"→"System Settings". Set "Average Speed" to "None". Should an average speed be needed, adjust the number of averages to be taken. 2. Go to: "Menu"→"Other"→"GPS/DGPS Settings". Set "Stablizing Factor" to 3.
Old ship's track is erased.	Number of plots have reached 7000.	When the number of plots grows too large, the old tracks are overwritten, one by one. Save important plots by going to: "Menu"→"Plotter"→"Store track plots".

Table 7.3 Fault diagnosis table -3(Sounder)

Faults detected	Possible cause	Remedial action
Water depth reading shows: "XXXX"	1. The bottom echo is not displayed within the display. 2. Sensitivity is too low for the inner hull of the transducer.	1. Select the range of the seabed to be displayed. Or, go to: "Menu"→"Echo Sounder"→"System Settings". Then adjust the "Bottom Detection Range". 2. Go to: "Menu"→"Sounder". Engage "Video Threshold Adjustment". Refer to section 7.3. Be aware that decreasing this value can lead to schools of fish and the sea bottom indistinguishable.
No Water temp./ Speed data shown.	1. "Water Temperature Display" may not be set. 2. Water Temp/Speed Sensor may not be properly connected. 3. Go to: "Menu"→"Echo Sounder"→"System Settings". Confirm that "Water Temp Data" is chosen.	1. Go to: "Menu"→"Sounder"→"Display". Set "Water Temperature Display" to either °C or °F. 2. Re-establish proper connection. 3. Re-engage selection. Internal: Input from "J3". External: Input from "J2"and from "J6". (NMEA0183 sentence MTW)

Chapter 8
Maintenance

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Chapter 8 Maintenance

8.1 Periodic inspections and cleaning

8.1.1 Monthly Inspection

To visually confirm the safety and condition of the LCD surface of display unit, a glass filter is installed. Should this surface become soiled, the image will not be vivid. To restore vividness, use a soft cloth soaked with a mild alcohol cleanser to gently wipe off the glass filter.



CAUTION



Never use solvent such as thinner.
It may damaged the transparency of the plate,
sacrificing the picture clarify.

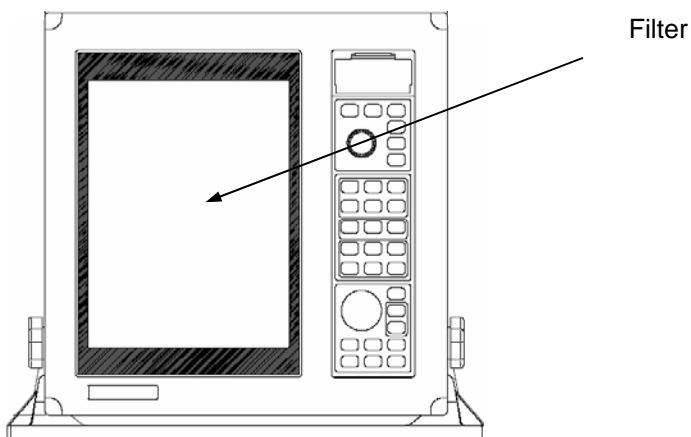


Figure 9.1 Location of glass filter



WARNING

The filter is made out of glass. Direct impact upon the filter surface can lead to breakage and injury. Take care not to press upon or strike the filter.

8.1.2 Semi-annual Inspection

Should your transducer be installed “thru-hull” style, inspect the transducer’s openings (i.e. ultrasonic transmitters) from time to time. Should shellfish, plankton or oil become stuck, use a wooden or bamboo spatula to carefully remove the debris without scratching the surface. Caution: Exerting too much force can damage the screen and decrease the performance of your unit.

Chapter 9

Technical Reference

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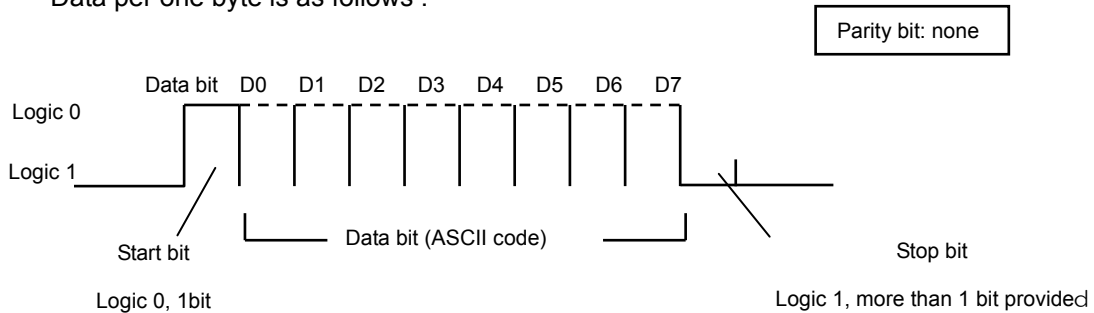
Chapter 9 Technical Reference

9.1 Details of input serial data

Sentence name : IEC 1162-1 (NMEA0183 Ver. 1.5/2.0)

9.1.1 Input data format

Data per one byte is as follows :



9.1.2 Input data specification

Baud rate	Sentence
4800	GGA + GLL+ HDT + MSK + MSS + MTW + PKODA+ PKODG + RMC + TLL + TTM + VTG

9.1.3 Kinds of input sentence ports

Port Classification	Acceptable sentences
GPS/DGPS	GGA, GLL, HDT, MSK, MSS, PKODA, PKODG, RMC, VTG
NMEA-CH1	HDT, MTW, TLL, TTM
NMEA-CH2	HDT, MTW, TLL, TTM

*Priority of sentence entry is as follows: GPS/DGPS, NMEA-CH1, NMEA-CH2. Sentences of lower priority are ignored. Priority of bearings sentences is as follows: HDT, VTG.

9.1.4 Details of input sentences

Name	Contents NOTE: Checksum is a total sum of EX-ORed data that are put between "\$" and asterisk "*" .
HDT Ver.1.5 Ver.2.0	<p>True Bearing</p> <p>\$ - - HDT, x.x, T *hh <CR><LF></p> <p>Diagram labels: Sentence name, Ship's bearing (°), Talker device, Checksum, Start of sentence.</p>

<p>GGA Ver.1.5 Ver.2.0</p>	<p>GPS Position data</p> <p>\$ - - GGA, hhmmss, xxxx.xxxx, N/S, xxxxx.xxxx, E/W, x, xx,</p> <p>Talker device UTC of position (Hour, Minute, Second) N: North S: South E: East W: West GPS quality indicator 0: Reception unable 1: GPS reception 2: DGPS reception</p> <p>Start of sentence</p> <p>xxx, 0/-xxxx, M, 0/-xxx, M, xxx, xxx, *hh <CR><L></p> <p>HDOP value Antenna height Meter Geoid .. DGPS standard station D No. Checksum</p> <p>0: Positive -: Negative 0: Positive -: Negative DGPS correction data (Lapsed time: sec) : Ver.2.0 only</p>
<p>GLL Ver.1.5 Ver.2.0</p>	<p>Geographic position (latitude/longitude)</p> <p>\$ - - GLL, xxxx.xxx, N/S, xxxxx.xxx, E/W, hhmmss, A *hh <CR><LF></p> <p>Talker device Latitude Longitude E: East W: West UTC (h, m, s) A: Available Checksum</p> <p>Start of sentence : Ver.2.0 only</p>
<p>MSK Ver.2.0</p>	<p>Beacon Receiver</p> <p>\$ - - MSK, xxx.x, A/M, xxx, A/M, xx, *hh <CR> <LF></p> <p>Talker device Beacon frequency (283.5 to 325.0kHz) Beacon bit rate (50,100,200 bit/sec) MSS Sentence output period (5 sec) Checksum</p> <p>Start of sentence A: Auto M: Manual A: Auto M: Manual</p>
<p>MSS Ver.2.0</p>	<p>Beacon receiver signal status</p> <p>\$ - - MSS, , xx, xxx.x, xxx <CR> <LF></p> <p>Talker device Beacon frequency (283.5 to 325.0kHz) Signal to Noise ratio(0 to 30db) Checksum</p> <p>Start of sentence</p>
<p>RMC Ver.1.5 Ver.2.0</p>	<p>GPS Satellite minimum Sentence(Minimum data required)</p> <p>\$ - - RMC, hhmmss, A, xxxx.xxx, N/S, xxxxx.xxx, E/W, xxx.x, xxx.x, xxxxxx, *hh <CR><LF></p> <p>Talker device UTC (h, m, s) Latitude N: North S: South Longitude E: East W: West Bearing (True) Speed over ground (knots) Date (D, M, Y) Checksum</p> <p>Start of sentence A: Data valid V: Data invalid</p>

MTW Ver.1.5	Water temperature \$ - - MTW, x.x, C *hh <CR><LF> <p>Start of sentence</p> <p>Talker device</p> <p>Sentence name</p> <p>Temperature</p> <p>Checksum</p>
TTM Ver.2.0	Tracked target message \$ - - TTM, xx, x.xx, xxx.x, a, x.xx, x.x, a, x.x, x.x, a, ,a, a,, *hh <CR><LF> <p>Start of sentence</p> <p>Talker device</p> <p>Sentence name</p> <p>Target No.(00 to 99)</p> <p>Target distance from own ship</p> <p>Bearing from own ship</p> <p>Bearing</p> <p>T: True R: Relative</p> <p>Target speed</p> <p>Course</p> <p>Distance of CPA</p> <p>Time to CPA</p> <p>Speed/Distance units (NM)</p> <p>Target status</p> <p>L: Lost. Tracked has lost Q: Query target in the process of acquisition T: Tracking</p> <p>Checksum</p> <p>Speed/Distance units</p>
TLL Ver.2.0	Target number, position, name and UTC \$ - - TLL, xx, xxxx.xxx, a, xxxxx.xxx, a, , hhhmss, a, a *hh <CR><LF> <p>Start of sentence</p> <p>Talker device</p> <p>Sentence name</p> <p>Target number</p> <p>Latitude</p> <p>N/S</p> <p>Longitude</p> <p>E/W</p> <p>UTC</p> <p>Target status</p> <p>Reference target</p> <p>Checksum</p>
VTG Ver.1.5	Course over round and speed over ground \$ - - VTG, xxx.x, T, , , xx.x, N, , , *hh <CR><LF> <p>Start of sentence</p> <p>Talker device</p> <p>Sentence name</p> <p>Course over ground, true</p> <p>Speed over ground (km/h)</p> <p>Checksum</p>
PKODA Ver.2.0	GPS Satellite information (KODEN proprietary sentence) \$ PKODA, P/H, XXX.X, XX, XX, XX, XX, XX, XX, XXX, M, XXX.X, N <p>Start of sentence</p> <p>Proprietary format</p> <p>Company name KOD: KODEN proprietary sentence name</p> <p>KODEN revision number</p> <p>DOP value P:PDOP H:HDOP</p> <p>Satellite number in use(1 to 4Channel)</p> <p>Satellite S/N ratio (1 to 4Channel)</p> <p>Antenna height</p> <p>Meter</p> <p>Speed over ground</p> <p>Knot</p> <p>Checksum</p> XXX.X, 0/-XX.X, X, X <CR> <LF> <p>True bearing</p> <p>X'tal oscillator frequency deviation (0: positive, -: negative)</p> <p>Longitude (1/1000 min)</p> <p>Latitude (1/1000 min)</p>

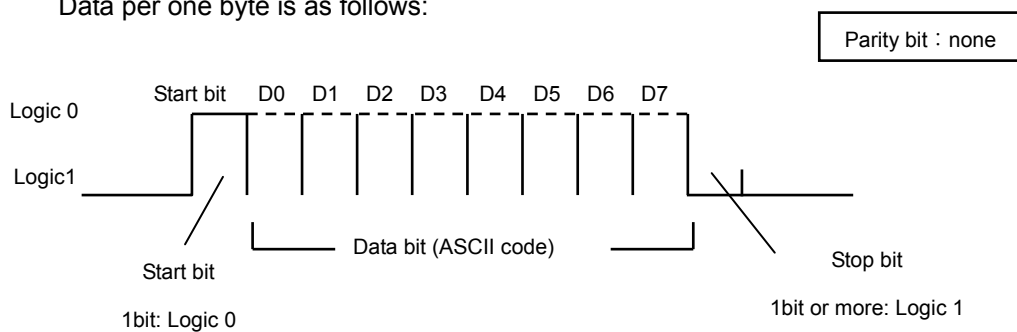
PKODG, 1 Ver.2.0	<p>Satellite information (KODEN proprietary sentence)</p> <p>\$ PKODG, 1, X, XX, +/- XX, XXX, XX, XX, XX, XX, XX,</p> <p>XX, XX, XX, XX, <CR> <LF></p>
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9.2 Details of output serial data sentence

Sentence name : IEC 1162-1 (NMEA0183 Ver. 2.0)

9.2.1 Output data format

Data per one byte is as follows:



9.2.2 Output data specification

Baud rate	Output level	Output current	Sentence	Update
4800	RS-422	20mA max	APB+BWC+BOD+GGA+GLL+GTD+RMB+VTG+WPL+XTE+ZDA+DBT+DPT+MTW	1second

9.2.3 Kinds of output sentence ports

Port Classification	Acceptable Output Sentences
GPS/DGPS	(none)
NMEA-CH1	APB,BWC,BOD,GGA,GLL,GTD,VTG,WPL,XTE,ZDA
NMEA-CH2	APB,BWC,GGA,GTD,VTG,WPL,ZDA

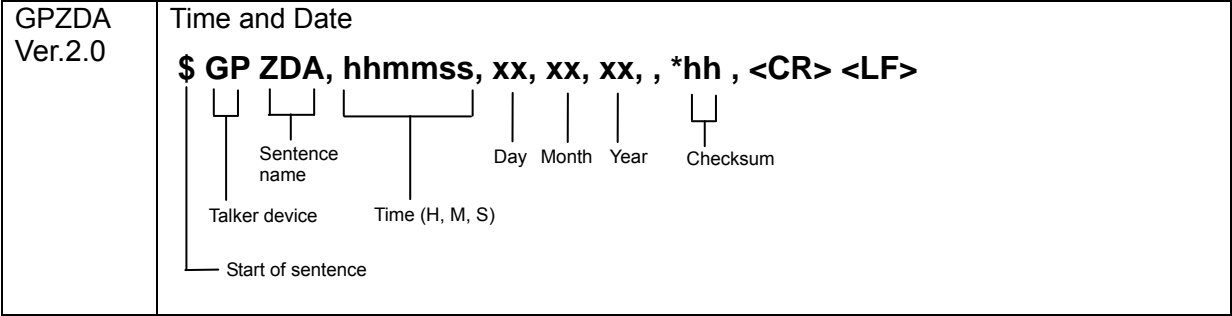
9.2.4 Details of output sentence

Name & Version	NOTE: Checksum is a total sum of EX-ORed data that are put between the "\$"and asterisk "*" signs.
GPAPB Ver.1.5 Ver.2.0	<p>Autopilot (This sentence is output only when waypoint is set up)</p> <p>\$ GP APB, x, x, xx.x, x, N, x, x, xxx.x, x, xxxxx, xxx.x, x,</p> <div><div>Talker device</div><div>Sentence name</div><div>Start of sentence</div><div>M=Magnetic bearing T=True bearing</div><div>Bearing, present position to the destination</div><div>Destination waypoint ID</div><div>M=Magnetic bearing T=True bearing</div><div>Bearing origin to destination</div><div>A=Perpendicular passed at waypoint V=Perpendicular not enter waypoint</div><div>A=Arrival circle entered V=Arrival circle not entered</div><div>N=nm(mile)</div><div>Direction to steer L=Left R=Right</div><div>XTE (Cross Track Error)</div><div>A=Status indicator fixed to A</div><div>A=Status indicator fixed to A</div></div> <p>xxx.x, x, *hh <CR> <LF></p> <div><div>Checksum</div><div>M=Magnetic bearing T=True bearing</div><div>Heading to steer to destination waypoint</div></div>
GPBOD Ver.1.5 Ver.2.0	<p>Bearing origin to destination</p> <p>\$GPBOD,x.x,T,x.x,M,c--c,c--c*hh <CR><LF></p> <div><div>Start of sentence</div><div>Talker device</div><div>Sentence name</div><div>Bearing,degrees true</div><div>Bearing, degrees magnetic</div><div>Destination waypoint ID</div><div>Origin waypoint ID</div><div>Checksum</div></div>

<p>GPBWC Ver.1.5 Ver.2.0</p>	<p>Waypoint bearing & distance</p> <p>\$ GP BWC, hhmmss.ss, llll.ll, a, yyyyy.yy, a, xxx., T, xxx. , M,</p> <p>xxx. , N, cccc *hh <CR><LF></p>
<p>SDDBT Ver.1.5 Ver.2.0</p>	<p>Depth (From the transducer surface to the seabed)</p> <p>\$ SD DBT, xxxx.x, f, xxxx.x, M, xxx.x, F *hh <CR><LF></p>
<p>SDDPT Ver.2.0</p>	<p>Depth (From the transducer surface to the ocean down below)</p> <p>\$ SD DPT, xxxx.x, xxxx.x, *hh <CR><LF></p>

<p>GPGGA Ver.1.5 Ver.2.0</p>	<p>GPS Positioning state</p> <p>\$ GP GGA, hhhmmss, xxxxx.xxx, N/S, xxxxxx.xxx, E/W</p> <p>Start of sentence</p> <p>x, xx, xxx, 0/-xxxx, M, 0/-xxx, M, xxx, xxx, *hh <CR><LF></p> <p>GPS qualify indicator 0: Reception unable 1: GPS reception 2: DGPS reception</p> <p>: Ver.2.0 only</p>
<p>GPGLL Ver.1.5 Ver.2.0</p>	<p>Latitude / Longitude</p> <p>\$ GP GLL, xxxxx.xxx, N/S, xxxxxx.xxx, E/W, hhhmmss, A *hh <CR><LF></p> <p>Start of sentence</p> <p>A: Available</p> <p>: Ver.2.0 only</p>
<p>GPGTD Ver.1.5</p>	<p>Loran C Time deviation (A display position is outputted only when set up with LORAN C.)</p> <p>\$ GP GTD, xxxxx.x, xxxxx.x, , , *hh <CR><LF></p> <p>Start of sentence</p>
<p>SDMTW Ver.1.5 Ver.2.0</p>	<p>Water temperature</p> <p>\$ SD MTW, xx.x, C *hh <CR><LF></p> <p>Start of sentence</p>

<p>GPRMB Ver.1.5 Ver.2.0</p>	<p>Minimum Navigation Information</p> <p>\$ GP RMB, A, x.x, a, c - - c, c - - c, IIII.II, a, yyyyy, yy. a,</p> <p>x. x, x. x, x. x, A *hh <CR><LF></p>
<p>GPVTG Ver.1.5 Ver.2.0</p>	<p>Course & Speed over ground</p> <p>\$ GP VTG, xxx.x, T, , , xxx.x, N, xxx.x, K, *hh <CR><LF></p>
<p>GPWPL Ver.1.5 Ver.2.0</p>	<p>Waypoint position</p> <p>\$ GP WPL, IIII. II, a, yyyyy. yy, a, c - - c *hh <CR><LF></p>
<p>GPXTE Ver.1.5 Ver.2.0</p>	<p>Route deviation (This output comes only when the waypoint has been set.)</p> <p>\$ GP XTE, x, x, xx.x, x, N *hh <CR><LF></p>



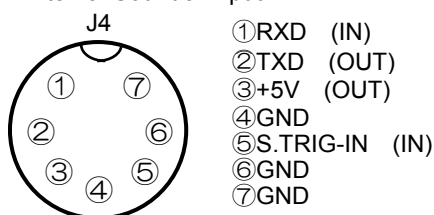
9.3 Connecting External Sounder

When transmission frequencies of CVG-200 and other sounder are the same or closer, there is a possibility of mutual interference between these sounders. To avoid this you need to synchronize the CVG-200 transmission timing with an external sounder.

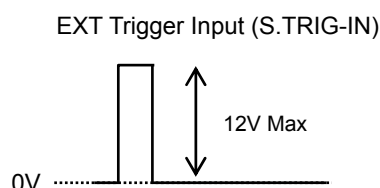
9.3.1 Connection

Connect the external sounder's trigger output to CVG-200 at pin 5 and pin 6 on J4.

• External Sounder input



Required voltage



9.3.2 Selecting the External Trigger Polarity

When you wish to operate the CVG-200 in synchronism with external sounder, you need to select the TX trigger (Sync TRIG-IN) polarity. To do:

- (1) Select the following under: "Menu"→ "System Settings" →"External sync"
- (2) When the polarity of trigger signal from external sounder is positive, choose: ☐
- When the polarity of trigger signal from external sounder is negative, choose: ☐
- Initial setting: OFF

9.4 Connection to Water Temperature/Speed Sensor

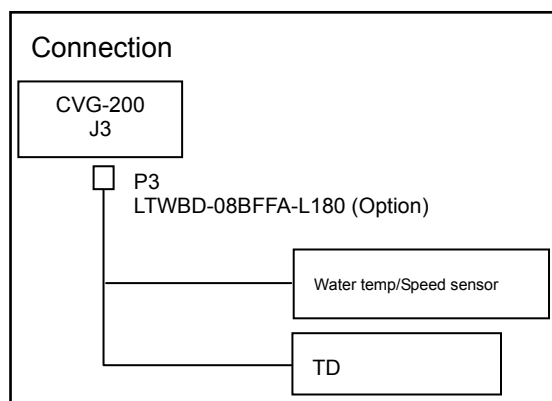
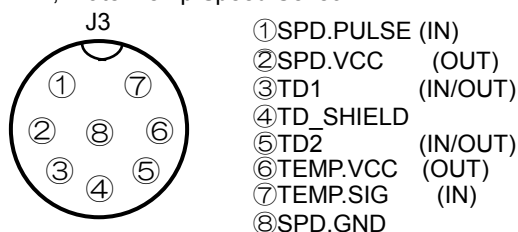
Using KODEN's Water Temp/Speed Sensor ST-80-1, ST-90-1, ST-100-1 or T-81, CVG-200 can display the water temperature and ship's speed.

9.4.1 Connector Used

Connect the water temp/speed sensor to the CVG-200 at the J3.

When the transducer and water temp/speed sensor are connected at the same time, the connection pictured below becomes necessary.

• TD, Water Temp/Speed Sensor



9.4.2 Settings of Water Temperature Display

Go to: "Menu"→"Sounder"→"Display"→"Water Temperature Display". Choose between °C for in Celsius mode, and °F for Fahrenheit. Initial setting: OFF

"Menu"→"Sounder"→"System Settings"→"Water Temperature Data" must be obtained internally.

9.5 Serial Data Input/Output

9.5.1 NMEA input/output CH1, CH2

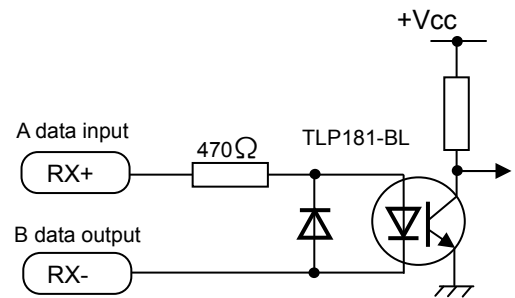
Connector name : J2(CH1), J6(CH2)

Connector used : LTWD-06BFFA-L180

Serial data input (Listener side) :

Input impedance : 470Ω

Device : Photo-coupler TLP181-BL(Toshiba)

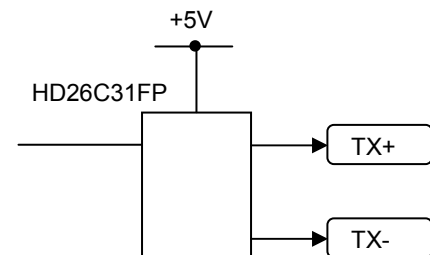


Serial data input circuit

Serial data output (Talker side)

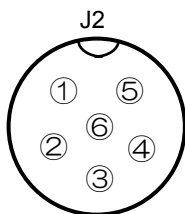
Device : Driver IC

AM26C31I (Texas)



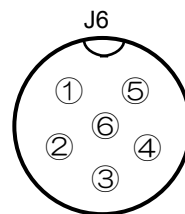
Serial data output circuit

• NMEA IN/OUT(CH1)



- ① GND
- ② TX1+(OUT)
- ③ TX1-(OUT)
- ④ RX1+(IN)
- ⑤ RX1-(IN)
- ⑥ NC

• NMEA IN/OUT(CH2)



- ① GND
- ② TX2+(OUT)
- ③ TX2-(OUT)
- ④ RX2+(IN)
- ⑤ RX2-(IN)
- ⑥ NC

9.5.2 Data input/output serial line

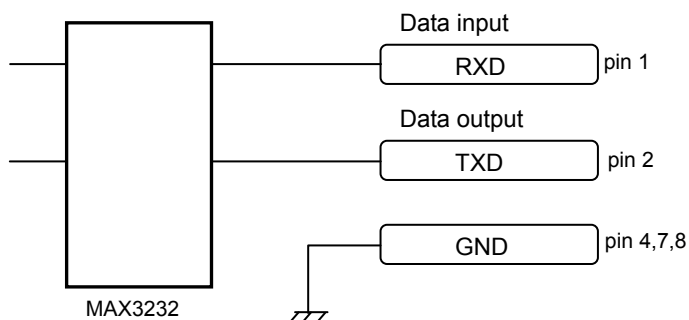
RS-232C standard signal can be transmitted and received.

Connector name: J4

Connector used: LTW-07BFFA-L180

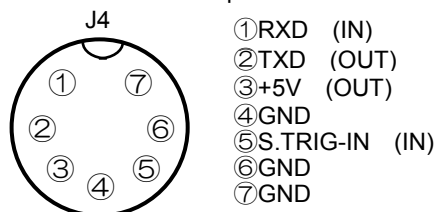
Output current: 60mA max

Device: MAX3232(Maxim)



Serial data input/output circuit

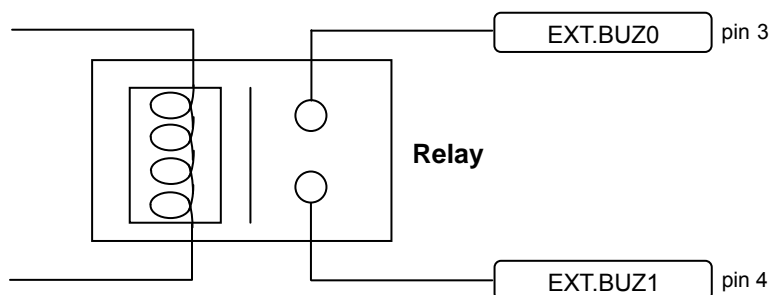
• External sounder input



9.6 Signal Output for External Buzzer

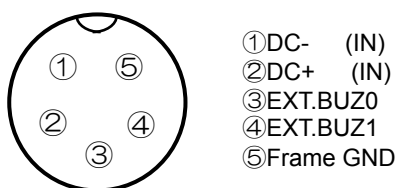
Alarm signal sends out to an external buzzer. (Relay point of contact)

Contact capacity : 24V, less than 0.5A(Resistance load)



• DC input (10.8 to 31.2VDC)

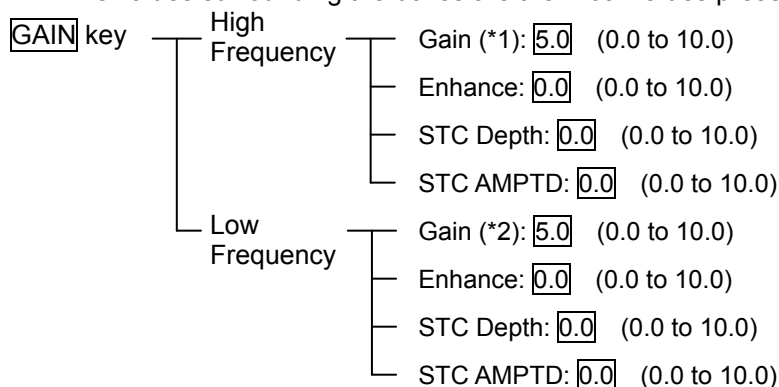
POWER



Annex

1. Menu tree

The values surrounding the boxes are the initial values preset at the factory.



*1: In automatic gain, the gain is automatically corrected (high): Initial setting 0.0 (–10.0 to 10.0)

*2: In automatic gain, the gain is automatically corrected (low): Initial setting 0.0 (–10.0 to 10.0)

SHIFT key : **OFF** 0000 to 3000(m/J.fm/fm/l.fm) / 0000 to 8000(ft)

RANGE + , **RANGE –** key: Depth range **1** , 2, 3, 4, 5, 6, 7, 8

(Set value according to the registered depth range of the menu)

MODE key

- High and Low Frequency Mode: **Normal** ,BPE
- High Frequency Mode: **Normal** , BFE, BQE, BPE, PE
- Low Frequency Mode: **Normal** , BFE, BQE, BPE, PE

MARK COLOR key : Green, **Red**, Yellow, Deep blue, Blue, Pink, White

MARK ERASE key

- Color : **Green**, Red, Yellow, Deep blue, Blue, Pink, White, All colors
- Shape : **○**, **▽**, **□**, **×**, All marks

TRACK COLOR key : Green, Red, Yellow, Deep blue, **Blue**, Pink, White

TRACK ERASE key : **Green**, Red, Yellow, Deep blue, Blue, Pink, White, All colors

Zoom out , **Zoom in** key : (nm)

0.01, 0.02, 0.04, 0.08, 0.1, 0.2, 0.4, 0.8, 1, 2, 3, 6, 12, 20,

40, 60, 20, 200, 350, 500, 700, 1400, 2800, **3600**

(km)

0.02, 0.04, 0.08, 0.1, 0.2, 0.4, 0.8 , 1, 2, 4, 6, 10

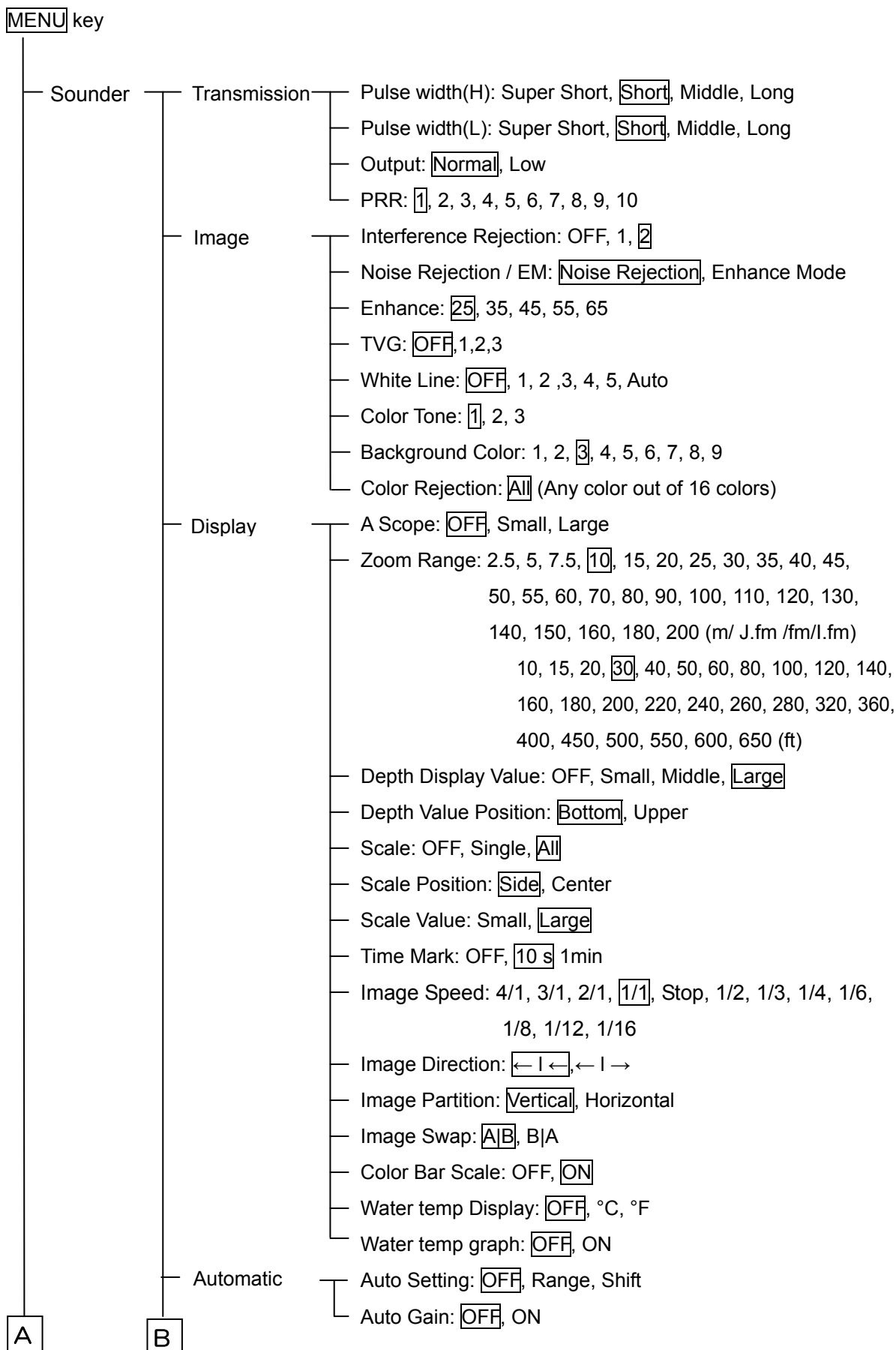
20, 40,

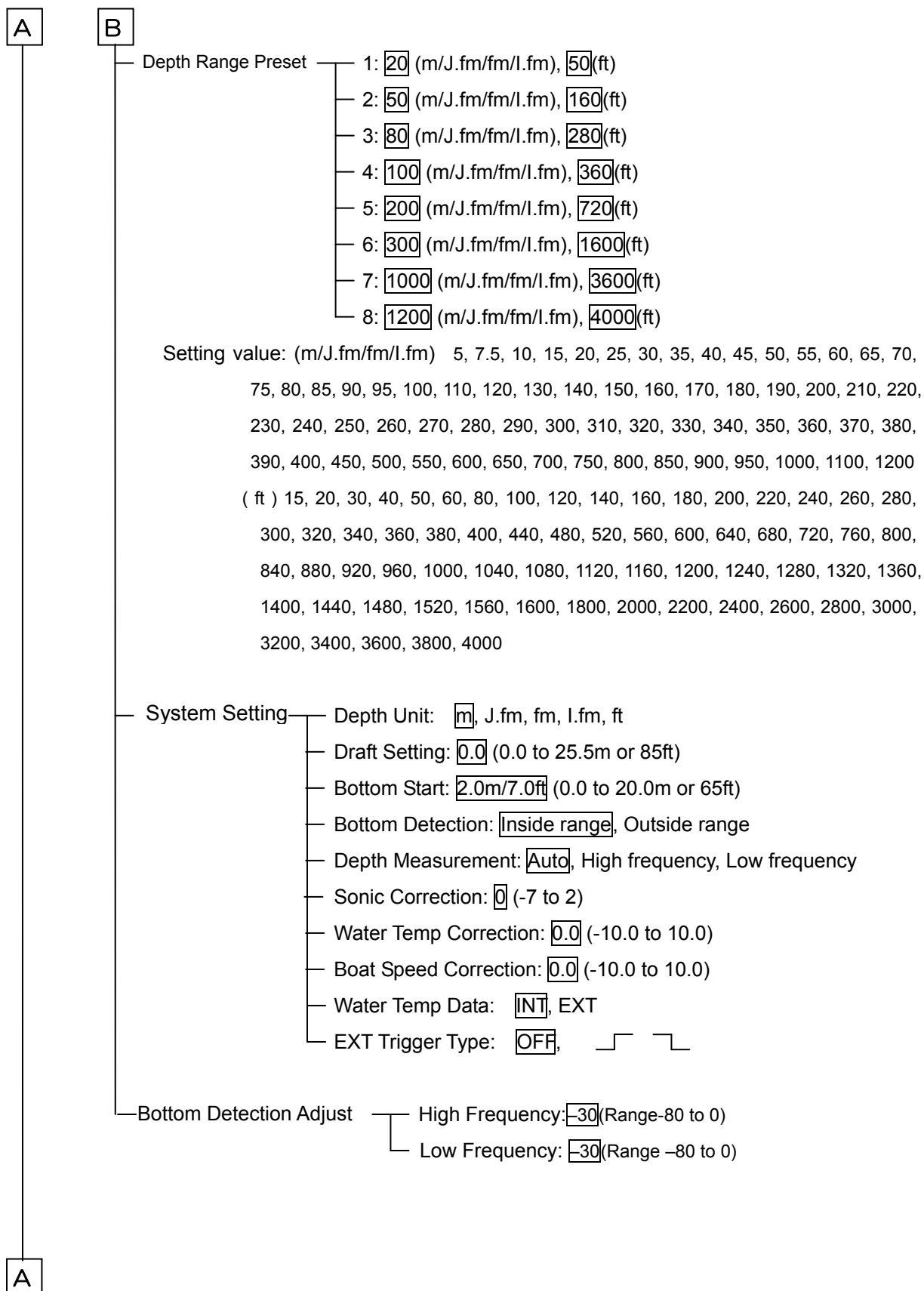
80, 120 , 220, 380, 650, 900, 1300, 2600, 5200, **6600**

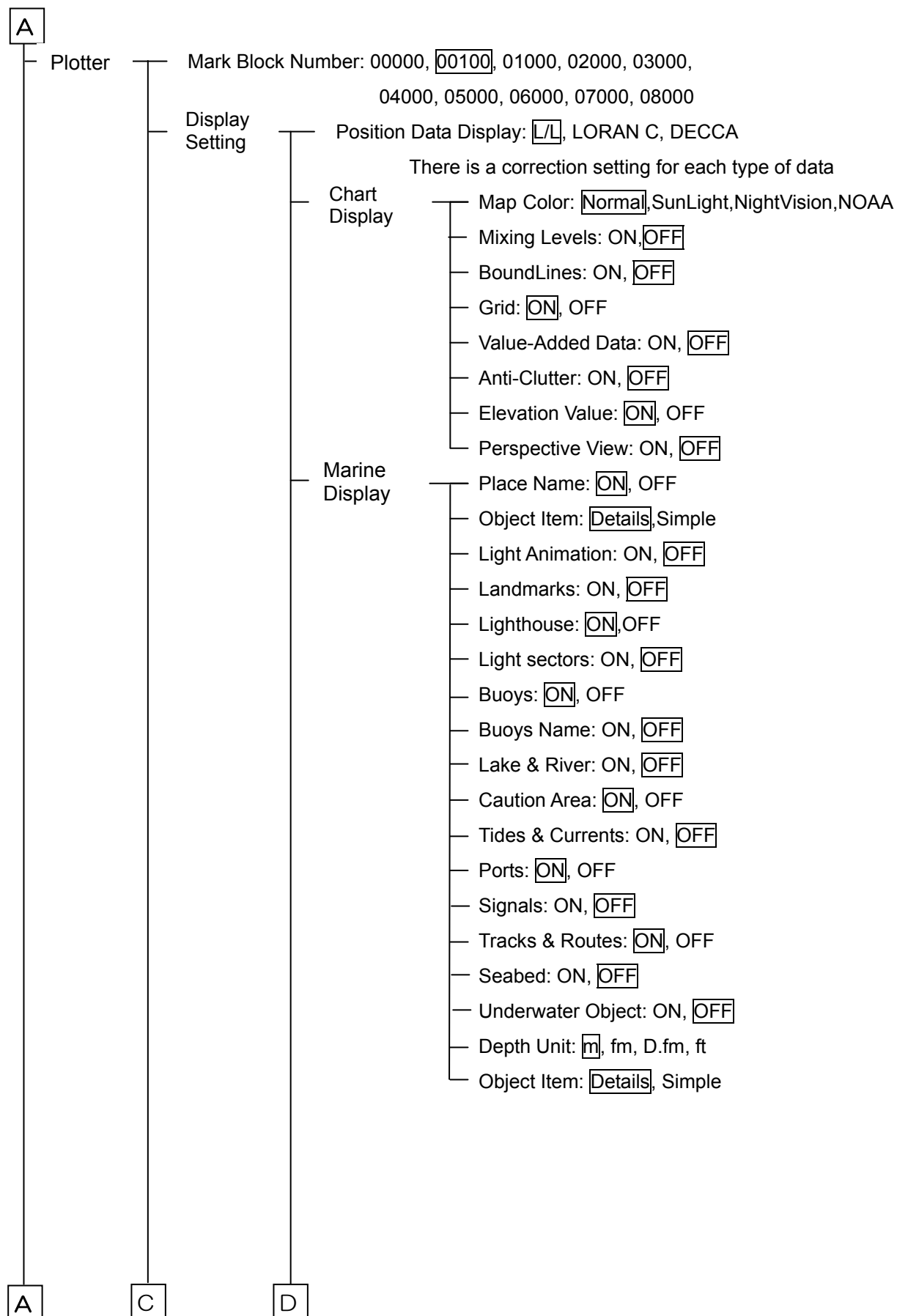
FIX SCL key : Fix scale **1**, 2, 3(Set values according to the fixed scales on the menu: 1, 2, 3)

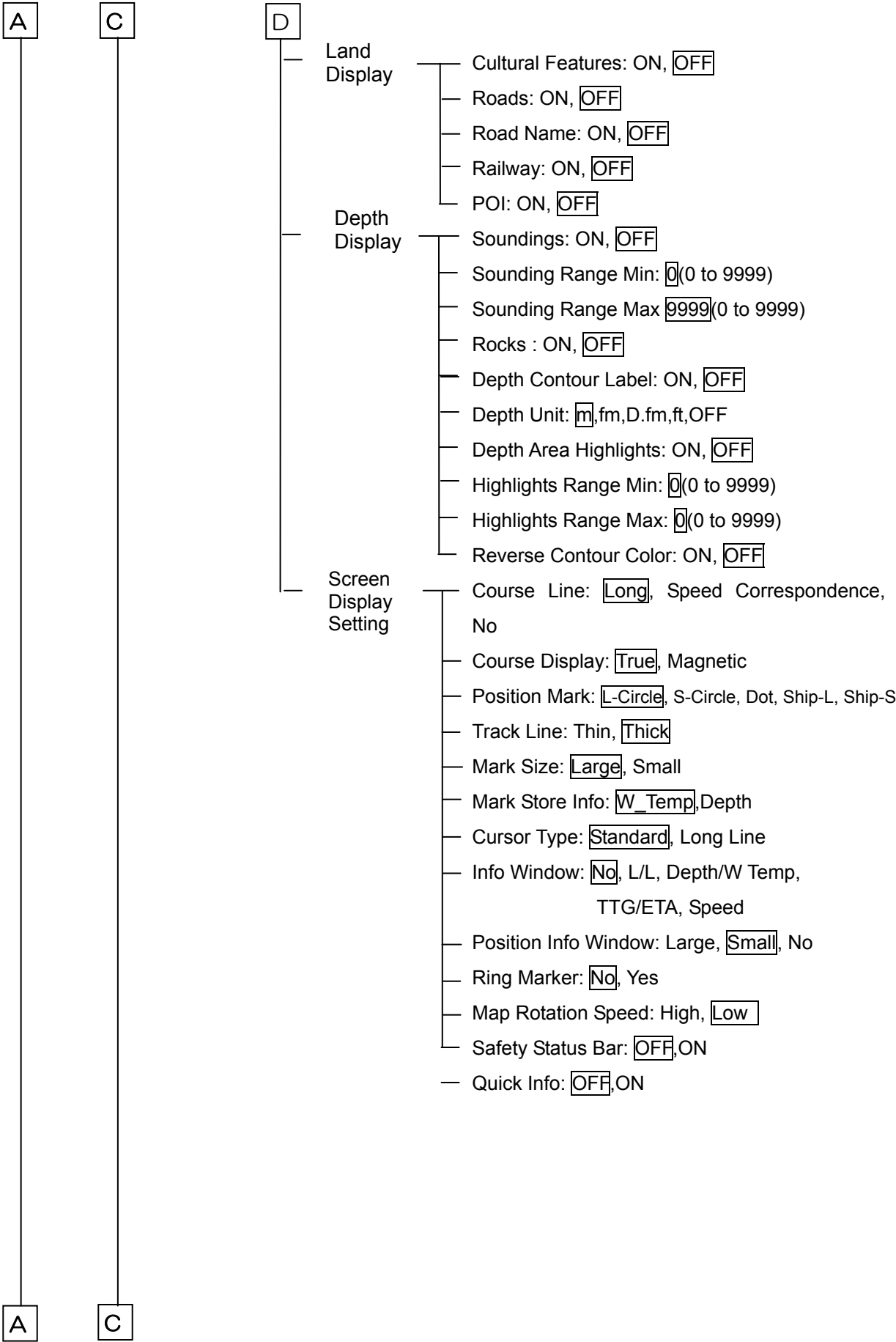
DISP key : Plotter, Sounder, **Plotter/ Sounder V-split**, Plotter/Sounder Left: Right partition 3:1

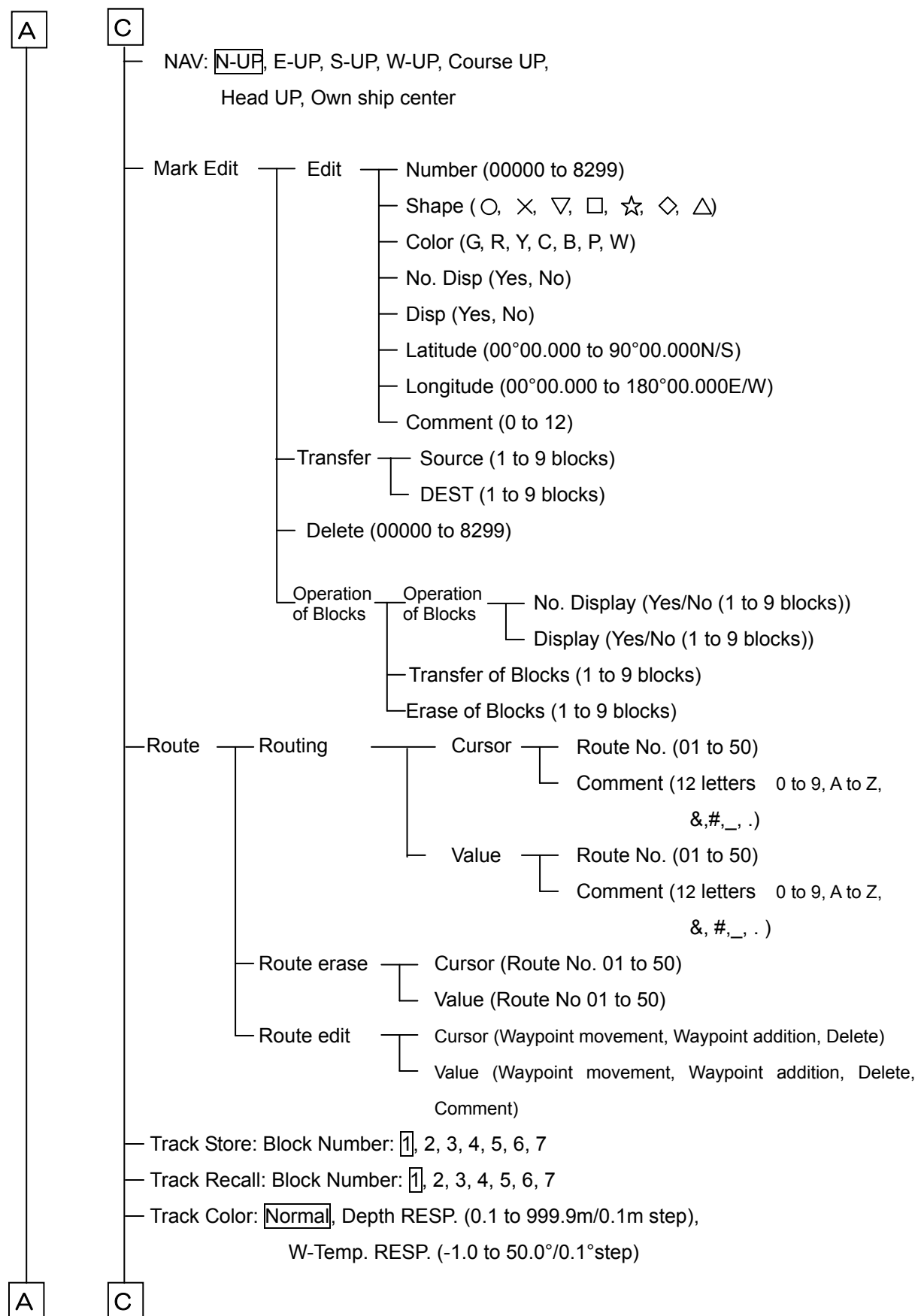
BRT key : 1, 2, 3, 4, 5, **6** (Brightness max)

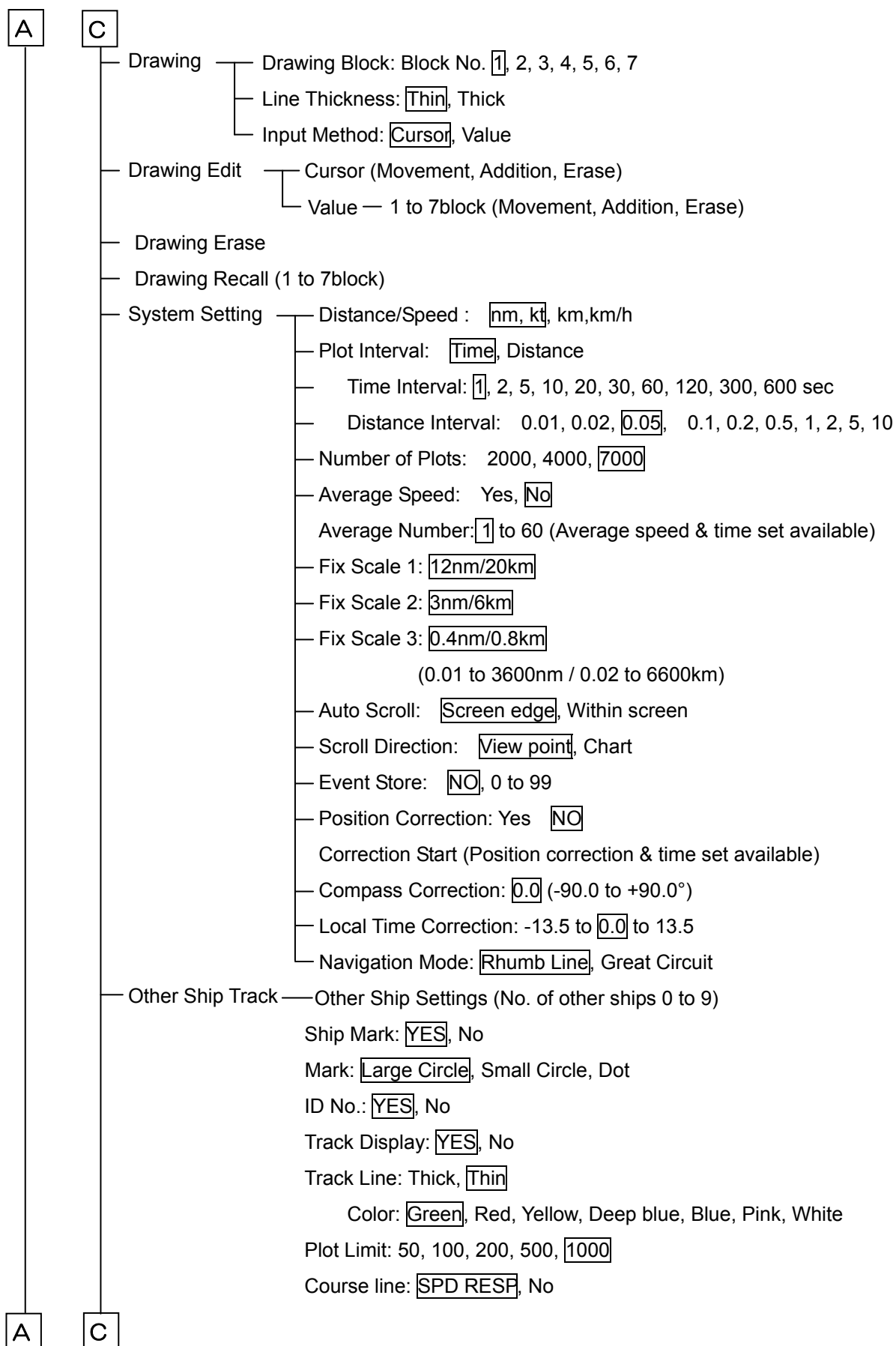


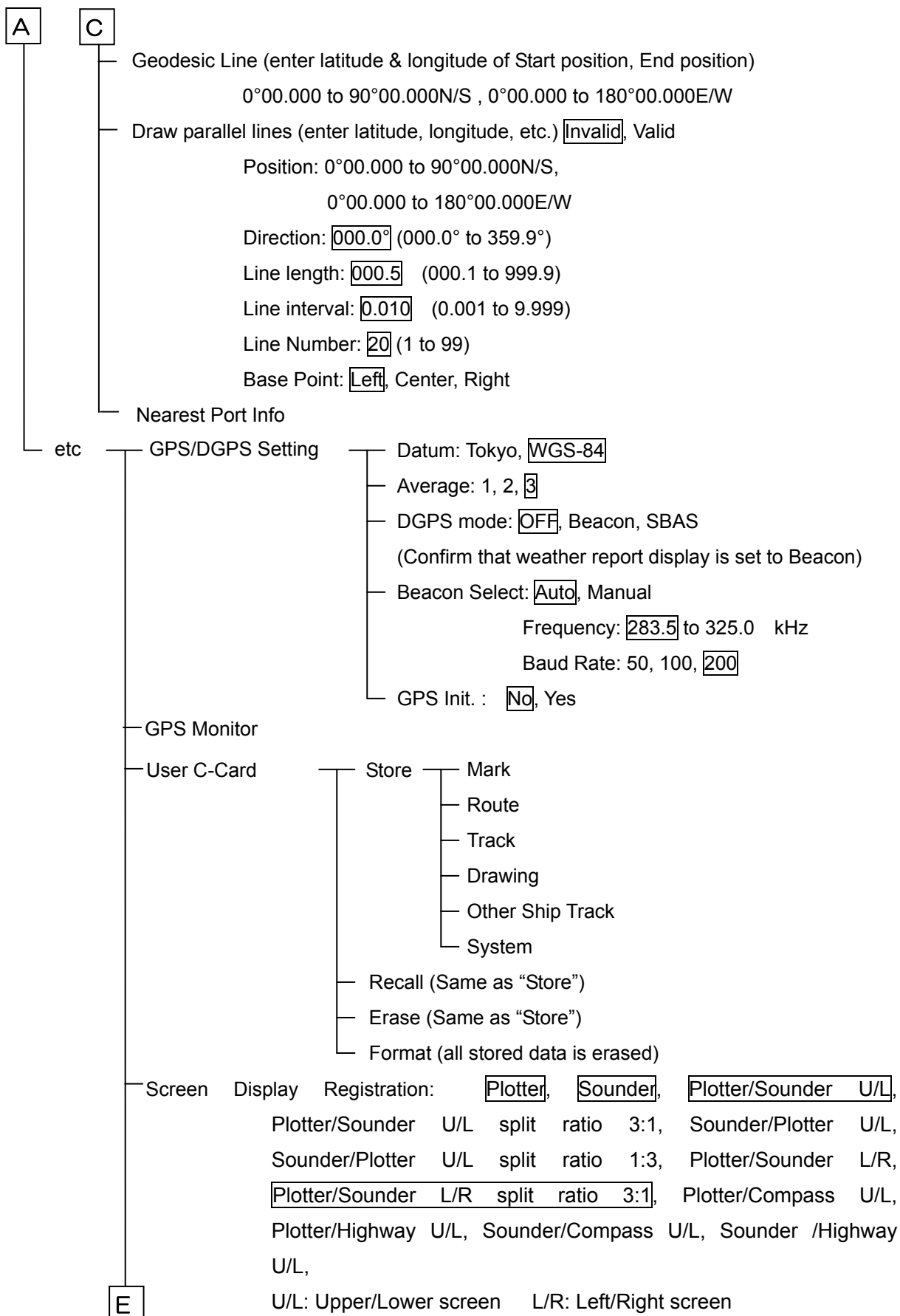


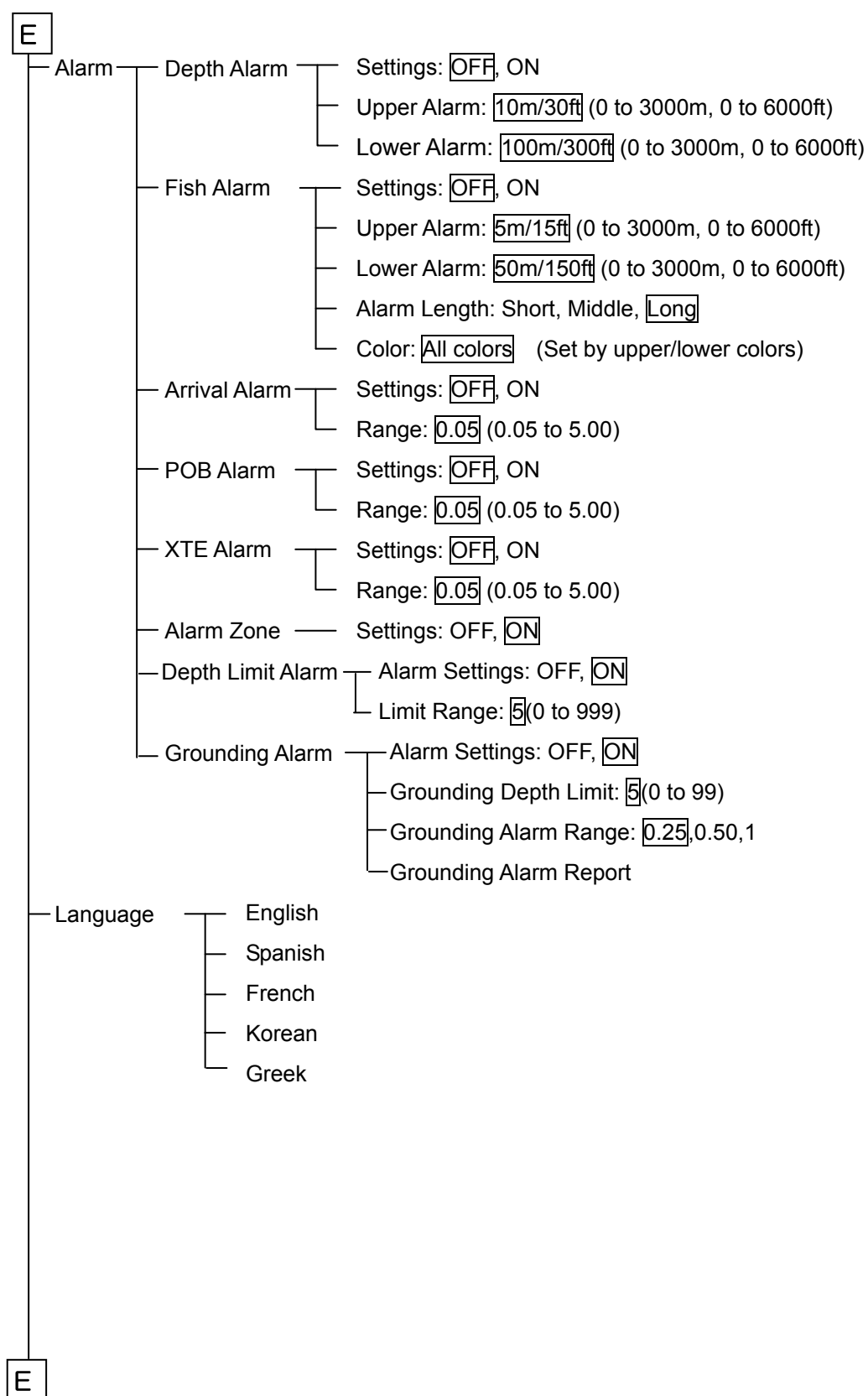


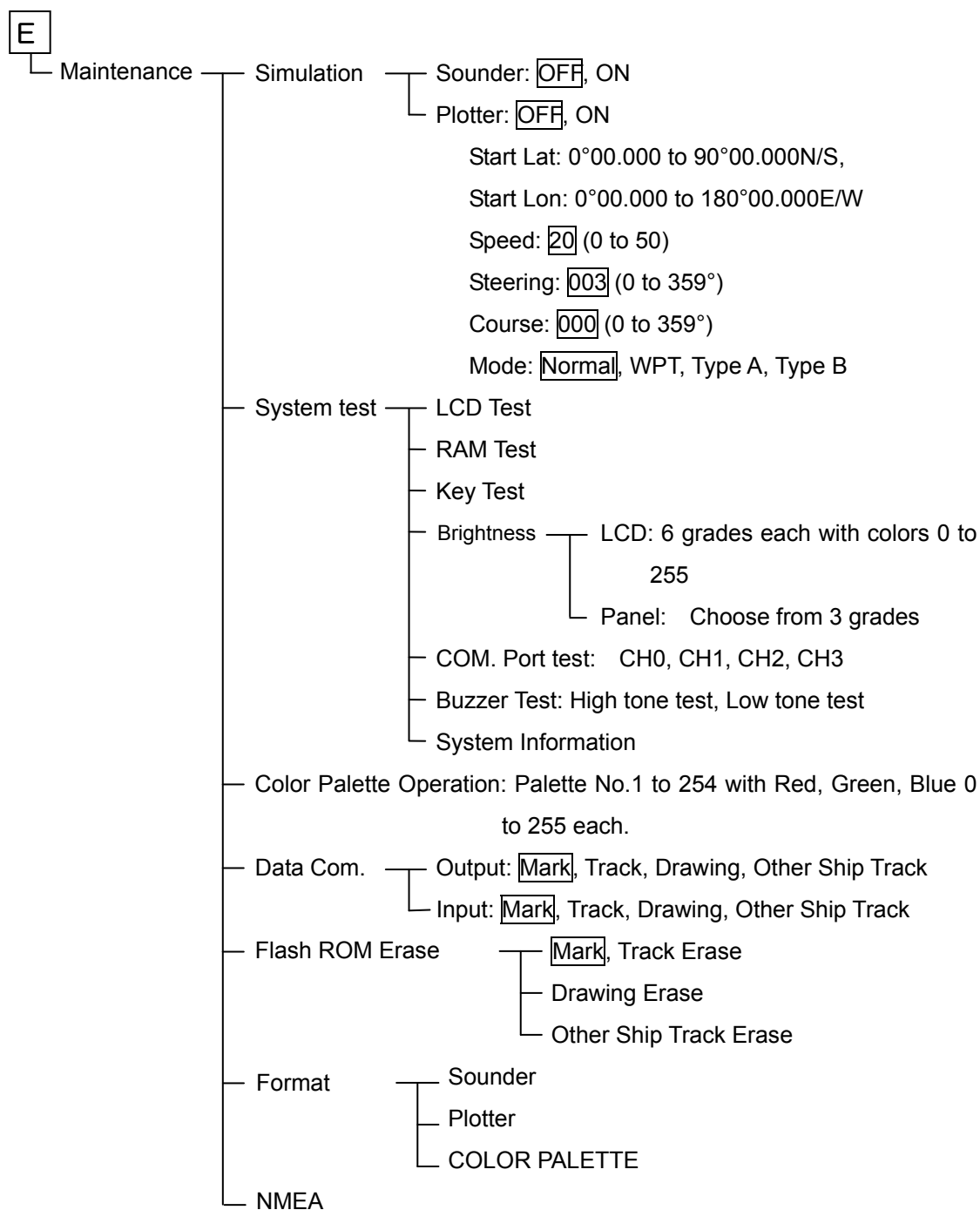












2. LOLAN C CHAINS

Chain	GRI	S1	S2	S3	S4	S5
Central Pacific	4990	11	29			
Canadian East Coast	5930	11	25	38		
Commando Lion (Korea)	5970	11	31	42		
Canadian West Coast	5990	11	27	41		
Lessay	6731	10	39			
B Ø	7001	11	27			
South Saudi Arabia	7170	11	26	39	52	
Newfoundland East Coast	7270	11	25			
Sylt	7499	11	26			
Labrador Sea	7930	11	26	42	55	
Eastern Russia	7950	11	30	46	61	
Gulf of Alaska	7960	11	26	44		
Norwegian Sea	7970	11	26	46	60	
Southeast USA	7980	11	23	43	59	
Mediterranean Sea	7990	11	29	47		
Western Russia	8000	10	25	50	65	
North Central USA	8290	11	27	42		
Northwest Pacific	8930	11	30	50	70	
England, France	8940	12	30			
Great Lakes	8970	11	28	44		
North Saudi Arabia	8990	11	25	40	56	69
Ejde	9007	10	23	38		
South Central USA	9610	11	25	40	52	65
Korea	9930	11	22	37	51	
West Coast USA	9940	11	27	40		
Northeast USA	9960	11	25	39	54	
Northwest Pacific (old)	9970	11	30	55	81	
Icelandic	9980	11	30			
North Pacific	9990	11	29	43		

3. DECCA CHAINS

Chain No.	Chain	Location	Chain No.	Chain	Location
01	South Baltic	Europe	31	Saliyah	Persian Gulf & India
02	Vestlandet	//	32	Hokkaido	Japan
03	Southwest British	//	33	Tohoku	//
04	Northumbrian	//	34	Kanto	//
05	Holland	//	35	Shikoku	//
06	North British	//	36	Hokuriku	//
07	Lofoten	//	37	Kita Kyushu	//
08	German	//	38	Namaqua	Southern Africa
09	North Baltic	//	39	Cape	//
10	North West Spanish	//	40	Eastern Province	//
11	Trondelag	//	41	South West Africa	//
12	English	//	42	Natal	//
13	North Bothnian	//	43	Dampier	Australia
14	South Spanish	//	44	Port Headland	//
15	North Scottish	//	45	Anticosti	North America
16	Gulf of Finland	//	46	East Newfoundland	//
17	Danish	//	47	Cabot Strait	//
18	Irish	//	48	Nova Scotia	//
19	Finnmark	//			
20	French	//			
21	South Bothnian	//			
22	Hebridean	//			
23	Frisian Islands	//			
24	Helgeland	//			
25	Skagerrak	//			
26	North Persian Gulf	Persian Gulf & India			
27	South Persian Gulf	//			
28	Bombay	//			
29	Calcutta	//			
30	Bangladesh	//			

Annex B

1. COLOR PALETTE

Number	Content
1	Background Color
2	Color Bar Scale 1
3	Color Bar Scale 2
4	Color Bar Scale 3
5	Color Bar Scale 4
6	Color Bar Scale 5
7	Color Bar Scale 6
8	Color Bar Scale 7
9	Color Bar Scale 8
10	Color Bar Scale 9
11	Color Bar Scale 10
12	Color Bar Scale 11
13	Color Bar Scale 12
14	Color Bar Scale 13
15	Color Bar Scale 14
16	Color Bar Scale 15
17	Color Bar Scale 16
18	Color Bar Scale 17
19	Color Bar Scale 18
20	Color Bar Scale 19
21	Color Bar Scale 20
22	Color Bar Scale 21
23	Color Bar Scale 22
24	Color Bar Scale 23
25	Color Bar Scale 24
26	Color Bar Scale 25
27	Color Bar Scale 26
28	Color Bar Scale 27
29	Color Bar Scale 28
30	Color Bar Scale 29
31	Color Bar Scale 30
32	Color Bar Scale 31
33	String
34	Background
35	Time Mark 1
36	Time Mark 2
37	VRM1
38	VRM2
39	White line
40	A Scope center
41	Fish alarm bar
42	Bottom alarm bar
43	Zoom bar

44	Bar area
45	Shift mode
46	True North, ETC
47	Fix Mode DGPS
48	Fix Mode background
49	Mark, Track, Drawing, Other 1
50	Mark, Track, Drawing, Other 2
51	Mark, Track, Drawing, Other 3
52	Mark, Track, Drawing, Other 4
53	Mark, Track, Drawing, Other 5
54	Mark, Track, Drawing, Other 6
55	Mark, Track, Drawing, Other 7
56	Scale
57	Track OFF / Number of Plot
58	FULL Plot
59	WPT
60	WPT (Cursor)
61	POB
62	GPS/DGPS Menu
63	Own Ship
64	Own Ship
65	Course Line (Other Ship)
66	Reserve
67	Parallel Line Mark
68	Parallel Line
69	Drawing
70	Mark edit
71	Track Erase (area)
72	Route line
73	Route waypoint
74	Cursor
75	Cursor
76	Cursor
77	Popup
78	Popup
79	Popup
80	Reserve
81	Menu
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90	Menu
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97	Menu
98	Menu
99	Menu
100	Blue
101	White
102	Blue
103	White
104	White
105	Red
106	Green
107	Blue
108	Yellow
109	White
110	Black
111	Dark White
112	Dark Gray
113	Light Blue
114	Reserve
115	Reserve
116	Reserve
117	Reserve
118	Reserve
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123	Compass
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Koden Electronics Co., Ltd.

Tamagawa Office:

2-13-24 Tamagawa, Ota-ku, Tokyo, 146-0095 Japan

Tel: +81-3-3756-6501 Fax: +81-3-3756-6509

Uenohara Office:

5278 Uenohara, Uenohara-shi, Yamanashi, 409-0112 Japan

Tel: +81-554-20-5860 Fax: +81-554-20-5875

www.koden-electronics.co.jp