Important Notice

Manual Handling	Keep this manual in a safe place where you can access it quickly.

The Global Positioning System (GPS) consists of a total 24 GPS satellites that orbit the earth, enabling you to determine your position anywhere in the world, 24 hours a day, if you can receive satellite signals. During actual navigation, carefully compare the position data with all available navigation sources such as Loran C, Decca, other navigators, charts, visual navigation, depth, water temperature and others. It is your responsibility to make navigation judgments.

DGPS Operation Note :

Your position can be improved by DGPS correction. However, when you are communicating with other ships, you may use a DGPS corrected position but they may not. Make your position source known during communication.

The Electronic Chart :

Only official authorized charts and notices to mariners contain all the information needed for the safety of navigation and, as always remember, the user is responsible for their prudent use.

Pictorials

This manual uses the following symbols for easy understanding safety instructions. Always follow these instructions carefully.

 **WARNING**	Always follow this safety instruction to prevent death or injury.
 **CAUTION**	Follow this safety instruction to avoid possible injury or damage to your property. Symbol "△" is a CAUTION or WARNING label indicating the safety instruction.

WARNING	This symbol is an Electrical Shock WARNING label.
	Symbol is an instruction that you must not violate. (This symbol instructs NOT to disassemble the system components)
	Symbol is an operation instruction that you must follow. (This symbol shows the main power OFF instruction.)

WARNING <For System Operators>

Always follow this instruction to prevent death or personal injury.

	**Turn power off During abnormality.**	If smoke or a small of burning occurs, a fire or an electrical short circuit may result. Turn the power switch OFF and shut down the power supply immediately. Never try to repair the system yourself. Call for service.
	**Do not open Cabinet.**	High voltage exists in the instrument. Contact with voltage may cause possible injury or death.
	**Do not touch back side of the equipment.**	Harmful line voltage is present on back side of the equipment. Never try to touch back side while power is turned on.
	**Avoid excessive shock to display unit.**	The LCD display module contains a liquid. Do not apply any mechanical shock to the display. If the display broken, liquid may leak and injure your skin and eyes.
	**Do not use with poor ventilation.**	If you cover this unit or use in an enclosed place, it may malfunction or become damaged as a result of overheating. Use only where there is sufficient ventilation.

Installation Cautions <For service Personnel>

Follow installation instructions to avoid personal injury and system malfunction.

Installation in rigid location.	Mount your HD-70 SERIES on a rigid frame or base to prevent your unit from working loose.
Use correct Installation materials.	Use the installation materials provided in the standard accessory pack only. If you use hardware of insufficient strength, your system may loosen causing damaged.
Keep away from direct sunlight.	Keep your system out of direct sunlight as it may become damaged by overheating.
Keep away from water.	Take care not to get water on or in your unit as it may be damaged and/or cause an electrical shock.
Keep away from heat source.	Keep your system away from other heat source as it may malfunction, be damaged, or burn.
Use correct power source.	Operate your system within the specified power voltage. An incorrect power supply may cause

Maintenance Cautions<For Maintenance Personnel>

Use the following safety precaution internal inspection.

Discharge capacitors.	High voltage may be retained in the capacitors if the high-tension circuit several minutes after you have turned the power switch off.
Check that power is OFF	To prevent an electrical injury due to erroneous power switching, make sure that the main power supply and the system power switch are both in the off position. Additionally, attach a safety label showing that service is in progress.
Avoid EMI.	Take care not to damage the ESDs (Electrostatic Sensitive Devices) by static electricity from carpet and cloths.
Avoid dust.	Wear a safety mask so as not to breath in dust during inspection or cleaning inside your system instruments.

Operation Notes <For operators>

Observe the following operation notes, otherwise the system failure or deterioration can result. And periodical inspection and maintenance are required for keeping the system in an optimum condition.

Backup important data.	The waypoint and other registered data may become unreadable by unexpected failure. We recommend recording this data separately.
Use correct transducer only.	If you use incorrect transducer, the transmitter circuit may be damaged due to a matching error. Consult is for system information.
Check transducer Connection before power on	Do not turn the power switch ON if the transducer is disconnected or if it is not inserted into the water. If done, the transducer or transmitter circuit may be damaged.
Always clean the transducer	Since transducer performance can drop due to accumulated bottom growth, keep the transducer clean. Never paint transducer surface.
Transducer must be installed by authorized personnel.	Consult us for transducer installation by authorized personnel.

 **WARNING**	This product is designed to assist a navigation. When you are sailing, use the certified chart from the Government or IMO.

Smart7 Series System

Welcome

HD-70 SERIES opens a new chapter of performance and integration in vessel navigation system display and management. Whether you are a Cruiser or Sport fisherman or both, HD-70 SERIES gives you the information you need.

⚠ CAUTION

HD-70 SERIES is Color LCD Charting Systems employs the latest in proven technology to provide accurate navigation information. The Plotter functions of HD-70 SERIES are totally dependent upon the capability of the navigation source to provide accurate position information. This device is only an aid to navigation. It should be used in conjunction with all other navigation accuracy. For safety, always resolve any uncertainty before continuing navigation.

⚠ CAUTION

The performance of LCD displays are degraded by continuous direct exposure to ultraviolet rays. Locate your HD-70 SERIES Display away from direct sunlight. When not in use. Keep the display covered.

⚠ DISPLAY BREAKAGE WARNING

The LCD display module contains a liquid. If the display is broken and the liquid contacts your skin, wash it off immediately in running water for 15 minutes. If the liquid contacts your eyes, immediately flush your eyes with running water for 15 minutes. Contact a physician if any abnormal symptom is experienced.

Smart7 Series System

Welcome

The Color LCD Fishfider System opens a new chapter of performance and integration in vessel navigation system display and management. Whether you are a Cruiser or Sport fisherman or both, 650 gives you the information you need.

⚠ CAUTION

The Color LCD Fishfider Systems employs the latest in proven technology to provide accurate navigation information. The Plotter functions of HD-70 SERIES are totally dependent upon the capability of the navigation source to provide accurate position information. This device is only an aid to navigation. It should be used in conjunction with all other navigation accuracy. For safety, always resolve any uncertainty before continuing navigation.

There is no direct relationship between the color of water areas and their depth. The navigator shall always query the area for depth information and use the official paper chart.

⚠ CAUTION

The performance of LCD displays are degraded by continuous direct exposure to ultraviolet rays. Locate your HD-70 SERIES Display away from direct sunlight. When not in use. Keep the display covered.

DISPLAY BREAKAGE WARNING

The LCD display module contains a liquid. If the display is broken and the liquid contacts your skin, wash it off immediately in running water for 15 minutes. If the liquid contacts your eyes, immediately flush your eyes with running water for 15 minutes. Contact a physician if any abnormal symptom is experienced.

INDICATION NOTICE

*: It is important or warning notice on front of article

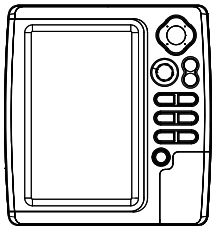
#: It is only functions for the HD-70CF on front of article.

Smart7 Series System

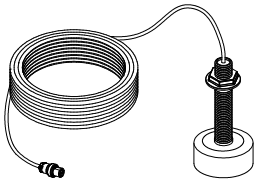
Introduction

The HD-70 SERIES is a premium multifunction command and control center. HD-70 SERIES front panel keyboard and its wide screen with wide viewing area make placement easy. Although HD-70 SERIES offers many advanced features, operation is simplified through the use of popup menus similar to those found on personal computers.

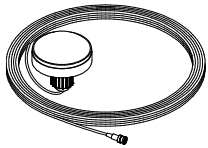
Standard Equipment Configuration List(Metal)



Display unit

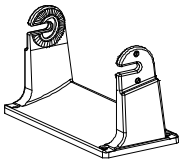


#Transducer

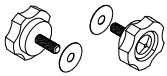


GPS ANT.

Protector

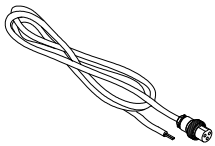


Mounting Bracket



Knobs

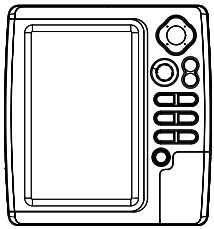
Manual



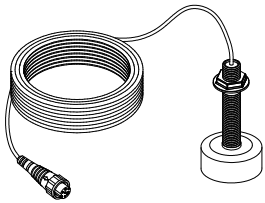
Power cable

Smart7 Series System

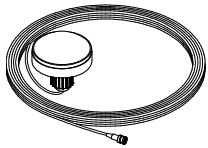
Standard Equipment Configuration List (Plastic)



Display unit

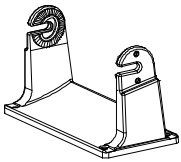


#Transducer

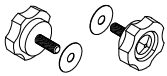


GPS ANT.

Protector

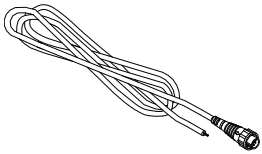


Mounting Bracket



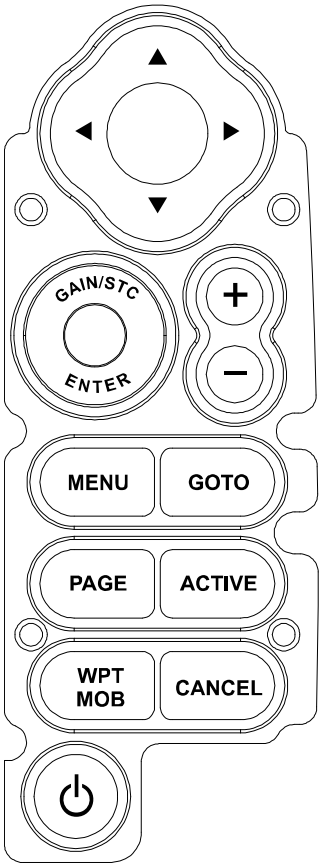
Knobs

Manual



Power cable

Keypad



KEY	Description
[Cursor Key]	With MENU: Choosing the menu Without MENU: Cursor on & *Choosing the frequency
[GAIN/STC] & [ENTER]	Button: Enter when menu table on the screen #Rotary: Adjustment of gain & STC level with turning.
[+] &[-]	Change the chart of scale & Setting up the depth range
[MENU]	One step: Quick menu is displayed. Two step: Main menu is displayed.
[GOTO]	Cursor display: Place the cursor and press “GOTO’ to set WPT No cursor/Pointed WPT: Save WPT and set free the pointed WPT No cursor/No pointed WPT: List for WPT, route
[PAGE]	Select the configuration & modification you wish.
[Active]	Select the activated section
[WPT/MOB]	WPT: Places a WPT on the plotter main screen. MOB: Set MOB(Man OverBoard)
[CANCEL]	Return to the previous display, or canceled the set-up.

How to use [Power/Brightness]

▶ Press [PWR/BRT]

1.Use PWR:

To turn off the power, keep pressing the [BRT/PWR] until the end of counting.

2.Use BRT:

Press [BRT/PWR] shortly and the brightness can be controlled. Use the arrow keys [←][→]of the cursor to control the brightness and the contrast.

3. Use day/night mode

Press [BRT/PWR] shortly and change mode. Use the arrow keys [↓][↑] of the cursor to change mode.

Choosing the frequency on the dual

▶ Press [↑][↓]

You can see the red color is moving with the up and the down. In the active frequency in the red, it's on operation.

Choose the Gain & STC

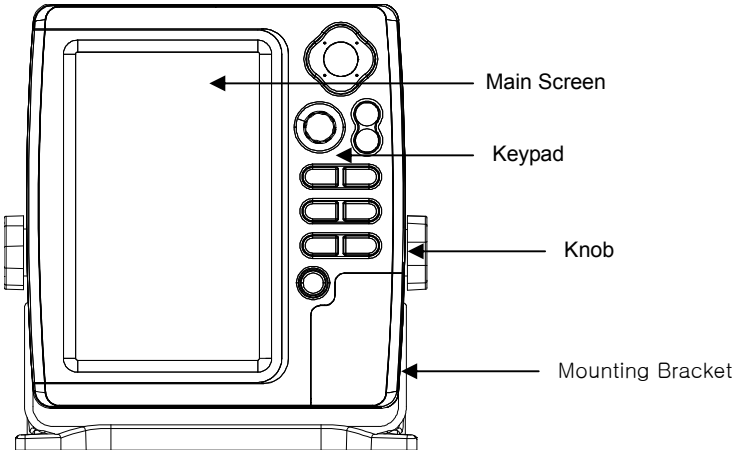
▶ Press [←][→]

You can see the red color is moving with the right and the left. In the active Gain & STC in the red, it's on operation.

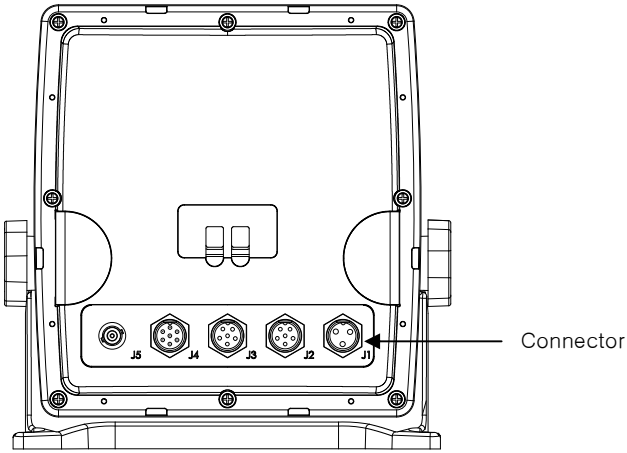
Smart7 Series System

Metal

<Front>



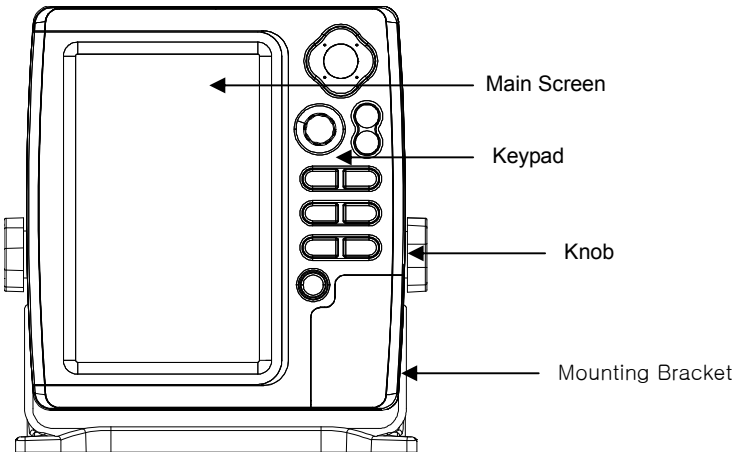
<Rear>



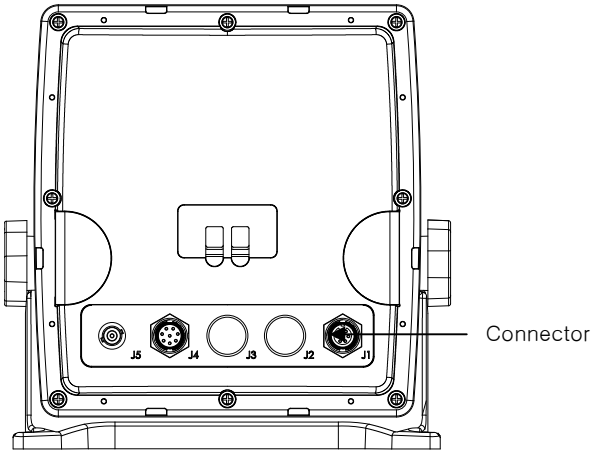
Smart7 Series System

Plastic

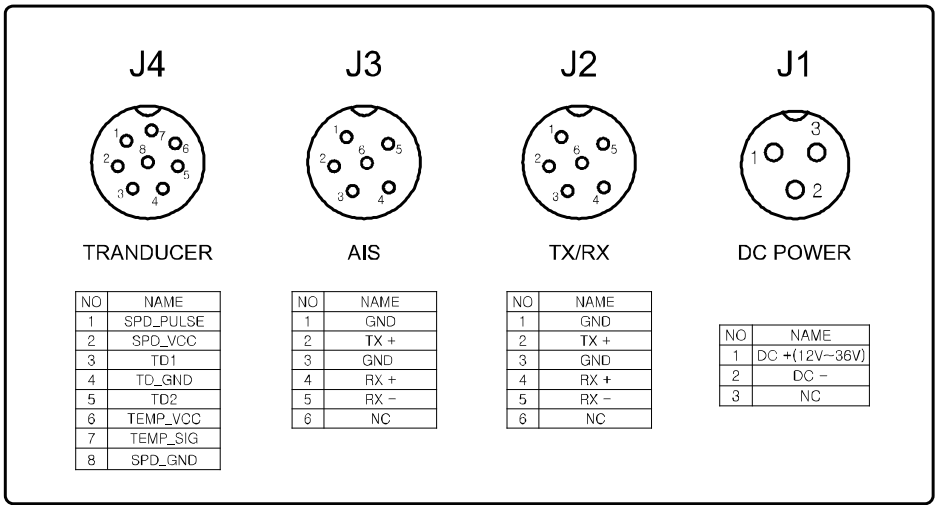
<Front>



<Rear>



SPEC of the connectors(Metal)



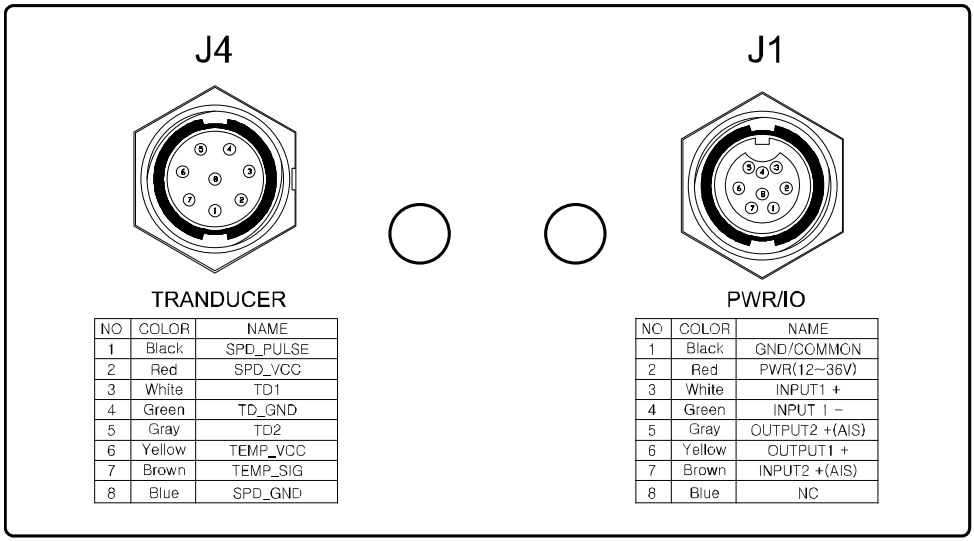
NO	NAME
1	SPD_PULSE
2	SPD_VCC
3	TD1
4	TD_GND
5	TD2
6	TEMP_VCC
7	TEMP_SIG
8	SPD_GND

NO	NAME
1	GND
2	TX +
3	GND
4	RX +
5	RX −
6	NC

NO	NAME
1	GND
2	TX +
3	GND
4	RX +
5	RX −
6	NC

NO	NAME
1	DC +(12V~36V)
2	DC −
3	NC

SPEC of the connectors(Plastic)



NO	COLOR	NAME
1	Black	SPD_PULSE
2	Red	SPD_VCC
3	White	TD1
4	Green	TD_GND
5	Gray	TD2
6	Yellow	TEMP_VCC
7	Brown	TEMP_SIG
8	Blue	SPD_GND

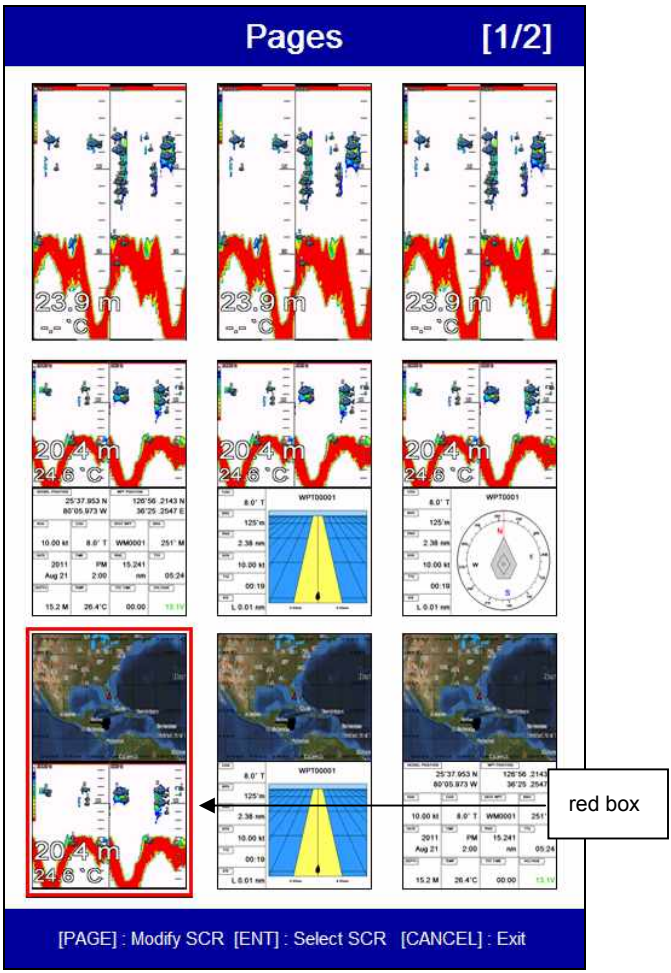
NO	COLOR	NAME
1	Black	GND/COMMON
2	Red	PWR(12~36V)
3	White	INPUT1 +
4	Green	INPUT 1 −
5	Gray	OUTPUT2 +(AIS)
6	Yellow	OUTPUT1 +
7	Brown	INPUT2 +(AIS)
8	Blue	NC

Pages

Select Page

Press [Page] key and then go to “Pages” screen

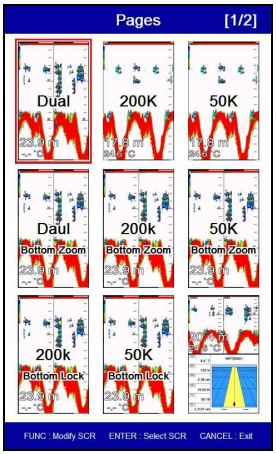
Selectable Pages by red box and then press [ENTER] key.



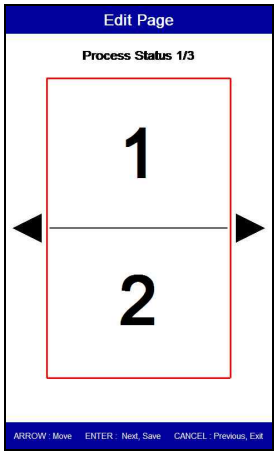
Customize

Customize of screen

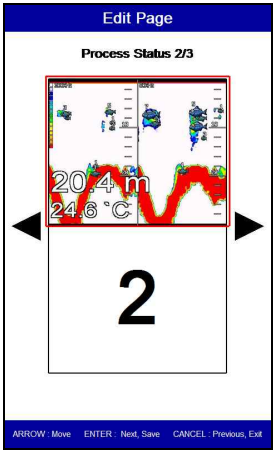
Press [PAGE] key on the Pages which selected red box.(*Refer Fig. 1.1.1 as below)
Select the layout of the formation of screen.(*Refer Fig. 1.1.2 as below)
Select displays .(*Refer Fig. 1.1.3 & 1.1.4 as below)



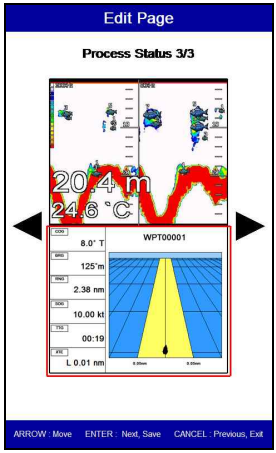
<Fig. 1.1.1>



<Fig. 1.1.2>



<Fig. 1.1.3>



<Fig. 1.1.4>

Customize

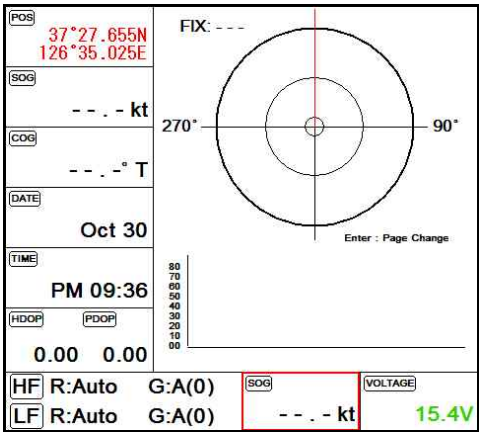
Customize of data bar

▶ [MENU]->Advance->Setup->Customizing->Data bar-> Edit

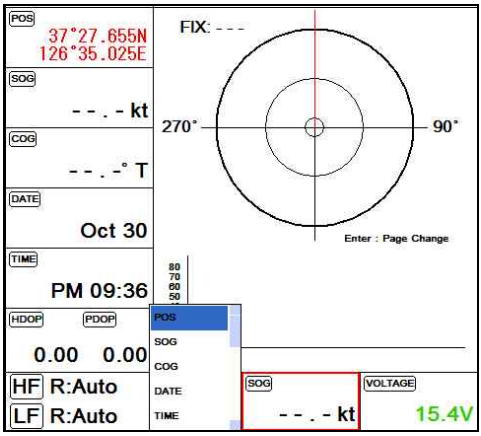
Select the section to edit by red box. .(*Refer Fig. 1.2.1 as below)

Press [ENTER] key and select the data as a user want.(*Refer Fig. 1.2.2 as below)

Finish the formation of data bar, press [CANCEL] key to complete.



<Fig. 1.2.1>



<Fig. 1.2.2>

Customize

Navigation data edit

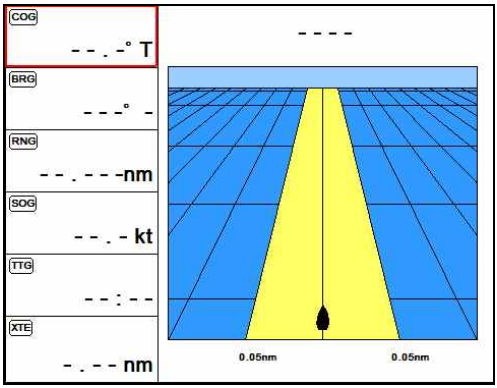
▶ [MENU]->Advance->Setup->Customizing->Navigation Data-> Edit

Select the section to edit .(*Refer Fig. 1.3.1 as below)

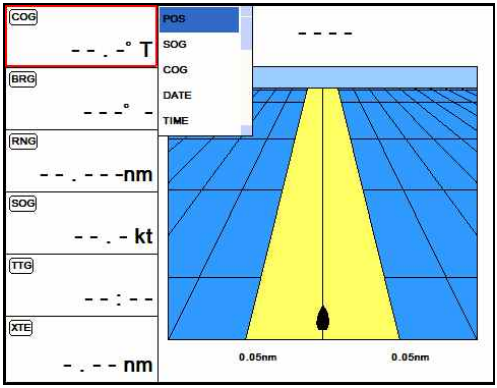
Press [ENTER] key and select the data as a user want. .(*Refer Fig. 1.3.2 as below)

Finish the formation of data bar, press [CANCEL] key to complete

(* If no navigation data on present activated display, it is not available to edit)



<Fig. 1.3.1>



<Fig. 1.3.2>

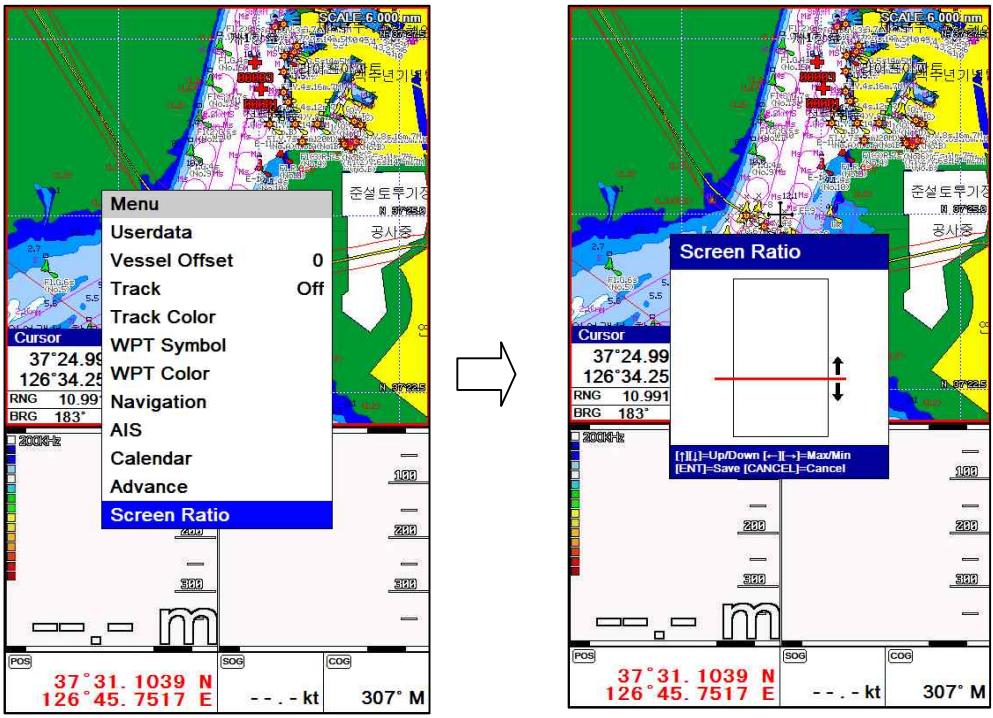
Customize

Screen ratio

(* It is only available on plotter and fishfinder at the same screen)

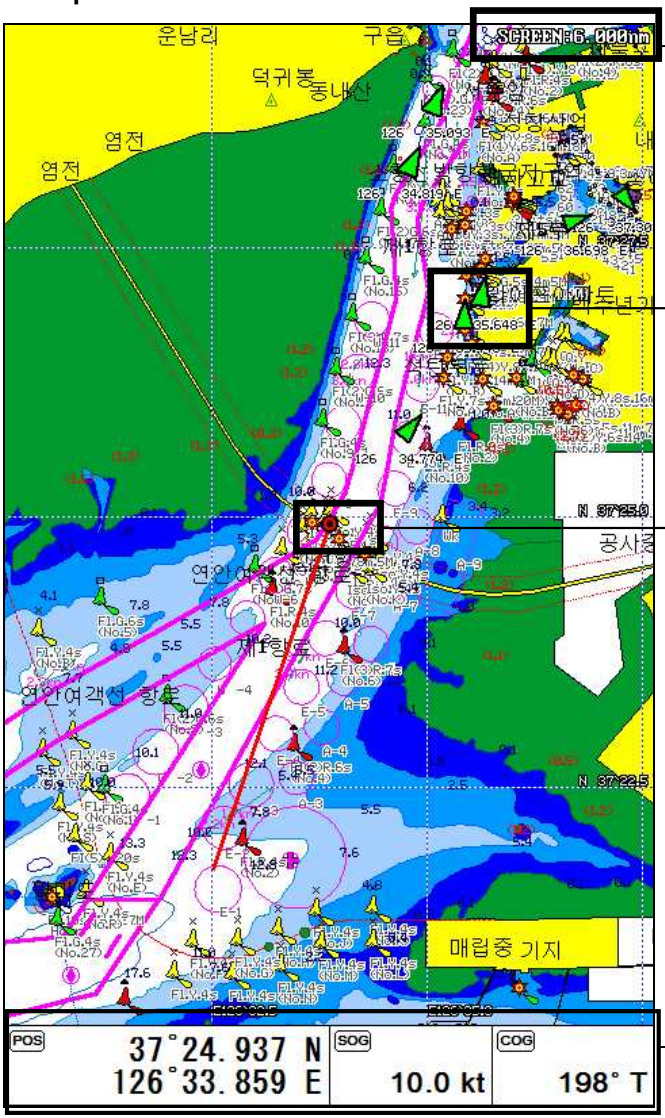
▶ [MENU]-> Screen ratio

It is available to adjust the size of screen for plotter and fishfinder.



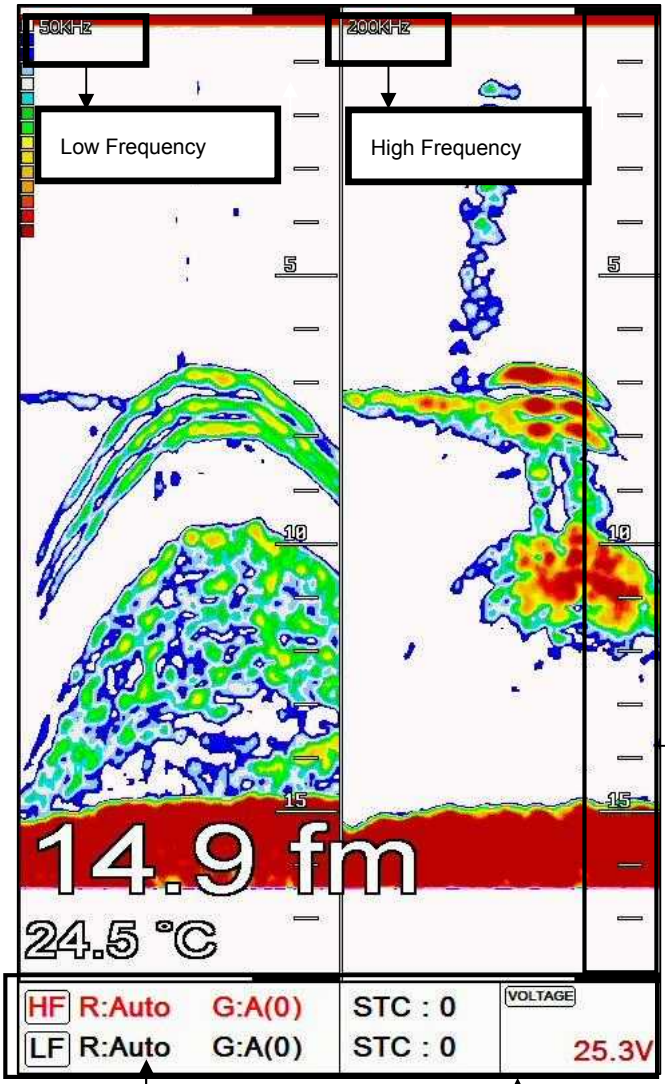
Display

Chartplotter



Display

#Fishfinder



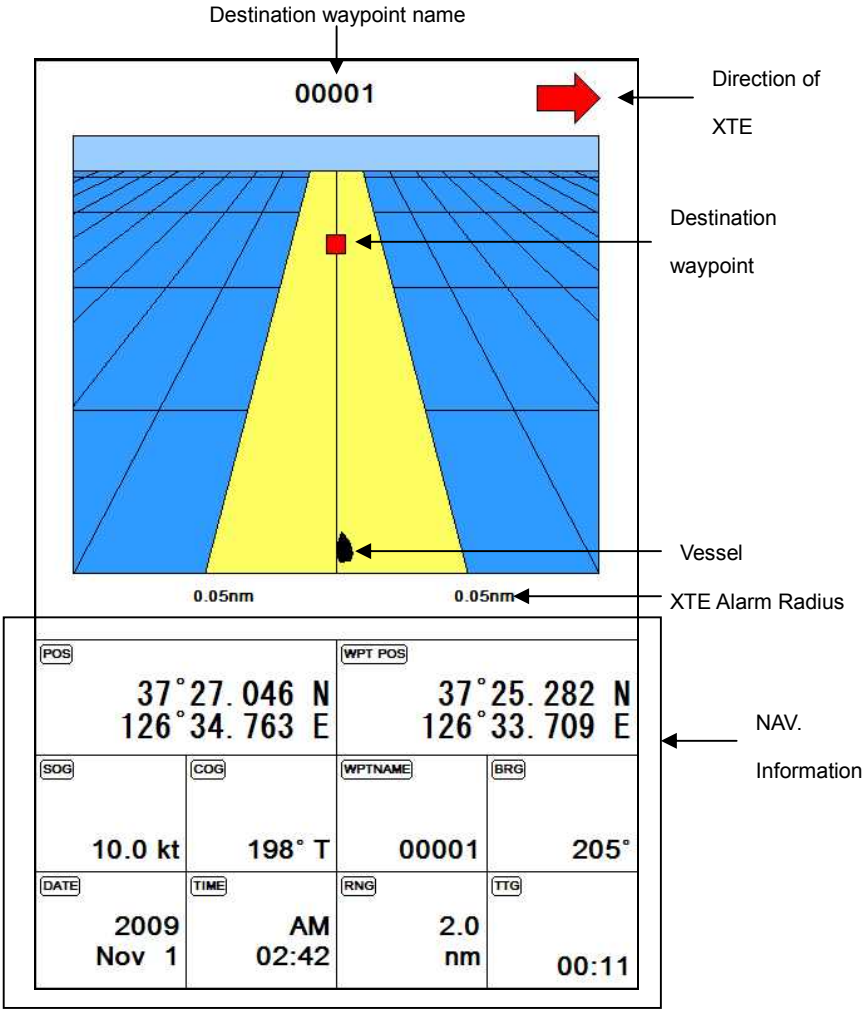
Depth bar

Red color: It is selected to setup Frequency

Data bar

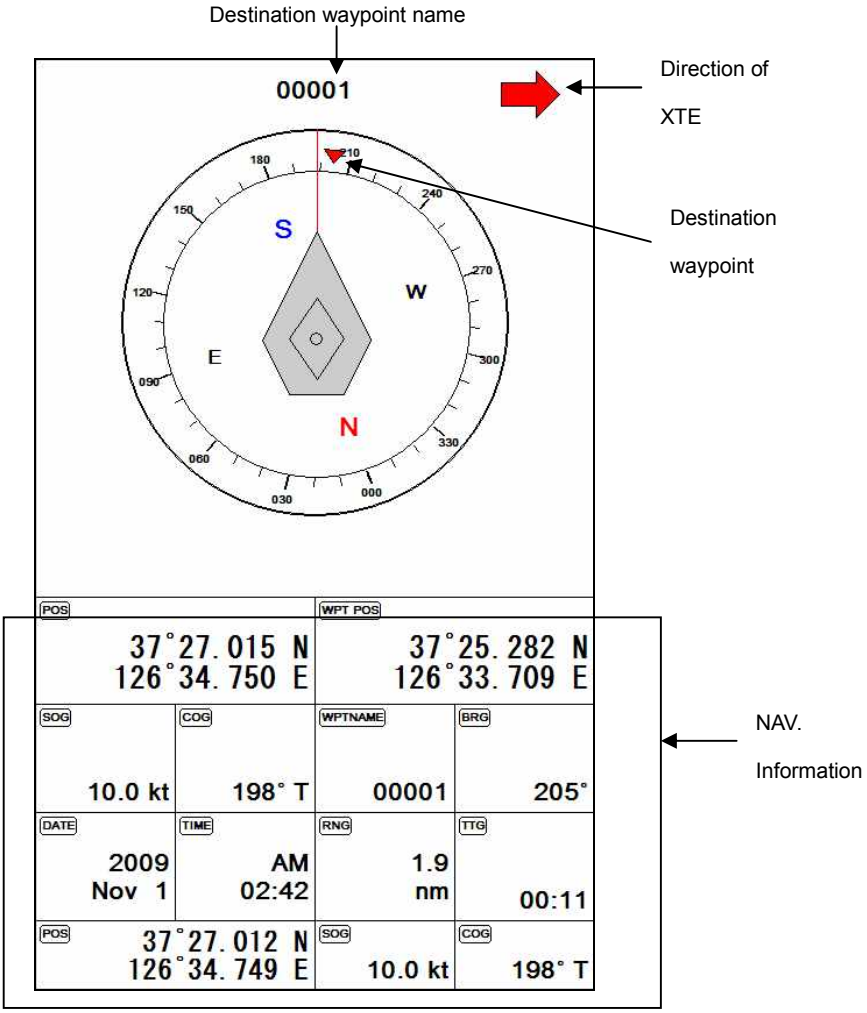
Display

Highway



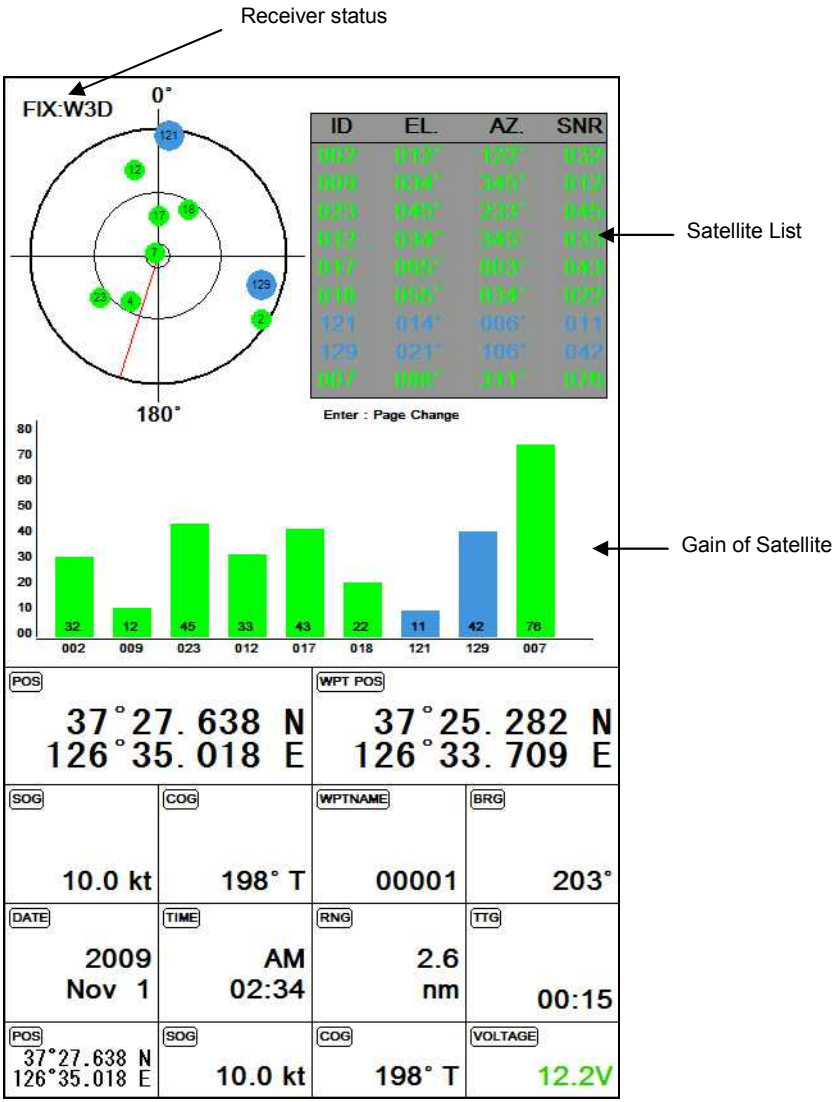
Display

Steering



Display

GPS Information



MOB (Man Over Board)

[MOB]

If a person or missing an object overboard and you need to get present position, use the MOB function.

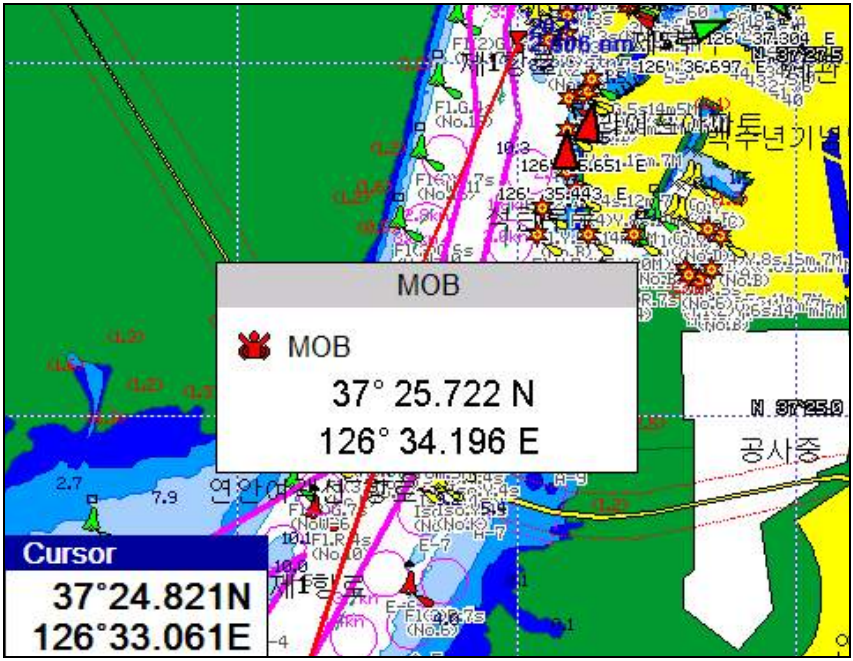
- How to use the MOB

Pressing [WPT/MOB] key for 3 seconds and then MOB window is shown up with alarm.

Pressing [CANCEL] key for call off alarm and MOB window.

Pressing [MOB] key once again, marked MOB will be disappeared on the screen

(*MOB is not stored in the flash memory)



Map Orientation

1. True Motion

The True Motion is in the way the vessel position is presented. In True Motion mode, the vessel position symbol moves over the map while the map remains stationary.

Select True motion.

(* It is not available to operate on Course up and Head up.)

2. North Up/South Up/East Up/West Up

They setting the vessel present position remains fixed in the center of the Main Screen while the map moves under it.

3. Course Up

The Course Up mode screen orientation is determined by whether or not navigation is in progress. During navigation vessel present position is in the center of the Screen and the course line to the destination is straight up. As your present position changes, the map moves under the stationary vessel symbol.

(*If navigation is stopped, the Main Screen appears as Head up.)

Head Up

For Head Up mode, vessel present position is fixed in the center of the Main Screen and vessel heading is upward. As your present position changes, the map moves under the vessel sym bol.

#Fishfinder Mode

1. Normal (200KHz or 50KHz)

Normal mode (with Auto Range active) displays the sounder image with the surface at the top of the screen and the sea bottom in the lower part of the screen. The depth scale indicates the depth range appearing in the display. Bottom contours and fish echoes are displayed at the depths where they are detected. If the depth Range is set manually to a value less than actual water depth, sea bottom echoes are not displayed, but all other echoes within the Range setting are displayed.

2. Bottom Zoom (200KHz or 50KHz)

Bottom Zoom magnifies the sounder display from the sea bottom toward the surface for a short distance. The sea bottom contour is displayed and additional contour lines are added at intervals above the sea bottom to aid in determining distances of echoes near the bottom. Use the Sounder Menu to set the magnified Bottom Range from 2.5 to 20m (10 to 60ft.). Default setting is 10m (40ft.). If the depth Range is set manually, the setting must place the sea bottom echo in the lower portion of the screen for Bottom Zoom to be effective.

3. Bottom Lock (200KHz or 50KHz)

Bottom Lock divides the Fishfinder main screen image for the selected Fishfinder into two sections. The left hand section displays a Normal Mode image. The right hand section of the screen displays the Fishfinder image relative to the sea bottom. The sea bottom appears as a straight line with the Fishfinder image magnified for a short distance toward the surface. A scale

appears on the right for estimating distances of echoes near the bottom. Use the Fishfinder Manu to set the magnified Bottom range from 2.5 to 20m (10 to 60ft.). Default setting is 10m (40ft.). If the depth Range is set manually, the setting must place the sea bottom echo in the

lower portion of the screen for Bottom Lock to be effective.

Fishfinder modes are selectable for single frequency or dual and some functions, for example bottom zoom or lock.

AIS System

AIS is an Automatic Identification System. It has been introduced to improve the safety of navigation by assisting in the efficient operation of ship to ship, ship reporting and VTS applications. The system should enable operators to obtain information from the ship automatically, requiring a minimum of involvement of ship's personnel, and should have a high level of availability.

Connecting to the chart plotter an AIS receiver, vessels with AIS transponder within VHF range are displayed on screen giving he skipper or navigator a visual interpretation of the data of nearby vessels. This improves safety, and specifically for collision avoidance reasons.

AIS System

1. AIS system definitions

CPA	Closest Point of Approach is the closest distance that will be achieved between your vessel and the tracked target, based on your vessel's speed and direction and the target's speed and direction.
CPA Alarm	Occurs if CPA is less or equal to CPA Radius. This test is done for active targets only.
CPA Limit	This is the distance from your vessel that a target may reach before a target is deemed a threat.
TCPA	Time to Closest Point of Approach is the time remaining until the CPA will occur.
TCPA Alarm	Occurs if TCPA is less or equal to TCPA Radius. This test is done for active targets only and if CPA value is less or equal to CPA Radius.
TCPA Limit	This is the time remaining before the CPA is reached.
Name	Name of ship, 20 characters.
MMSI	Maritime Mobile Service Identity.
MMSI number	A unique 9 digit number that is assigned to DSC radio station. It primarily registers the boat information in the U.S. Coast Guard's national distress database for use in emergency situations.
Target	It is a vessel equipped with AIS. Information about the targets is being received by AIS Receiver and displayed on the screen.
Active Target	Target located within the Activation Range. Active target is represented by oriented triangle with COG and Heading vectors. Rate of turn may also be displayed.
Dangerous Target	Target detected by CPA or TCPA Alarm. Dangerous target is Active Target by definition. For better visibility Dangerous Target symbol is charged from basic color to red color.
Sleeping Target	Target located outside the Activation Range. Sleeping target is represented by a small oriented triangle.
Lost Target	When the AIS info is not received from that vessel for 3.5minutes. The presentation will be marked X on the target.

2. Quick info on AIS target

Press [ENTER] key on Target which wants to see. It shows Information of “AIS INFO” window.

AIS INFO window

1. Name
2. MMSI number
3. National
4. Navigation Status
5. Heading
6. COG
7. SOG
8. CPA
9. TCPA
10. Latitude
11. Longitude

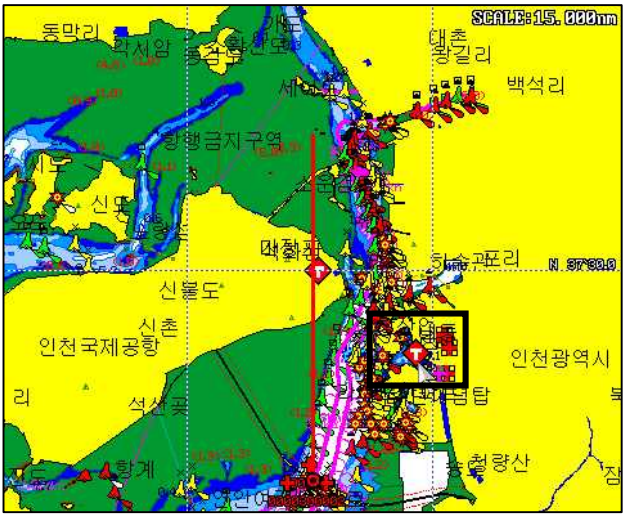
※Press [ENTER] key on Target which wants to see. It shows Information of “AIS INFO” window.

Tide Information

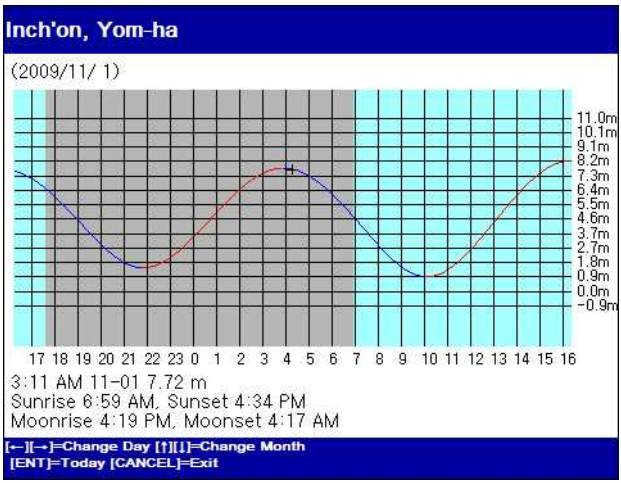
The HD-70 series contains the tide information of principal place in the world

▶ Press [ENTER]

[The icon of the tide list]



[The window of the tide list]



It is to be used for Object information or Find function of C-MAP.

▶ Press [ENTER]

1. Information

It is possible to see map information at the Vessel Position.

(*Information is Port Services, Tides, Lights, Wrecks, Rocks, Buoys, Beacon, Obstructions, Land markers, etc.)

2. Find

The charplotter allows finding Nearest Services, Port By name, Port by distance, Tide Stations, Wrecks, Obstructions.

2.1. Port Services

To locate and display the nearest available facilities of a particular type.

The icons of the available services are shown. Use the cursor key to select any facility and press [ENTER]. The list of the ports containing the facility will be sown on the screen. Then choose the port you want and press [ENTER]

2.2. Port by names

To select the Ports by name function following the procedure.

Shows the list of all ports stored on the C-CARD in alphabetical order and allows to search ports by name to locate the ports on the map.

2.3. Port by distance

To select the ports by distance function following the procedure.

Shows the list of all ports stored on the C-CARD in closest distance order and allows to locate the ports on the map

2.4. Tide stations

Finds the nearest Tide stations on the map, from the boat position –if a valid fix is received- or from the cursor position-if the received fix position is not good.

A new window will appear in few seconds. Choose the tide stations you want and press [ENTER] to display the tide graph page.

2.5. Wrecks

Searches for nearest Wrecks.

Use the cursor key to select the port. Press [ENTER] to locate the selected Wreck on the map.

Menu

It is available to load the window of the Menu on the activated chartplotter display in red box

▶ Press [MENU]

1. Userdata

1.1. WPT

Waypoints may be entered and stored in the waypoint library by any of two different methods. You may use the cursor to select locations from a chart, or store vessel present position as a waypoint

1.1.1. List

Verification of saved WPT information and edit, delete, navigation.

(*Refer the menu from bottom list on the list window)

1.1.2. Symbol size

You can select the size of “WPT symbol”

(☞ The default setting is Auto.)

1.2. Route

Use waypoints to create a instant route for your sailing. The capacity of waypoints are 20 point. Every time you put waypoints on the screen, the temporary route is drawn on the screen.

1.2.1. List

Verification of saved “Route” information and edit, delete, navigation.

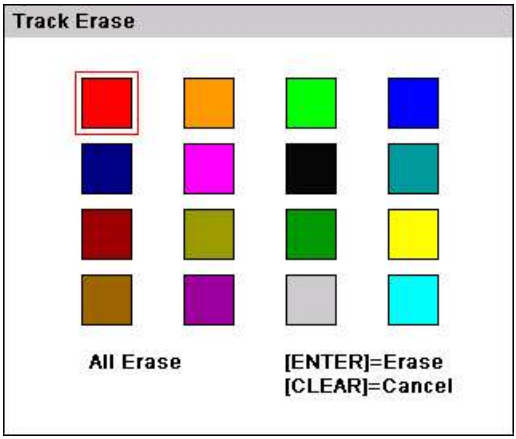
(*Refer the menu from bottom list on the list window)

1.3-1. Track(type 1)

1.3-1.1. Erase

You can erase all tracts by the selected color.

(* If you want to delete to be being used the track , choose “All Erase”)



1.3-1.2. Setup

1.3-1.2.1. Thickness

The size of a track is selectable between thin and pan.

(☞The default setting is Thin.)

1.3-1.2.2. Record setup

Track display interval is adjustable by distance or time.

(☞The default setting is Time.)

1.3-1.2.3. Time interval

If track interval is set in time, a track displays by track time interval. The track time interval and the maximum capacity is 50,000 points.

(☞The default setting is 10 seconds.)

1.3-1.2.4. DIST interval

If track interval is set in distance, a track displays by track distance interval. The track distance interval and the maximum capacity is 50,000 points.

(☞The default setting is 0.03nm.)

1.3-1.2.4. Track Type

Setting up track type for type1 or type2.

(☞The default setting is type1 .)

1.3-2. Track(type 2)

1.3-2.1. Select Index

Select the number of the active track.

1.3-2.2. Setup

1.3.2-2.1. Thickness

The size of a track is selectable between thin and pan.

(☞The default setting is Thin.)

1.3.2-2.2. Record setup

Track display interval is adjustable by distance or time.

(☞The default setting is Time.)

1.3.2-2.3. Time interval

If track interval is set in time, a track displays by track time interval. The track time interval and the maximum capacity is 10,000 points.

(☞The default setting is 10 seconds.)

1.3.2-2.4. DIST interval

If track interval is set in distance, a track displays by track distance interval. The track distance interval and the maximum capacity is 10,000 points.

(☞The default setting is 0.03nm.)

1.3.2-2.4. Track Type

Setting up track type for type1 or type2.

(☞The default setting is type2 .)

1.3-2.3. List

Verification of saved Track information and edit, delete, display.

(*Refer the menu from bottom list on the list window)

1.4. User Line

This function is used to create new line or plane at specific area on chart manually.

1.5 .User Name

This function is used to put a name on the specific area by user.

1.5. Save Userdata

You can save the “User data” in SD card

1.6. Load UserData

You can load the “User data” from SDcard.

2. Vessel offset

It is possible to be set up positions of 0, 1/3, and 2/3 by the standard of the center of Main Screen.

(☞The Vessel offset does not work on True Motion.)

3. Track

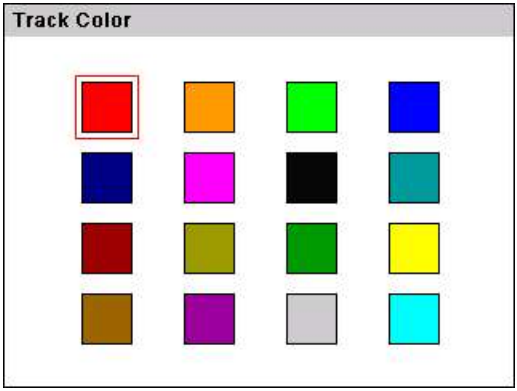
The Track function provides a record of the path over which your vessel has traveled. A track is a series of lines connecting points of vessel present position which are plotted at wither time or distance intervals. Tracks are recorded and stored one at a time. HD-70 series supports 50,000 points of track history.

(☞ The default setting is OFF.)

4. Track color

You can select the color of “Track”

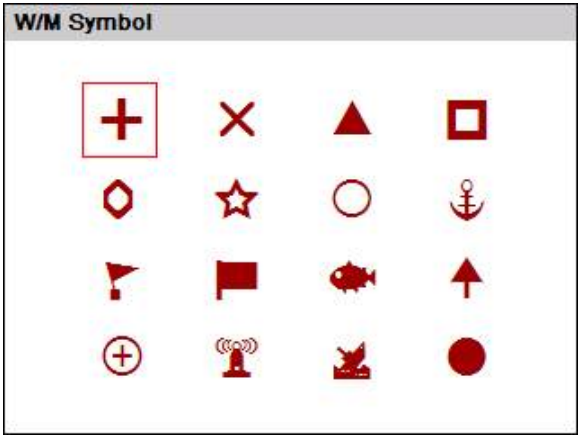
(There are 16 sort of * Track as picture)



5. WPT symbol

You can select shape of WPT.

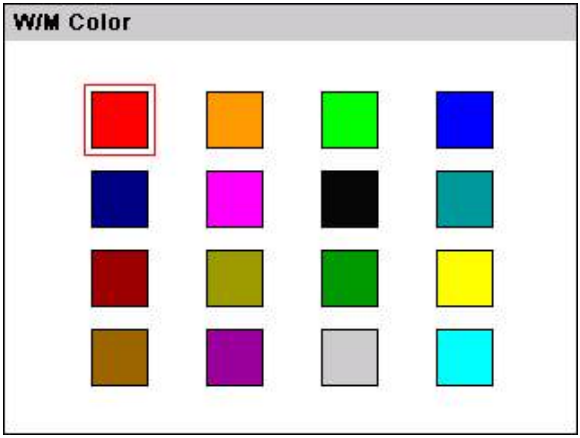
(There are 16 sort of * WPT symbols as picture)



6. WPT color

You can select the color of WPT symbol

(There are 16 sort of * WPT symbols as picture)



7. Navigation

7.1. Previous WPT

It is available to set up a previous WPT in the Present preferred route.

7.2. Next WPT

It is available to set up a next WPT in the Present preferred route.

7.3. Route order

It is available to set up the route forward and reverse in the Present preferred route.

7.4. Navigation Time

Setting up navigation time for TTG or ETA during navigating.

7.5. Goto Type

Setting up goto type for type1 or type2.

8. AIS

8.1. AIS On/Off

Turns the display of AIS targets overlay on the screen On or Off.

(☞ The default setting is On.)

8.2. List of Vessels.

Pressing the [ENTER] key will display a list of current AIS vessels inview. Initially these are sorted by showing the nearest first, additional pages of vessels can be displayed by pressing the [►] arrow key. The vessels Name, MMSI, Range and Bearing are shown.

To sort alphabetically by Name press [MENU]->[MENU], alternate pressing of this button will toggle between A to Z and Z to A order.

To sort numerically by MMSI press [MENU]->[GOTO], alternate pressing of this button will toggle between 0-9 and 9-0 order.

To sort by Range press [MENU]->[PAGE], alternate pressing of this button will toggle between nearest and furthest.

Pressing the [▲] or [▼] arrow keys will move the highlight blue bar over different vessels. Pressing [ENTER] when a vessel is highlighted will display another page showing all the details so far received from this vessel. Details of other vessels in the list can be accessed directly by scrolling through with the [◄] and [►] arrow keys. To return to the main list press the [CANCEL] button.

To GOTO a vessels position directly, scroll through the list to highlight the vessel you wish to go to and press the [GOTO] key. The screen will now return to the main chart display and be centred on the vessel you have selected.

8.3. Display radius

Displays range rings centred on your current position.

(☞ The default setting is OFF.)

8.4. Display vessels by Color

Different types of AIS transmissions can be selected to display different colors of icons on the chart display.

8.5. Display vessels by Type

Different types of AIS transmissions can be selected to display different types of icons on the chart display.

8.6.Filter AIS types

This function allows you to turn on or off reception from different types of AIS transmissions, for instance if you only wanted to view Class B vessels on the chart display then select Class B On and all the others Off.

8.7. Alarm

8.7.1. CPA Alarm

The CPA alarm is the closest approach alarm, this allows you to set a distance when the alarm will sound if a vessel comes within that distance .

(☞The default setting is OFF.)

8.7.2. CPA Radius

The values allowed are from 0.1nm to 10nm.

(☞The default setting is OFF.)

8.7.3. TCPA Alarm

The TCPA alarm is the time that a vessel will take to be in the same position as you currently are.

(☞The default setting is OFF.)

8.7.4. TCPA Limit

The values allowed are from 1 to 50 min.

(☞The default setting is 1 min.)

8.7.5 Radius Alarm

When approaching to the setting range, alarm activates.

8.7.6 Radius

The setting range is between 0.1nm and 10nm.

8.7.7. Ignore Vessels if Speed Less

If you want the alarms to ignore vessels that are travelling at less than a particular speed then switch ON.

8.7.8. Speed Less Than

The values allowed are from 0.1kt to 9.9kt.

8.8. Set up AIS time outs etc.

8.1. Mark vessels as lost after

If repeat transmissions are not received from a vessel after 7 minutes then the target is marked with a “X “.

8.2. Remove lost vessels after

If repeat transmissions are not received from a vessel after 10 minutes then the target is removed from the chart display.

8.3. Vessel target

It is available to setup the own vessel’s AIS target display on the screen.

(☞The default setting is On.)

8.9. Labels on vessels.

This menu controls what details are displayed alongside the vessels icons on the chart display.

8.10. Cursor Box info.

When you move the cursor in chart mode over an AIS target a box appears showing details of that vessel.

8.11. Messages List.

This window displays lists of specific AIS messages, such as Safety Messages that the unit has received. Scrolling down the list and highlighting a message allows you to see the contents by pressing the [ENTER] key. Whilst in the main list pressing the [MENU] key when a message is highlighted will erase that message, pressing the [►] [◄] keys will allow you to view any other pages of messages.

★ AIS SART Messages

If an AIS SART message is received it will immediately be displayed on whatever screen you are viewing. If the “Status” shows “Test” then no further action is required as it is just a test transmission. If the “ Status” shows “Active” it will also show the MMSI, Name and position, the SART icon should now be displayed on your chart screen at that location. Monitor your VHF radio on Channel 16 and establish whether any other station has received this SART message, if not take the appropriate action.

8.12. Fishing net

8.12.1. Fishing net

Display the programmed Fishing net AIS target.

(☞ The default setting is Off.)

8.12.2. Select name

Program the name of Fishing Net

8.12.3. Alarm

The alarm goes off when no Fishing net AIS target is in setting range.

(☞ The default setting is Off.)

8.12.4. Alarm Radius

Setup the Fishing net alarm range.

(☞ The default setting is 0.05nm.)

9.Calendar

It is available to check the solar/moon calendar and tide.

0.Advance

Load the additional advanced menu on the Menu.

Advanced Menu

It is available to load the window of the Advanced Menu on the activated chartplotter display in red box

▶ Press [MENU] -> Advance

1. Map setting

1.1. Map orientation

1.1. True motion

You can select “True motion”

(☞ The default setting is OFF.)

1.2. Up mode

You can select “Map Orientation”

(☞ The default setting is North Up.)

1.2. UserData Display

Setting up shown/hide the user data on the display.

1.3. INFO Display

Setting up shown/hide common item between the HY-MAP and the C-MAP on the display.

1.4. Map scale

Setting up the map scale on the display.

1.5. Palette

It is possible to the palette used to enhance the visibility of the screen depending on the surround light condition. The possible choices are listed in the table below:

1.5.1. Normal

It set the maps are displayed in ordered to use colors as similar as possible to the ones used in the original paper charts.

1.5.2. Sunlight

It is designed to enhance the visibility of the screen when HD-70 series is exposed to the sunlight. The maps are much brighter than in the other displays.

1.5.3. NOAA

Allows setting NOAA paper chart colors presentation.

(*It is available NOAA menu on C_MAP mode.)

1.6. LAT. Modification

Though GPS information is accurate, there could be an error in the chart at latitude. The error can be modified in the chart latitude modification.

1.7. LOT. Modification

Though GPS information is accurate, there could be an error in the chart at longitude. The error can be modified in the chart longitude modification.

1.7. Map

Select the chart among HY-MAP,C-MAP and External map.

1.8-1. HY-Map (*Only for *HY-MAP mode.)

1.8-1. 2M

Setting up 2m of the depth line on the HY-MAP.

1.8-1.2. 5M

Setting up 5m of the depth line on the HY-MAP.

1.8-1.3. 10M

Setting up 10m of the depth line on the HY-MAP.

1.8-1.4. 20M

Setting up 20m of the depth line on the HY-MAP.

1.8-1.5. Fishing Banks

Setting up the Fishing Banks on the HY-MAP.

(☞The default setting is shown.)

1.8-1.6. Land Color

Select the land color as you want.

(☞The default setting is yellow.)

1.8-1.7. Lighthouse Info

Setting up the Lighthouse on the HY-MAP.

(☞The default setting is shown.)

1.8-1.8. EEZ

Setting up the EEZ line on the HY-MAP.

1.8-1.9. Screen Magnification

Setting up the Screen Magnification on the HY-MAP.

(*MAX Magnification [ON = 0.05nm, OFF = 0.2nm])

1.8-2. C-Map (*Only for *C-MAP mode.)

1.8-2. 1. SAT.Image

Setting up the overlay Satellite Image on the C-MAP.

(☞The default setting is shown.)

1.8-2. 2. Font&Symbols

On charts it is possible to set the size of all names and symbols drawn on the charts, selecting between Normal size and Large size.

(☞The default setting is normal.)

1.8-2. 3. Mixing Level

When the map coverage at the current zoom level does not fill the entire screen, the chartplotter draws the rest of the map expanding the cartographic information read from, at most, two zoom levels above the current zoom level. For this reason the map is drawn three times; firstly it draws the two levels before the current level and then the current level. The area covered by the cartographic data read from the previous levels is identified by a dotted pattern. When the cursor is moved area not covered by data of the currents level the chartplotter zooms out to the first level covered by cartographic data. The default setting is ON.

(☞The default setting is on.)

1.8-2. 4. Perspective View

Chart data may be projected in perspective mode during navigation. This function allows setting the panoramic View of the chart.

As the upper side of the map is more compressed than the lower side, a wider map area is visible. The perspective view allows showing more chart information immediately ahead and around the cursor.

(☞The default setting is off.)

1.8-2. 5. Chart Boundaries

Sets ON/OFF the displaying of the chart boundaries, which represents the boundaries of the charts available on the chartplotter. Selecting Auto instead, if we are in background charts only the first chart levels contained in the C-CARD are displayed, if we are in a charts level contained in the C-CARD the next four charts level are displayed.

(☞The default setting is auto.)

1.8-2. 6. Multi Language

Select language for name of the place, lighthouse or buoy.

(☞The default setting is English.)

1.8-2. 7. QuickView

It is available to set up. Place the cursor on buoys or icons on the C-MAP, the information window is shown up automatically.

(☞The default setting is hidden.)

2. Vessel

2.1. Vessel Icon Size

The size of the present position is adjustable from 0 to 9. The biggest size is '0'.

(☞The default setting is 9.)

2.2. Heading Line

The length of the heading line is adjustable from 50 until 300. The bigger number, the longer line. The heading line is used in modes of the true motion and the north up.

(☞The default setting is 270.)

2.3. Vessel Style (Circle/Arrow/Vessel)

Select the vessel symbol among Circle, Arrow and vessel.

(☞ The default setting is circle.)

2.4. Orient. Resolution

Sets you preferred Rolling Road Scale.

(☞The default setting is 0.)

3. Cursor Icon

Select the cursor icon between Cross to Arrow.

(☞The default setting is Cross.)

3. Alarm

3.1. Navigation

3.1. 1. Arrival Alarm:

When you approach into the waypoint range, it gives you a notice with alarm.

(☞The default setting is OFF.)

3.1.2. Arrival Radius:

It is to adjust the range of arrival from your waypoint. If you have a route, it changes to the next waypoint automatically.

(☞The default setting is 0.05nm.)

3.1.3. XTE Alarm:

If you are out of the course, it gives you a notice with alarm.

(☞The default setting is OFF.)

3.1.4. XTE Radius:

It is to adjust the range of the off course.

(☞The default setting is 0.25nm.)

3.2. Anchor

3.2.1. Anchor Alarm:

It is necessary when your vessel anchors.

(☞The default setting is OFF.)

3.2.2. Anchor Radius:

If you vessel is out of the range of the anchor, it gives you notice with alarm.

(☞The default setting is 0.05nm.)

3.3. Interval

3.3.1. Interval Alarm:

It alarms every time you set.

(☞The default setting is OFF.)

3.3.2. Interval Time

The time is available from one minute until sixty minutes.

(☞The default setting is 3 min.)

3.4 User Line

3.4.1. User Line Alarm

It alarms if it breaks into the setting area.

(☞The default setting is OFF.)

3.4.2. User Line Radius

It sets the range of the course alarm.

(☞The default setting is 0.05nm.)

Menu

It is available to load the window of the Menu on the activated Fishfinder display in red box

▶ Press [MENU]

1. Userdata

It is same as Chartplotter. PLS refer the Chartplotter operation manual.

2. Depth Range

Smart7 selects the best condition for measuring the depth automatically in the environment of the sea.

(☞ The default setting is Auto.)

3. Shift

A user selects this function to see more detailed bottom of the sea. When you turn up the shift, the range of Fish finder shall go up from the shift range. For example, if you raise 5m of shift at 20m range, the surface shall start 5m and the bottom range shall be 25m.

(☞ The default setting is 0m.)

4. Mode

Fish finder modes are selectable for single frequency or dual and some functions.

5. Zoom Range

Select the range of the bottom zoom or lock. It is necessary to modify the bottom.

(☞ The default setting is 10m.)

6. Fish symbol

Fish symbol with sizes and levels show for targets.

(*Fish symbol is only for reference. This could be different from the real.)

7. Fish size

Setup to display of the size of fish.

(☞ The default setting is Off.)

8. Interference Rejection (from engine)

When there are another boats around you on sailing, your Fish finder could be disturbed to work. The step of the function is from off to level 2. The bigger number, the more rejection.

(☞ The default setting is OFF.)

9. Noise Rejection

Your Fish finder could be disturbed by the engine noise. This function can reject the noise from the engine or other machinery instruments.

(☞ The default setting is OFF.)

10. Calendar

It is available to check the solar/moon calendar and tide.

11. Advance

Load the additional advanced menu on the Menu.

Advanced Menu

It is available to load the window of the Advanced Menu on the activated Fishfinder display in red box

▶ Press [MENU] -> Advance

1. Display

1.1. A-scope

A-scope shows the research under the water by a scope to see the environment under the water.

(☞The default setting is OFF.)

1.2. Image Speed:

Select the speed of Fish finder image from 4X until 1/32X.

(☞The default setting is 1X.)

1.3. White Line

It is necessary to research a detailed fish on the bottom or a seaweed under the sea. The color of the bottom changes into white or black to see the bottom easier than red.

(☞The default setting is OFF.)

1.4.Depth

On/Off the depth range on the screen.

(☞The default setting is ON.)

1.5.Depth Font

Select the depth range font size on the screen.

(☞The default setting is Large.)

1.6.TEMP

On/Off the temperature on the screen.

(☞The default setting is OFF.)

1.7.TEMP Font

Select the temperature font size on the screen.

(☞The default setting is Large.)

1.8. Frequency Display

It is available to setup the place of high/low frequency on dual display.

(☞ The default setting is 50KHz/200KHz.)

2. Color

2.1. Color Level

This function adjusts the colors. Make it upper level, the color becomes darker.

(☞The default setting is OFF.)

2.2. Color Rejection

There are 16 color levels for Fish finder. The color bar is on the left of the Fish finder. If the level is higher, the color of the bar is deleted one by one.

2.3. Screen Color

Select he back ground color of the Fish finder for your convenience.

3. Pulse

Select the pulse of the output from the transducer. Levels are among Low, Medium and High, which depends upon the depth. Low is proper to research precise a fish school but it is not suitable to measure a deep depth. High is opposite from Low.

(☞The default setting is Medium.)

4. Output Power

Select the output from the installed transducer. Levels are from off to 3. It should be careful about the depth. If you set high level in a sallow depth, the Fish finder screen turns to red. You see nothing expect red on the screen.

(☞The default setting is 3.)

5. Alarm

5.1. Depth

It alarms when the set depth is out of the range.

(☞The default setting is OFF.)

5.2. TEMP

Position of the temperature is 4. It will alarm when it is out of the set range.

5.3. Fish-school

5.3.1. F.S.

It alrams when it detects school of fish.

It will detect school of fish depend on set depth, range and level of the Fish finder.

(☞The default setting is OFF.)

5.3.2. F.S. depth

If the alram is on, It is available to setup the depth of the Fish-school

(☞The default setting is 10m.)

5.3.3. F.S. Range

If the the alram is on, It is available to setup the Range(hight) of the Fish-school.(The bar, next of display is shown)

(☞The default setting is 50m.)

5.3.4. Alarm interval

If the the alram is on, It is available to setup the alarm interavl.

(☞The default setting is middle)

5.3.5. Color level

If the the alram is on, It is available to setup the color level.

It is available to setup the color level

6. Water Temp

The error of water temp value can be corrected.

(setting:-10.0 ~ 10.0℃,-10 ~ 10°F)

(☞The default setting is 0.)

7. Image Filtering

This function is reduction of the noise.

(☞ The default setting is OFF.)

8. Speed Source

Switch the Sensor/NMEA.

- InsideSensor: Use the built-in speed meter for sensor.
- NMEA: Use the external input value for NMEA.

(☞The default setting is NEMA.)

General

1.GPS

It is available to control and confirm information in GPS receiver.

1.1. Coordinate System

It sets coordinate system of GPS or Loran.

(☞The default setting is GPS.)

1.2. Datum

It shows GPS Datum. WGS-84, which is the worldwide standard is only available.

(☞ The default setting is WGS-84.)

1.3. LAT. Modification

There could be a receiving signal error from satellites. If it is on the latitude, modify in the latitude modification.

1.4. LOT. Modification

There could be a receiving signal error from satellites. If it is on the longitude, modify in the longitude modification.

1.5. POG filter

Step 1(OFF)~59(MAX) the POG Filter. When it is On(over step 1), you can filter the POG of the vessel, to optimize it.

(☞The default setting is incorrect every the country.)

1.6. COG filter

Step 1(OFF)~119(MAX) the COG Filter. When it is On(over step 1), you can filter the COG of the vessel, to optimize it.

(☞ The default setting is incorrect every the country.)

1.7. SOG filter

Step 1(OFF)~119(MAX) the SOG Filter. When it is On(over step 1), you can filter the SOG of the vessel, to optimize it.

(☞ The default setting is incorrect every the country.)

1.8. LAT/LON Unit

It is to select the number of the unit for Lat/Lon.

(☞ The default setting is 4 unit.)

1.9. Receiving Port

It is to select Inter receiver Internal, External and AIS.

(☞ The default setting is Internal.)

2.Setup

It is available to set the menu or units for user's visual confidence.

2.1. Unit

2.1.1. DIST/Speed

Select desired unit of measure for distance and speed. Choose from: nautical mile/knots (nm/kt), kilometer/kilometers per hour(km/kmh), yard/knot(yd/kt).

cf) 1nm = 1.852km, 1kt /h= 1.852km/h, less than 1nm display in yard and over 1nm display in mile

(☞The default setting is Nm/Kt.)

2.1.2. Depth

Select desired unit of measure for depth of water. Choose from: meter(M), foot(ft), fathom(fm), Italian Fathom(Ifm), Japanese fathom(Jfm).

cf) 1m = 3.281ft = 0.549fm = 0.609Ifm = 0.660jfm

(☞The default setting is Meter.)

2.1.3. TEMP

Select desired unit of measure for temperature of water. Choose from Celsius(℃), Fahrenheit(°F).

cf) 1℃ = +32°F

2.2. Compass

2.2.1. BRG

There is a difference degree where you are in the earth. This function is to modify the error from true and Magnetic.

(☞The default setting is Auto.)

2.2.2. Variation

There could be a difference between the magnetic compass and the GPS compass. An error depends upon your area.

2.3. Time&Date

2.3.1. Reference

Available to adjust the collect local time by the UTC time from the GPS.

(☞The default setting is incorrect every the country.)

2.3.2. Time Format

Sets you preferred time between 12 hour or 24 hour.

(☞The default setting is 12 hour.)

2.3.3. Date Format

Sets you preferred date among YY-MM-DD, MM-DD-YY or DD-MM-YY.

(☞The default setting is YY-MM-DD.)

2.3.4. Month format

Sets you preferred date between Character or Number.

2.3.5. Calendar setup

2.3.5.1. Week starts on

You can select the first day of week.

(☞ The default setting is SUN.)

2.3.5.2. Color Saturday

You can setup the color of Saturday.

2.3.5.3. Color Sunday

You can setup the color of Sunday.

2.4 Input/Output

2.4.1. Output Sentences

The chartplotter allows customizing the NMEA-0183 sentence.

DESCRIPTIONS	CONTENTS OF DATA FIELD	DEFAULT
$GPGGA	Global Positioning System Fix Data	ON
$GPVTG	Course and Ground Speed	ON
$GPZDA	Time and Date	OFF
$GPRMB	Recommended minimum navigation information	OFF
$GPRMC	Recommended Minimum Specific GPS/TRANSIT DATA	OFF
$GPAPB	Heading/track controller (Autopilot) sentence B	ON
$GPXTE	Cross-track error, measured	OFF
$GPBOD	Bearing, origin to destination	OFF
$GPBWC	Bearing and distance to waypoint	ON
$SYPLT	Samyoung autopilot	OFF

2.4.2. Transmit

Available to adjust transmit speed of input/output in each ports.

2.4.3. Buzzer

It is can be buzzer on/off.

(☞The default setting is on.)

2.4.4. Backlight time out

It is the screen sets the time to sleep mode.

(☞The default setting is off.)

2.4.5. Customizing

2.4.5.1. Databar

2.4.5.1.1. Display

Setting up shown/hide the databar on the display.

(☞ The default setting is Shown.)

2.4.5.1.2. Position

Setting up up/down the position of databar on the display.

(☞ The default setting is Down.)

2.4.5.1.3. Edit

It customizes the data bar information.

2.4.5.1.4 Mode

It is available to set up the data bar.

- Customizing : It is selectable and modifiable the data bar by user.
- Fix mode : It is fixed data bar by default. It is not available selectable and modifiable the data bar by user.

(☞ The default is User mode.)

2.4.5.2. Navigation Data

2.4.5.2.1. Type

It is a select the navigation data type.

(☞ The default setting is Type1.)

2.4.5.2.2. Edit

It customizes the Navigation data section except activated the echo sounder section.

2.4.5.3. Page mode

It is a select the page mode.

- Standard: Choosing Page and customizing is available.
- Flip: Showing the chosen pages in order.

(☞ The default setting is Standard.)

2.4.6. TD Setup

It sets Chain, Pair, ASF

3. Maintenance

It is necessary to check the system or the version for maintenance and demonstrate HD-70 series with the simulators

3.1. Program VER.

It contains ID and the program version, and it has important information for maintenance and upgrade.

3.2. OS VER.

It contains the version of OS, which is necessary for maintenance and upgrade

3.3. MAP VER.

It contains the version of the chart, the datum and the number, which is necessary for maintenance and upgrade

3.4. Simulator

It is necessary for an indoor demonstration. The simulations of GPS, Fish finder or AIS.in the memory..

3.5. Language

Select the language.

3.6. Initialization

3.6.1. Setup Initialization

reset without deleting user data.

3.6.1. Factory Initialization

returning to the initial system from the releasing of factory. (*All user data will be deleted)

4. Others

4.1. Recording

This is the function of recording current screen.

Marked [● REC] in red color on the upper right on the data bar during recording.

Note: The recording file is stored in SD card.

(*The storage location is “E9\Recording\” in SD card).

(* Recording time is different by the size of the memory card)

4.2. Recording List

Available to display and delete the recording file

4.3. Screen capture

This is the function of save the current screen

Note: The capture file is stored in external SD card.

(*The storage location is “E9\Capture\” in SD card).

(* Recording time is different by the size of the memory card)

4.4. Capture List

Available to display and delete the capture file

HY-MAP Icon

Icon	Description	Icon	Description
	Anchor berths		Beacon with color and topmark
	No Anchoring Area		Position of fog signal
	Pilot boarding place		Radar reflector
	Wreck showing any part of hull or superstructure at the level of Chart Datum.		Wreck, in over 200m or depth unknown, which is not considered dangerous to surface navigation
	Marine farm		Lighthouse
	Wreck, depth unknown, which is considered dangerous to surface navigation		Military restricted area into which entry is prohibited
	Radar transponder beacons		Yacht harbor, Marina
	Fishing prohibited		Lighted offshore platform
	Conical buoy, nun buoy, ogival buoy		Oil tanks
	Can buoy, cylindrical buoy		Wrecks
	Spherical buoy		Lights

	Pillar buoy		Barrel buoy, tun buoy
	Spar buoy, spindle buoy		Superbuoy. Superbuoys are very large buoys
	Tides		Port information(

Installation

HD-70 SERIES brings expandable display technology to your bridge or navigation station. A careful installation will assure maximum benefit from HD-70 SERIES integrated features.

Display Unit Location

Select a location for your HD-70 SERIES display unit that provides easy viewing from all likely operator's positions. The display unit is designed to be mounted on either a console or from an overhead surface. The HD-70 SERIES display is also designed for flush mounting using six threaded holes on the rear panel. Locate the display in an area with protection from the elements and avoid direct sunlight on the viewing window. Also, consider access to the rear panel of the unit for connecting power and cables to the various remote sensors. The mounting surface must be flat and solid to support the unit and prevent vibration. There should be access to the inside of the surface to permit through bolt fastening for the mounting bracket.

Display Unit Installation

Temporarily install the mounting bracket on the Genesis display unit and place the unit at the selected location.

CAUTION

The HD-70 SERIES display unit is unstable when the mounting bracket is not secured. Hold the unit in place at all times.

Check the suitability of the location and make any adjustments. When all is satisfactory, use the holes in the mounting bracket as a guide and mark the holes locations on the mounting surface.

II Installation

Drill a 1/4 in. diameter hole at each marked location. Mount the HD-70 SERIES display bracket using bolts through the mounting surface. Place large flat washers on the opposite side of the mounting surface from the bracket and then install lock washers and nuts. Tighten securely.

Install the display unit into the mounting bracket. Check alignment and operation of the pivots and security of the mounting. Make any adjustments necessary to prevent binding and assure even meshing of the pivot locking washers. It is advised to remove the display unit and store it in a safe place to prevent damage during the rest of the installation process.

- Power Connection

Power is supplied to the HD-70 SERIES Charting System through a connector on the rear panel of the display unit.

Route the power cable from the HD-70 SERIES location to the ship's power distribution panel.

Connect the black wire to a battery negative (-) terminal of the power panel.

Connect the white wire to a fused battery positive (+) terminal of the power panel (12 to 24 Vdc nominal). If a fused terminal is not available, install an in-line fuse holder.

- Care and Cleaning

HD-70 series is made to withstand marine elements but a little care ensures a trouble free life. Accumulations of salt and sand, if not removed, will eventually mar the finish. No solvents or harsh cleaners should be used. The display unit may be wiped down with a damp cloth while avoiding the display window. Be careful not to scratch the display window surface. Gently remove any sand or other grit particles before cleaning the display window. The display window should be cleaned only with water and a clean soft cloth using very light pressure.

Reference

- NMEA

A standard developed by the National Marine Electronics Association and used by most marine equipment manufacturers for data communication is known as NMEA 0183 version 1.5 and version 2.0. NMEA0183 specifications offer many recognized sentences for exchanging data between many types of marine equipment.

The following technical information is provided for reference and is accurate to the best of our knowledge at the time of printing. Please refer to the appropriate NMEA specifications for details and the latest information.

The data sentences used by the HGP-660 are as follows.

Output sentences:

Descriptions	Contents of data field
$GPGGA	Global Positioning System Fix Data
$GPGLL	Geographic Position, Latitude/Longitude
$GPGSA	GPS DOP and active satellites
$GPGSV	GPS Satellites in View
$GPVTG	Course and Ground Speed
$GPZDA	Time & Date
$GPRMC	Recommended Minimum Specific GPS/TRANSIT DATA
$GPAPB	Heading/track controller (Autopilot) sentence B
$GPXTE	Cross-track error, measured
$GPBOD	Bearing, origin to destination
$GPRMB	Recommended minimum navigation information

GPS

For centuries, sailors have een searching for a reliable and precise method of travelling the world's waterways. From celestial navigating to the modern navigation techniques as Loran, Decca navigator, Omega or Transit Satnav, each system has had its problems with weather, range and reliability. Without doubt, the "Global Positioning System", or GPS for short, is the most significant advance in navigation: it fives the navigator a position 24 hours a day, 365 days a year in any weather condition. GPS is a satellite based navigation system which provides suitably equipped users with accurat e position, velocity and time data. Originally the GPS, developed by the U.S. Department of Def ense, was conceived for military purposes, but now it is used in a host of civilian applications. GPS navigation uses satellite signals to determine your position in relation to a set of satellite o rbiting the earth. The GPS constellation of satellites continuously send radio signals, containing the precise position for each satellite back to earth. By knowing the position of 3 or 4 satellites and calculating various time differences between transmitted signals, the GPS receiver can det ermine its present position anywhere on earth, and thanks to continuous updates, calculate spe ed and course information.

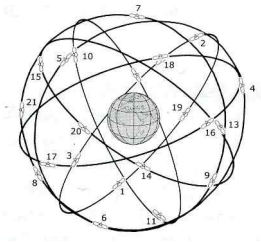
GPS

HOW GPS WORKS

Currently, the GPS constellation consists of 26 orbiting satellites (including 3 spares), but this number will increase in the future.

The GPS receiver computes an accurate position by calculating the distance to the GPS satellites that orbit the earth. Signals are required from 3 satellites for two dimensional (2D) position calculation whilst 4 satellites are required for three dimensional (3D) position calculation.

As mentioned earlier, GPS satellites are not geostationary, but they are orbiting the earth as illustrated on the following figure:



[The GPS constellation]

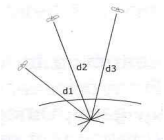
Note that position is repeatedly fixed through the following three steps while any 3 satellites are in line of sight.

The position calculation procedure is indicated in the following three steps:

1. GPS satellites continuously transmit their own precise orbital data and the GPS receiver computes their locations by receiving this data.

2. In this receiving process, the GPS receiver measures very accurate distances to the satellites, using the "Spread Spectrum Modulation" method. Excellence in GPS's position-fixing accuracy is mainly due to this technology.

3. When the satellite locations and their distances are known, the GPS receiver fixes its own position by triangulation:



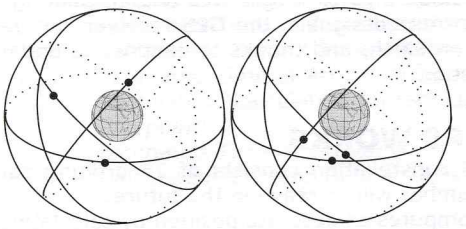
[The GPS position calculation]

As illustrated in the previous figure, the position is calculated as the meeting point of three spheres which are drawn around the three satellites with diameters d1, d2 and d3.

Position Fixing Accuracy: HDOP

The GPS fix accuracy is due to the locations of 3 satellites in the sky. High accuracy is obtain able when the satellites are widely scattered in the sky; on the

contrary, accuracy is reduced when the satellites have gathered in a narrow space. In the follow ing figure, in both cases it is possible to obtain the GPS fix, but in the left case the accuracy will be higher than the right:



[HDOP]

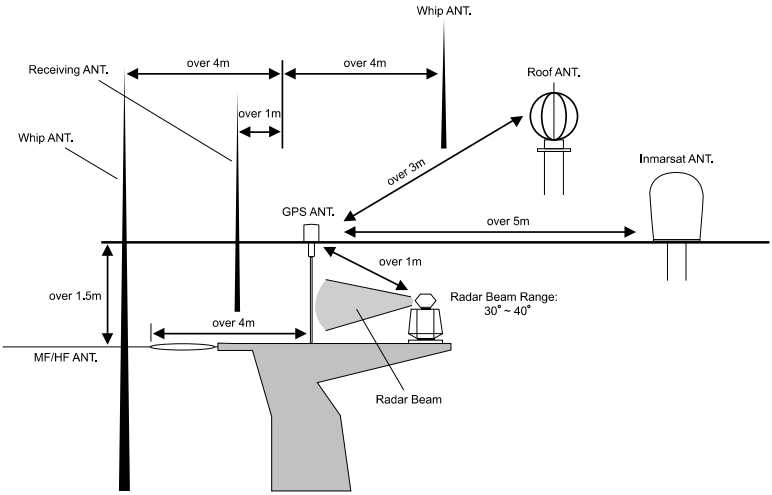
The index for position-fixing accuracy is called HDOP (*"Horizontal Dilution Of Precision"*). T he smaller the HDop value, the more accurately the position can be fixed.

II GPS

The installation of the GPS ANT.

The GPS ANT must be installed at the highest area of the boat and the easiest place to catch the signal from the satellites. If there are obstacles around the GPS ANT, it isn't able to catch all signals. The receiving time would be longer or the receiving power would be weaker. Please, follow the instruction for your installation.

1. Keep from a metal.
2. Over 4m away from a MF/HF ANT, VHF or HF whip ANT.
3. Over 1.5m upper away from MF/HF ANT.
4. Over 1m away from a receiving ANT.
5. Don't put the GPS ANT into the range of radar's beam. (Range: 30° ~ 40°)
6. Over 1m away from the scanner of the radar.
7. Over 5m away from the ANT of the inmarsat.
8. Over 3m away form the ANT of the roof.
9. Over 2m away from the engine.
10. Over 0.5m away from the metal surface.



※Warning: Not less than 0.5m away from the metal surface.

If the environment can't be satisfied from 1 to 10, have NO. 10 satisfied and consider the others.

II Installation

Display unit brings expandable display technology to your bridge or navigation station. A careful installation will assure maximum benefit from Display unit integrated features.

Display Unit Location

Select a location for your Display unit that provides easy viewing from all likely operator's positions. The display unit is designed to be mounted on either a console or from an overhead surface. The Display unit is also designed for flush mounting using six threaded holes on the rear panel. Locate the display in an area with protection from the elements and avoid direct sunlight on the viewing window. Also, consider access to the rear panel of the unit for connecting power and cables to the various remote sensors. The mounting surface must be flat and solid to support the unit and prevent vibration. There should be access to the inside of the surface to permit through bolt fastening for the mounting bracket.

Display Unit Installation

Temporarily install the mounting bracket on the Genesis display unit and place the unit at the selected location.

⚠ CAUTION

The Display unit is unstable when the mounting bracket is not secured. Hold the unit in place at all times.

Check the suitability of the location and make any adjustments. When all is satisfactory, use the holes in the mounting bracket as a guide and mark the holes locations on the mounting surface.

Installation

Drill a 1/4 in. diameter hole at each marked location. Mount the Display unit bracket using bolts through the mounting surface. Place large flat washers on the opposite side of the mounting surface from the bracket and then install lock washers and nuts. Tighten securely.

Install the display unit into the mounting bracket. Check alignment and operation of the pivots and security of the mounting. Make any adjustments necessary to prevent binding and assure even meshing of the pivot locking washers. It is advised to remove the display unit and store it in a safe place to prevent damage during the rest of the installation process.

Power Connection

Power is supplied to the Fishfinder Unit through a connector on the rear panel of the display unit.
Route the power cable from the Fishfinder Unit location to the ship's power distribution panel.
Connect the black wire to a battery negative (-) terminal of the power panel.
Connect the white wire to a fused battery positive (+) terminal of the power panel (12 to 24 Vdc nominal). If a fused terminal is not available, install an in-line fuse holder.

Sensor Connection

There are many sensors and transducers available which may be used to expand the capabilities of the Fishfinder Unit. Connectors for these accessories are provided on the rear panel of the Fishfinder Unit. For most sensors, only data and control connections are routed to the Fishfinder Unit.

Installation

An input designation means, in put to Fishfinder unit and an output designation means, output from HD-70 SERIES. Sensors will have similar designations, but from the sensors point of view. Therefore, a sensor output will connect to an HD-70 SERIES input and a sensor input will connect to an Fishfinder unit output.

Transducer Installation

If you have chosen a Sonar option for your Fishfinder a transducer must be installed on your vessel unless an exiting compatible transducer is installed. The installation of sonar transducers require some planning and skill to achieve the best result. It is strongly advised hat you read the installation instructions completely before starting. The two basic types of transducers are transom mount and through-hull mount. There are variations within each type to provide for options such as temperature sensors, speed sensors and for different beam angels and sonar frequencies. Several different transducers may be used with the HD-70 SERIES. Refer to the optional Equipment list for the variations available.

⚠ CAUTION

Mounting a sonar transducer for your HD-70 SERIES Sonar requires drilling holes into the hull of your boat which could affect its water integrity. Therefore, installation should be attempted only by qualified individuals. If you have any doubt about your ability to complete the process successfully, we recommend you obtain the services of a HAIYANG dealer or marine service center with knowledge and experience in transducer installation .

Since your HD-70 SERIES Sonar performance depends upon how well the transducer is installed, please carefully observe the following mounting procedures.

For proper performance, the transducer's mounting location must be chosen carefully. The transducer must be mounted in a location that is free from turbulence and air bubbles created by movement of the boat through water. Air bubbles greatly reduce the efficiency of the transducer. It is also strongly

recommended, for transom mounted transducers, the transducer be mounted in an area with the least amount of disturbed water passing under the transom. To determine the best mounting location, operate the boat at several different speeds and observe the water as it passes under the transom. Turbulence caused by the trim tabs, motor mounting, the keel, and lifting strakes.

Transom Mounting

Transducers designed for transom mounting give good performance when installed on most boat types, however, the transom transducer style should not be used on boats with inboard engines.

For boats with poor water flow under the transom or on in-boards, consider selecting a through-hull transducer. HAIYANG offers many styles of transducers.

Determine the transducer mounting place by referring to the steps mentioned above. For best result, the transducer face should be level. Also, the transducer face should be mounted from flush to 1/4 inch below the under surface of the hull. The trailing edge of the housing should be about 1/8 inch below the leading edge. The adjustable stainless steel bracket is designed to allow fine tuning of the transducer position once the installation is completed.

Route the transducer cable as far as possible away from the boat's power cables, engine controls and other electrical cables. Do not route transducer cables near your VHF radio power or antenna cables.

Assemble the transducer using the brackets and hardware supplied. Actual fastening to the hull of your boat depends upon the hull construction and hull material. If additional items must be used, be sure to obtain marine stainless steel hardware. Also, be sure to use marine waterproof sealant on all through hull fastenings. Do not use silicone RTV, since it does not have long life underwater.

Transom Transducer Maintenance

If your boat is kept in the water, sea growth can quickly accumulate on the face of the transducer. In just two weeks in some locations, your Sonar performance could be affected. It is recommended that at least the face of the transducer be coated with special transducer antifouling paint. Alternatively, the entire transducer can be painted and is easier to keep clean. **Do not use regular antifouling paint**.

Installation

All copper base antifouling paints are unsatisfactory and will prevent normal operation. If fouling does occur, use a stiff brush or putty knife to remove growth. Be careful not to gouge the face of the Transducer. Occasional wet sanding of the transducer face is permissible with #220 grit or finer wet or dry paper.

Do not use solvents to clean your transducer. The high impact polycarbonate housing is very durable but solvents will destroy it. Keep acetone, MEK, lacquer thinner and most other thinner/solvents away from your transducer.

Through-hull Transducers

Through-hull transducers are recommended for in-boards and other vessels with disturbed water flow under the transom. HAIYANG offers several models of bronze through-hull transducers. To enjoy the full capability of your Sonar, select a dual frequency model with temperature sensor. Sturdy bronze construction assures a secure installation and provides a strong base for fairing blocks, if needed, to compensate for hull shape.

The transducer should be installed in a location free of bubbles and away from disturbed water flow. Smooth water flow around the transducer and along its surface is very important for consistent operation.

Areas in the center third of water line length at cruising speed are usually satisfactory.

Locations forward of the engine and in a flat area near the center line of the boat are preferred. Do not install the transducer behind water intakes, other through-hull fittings or irregularities in the hull.

Dead-rise

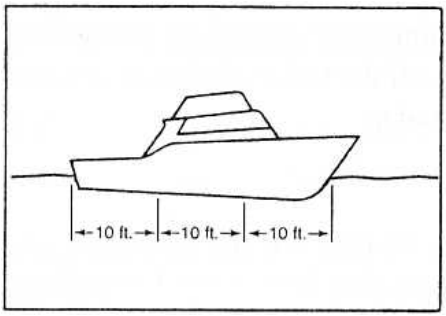
On hulls with dead-rise of 5 or less, the transducer may be mounted directly through the hull. Where dead-rise is greater than 5, fairing blocks must be used to orient the face of the transducer parallel with the water surface.

In this case, no fairing block is necessary. To prevent leakage, any gaps between the stem threads and holes drilled in the hull should be completely filled with waterproof marine sealant.

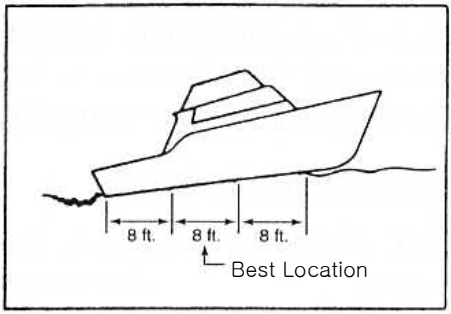
Installation

Tighten the stem nuts securely but do not over tighten. In this situation, install fairing blocks both inside and outside the hull. Install the transducer with the face aiming straight down. To prevent leakage, any gaps between the stem threads and holes drilled in the hull should be completely filled with waterproof marine

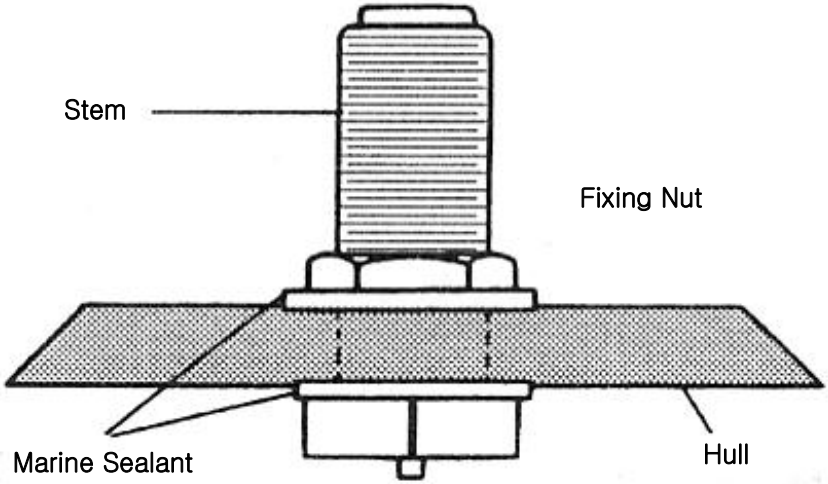
sealant. Tighten the stem nuts securely but do not over tighten.



Water Line Drifting



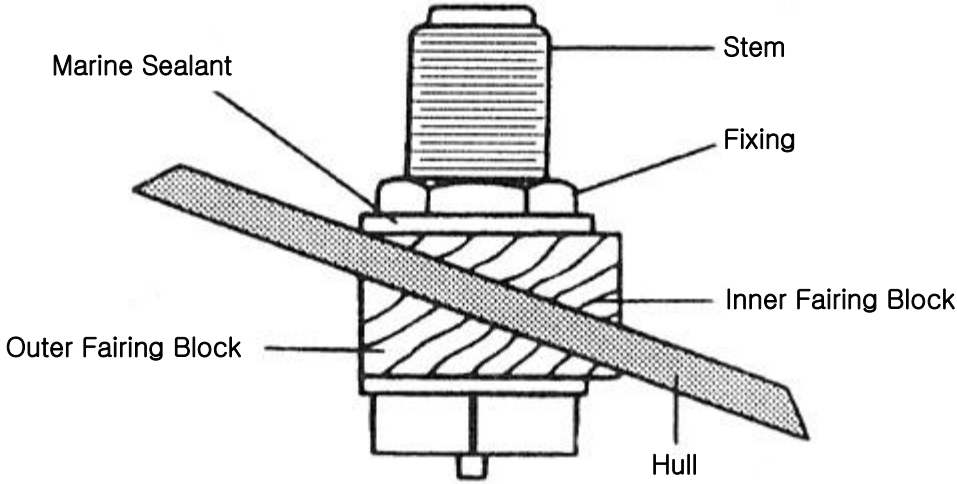
Water Line Cruising

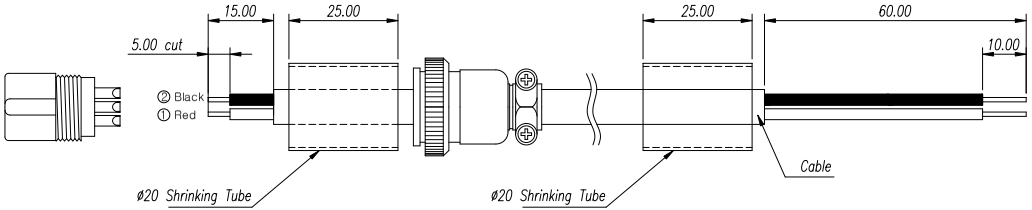


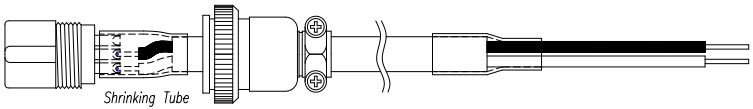
Installation

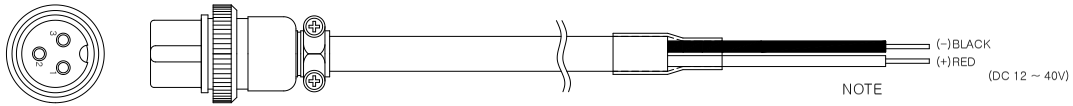
Through-hull Transducer Maintenance

If your boat is kept in the water, performance of your HD-70 SERIES Sonar will be adversely affected by accumulations of sea growth on the face of the transducer. To prevent sea growth effects, the face of the transducer may be coated with antifouling paint specially formulated for transducers. Do not use regular antifouling paint on the face of the transducer. The bronze housing may be coated with any antifouling paint. If fairing blocks are used, especially if made of wood, complete sealing prior to painting is important.



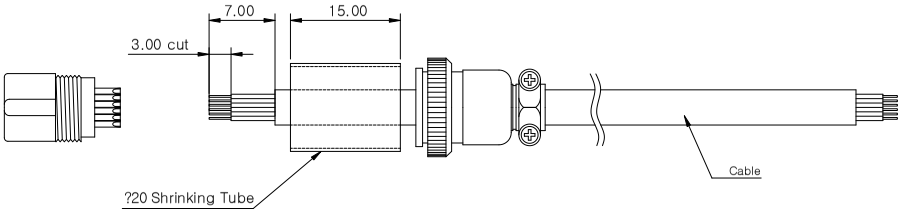


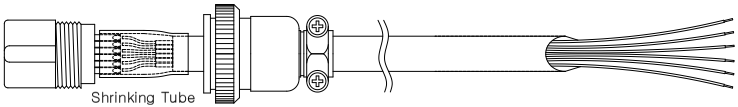




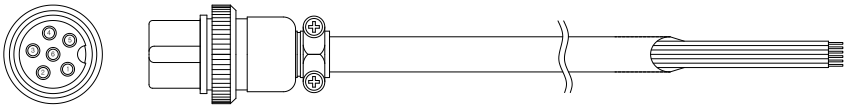
16-03P
To HD-70 series (J1)

	MATERIAL ---				DESCRIPTION Power Cable
SCALE NONE	MODEL HD-70 Series				DWG. NO. S7-DC10303M
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	HAIYANG OLIX CO.,LTD
Y.S.KIM	Y.S.KIM	Y.S.KIM	Y.S.KIM	05.07.2012	



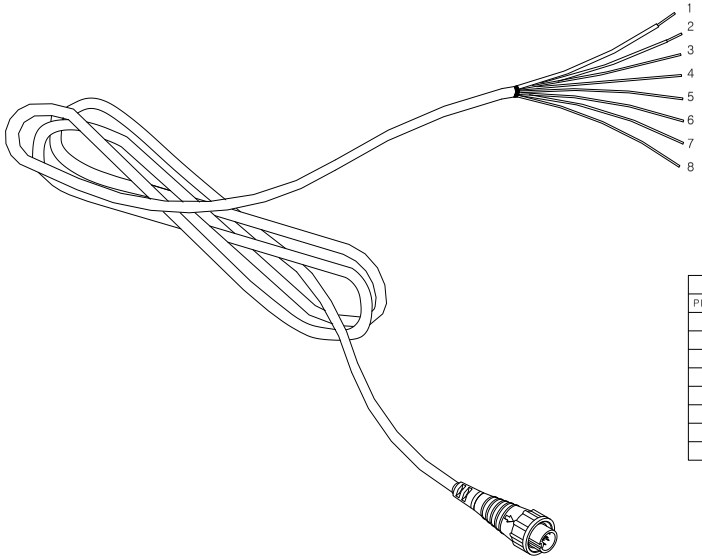


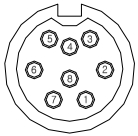
Data Cable	
PIN #	FUNCTION
1	GND
2	TX+
3	GND
4	RX+
5	RX-
6	NC



16-06P
To HD-70 series (J2/J3)

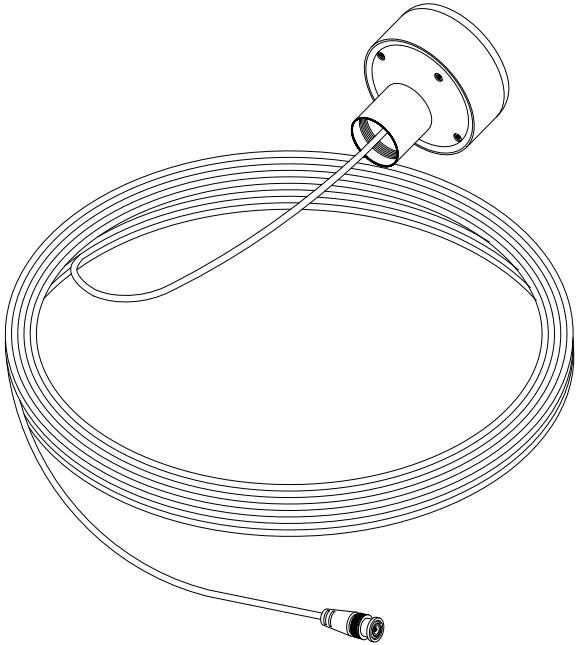
	MATERIAL ---				DESCRIPTION Data Cable
SCALE NONE	MODEL HD-70 Series/HFF-650				DWG. NO. S7-DC10103M
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	HAIYANO OLIX CO.,LTD
Y.S.KIM	Y.S.KIM	Y.S.KIM	Y.S.KIM	05.07.2012	

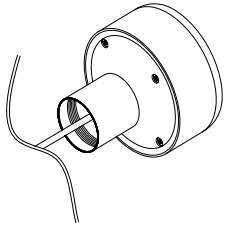




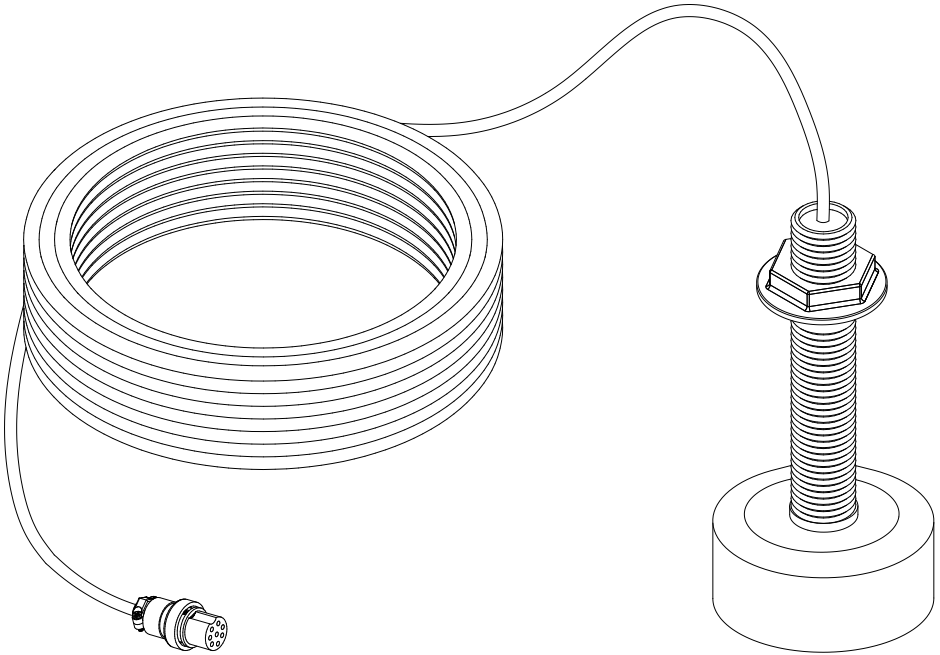
Power Calbe		
PIN #	WIRE COLOR	FUNCTION
1	BLACK	GND/COMMON
2	RED	PWR+(12~36)
3	WHITE	INPUT 1
4	GREEN	NC
5	GRAY	OUTPUT 2 (AIS)
6	YELLOW	OUTPUT 1
7	BROWN	INPUT 2 (AIS)
8	BLUE	GND

	MATERIAL ---				DESCRIPTION Power Cable & I/O
SCALE 1/2	MODEL HD-70 Series				DWG. NO. S7-DC10301P
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	
Kim Y.S.	Kim Y.S.	Kim Y.S.	Park D.J.	2012.05.07	HAIYANG OLIX CO.,LTD





	MATERIAL ---				DESCRIPTION GPS ANT
SCALE 1/1	MODEL HD-70 series				DWG. NO. S7-PA90101
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	
KIM Y.S	KIM Y.S	KIM Y.S	D.J.PARK	2012.05.07	HAIYANG OLIX CO.,LTD

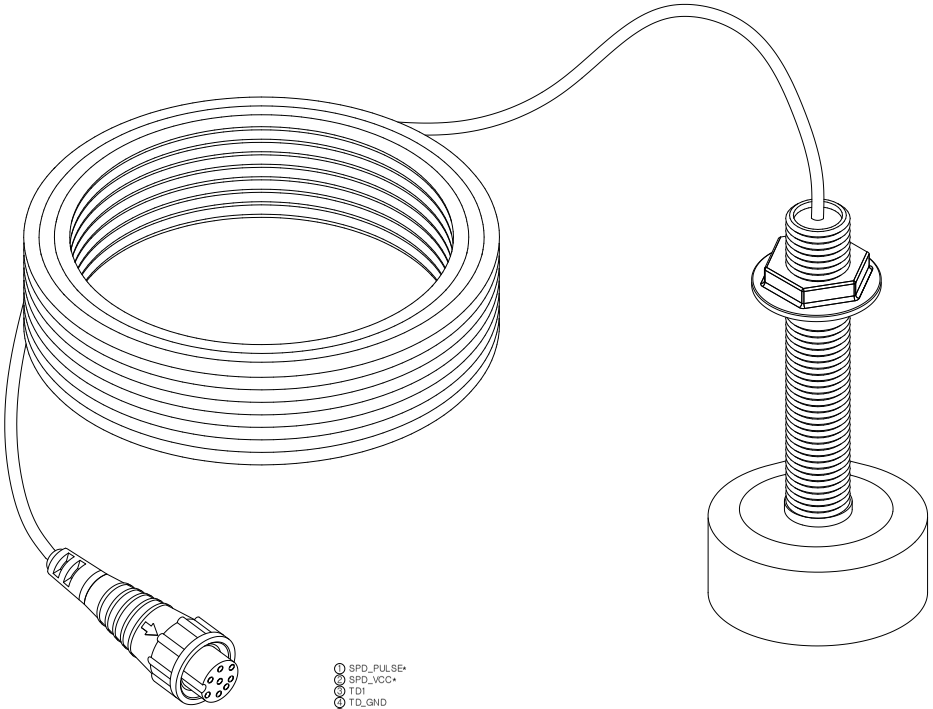


① SPD_PULSE*
② SPD_VCC*
③ TD1
④ TD_GND
⑤ TD2
⑥ TEMP_VCC
⑦ TEMP_SIG*
⑧ SPD_GND*

'*' mark: option

To SMART7 TD Connector

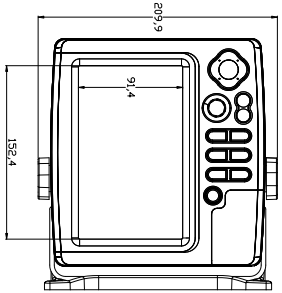
	MATERIAL ---				DESCRIPTION Transduser
SCALE NONE	MODEL SMART7				DWG. NO. S7-TD90201M
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	
Kim Y.S.	Kim Y.S.	Kim Y.S.	Park D.J.	2013.04.08	HAIYANG OLIX CO.,LTD



1 SPD_PULSE*
2 SPD_VCC*
3 TD1
4 TD_GND
5 TD2
6 TEMP_VCC
7 TEMP_SIG
8 SPD_GND*
'*' mark: option

To SMART7 TD Connector

	MATERIAL ---				DESCRIPTION Transduser
SCALE NONE	MODEL SMART7				DWG. NO. S7-TD90201P
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	KAIYANO OLIX CO.,LTD
Kim Y.S.	Kim Y.S.	Kim Y.S.	Park D.J.	2013.04.08	



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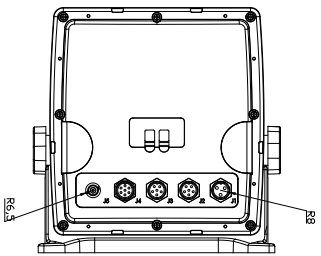

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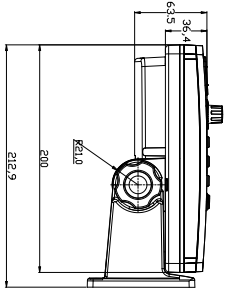

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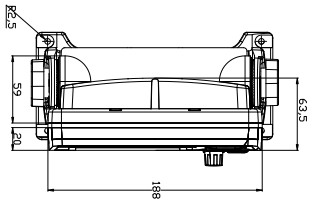
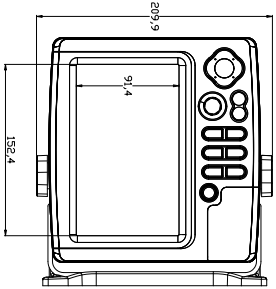


<TOP>

	MATERIAL ---				DESCRIPTION PLAN & DIMENSIONS
SCALE NS	MODEL HD-70C METAL				DWG. NO. S7-PL00DM
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	HAIYANG OLIX CO.,LTD
Kim Y.S.	Kim Y.S.	Kim Y.S.	Park D.J.	2012.02.16	



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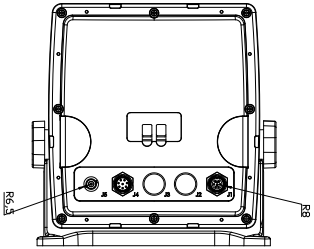

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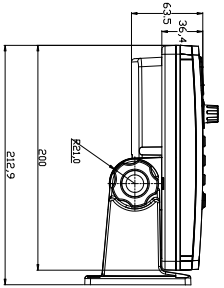

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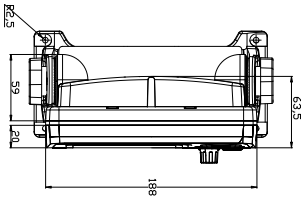

<TOP>

	MATERIAL ---				DESCRIPTION PLAN & DIMENSIONS
SCALE NS	MODEL HD-70 Series				DWG. NO. S7-PL00DP
PER'N	CHK. BY	DES. BY	DRA. BY	DATE	
Kim Y.S.	Kim Y.S.	Kim Y.S.	Park D.J.	2012.02.16	HAIYANG OLIX CO.,LTD

Declaration of Warranty

Declares of under his sole responsibility that the produced Plotter with Fish Finder manufactured by

HAIYANG OLIX Co., LTD.

103-903 BucheonTechnopark 364 Samcheongdong

Ojeonggu Bucheon Gyeonggi, Korea

TEL +82 2 3240381 FAX +82 32 327 4713

Web-site: http://www.haiyang.co.kr

Guarantee for One Year

Haiyang Electronic Equipment Co., LTD warrants the produced equipment, Equipment for One (1) year for guarantee as bellows.

1. Main Unit: One (1) year guarantee after a user purchases the product within one (1) year

2. Accessories: One (1) year for consumed accessories (including TD) after a user purchases them.

Service in Charge

1. Over the term from the guarantee

2. Damage from user's carelessness (inundation, impact)

3. Intentional dismantle, modification or remodeling of the unit.

4. Unauthorized parts, components or accessories are used in the unit.

5. Installed or maintained by unauthorized person

6. Consumed parts and components (batteries, LCD, etc) run out.

7. Faults or damages from other reasons.

Model	HIS -70A	Serial No.	
Date of Purchase		Customer Name	
Name of Dealer		Price	

※Caution – Keep this warranty card with the receipt for fast and good service