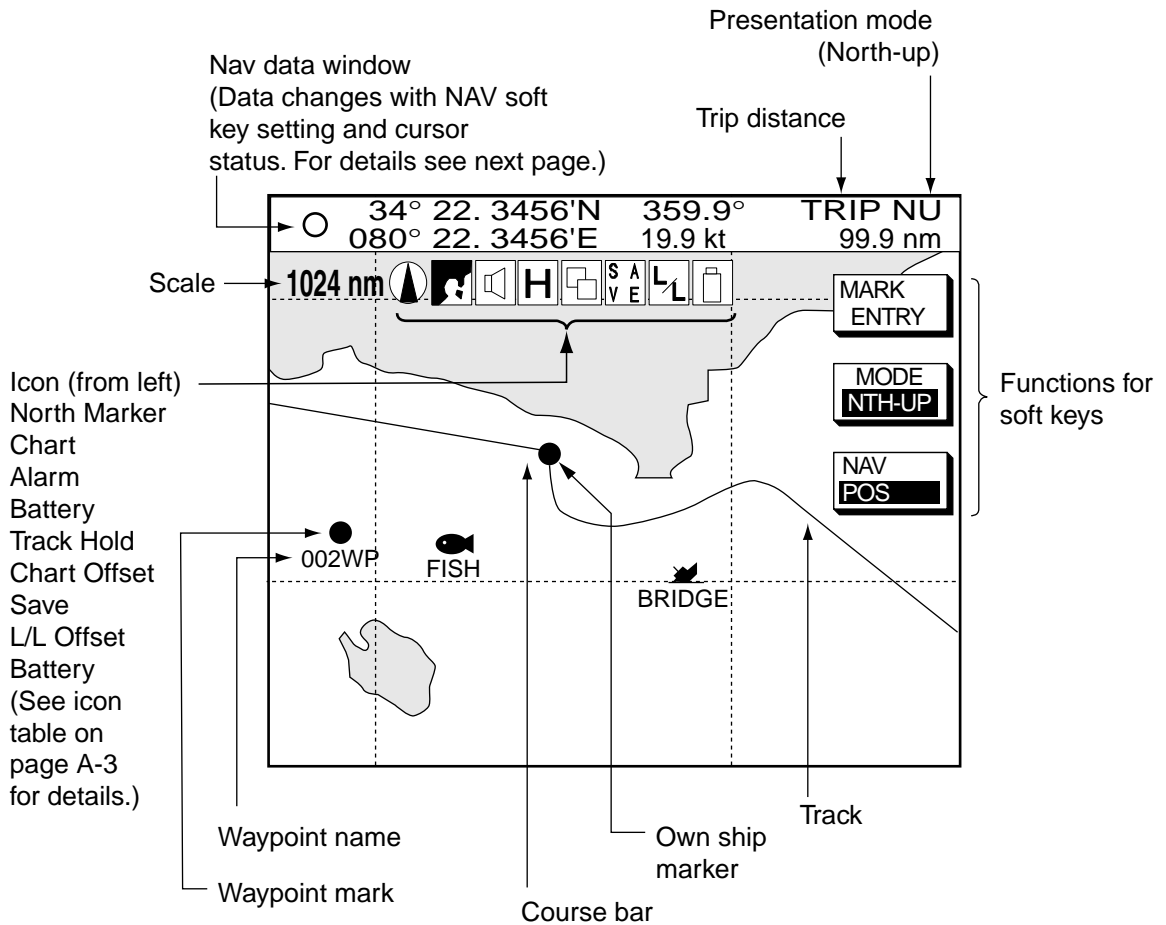# 3. PLOTTER OPERATION

3.1 Plotter Displays

3.1.1 Normal plotter display

You may show the plotter display over the entire screen, in the overlay screen (MODEL-1700 series only) with the radar display, or in a combination screen.
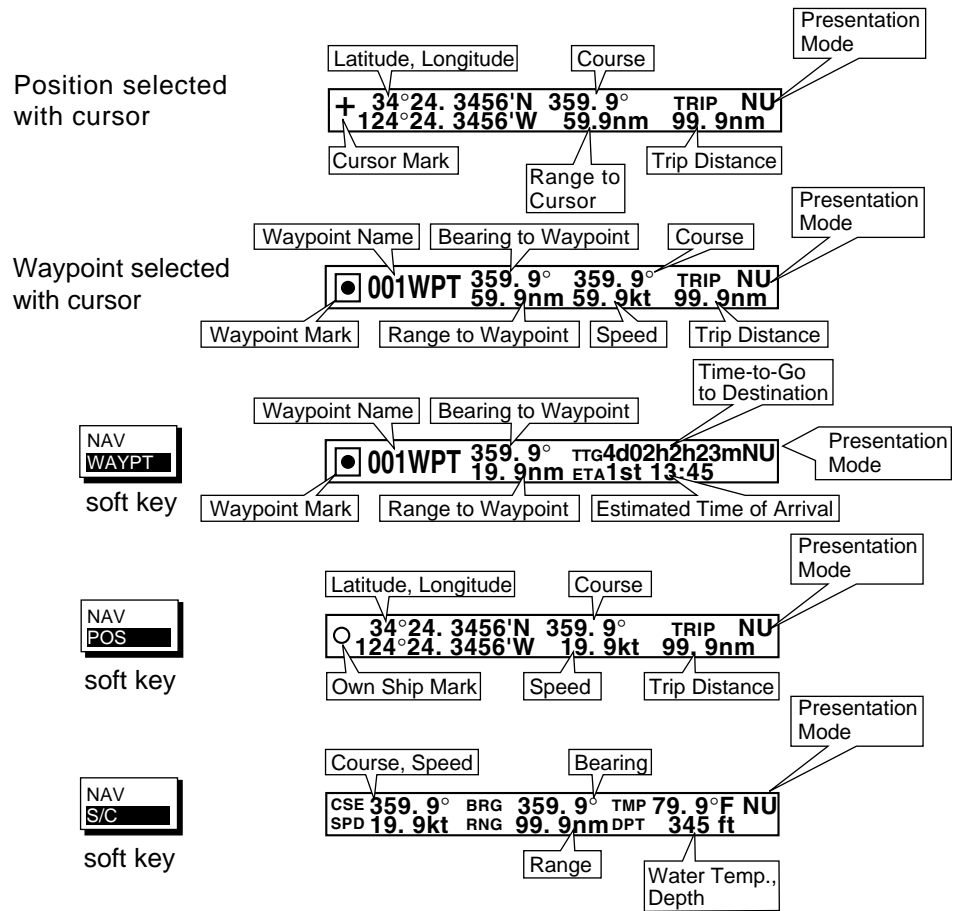

Normal plotter display

Nav data window

The data show in the nav data window depends on the status of the NAV soft key and the cursor.

Position selected
with cursor

| Latitude, Longitude | Course | | Presentation Mode |
| Cursor Mark | Range to Cursor | Trip Distance |

+ 34°24. 3456'N 359. 9°   TRIP   NU
  124°24. 3456'W   59.9nm   99. 9nm

Waypoint selected
with cursor

| Waypoint Name | Bearing to Waypoint | Course | Presentation Mode |
| Waypoint Mark | Range to Waypoint | Speed | Trip Distance |

⦿ 001WPT 359. 9° 359. 9°   TRIP   NU
           59. 9nm 59. 9kt   99. 9nm

NAV
WAYPT
soft key

| Waypoint Name | Bearing to Waypoint | Time-to-Go to Destination | Presentation Mode |
| Waypoint Mark | Range to Waypoint | Estimated Time of Arrival |

⦿ 001WPT 359. 9° TTG4d02h2h23mNU
           19. 9nm ETA1st 13:45

NAV
POS
soft key

| Latitude, Longitude | Course | Presentation Mode |
| Own Ship Mark | Speed | Trip Distance |

○ 34°24. 3456'N 359. 9°   TRIP   NU
  124°24. 3456'W   19. 9kt   99. 9nm

NAV
S/C
soft key

| Course, Speed | Bearing | Presentation Mode |
| Range | Water Temp., Depth |

CSE 359. 9° BRG 359. 9° TMP 79. 9°F NU
SPD 19. 9kt RNG 99. 9nm DPT   345 ft

NAV soft key status and nav data window

3.1.2 Compass display

The compass display, displayed at the bottom half of the screen in the plotter/compass combination display, provides steering information. The compass rose shows two arrows: the solid triangle shows own ship's course (heading) and the hollow inverted triangle shows the bearing to destination waypoint. When own ship's course is changed, the hollow inverted triangle moves with course change. Ship's course and waypoint direction are updated every second and other information is updated every 15 seconds.

The water temperature and depth graphs shows latest 10 minutes of temperature and depth data. The range of the depth graph is 50 feet and it is automatically adjusted with depth.
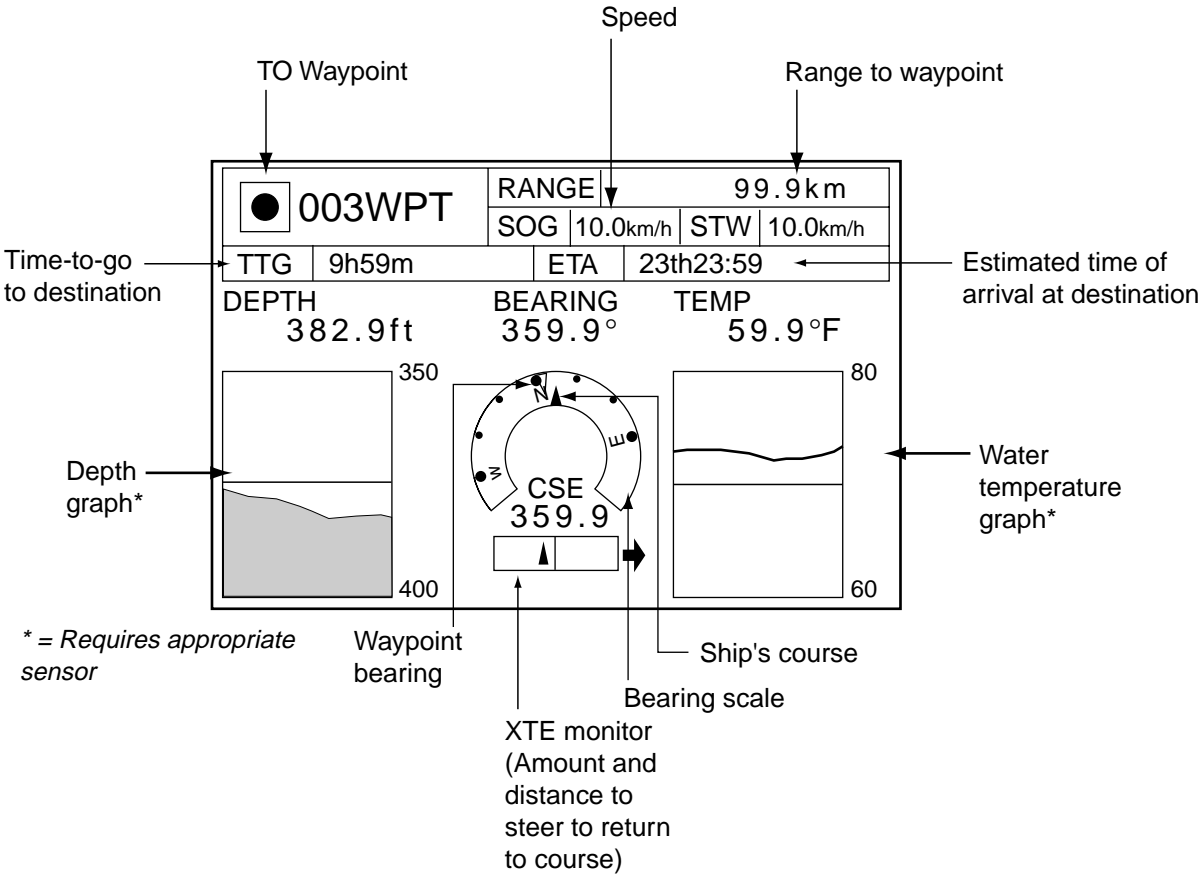
Compass display

Reading the XTE monitor

The XTE monitor, located below the compass rose, shows the direction you are off course. In the example the monitor shows, by the solid triangle, that the vessel is off course to the port side. Steer the vessel so the triangle keeps at the center of the monitor scale.

Soft keys

EDIT XT-LMT: Sets the range for XTE monitor scale. See the procedure below for how to set.
RESET XTE: Displayed when destination is set, and enables you to restart navigation. When the key is pressed the following message is displayed.

```
RESTART NAVGATION TO
CURRENT WAYPOINT.
ARE YOU SURE?
YES ... PUSH ENTER KNOB
NO   ... PUSH CLEAR KEY
```

COMPASS CNTRL: Switches control between the compass display and other display, in a combination display.

Setting the range for the XTE monitor

1. With the highway display shown, press the EDIT XT-LMT soft key to display the following window.

```
        XTE LIMIT


          0 .1nm

DEFAULT: 0.1 nm (km, sm)
```

XTE range setting window

2. Use the cursor pad to select digit to change.
3. Use the [ENTER] knob to set.
4. Repeat steps 2 and 3.
5. Press the [ENTER] knob to set, or press the CANCEL soft key to cancel.

3.1.3 Highway display

The highway display, displayed at the lower half of the screen in the plotter/highway combination display, provides a graphic presentation of ship's track along intended course. It is useful for monitoring ship's progress to a waypoint. The own ship marker shows own ship's movement and direction. The XTE monitor to show the direction and amount your vessel is off course. The arrow shows the direction to steer and the numeric the amount you are off course. Using the figure below as an example, you would steer starboard 0.009 nm to return to course.
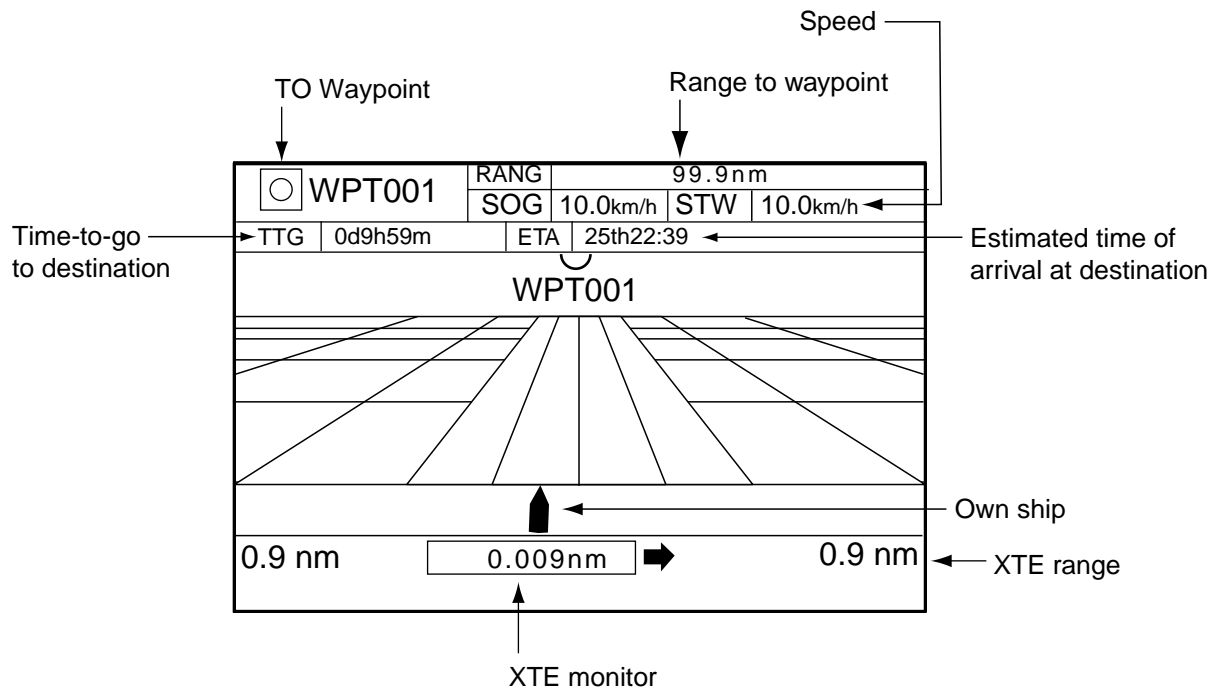
Highway display

Note that all digits may be cleared by pressing the [CLEAR] key.

Soft keys

EDIT XT-LMT: Sets the range for XTE monitor scale. See the procedure on the previous page for how to set.
RESET XTE: Displayed when destination is set, and enables you to restart navigation. When the key is pressed the following message is displayed.
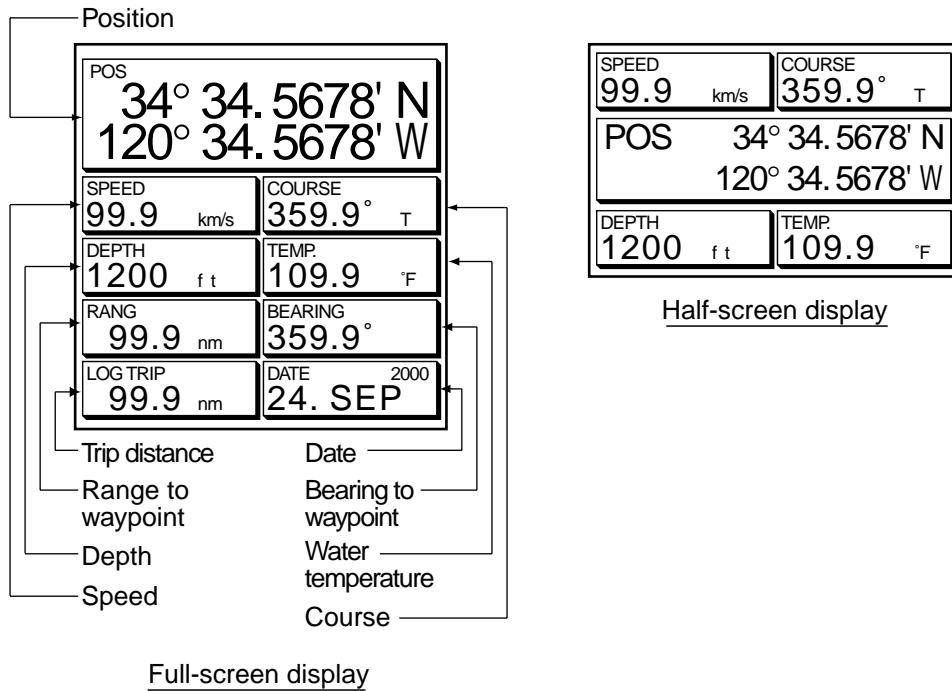
```
RESTART NAVGATION TO
CURRENT WAYPOINT.
ARE YOU SURE?
YES ... PUSH ENTER KNOB
NO   ... PUSH CLEAR KEY
```

COMPASS CNTRL: Switches control between the compass display and other display, in a combination display.

3.1.4   Nav data display

The nav data display provides comprehensive navigation data. It can be displayed on the entire screen or in a combination display.

Position

POS	
34° 34. 5678' N	
120° 34. 5678' W	

SPEED	COURSE
99.9 km/s	359.9˚ T
DEPTH	TEMP.
1200 f t	109.9 ℉
RANG	BEARING
99.9 nm	359.9˚
LOG TRIP	DATE 2000
99.9 nm	24. SEP

Trip distance   Date

Range to   Bearing to
waypoint   waypoint

Depth   Water
                             temperature

Speed   Course

Full-screen display

SPEED	COURSE
99.9 km/s	359.9˚ T
POS 34° 34. 5678' N	
120° 34. 5678' W	
DEPTH	TEMP.
1200 f t	109.9 ℉

Half-screen display

Full-screen nav data display

3.2   Selecting a Presentation Mode

Three types of display presentations are provided for the plotter display: north-up, course-up and auto course-up. To change the presentation mode, use the MODE soft key. Each press of the key changes the presentation mode and presentation mode indication cyclically in the sequence of North-up, Course-up and Auto course-up.

3.2.1   North-up

Press the MODE soft key to show "AC-UP." North (zero degree) is at the top of the display and own ship is at the center of the screen. Own ship marker is a filled circle. This mode is useful for long-range navigation.
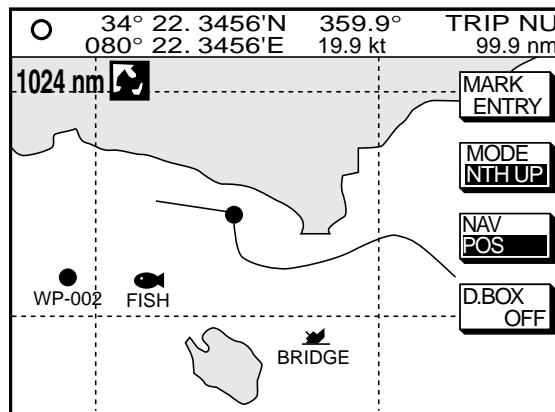
Plotter display, north-up mode

3.2.2   Course-up

Press the MODE soft key to show the indication NTH-UP. When destination is set it is at the top of the screen, the north mark appears at the upper left side of the screen and points to north. A filled triangle marks own ship's position.

When destination is not set, the course or heading is upward on the screen at the moment the course-up mode is selected.
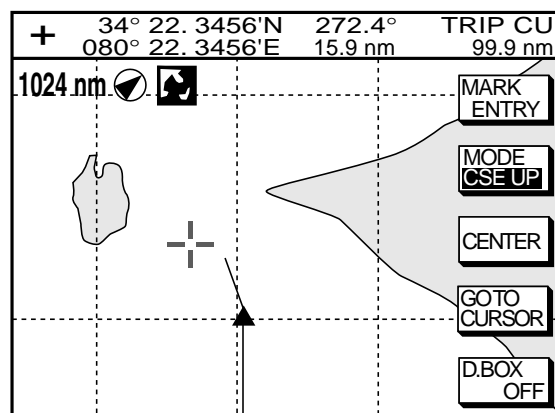
Plotter display, course-up mode, cursor on

3.2.3   Auto course-up

Press the MODE soft key to show the indication CSE-UP. The course or heading is at the top of screen at the moment the course-up mode is selected. When own ship is off its intended course by 22.5° or more, it is automatically brought back to perpendicular.
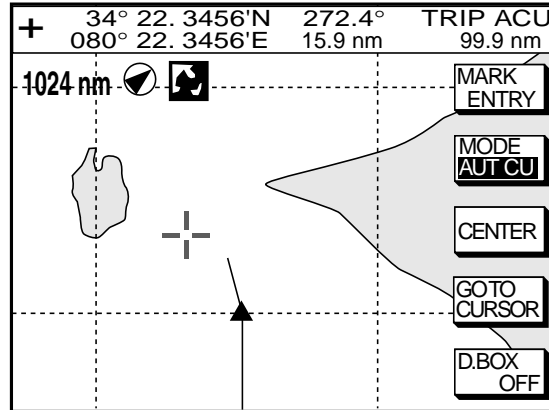

Plotter display, auto course-up mode

3.3   Cursor

3.3.1   Turning on the cursor, shifting the cursor

Press the cursor pad to turn the cursor on, and the cursor appears at the own ship's position. Operate the cursor pad to shift the cursor. The cursor moves in the direction of the arrow or diagonal pressed on the cursor pad.

Cursor position is displayed in latitude and longitude or Loran or Decca TDs (depending on menu setting) at the top of the plotter display when the cursor is on.
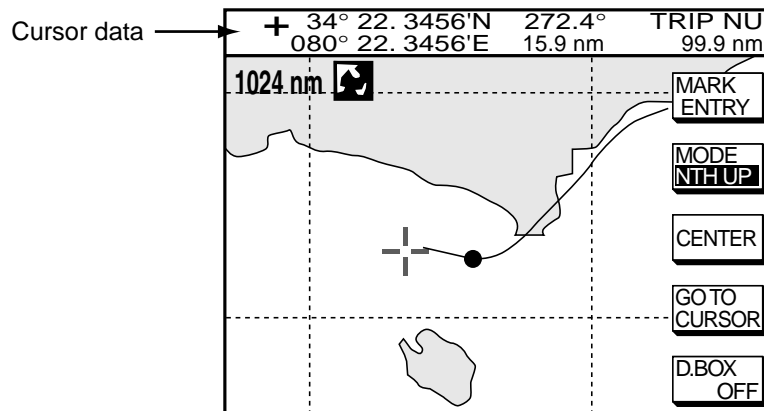
Cursor data

3.3.2   Turning off the cursor, returning own ship marker to screen center

The CENTER soft key turns off the cursor and returns own ship marker to screen center.

3.4   Shifting the Display

The display can be shifted on the plotter display as below.

1. Press the cursor pad to display the cursor.
2. Locate the cursor at a screen edge and press and hold down the cursor pad. The screen shifts in the direction opposite of cursor location.

3.5   Selecting Chart Scale/Range

Chart scale (range) may be selected with the [-] or [+] key. The [-] key expands the chart range; the [+] key shrinks it.

Note: When the display is expanded or shrunk beyond the range of the chart card in use NO CHART appears, along with the appropriate chart icon. See the table below for details.

3.6   Chart Cards

3.6.1   Chart card overview

Three types of chart cards can be used: FURUNO, Nav-Charts™ (NAVIONICS) and C-MAP.

When you insert a suitable mini chart card in the slot and your boat is near land, a chart appears. If a wrong card is inserted or a wrong chart scale is selected, the land will be hollow. Insert the proper card and select a suitable chart scale. Chart icons appear to help you select a suitable chart scale. The table below shows the chart icons and their meanings.

Chart icons and their meanings

Icon	Meaning
	Proper card is not inserted or chart scale is too small. Press the soft key ZOOM IN to adjust chart scale.
	Chart scale is too large. Press the soft key ZOOM OUT to adjust chart scale.
	Suitable chart scale is selected.

Indices and chart enlargement

When the [-] key is operated, you will see several frames appear on the chart. These frames are called indices and they show you what parts of the chart can be enlarged in the current picture range. The areas circumscribed with smaller frames can be enlarged, but the area enclosed by the largest frame cannot.
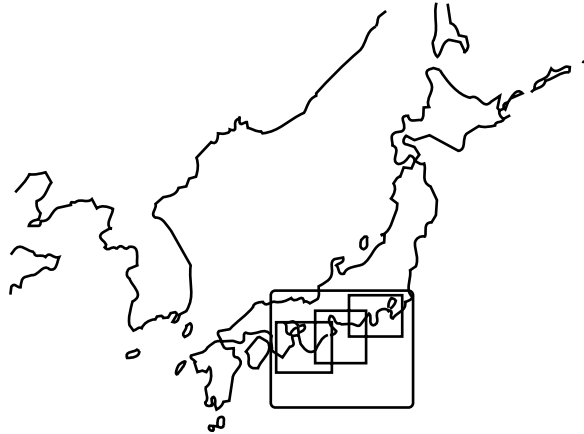
Sample chart (Japan and South Korea) showing indices

When a chart cannot be displayed

A chart will not be displayed in the following conditions:
- When the chart scale is too large or too small.
- When scrolling the chart outside the indices.
- When this happens, select proper chart scale.

3.6.3   FURUNO, Nav-Charts™

Chart symbols

The table below shows FURUNO mini chart symbols and their meanings.

Chart symbols

| Symbol	Description	Symbol	Description
⚠	Summit	•	Position of Sounding
┼┼┼	Wreck	✕	Obstruction
⊙	Lighthouse	⊙✕	Fishing Reef
⸸	Lighted Buoy	☐	Platform
⊡	Buoy	⚓	Anchorage
⊙	Radio Station		

Comparison of FURUNO and Nav-Charts™

Comparison of FURUNO and Nav-Charts™ chart cards

Item	FURUNO	Nav-Charts™
Dot scrolling capability	YES	YES
Course-up display	YES	YES
Lighthouse data	YES *3	YES
Zoom at cursor position	YES	*1
Range at Equator	0.125, 0.5, 1, 2…2048 nm	Same as left
Chart offset	YES	YES
Centering	YES	*2

*1 Nav-Charts™ chart may not center the cursor perfectly.

*2 Nav-Charts™ chart may not center own ship's position perfectly.

*3 Newly designed chart cards containing lighthouse data. Chart cards for North America area are completed, and others are in production.

*4 Nav-Charts™ is the registered trademark of NAVIONICS INC.

Data for aids to navigation data

Selected FURUNO and Nav-Charts™ charts can show buoy and lighthouse data. Simply place the cursor on the lighthouse or buoy mark.

Place the cursor on
a lighthouse or buoy mark.

Lighthouse mark

Range and bearing
from own ship

Period (ex.: 6 seconds)

Visibility in nautical
mile (ex.: 12 miles)

NAVAID: /FL 6S 12M
FROM OS   52.38nm 48.0°

FL   : Flashing
F   : Fixed light
F FL : Fixed and Flashing light
MO   : Morse code light
Oc   : Occulting light
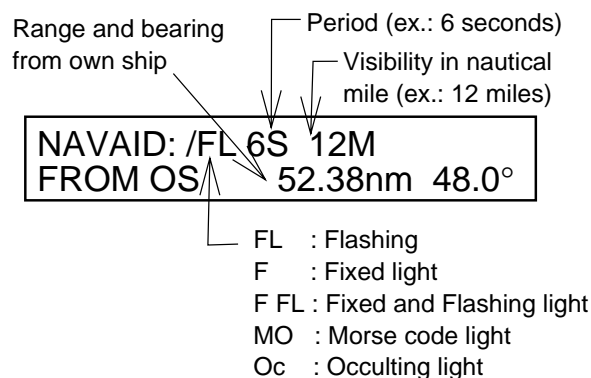
Example of buoy, lighthouse data

Port service icons (Nav-Charts™ cards)

Selected Nav-Charts™ mini chart cards show by icons services available at ports.
Use the cursor pad to place the cursor on the sailboat icon (denotes a port or
harbor), and then push the [ENTER] knob. The services available appear at the
top of the display.

Detailed information of service
selected

List of services
at the port selected

Sailboat mark (Port)

Emergency
medical service

Fueling station

Water
supply station

Traveler's
service station

Customer
service station

Marine
equipment service

Port

Information center
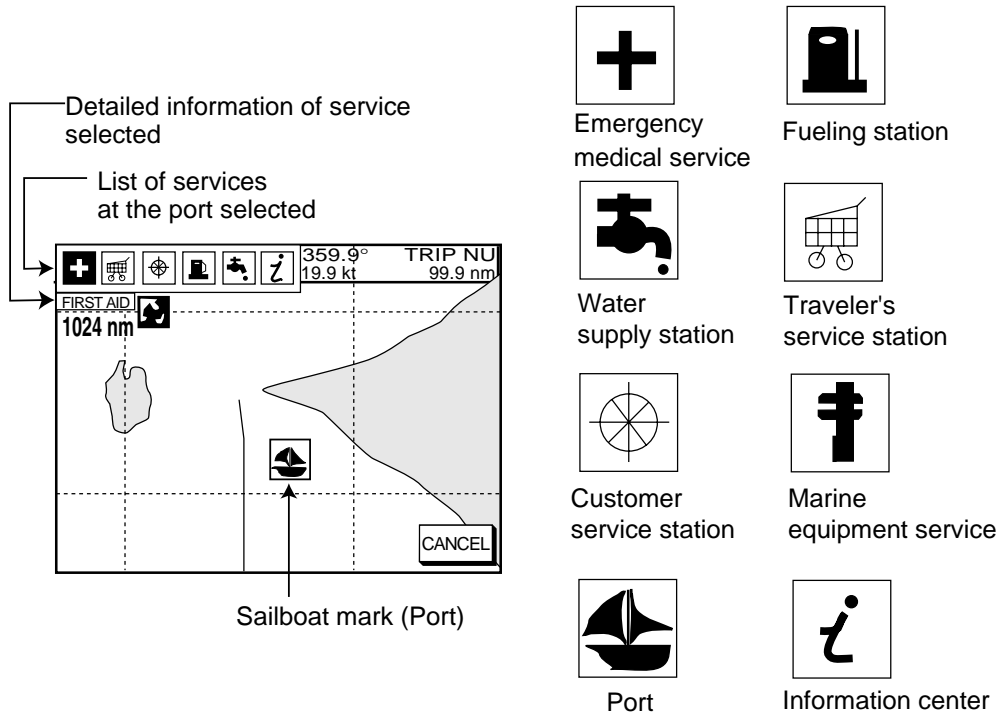
Plotter display showing Nav-Charts™ port service display

3.6.4   C-MAP cards

Cursor and data display

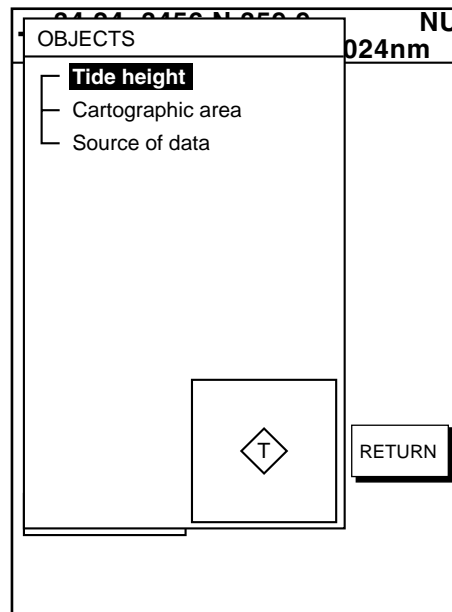Besides its fundamental functions of providing position data, the cursor can also show caution area, depth area, source of data, etc. Further, you can display information about an icon by placing the cursor on it.

1. Press the cursor pad to turn the cursor on.
2. Use the cursor pad to place the cursor on the position desired.
3. Push the [ENTER] knob to open the Objects window.

Objects window

4. Select the item desired.
5. Push the [ENTER] knob to display details for object selected.
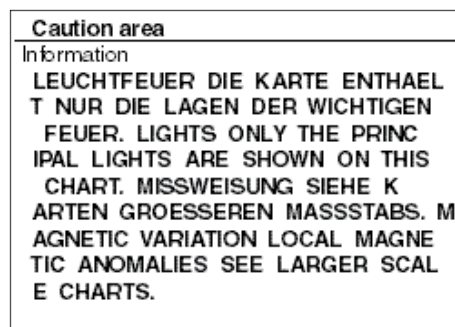
Example of caution area window

6. Press the RETURN soft key to close the window.
7. Repeat step 4 to 6 to select other item.
8. Press the RETURN soft key to close the Objects window and the [MENU] key to close the menu.

Icon data

You may place the cursor on any icon to find information about the selected icon.

1. For example, place the cursor on a lighthouse icon.
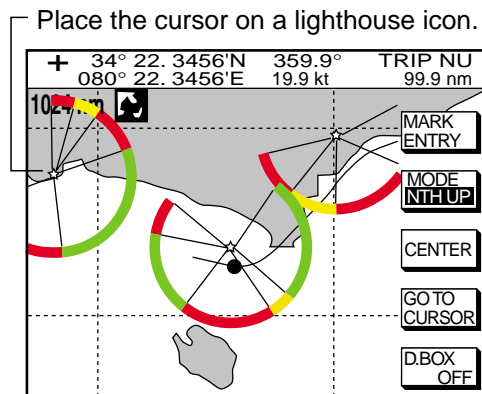
Lighthouse icon

2. Push the [ENTER] knob to show data. For example, the following window appears for lighthouse.
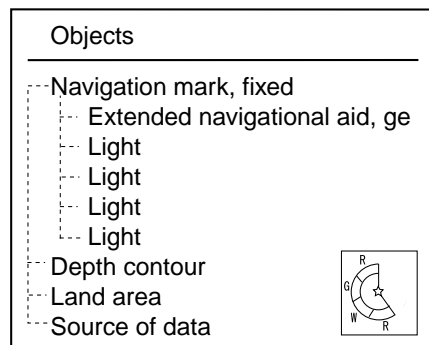
Object windows

3. Select the item desired.
4. Push the [ENTER] knob to display detailed information.
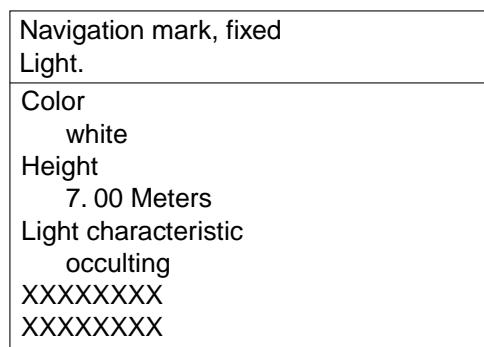
Sample lighthouse data

5. Press the RETURN soft key to close the Objects window and the [MENU] key to close the menu.

Tidal Information

The C-MAP NT-FP chart card provides for calculation of the tide heights for any date. Additionally it displays the times of sunrise and sunset.

1. Press the cursor pad to place the cursor on a Tide icon ($\diamond$T).
2. Push the [ENTER] knob to open the Objects window.
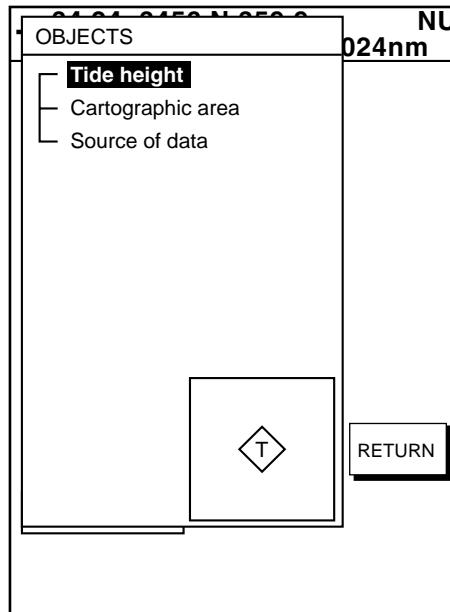
Objects window

3. Select Tide height.
4. Push the [ENTER] knob to open the TIDE window.
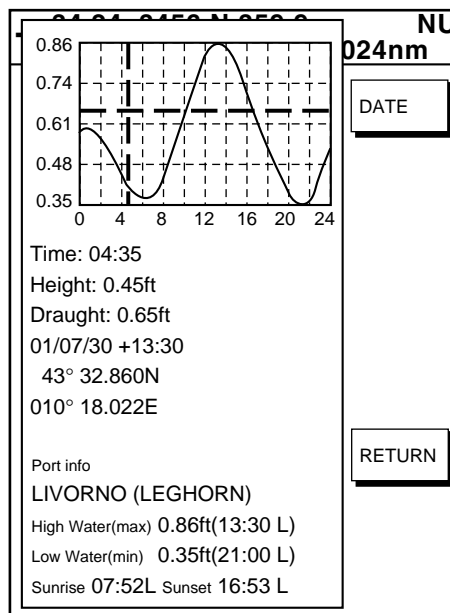
Tide window

5. Press the DATE soft key to open the DATE window.

```
DATE


DD/MM/YYYY
01 / 01 / 2000
```

Date window

6. Place the cursor where desired and then rotate the [ENTER] knob to enter a appropriate date.
7. Push the [ENTER] knob to show the tidal graph for entered date.
8. Locate the vertical cursor on the time desired. Time and height are shown to the left of the graph.
9. Shift the level cursor. Draught is shown to the left of the graph.
10. Press the RETURN soft key to close the TIDE window.
11. Press the [MENU] key to close the menu.


3.7   Resetting Trip Distance

Trip distance is shown on the navigation data display. You can reset the trip distance to zero as follows.

1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION and GENERAL SETUP soft keys in that order to show the general setup menu.

```
KEY BEEP                    GENERAL
            ON              SETUP 1
LANGUAGE
            ENGLISH         EDIT
▶RANGE/SPEED UNIT
            nm, kt
TEMP UNIT
            °C
DEPTH UNIT
            ft
TEMP SOURCE
            NMEA
DEPTH SOURCE                NEXT
            NMEA            PAGE
RESET TRIP LOG
            NO              RETURN
```

General setup menu, page 1

3. Select RESET TRIP LOG and press the EDIT soft key.
4. Select YES.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

3.8 Working with Track

Your ship's track is plotted on the screen using navigation data fed from a GPS receiver. This section shows you what you can do with track, from turning it on or off to changing its plotting interval.

3.8.1 Displaying track

Own ship track

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
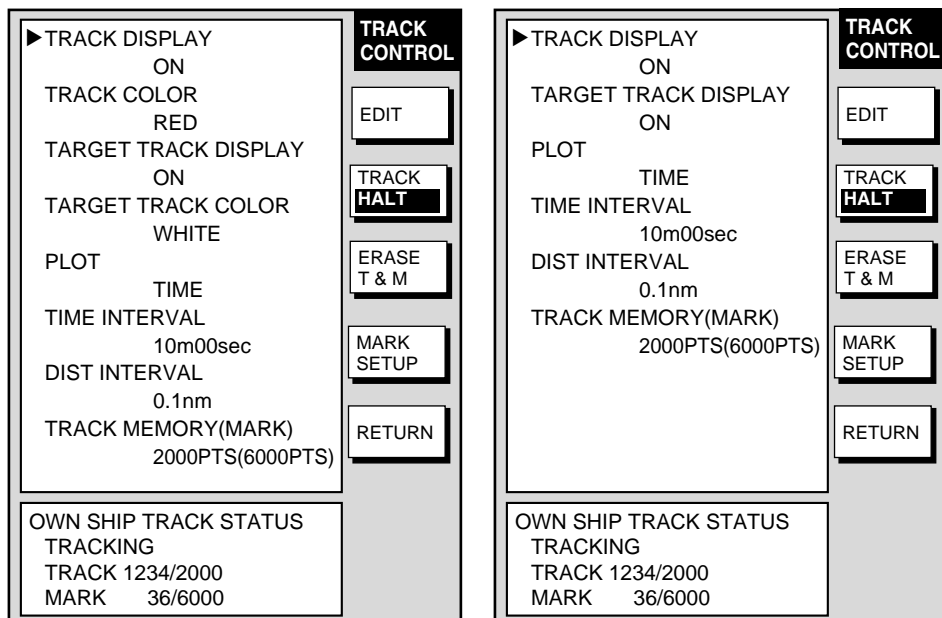
MODEL-1700C series   MODEL-1700 series

Track & mark control menu

2. Select TRACK DISPLAY.
3. Press the EDIT soft key to show the display track window.
4. Select ON (default setting) or OFF as appropriate.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

Note: The number of track and mark points used appears at the TRACK STATUS window on the track control menu. Using the figure above as an example, 1234 points (max. 2000 points) and 36 marks (max. 5000 points) respectively have been recorded.

Target track

Target track, NMEA format TTM data sentence or target data fed from an ARPA board-equipped radar, may be turned on or off as desired. The default setting is off.

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select TARGET TRACK DISPLAY.
3. Press the EDIT soft key to show the target track display window.
4. Select ON or OFF (default setting) as appropriate.
5. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.8.2 Stopping, restarting plotting of own ship track

When your boat is at anchor or returning to port you probably won't need to record its track. You can stop recording the track, to conserve the track memory, as follows:

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
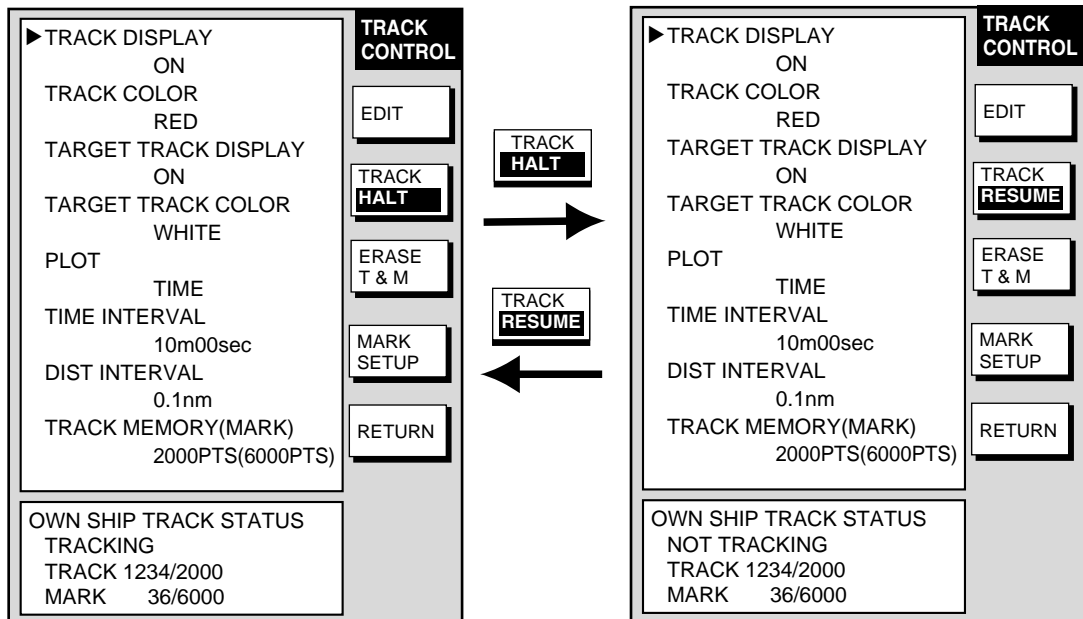
Track & mark control menu (MODEL-1700C series)

2. Press the TRACK HALT soft key. The indication "TRACKING" in the TRACK STATUS window changes to "NOT TRACKING." Further the icon "H" is displayed at the top of the plotter display. To restart plotting the track, press the TRACK RESUME soft key.
3. Press the RETURN soft key.
4. Press the [MENU] key to close the menu.

3.8.3   Changing track color (MODEL-1700C series only)

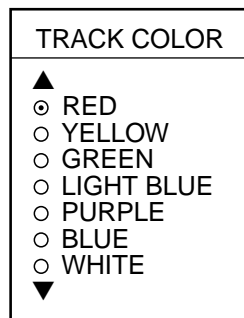Track can be displayed in red, yellow, green, light-blue, purple, blue and white. It can be useful to change track color on a regular basis to discriminate between previous day's track, past track, etc. The default own ship track color is red.

Own ship's track

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select TRACK COLOR.
3. Press the EDIT soft key to display the track color window.

```
 TRACK COLOR
 ▲
 ⊙ RED
 ○ YELLOW
 ○ GREEN
 ○ LIGHT BLUE
 ○ PURPLE
 ○ BLUE
 ○ WHITE
 ▼
```

Track color window

4. Select the color desired.
5. Press the ENTER soft key.
6. Press the RETURN soft key.
7. Press the [MENU] key to close the menu.

Target track

Like own ship's track, target tracks can be displayed in red, yellow, green, light-blue, purple, blue and white (default setting).

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select TARGET TRACK COLOR.
3. Press the EDIT soft key to display the track color window.
4. Select the color desired.
5. Press the ENTER soft key.
6. Press the RETURN soft key.
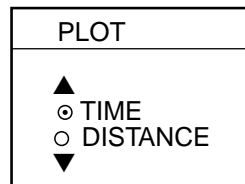7. Press the [MENU] key to close the menu.

3.8.4 Track plotting method and interval for own ship track

In drawing the own ship track, first the ship's position (fed from the blackbox GPS unit or DGPS/GPS receiver) is stored into the unit's memory at an interval of time or distance. A shorter interval provides better reconstruction of the track, but the storage time of the track is reduced. When the track memory becomes full, the oldest track is erased to make room for the latest.

Track plotting method

Track may be plotted by time or distance interval and the default setting is "time."

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select PLOT.
3. Press the EDIT soft key to display the plot window.

```
┌─────────────────────┐
│ PLOT                │
│                     │
│ ▲                   │
│ ⊙ TIME              │
│ ○ DISTANCE          │
│ ▼                   │
└─────────────────────┘
```

Plot window

4. Select TIME or DISTANCE as appropriate. Distance is useful for conserving track memory, since no track is recorded when the boat is stationary.
5. Press the ENTER soft key.
6. Press the RETURN soft key.
7. Press the [MENU] key to close the menu.

Track plotting interval

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select TIME INTERVAL or DIST INTERVAL as appropriate
3. Press the EDIT soft key to display the time or distance interval window, whichever you selected at step 2.

```
┌──────────────────┐
│ TIME INTERVAL    │
│                  │
│   01 m 00 s      │
└──────────────────┘
```
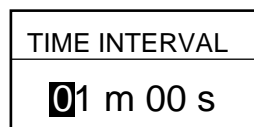
Setting range: 0 min 0 sec (continuous) - 99 min 59 sec
Default setting: 10 sec

(When selecting TIME INTERVAL.)

```
┌──────────────────┐
│ DIST INTERVAL    │
│                  │
│   00.10 nm       │
└──────────────────┘
```
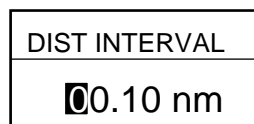
Setting range: 0 nm (continuous) - 9.9 nm (km, sm)
Default setting: 0.1 nm

(When selecting DIST INTERVAL.)

Interval windows

4. Use the [ENTER] knob and the cursor pad to enter numeric data. The [CLEAR] key functions to clear an entire line of data.
5. Press the ENTER soft key or the [ENTER] knob.
6. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.8.5   Changing own ship track memory capacity

The equipment stores a total of 8000 points of track and marks. This amount may be apportioned as desired, and the default setting is 2000 points of track and 6000 marks.

When you change the track memory capacity all tracks and marks in the memory are erased. If necessary save the data to a memory card. For further details see 6.1.2 Saving data to a memory card.

1. Press the [MENU] key followed by CHART SETUP and TRACK & MARK CONTROL soft keys to open the track control menu.
2. Select TRACK MEMORY(MARK).
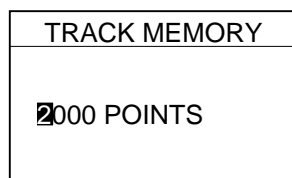3. Press the EDIT soft key to display the track memory window.

```
┌─────────────────────┐
│   TRACK MEMORY      │
├─────────────────────┤
│                     │
│  2000 POINTS        │
│                     │
│                     │
└─────────────────────┘
```

Track memory window

4. Use the [ENTER] knob to enter number of track memory points
5. Press the ENTER soft key or the [ENTER] knob. You are asked if you are sure to change the track memory capacity.
6. Press the [ENTER] knob or ENTER soft key again.
7. Press the RETURN soft key.
8. Press the [MENU] key to close the menu.

3.8.6 Erasing track

This paragraph shows you how to erase own ship's track and target tracks. Own ship's track can be erased by area, color (MODEL-1700C series only) or collectively.

Erasing own ship track by area

You can erase own ship's track by area as below.

1. Press the [MENU] key.
2. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and ERASE T & M soft keys to show the erase menu.

MODEL-1700C series	MODEL-1700 series
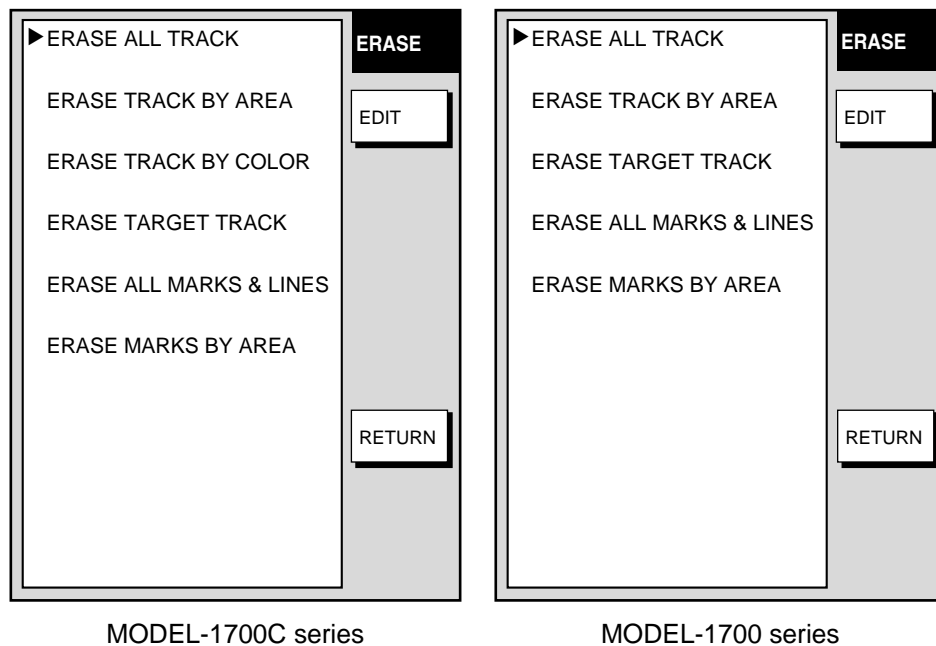
Erase menu

2. Select ERASE TRACK BY AREA and press the EDIT soft key. The menu is erased and the plotter display appears.
3. Use the cursor pad to place the cursor at one of the corners which will encompass the area to process.
4. Press the [ENTER] knob.
5. Drag the cursor diagonally to enclose all the track to be erased.
6. Press the [ENTER] knob. You are asked if it is all right to delete the track.
7. Push the [ENTER] knob to delete the track selected.
8. Press the RETURN soft key.
9. Press the [MENU] key to close the menu.

Erasing own ship track by color (MODEL-1700C series only)

You may erase own ship's track by color as follows:

1. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and ERASE T & M soft keys to show the erase menu.
2. Select ERASE TRACK BY COLOR and press the EDIT soft key.

```
┌─────────────────────┐
│  TRACK COLOR        │
│─────────────────────│
│  ▲                  │
│  ⊙ RED              │
│  ○ YELLOW           │
│  ○ GREEN            │
│  ○ LIGHT BLUE       │
│  ○ PURPLE           │
│  ○ BLUE             │
│  ○ WHITE            │
│  ▼                  │
│                     │
└─────────────────────┘
```

Track color window

3. Use the cursor pad to select the color you want to erase and push the [ENTER] knob.
4. Press the [ENTER] knob to erase track color selected.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

Erasing all own ship track

1. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and ERASE T & M soft keys to show the erase menu.
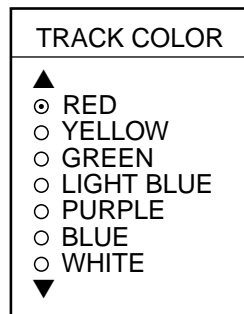2. Select ERASE ALL TRACK and press the EDIT soft key.
3. Push the [ENTER] knob to erase all track.
4. Press the RETURN soft key.
5. Press the [MENU] key to close the menu.

Erasing all target tracks

1. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and ERASE T & M soft keys to show the erase menu.
2. Select ERASE TARGET TRACK and press the EDIT soft key.
3. Push the [ENTER] knob to erase all target tracks.
4. Press the RETURN soft key.
5. Press the [MENU] key to close the menu.

3.9 Marks

Marks are useful for denoting important events such as a good fishing spot.
Marks can be inscribed in colors (MODEL-1700C series only) of red, yellow,
green, light-blue, purple, blue and white and seven shapes.

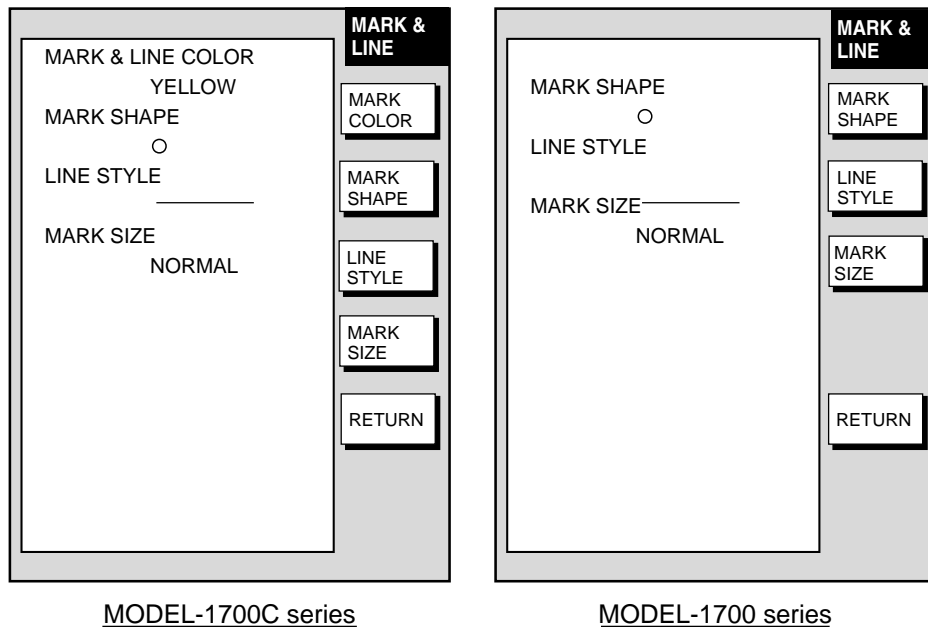○ □ ◇ ✕ 凸 凹 •

Mark shapes

3.9.1 Entering a mark

1. Place the cursor on the location desired for a mark.
2. Press the MARK ENTRY soft key.

The mark is inscribed in the size, color (MODEL-1700C series only) and shape
selected on the mark setup menu. The default mark attributes are size, normal;
color, yellow, and shape, hollow circle

3.9.2 Changing mark attributes

You can select the shape, size and color (MODEL-1700C series only) of marks
on the mark

1. Press the [MENU] key to show the menu.
2. Press the CHART SETUP, TRACK CONTROL and MARK & LINE soft keys
   to show the mark & line menu.

MARK & LINE		MARK & LINE
MARK & LINE COLOR YELLOW MARK SHAPE ○ LINE STYLE ———— MARK SIZE NORMAL	MARK COLOR / MARK SHAPE / LINE STYLE / MARK SIZE / RETURN	MARK SHAPE ○ LINE STYLE MARK SIZE——— NORMAL

MODEL-1700C series   MODEL-1700 series

Mark & line menu

3. **For the GD-1700C only,** do the following to select mark & line color.

   a) Select MARK & LINE COLOR.

   b) Press the EDIT soft key.

   c) Choose color desired (default setting; yellow).

d) Press the ENTER soft key or [ENTER] knob.

4. Select MARK SHAPE.
5. Press the EDIT soft key.
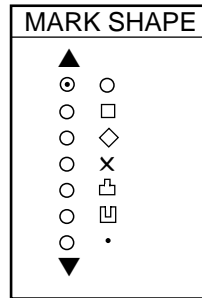
Mark shape window

3. Select mark shape and press the ENTER soft key.
4. Select MARK SIZE.
5. Press the EDIT soft key.
6. Select NORMAL (default setting) or SMALL.
7. Press the ENTER soft key or [ENTER] knob.
8. Press the RETURN soft key.
9. Press the [MENU] key to close the menu.

3.9.3 Connecting marks

You may wish to connect marks with lines. This feature can be used to mark boundaries, etc.

1. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and MARK & LINE SETUP soft keys to show the mark & line menu.
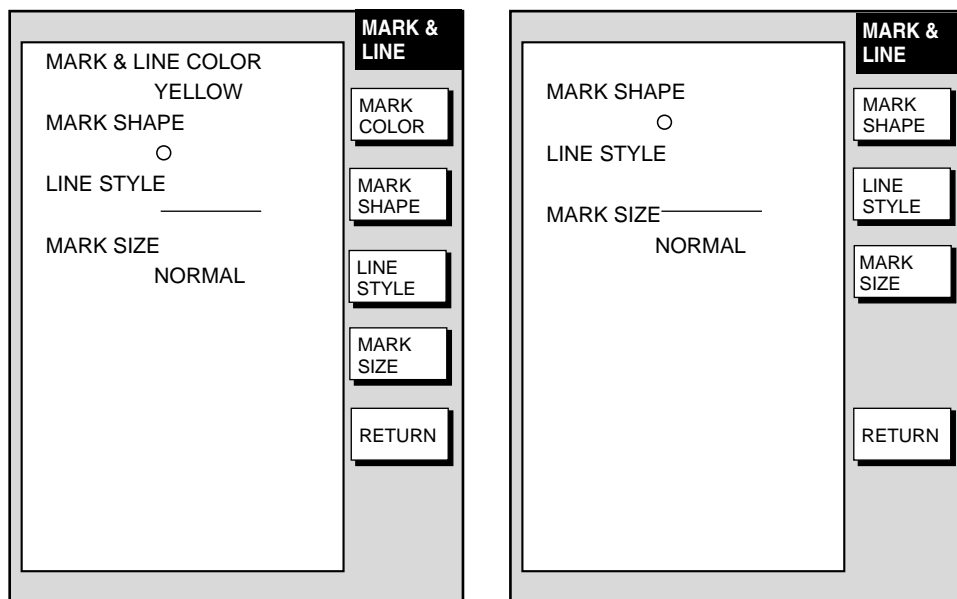
MODEL-1700C series   MODEL-1700 series

Mark & line setup menu

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2. Select MARK STYLE.
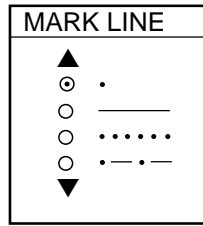3. Press the EDIT soft key.

```
┌─────────────┐
│ MARK LINE   │
│     ▲       │
│   ⊙  ·       │
│   ○  ─────   │
│   ○  ·· ·· ·· │
│   ○  ·─·─    │
│     ▼       │
└─────────────┘
```

Mark line window

4. Select line style desired and press the ENTER soft key or [ENTER] knob.
5. Press the RETURN soft key followed by the [MENU] key to close the menu.

When you wish to enter marks without connection them with lines, select the line style "single dot" at step 5 in the above procedure.

3.9.4   Erasing marks

Erasing an individual mark

1. Operate the cursor pad to place the cursor on the mark you want to erase.
2. Press the [CLEAR] key to erase the mark.

Note: To erase a line, place the cursor on the mark which encloses the line, and then press the [CLEAR] key. Place the cursor at the intersecting points of two lines will erase both lines.

Erasing all marks, lines

You can erase all marks and lines. Be absolutely sure you want to erase all marks and lines; erased marks and lines cannot be restored.

1. Press the [MENU] key followed by CHART SETUP, TRACK & MARK CONTROL and ERASE T & M soft keys to show the erase menu.
2. Select ERASE ALL MARKS & LINES and press the EDIT soft key.
3. Push the [ENTER] knob to erase all marks and lines.
4. Press the RETURN soft key.
5. Press the [MENU] key to close the menu.

3.10   Waypoints

In navigation terminology, a waypoint is a particular location on a voyage whether it be a starting, intermediate or destination point. A waypoint is the simplest piece of information your equipment requires to get you to a destination, in the shortest distance possible.

This unit has 1000 waypoints into which you can enter position information. There are five methods by which you can enter a waypoint: at own ship position, at MOB position, by cursor, by range and bearing, and through the waypoint list (manual input of latitude and longitude).

3.10.1   Entering waypoints

Entering a waypoint at own ship position

Press the [SAVE/MOB] key with a touch-and-release action to store your position. This new waypoint will automatically be saved in the waypoint list under the youngest empty waypoint number.

Entering a waypoint with the cursor

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE, WAYPOINTS and WAYPOINT BY CURSOR soft keys. The plotter display appears.
3. Operate the cursor pad to place the cursor on the location desired.
4. Press the NEW WPT soft key. The waypoint window appears and it shows mark shape, waypoint name, comment (default: date), position of waypoint and proximity alarm radius.
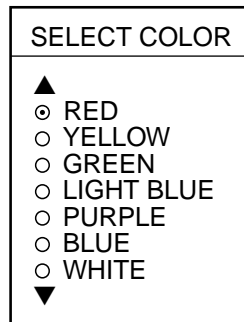

Waypoint window

5. **If you do not need to change the waypoint data,** go to step 16.
6. Press the SELECT MARK soft key.
7. Press the MARK SHAPE soft key to open the mark shape selection window.
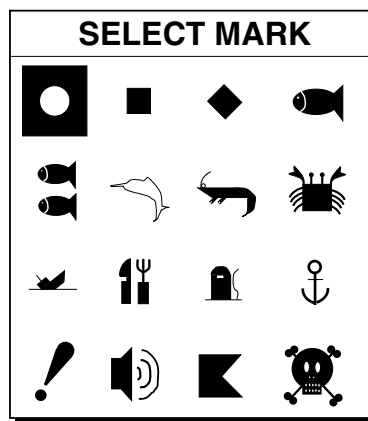
Mark shape selection window

8. Operate the cursor pad to select shape desired.
9. Press the ENTER soft key.
10. Press the RETURN soft key.

11. For the MODEL-1700C series, press the SELECT MARK and MARK COLOR soft keys to open the mark color selection window. Select the color desired, and then press the ENTER soft key.

```
┌─────────────────────┐
│ SELECT COLOR        │
├─────────────────────┤
│ ▲                   │
│ ⊙ RED               │
│ ○ YELLOW            │
│ ○ GREEN             │
│ ○ LIGHT BLUE        │
│ ○ PURPLE            │
│ ○ BLUE              │
│ ○ WHITE             │
│ ▼                   │
└─────────────────────┘
```

Mark color selection window

Note: You cannot change the shape and color of a waypoint when the proximity alarm radius for it is other than "zero." To change shape or color, enter all zeroes as the proximity alarm radius.

12. You can change the name (1 to 6 characters), comment (13 characters), L/L position and the proximity alarm radius as follows:

a) Select the NAME, COMMENT or PROXIMITY ALARM RADIUS field.

b) Use the Omnipad to select appropriate location.

c) Use the [ENTER] knob to select appropriate alphanumeric character.

d) Push the [ENTER] knob to enter character selected.

13. Use the cursor pad to place the cursor in the POSITION box.

14. Use the cursor pad to select the digit you want to change.

15. Use the [ENTER] knob to select digit and push the knob to register.

16. Press the SAVE soft key to register the waypoint.

To enter another waypoint select its location with the cursor pad and press the NEW WPT soft key.

Entering a waypoint by range and bearing

This method is useful when you want to enter a waypoint using range and bearing to a target found on a radar.

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE, WAYPOINTS and WAYPOINT BY RNG. & BRG. soft keys.
3. Operate the cursor pad to place the cursor on the location desired. Range and bearing from own ship to the cursor appear at the top of the display.

    Note: The origin point of range and bearing can be shifted to the place you desire. Operate the cursor pad to select location, and then press the START POINT soft key.

4. Press the NEW WPT soft key. The waypoint window appears and it shows mark shape, waypoint name, comment (default: date), position of waypoint and proximity alarm radius.
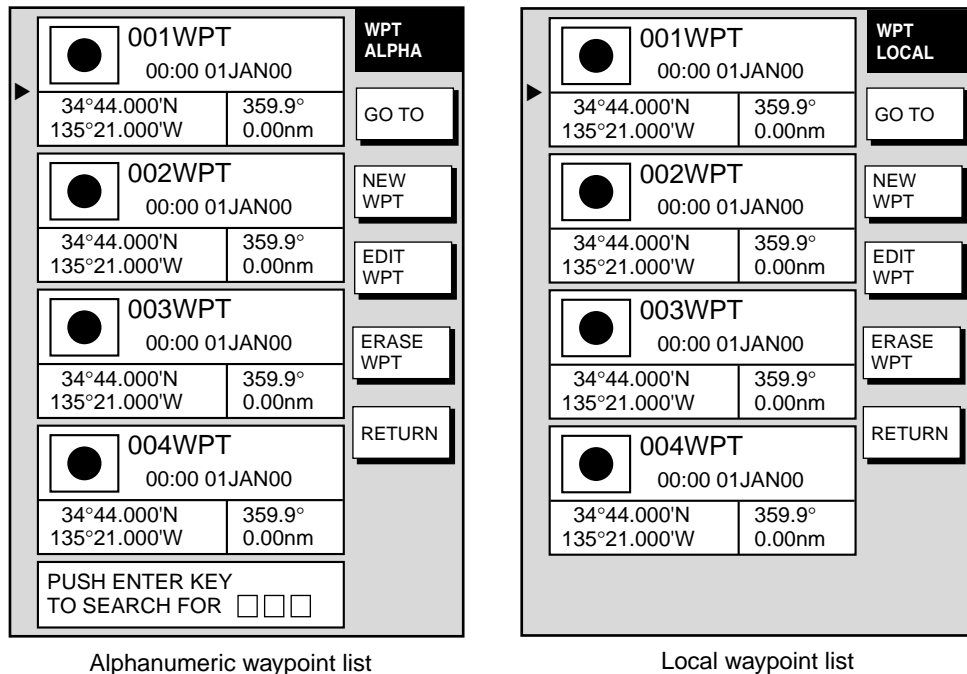

Waypoint window

5. If necessary, change waypoint data following the instructions from step 7 in "Entering waypoints with the cursor."
6. Press the SAVE soft key to register the waypoint.

Entering a waypoint from the waypoint list

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE and WAYPOINTS soft keys.
3. Press the LOCAL LIST (lists waypoints in order from nearest to furthest) or ALPHA/NUMERIC LIST (lists waypoints in alphanumeric order) soft key.

	WPT ALPHA			WPT LOCAL
● 001WPT 00:00 01JAN00			● 001WPT 00:00 01JAN00	
34°44.000'N 135°21.000'W 359.9° 0.00nm	GO TO		34°44.000'N 135°21.000'W 359.9° 0.00nm	GO TO
● 002WPT 00:00 01JAN00	NEW WPT		● 002WPT 00:00 01JAN00	NEW WPT
34°44.000'N 135°21.000'W 359.9° 0.00nm	EDIT WPT		34°44.000'N 135°21.000'W 359.9° 0.00nm	EDIT WPT
● 003WPT 00:00 01JAN00	ERASE WPT		● 003WPT 00:00 01JAN00	ERASE WPT
34°44.000'N 135°21.000'W 359.9° 0.00nm	RETURN		34°44.000'N 135°21.000'W 359.9° 0.00nm	RETURN
● 004WPT 00:00 01JAN00			● 004WPT 00:00 01JAN00	
34°44.000'N 135°21.000'W 359.9° 0.00nm			34°44.000'N 135°21.000'W 359.9° 0.00nm	
PUSH ENTER KEY TO SEARCH FOR □□□				

Alphanumeric waypoint list   Local waypoint list

Alphanumeric and local waypoint lists

4. Press the NEW WPT soft key to show the waypoint window. Own ship position is shown in the position box. If necessary, change the data following from step 7 in "Entering waypoints with the cursor."
5. Press the SAVE soft key to register the waypoint.
6. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.10.2 Editing waypoint data

Waypoint data may be from the waypoint list. You can select the waypoint to edit directly from the waypoint list or with the cursor.

Selecting waypoint data to edit from the waypoint list

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE and WAYPOINTS soft key.
3. Press the LOCAL LIST or ALPHA/NUMERIC LIST soft key.
4. Select the waypoint you want to edit.
5. Press the EDIT WPT soft key.
6. Edit waypoint as appropriate.
7. Press the SAVE soft key.
8. Press the RETURN soft key followed by the [MENU] key to close the menu.

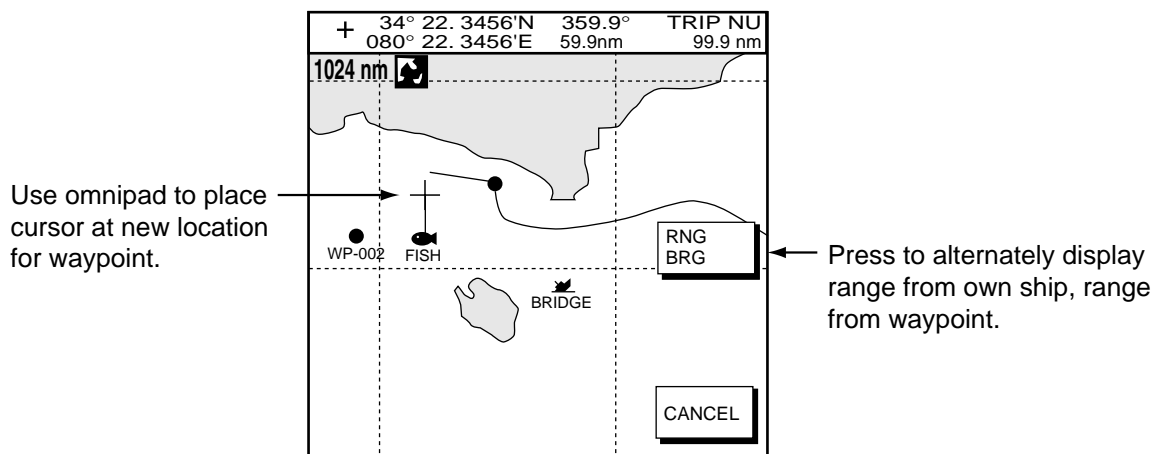### Selecting waypoint data to edit with the cursor

1. Use the cursor pad to place the cursor on the waypoint to edit. A flashing diamond appears over the waypoint when it is correctly selected.
2. Press the EDIT MOVE soft key followed by the EDIT WPT soft key.
3. Edit waypoint as appropriate.
4. Press the SAVE SOFT key.
5. Press the RETURN soft key followed by the [MENU] key to close the menu.

Changing waypoint position from the plotter display

You may change the latitude and longitude position of waypoints from the plotter display as follows:

1. Press the [MENU] key followed by the WAYPOINTS soft key to open the waypoint menu.
2. Press the WAYPOINT BY CURSOR soft key.
3. Operate the cursor pad to place the cursor on the waypoint which you want to change. A flashing diamond mark appears on the waypoint when it is correctly selected.
4. Press the EDIT MOVE soft key.
5. Press the MOVE WPT soft key.
6. Operate the cursor pad to place the cursor on the location desired. A line connects previous position and new position.
7. Push the [ENTER] knob.

The waypoint moves to the cursor position and its new position is recorded on the waypoint list. If the waypoint is set as destination or is part of a route, you are asked if you are sure to move the waypoint. In this case, push the [ENTER] knob to move the waypoint, or press the [CLEAR] key to cancel.

Use omnipad to place cursor at new location for waypoint.

Press to alternately display range from own ship, range from waypoint.

WP-002   FISH

BRIDGE

RNG
BRG

CANCEL

34° 22. 3456'N   359.9°   TRIP NU
080° 22. 3456'E   59.9nm   99.9 nm

1024 nm

Plotter display

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3.10.3　Erasing waypoints

Erasing a waypoint with the cursor

1. Press the cursor pad to turn on the cursor.
2. Operate the cursor pad to place the cursor on the waypoint you want to erase. A flashing diamond mark appears over the waypoint when the waypoint is correctly selected.
3. Press the [CLEAR] key, or press the EDIT MOVE soft key followed by the ERASE WPT soft key. You are asked if you are sure to erase the waypoint.
4. Push the [ENTER] knob. The waypoint is erased from both the plotter screen and the waypoint list.

Erasing a waypoint from the waypoint list

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE followed by WAYPOINTS soft keys.
3. Press the LOCAL LIST or ALPHA/NUMERIC LIST soft key.
4. Select the waypoint you want to erase.
5. Press the ERASE WPT soft key. You are asked if you are sure to erase the waypoint.
6. Push the [ENTER] knob. The waypoint is erased from both the waypoint list and the plotter screen (if it is currently displayed).
7. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.10.4 Changing waypoint mark size (FURUNO, NAV CHART)

You may change the size of all waypoint marks to small or large (default), or you may turn them off.

1. Press the [MENU] key to open the menu.
2. Press the CHART SETUP and CHART DETAILS soft keys.
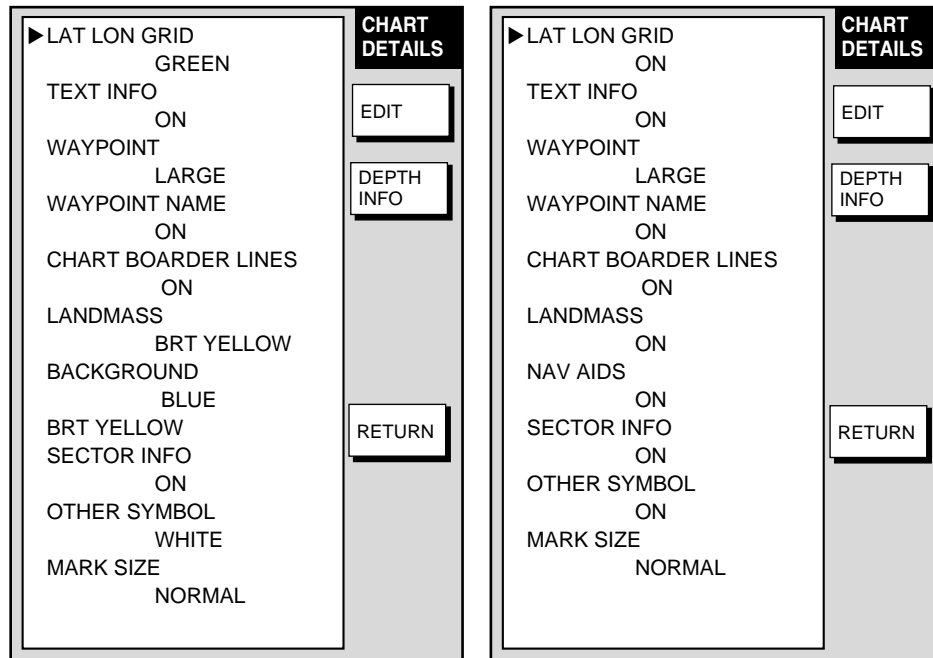
MODEL-1700C series	MODEL-1700 series

Chart details menu

3. Select WAYPOINT.
4. Press the EDIT soft key.
5. Select LARGE, SMALL or OFF.

   LARGE: Shows mark in actual shape.
   SMALL: Displays all waypoints with an "X" regardless of mark shape selected.
   OFF: Turns off all waypoints and their names. Waypoints which are part of a route are always shown regardless of this setting.

6. Press the ENTER soft key or the [ENTER] knob.
7. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.10.5 Searching waypoints

You can search for a waypoint through the alpha/numeric list as follows:

1. Press the [MENU] key.
2. Press the WAYPOINT & ROUTE, WAYPOINTS and ALPHA/NUMERIC LIST
   soft keys to show the alpha/numeric list.

Search window

Alphanumeric list

3. Use the alphanumeric keys to enter the first 1 - 3 characters in the search
   window. The waypoint searched appears at the top of the screen.
4. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.11 Routes

Often a trip from one place to another involves several course changes, requiring a series of route points (waypoints) which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route. Your unit can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly.

You can store up to 200 routes, and a route may have 35 waypoints.

3.11.1 Creating routes

Entering a route from the route list

This method constructs routes using existing waypoints.

1. Press the [MENU] key.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key to open the route menu. (No data will be shown if there is no route data entered.)

Route menu

4. Press the NEW ROUTE soft key to open the new route entry screen.

New route entry screen

5. If desired you can change the route name shown and/or add a comment. To change route name, press the [CLEAR] key to clear the route name. Use the cursor pad to locate the cursor and then use the [ENTER] knob to enter appropriate alphanumeric. To enter a comment, place the cursor in the COMMENT window. Use the cursor pad and the [ENTER] knob to enter your comment. A route name may consist of six characters; comment, 13 characters.
6. Press the LOCAL LIST or ALPH LIST soft key to open the waypoint list.
7. Select a waypoint, and press the ADD WPT soft key to add it to the route.
8. Repeat step 7 to complete the route.

   Note: To clear a waypoint, press the ERASE LST WP soft key. Each pressing of this key deletes the last waypoint entered.

9. Press the SAVE soft key to register the route.
10. Press the RETURN soft key followed by the [MENU] key to close the menu.

Entering a route with the cursor

This method allows you to construct a route directly on the plotter display, using existing waypoints or new locations. Any new location will be saved as a waypoint, under the youngest empty waypoint number.

1. Follow step 1-5 in "Entering routes through the route list."
2. Press the PLOT soft key. The plotter display appears.
3. Operate the cursor pad to place the cursor on an existing waypoint (ADD WPT soft key appears) or new location (ADD NEW WPT soft key appears).
4. Press the ADD WP soft key (or ADD NEW WPT soft key).
5. Repeat steps 3 and 4 to complete the route.
6. Push the [ENTER] knob to register the route.

3.11.2   Connecting routes

Two routes can be connected as follows:

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key.
4. Press the NEW ROUTE soft key.
5. Enter the name for new route.
6. Press the CONECT ROUTE soft key.
7. Enter the route name for the first route beneath FIRST in the CONNECT ROUTE window.

Connect route window

8. Press the F⇔R soft key to select direction to transverse the waypoints of the route, forward or reverse.
9. Enter the route name of the second route as you did for the first route.
10. Press the SAVE soft key.
11. Press the RETURN soft key followed by the [MENU] key to close the menu.

Note: The maximum number of waypoints in a route is 35. If this number is exceeded an error message appears. In this case, delete waypoints in one or both routes so the total number of waypoints does not exceed 35.

3.11.3 Inserting waypoints in a route

Inserting a waypoint from the route list

Waypoints can be inserted in routes as follows:

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key.
4. Select a route.
5. Press the EDIT ROUTE soft key. The route name screen appears.
6. Press the LOCAL LIST soft key. All waypoints in the route are displayed.

Edit route menu

7. Place the cursor at the location where you want to insert a waypoint.
8. Press the INSERT WPT soft key to show the waypoint list.

Waypoint list for editing a route (local list)

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9. Select the waypoint you want to insert. You can switch between the local list and alphanumeric list by pressing the LOCAL LIST or ALPH LIST soft key.
10. Press the SELECT WPT soft key.
11. Press the RETURN soft key followed by the [MENU] key to close the menu.

Inserting a waypoint from the plotter display

Inserting waypoints before the first waypoint or after the last waypoint

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key.
4. Select a route.
5. Press the EDIT ROUTE soft key.
6. Press the PLOT soft key to show the plotter screen.
7. Operate the cursor to place the cursor on the waypoint which you want to insert.
8. Press the ADD TO START soft key.
9. Operate the cursor pad to place the cursor on an existing waypoint (ADD WPT soft key appears) or new location (ADD NEW WPT soft key appears).
10. Press the ADD WPT soft key (ADD NEW WPT soft key).
11. Press the [ENTER] knob.

To insert a waypoint after the last waypoint, press the ADD TO END soft key at the step 8.

Inserting waypoints in an intermediate location within a route

1. Follow steps 1 through 4 in "Inserting waypoints before the first waypoint or after the last waypoint."
2. Operate the cursor pad to place the cursor on a line connecting waypoints.
3. Press the SPLIT LEG soft key. The selected line turns red.
4. Operate the cursor pad to place the cursor on an existing waypoint (INSERT WPT soft key appears) or new location (INSERT NEW WPT soft key appears).
5. Press the appropriate soft key appearing at step 4.

3.11.4 Removing waypoints from a route

Removing a waypoint from the route list

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key
4. Select a route.
5. Press the EDIT ROUTE and LOCAL LIST soft keys to show the waypoint list.
6. Select the waypoint you want to delete.
7. Press the REMOVE WPT soft key.
8. Press the RETURN soft key followed by the [MENU] key to close the menu.

Removing a waypoint from the plotter display

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key.
4. Select a route.
5. Press the EDIT ROUTE soft key.
6. Press the PLOT soft key to show the plot screen.
7. Operate the cursor pad to place the cursor on the waypoint you want to remove from the route.
8. Press the REMOVE WPT soft key.

3.11.5 Creating voyage-based routes

You can create routes based on your ship's track. This can be done automatically by time or distance, or manually. 35 waypoints may be entered. This feature is useful when you wish to retrace previous track.

How to create a voyage-based route

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the CREATE VOYAGE BASED ROUTE soft key.

Save route menu

4. Press the NEW soft key to show the new route window.
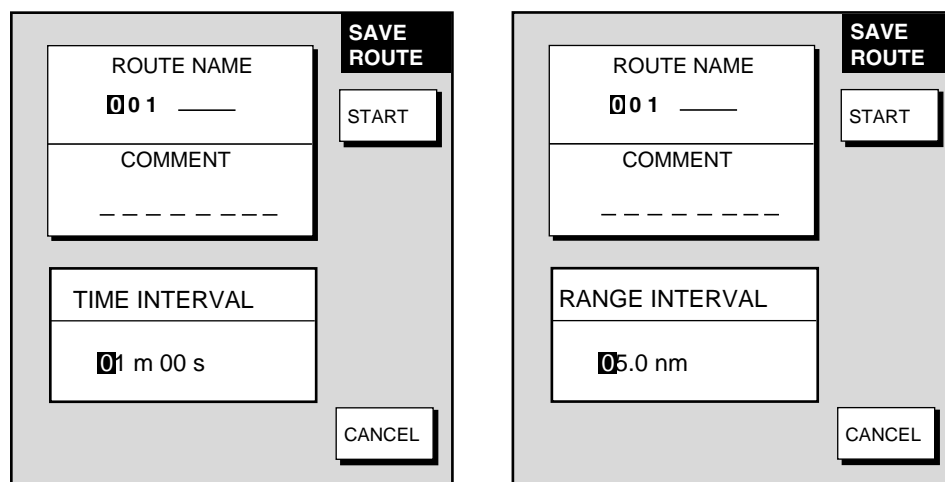
Next consecutive route number

Save route window

5. If required, you may change the route name and enter a comment. You may also enter an existing route, for which track-based waypoints will be tacked on from the last waypoint in the route.

6. Choose how to record points for your route, by time, by range or manual entry. Press one of BCKTRK TIME and BCKTRK RANGE or MANUAL soft key as appropriate. For manual go to step 7. For BCKTRK TIME, BCKTRK RANGE one of the following displays appears.

Save route menu, displays for entry of time, range interval

7. Enter interval desired and press the START and RETURN soft keys followed by the [MENU] key to close the menu.

8. For manual entry of waypoints, do the following:
    a) Press the [SAVE/MOB] key with a touch-and-release action to enter a waypoint mark at own ship position. A new waypoint is created under the next consecutive waypoint number and that waypoint is added to the route.
    b) Repeat step a) as necessary. 35 waypoints may be entered. The "SAVE" icon appears at the top of the screen when points are saved manually.

To stop recording waypoints and save the route

When 35 waypoints have been entered the message "Total 35 WPTS have been already registered in the route. Stop creating voyage based route." is displayed. In this case, follow the procedure above to stop recording waypoints and save the route as shown below. You can also stop recording waypoints at any time desired.

1. Press the [MENU] key followed by the WAYPOINT/ROUTE and CREATE VOYAGE BASED ROUTE soft keys.
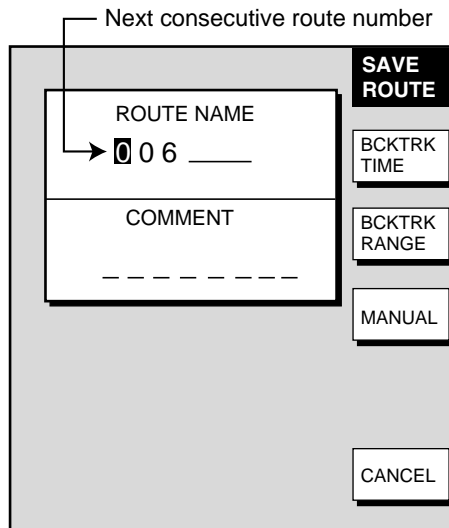2. Press the FINISH LOG soft key to register the route.

3.11.6   Erasing routes

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTES soft key.
4. Select a route.
5. Press the ERASE ROUTE soft key. You are asked if you are sure to erase the route.
6. Press the [ENTER] knob to erase the route.
7. Press the RETURN soft key followed by the [MENU] key to close the menu.

3.12   Navigation

This section shows you how to get to a desired destination by "quick points," waypoints, port services and routes.

3.12.1   Navigating to a "quick point"

The "quick point" feature allows you to navigate to point(s) without retaining the data indefinitely in your unit's memory.

Selecting quick point entry method

You need to tell your unit how to set the quick point: 1 POINT, 35 POINT (up to 35 points) or WPT/PORT SERV. (For WPT/PORT SERV, see the next page.)

1. Press the [MENU] key.
2. Press the PLOTTER SETUP soft key.
3. Select SET GO TO METHOD and press the EDIT soft key.

```
┌─────────────────────────┐
│  SET GO TO METHOD       │
│  ▲                      │
│  ⊙ 1 POINT              │
│  ○ 35 POINT             │
│  ○ WPT/PORT             │
│  ▼                      │
└─────────────────────────┘
```
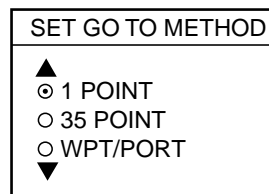
Set go to method window

4. Select 1 POINT.
5. Press the ENTER soft key.
6. Press the RETURN soft key followed by the [MENU] key to close the menu.

Navigating to a single quick point

1. Press the [MENU] key followed by the PLOTTER SETUP soft key.
2. Place the cursor on an existing waypoint (GO TO WPT soft key appears) or a new location (GO TO CURSOR soft key appears).
3. Depending on the selection you made at step, two press GO TO CURSOR or GO TO WPT soft key.

    A line (light-blue on the MODEL-1700C series) with arrows connects between own ship and destination, marked "QP<01>," and it shows the shortest course to the destination. Arrows on the line show the direction to follow to get to the quick point. Range and bearing from own ship to the destination appear at the top of screen. This location is saved to the waypoint list as waypoint "QP01."

Navigating to multiple quick points

1. Press the [MENU] key followed by the PLOTTER OPTION soft key.
2. Press the GO TO soft key.
3. Place the cursor on an existing waypoint (SELECT WPT soft key appears) or a new location ADD QP soft key appears).

3. PLOTTER OPERATION

4. Depending on the action taken at step 3 press the SELECT WPT soft key or ADD QP. "QP<01>" appears at the cursor location. To erase last-entered waypoint press the ERASE LST WPT soft key.
5. Repeat steps 3 and 4 to complete the route.
6. Push the [ENTER] knob to finish.

A line (light-blue on the MODEL-1700C series) with arrows connects between own ship and all quick points, and it shows the shortest course to destination. Arrows on the line show the direction to follow to get to your destination. Quick points are numbered in sequential order from QP<01> and are saved to the waypoint list. Range and bearing from own ship to the first destination appear at the top of screen. The points are saved as a route, under the name "Q>RTE" (Quick Route).

3.12.2 Navigating to waypoints

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the WAYPOINTS soft key to open the waypoint menu.
4. Press the LOCAL LIST or ALPHA/NUMERIC LIST soft key to show corresponding waypoint list.
5. Select a waypoint.
6. Press the GO TO soft key.

The plotter display appears. A line (light-blue on the MODEL-1700C series) runs between destination selected and own ship's position. Arrows on the line show the direction to the follow to get to the waypoint. Waypoint data appears at the top of screen.

3.12.3 Navigating to ports, port services

Some Nav-Charts™ and C-MAP have a port service list, shown at the top of the screen, which shows services available at ports or harbors. (See page 3-4.) You can use the list to set destination as follows:

1. Press the [MENU] key followed by the PLOTTER OPTION soft key.
2. Press the DISPLAY OPTIONS soft key.
3. Select SET GO TO METHOD and press the EDIT soft key. The following display appears.

```
SET GO TO METHOD

▲
⊙ 1 POINT
○ 35 POINT
○ WPT/PORT
▼
```

Set go to method window

4. Select WPT/PORT.
5. Press the ENTER soft key or [ENTER] knob.

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6. Press the [MENU] key to close the menu and return to the plotter display. Soft key titles change as in the figure below.
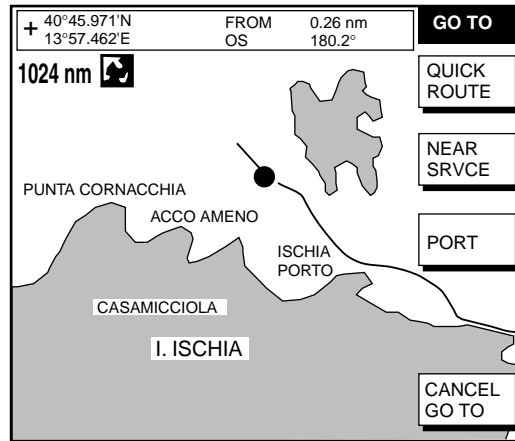
Plotter display

7. Press the PORT or NEAR SRVICE soft key depending on objective. PORT shows a list of ports in your area. NEAR SRVICE displays the port service list.

Port services

SELECT PORT
▶ ACCIAROLI
 ACQUAMORTA
 AGNONE S. NICOLA
 AGROPOLI
 AMALFI
 BAIA
 CAPRI
 CASA MICCIOLA-ISCHIA
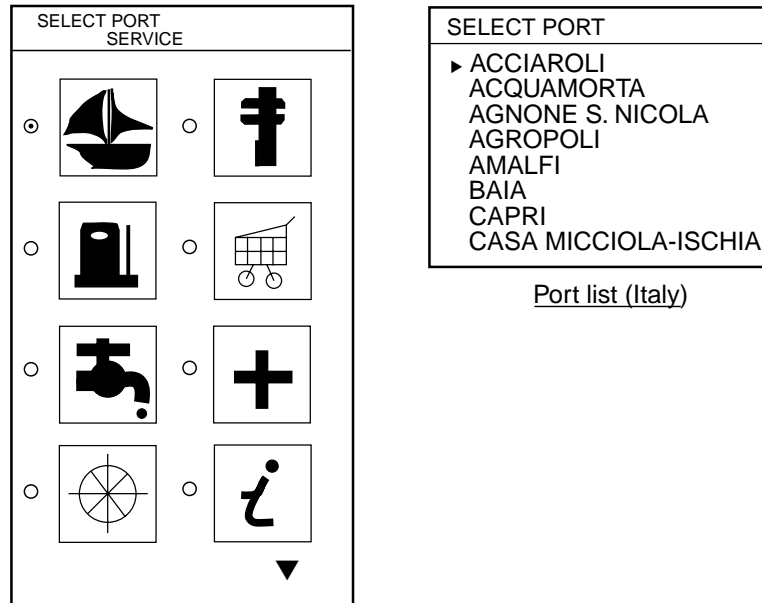
Port list (Italy)

Port services and sample port list

8. **If you selected PORT at step 7,** use the Omnipad to select a port and press the ENTER soft key. Make a route using the soft keys and press the [ENTER] knob. (If you want to go directly to that port, simply press the ADD QP soft key followed by the [ENTER] knob.)

    If you selected NEAR SERVICE at step 7, select service mark desired and then press the ENTER soft key. Then, the display shows the locations of those services nearest you. (The figure below shows location of filling stations in an area in southern Italy.) Place the "hand cursor" on the port service icon desired and press the ENTER soft key. Make a route using the soft keys and push the [ENTER] knob. (If you want to go directly to location selected, simply press the ADD QP soft key followed by the [ENTER] knob.)
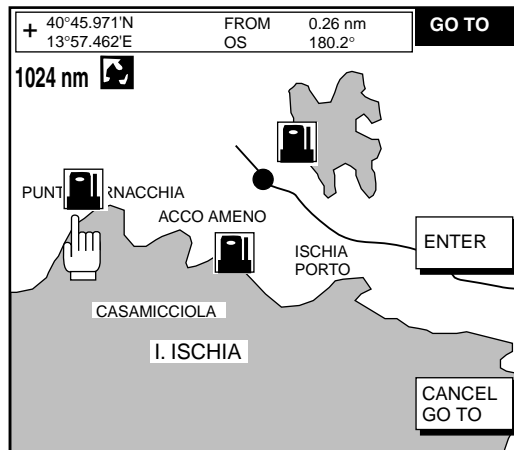
Sample filling station locations (southern Italy)

2.12.4   Following a route

Selecting the route to follow
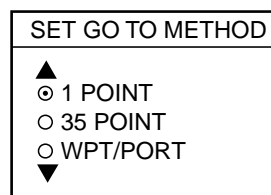
1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the ROUTE soft key to open the route list.
4. Select a route.
5. Press the GO TO soft key to show the plotter display. The cursor is on the route waypoint nearest own ship.
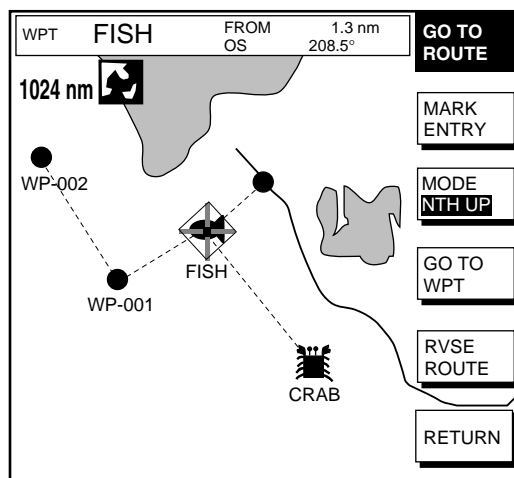
Plotter display, route selected as destination

6. Operate the cursor pad to place the cursor on the waypoint or leg desired in the route.
7. Press the GO TO WPT or FOLLOW LEG soft key (depending on the action taken at step 6).

Green lines connect all route waypoints and arrows on the lines point in the direction to traverse the route.

Navigating route waypoints in reverse order

Press the RVSE ROUTE soft key to reverse the order to traverse waypoints. The arrows on the route line point in direction selected.

<u>Navigating directly to a route waypoint</u>

If you want to go directly to a route waypoint, place the cursor on the waypoint to show the flashing diamond, and then press the GO TO WPT soft key.

<u>Navigating along specific leg of route</u>

Place the cursor on the leg to display it in a white and red flashing line, and then press the FOLLOW LEG soft key.

Restarting navigation

When you steer to avoid an obstacle or the vessel drifts, you may go off your intended course (Line 1 in the figure below). Use the steering or highway display to return to course.

Also, if you don't need to return to the original course, you can go directly to the waypoint (Line 2 in the figure below) using the restart function as on the next page.
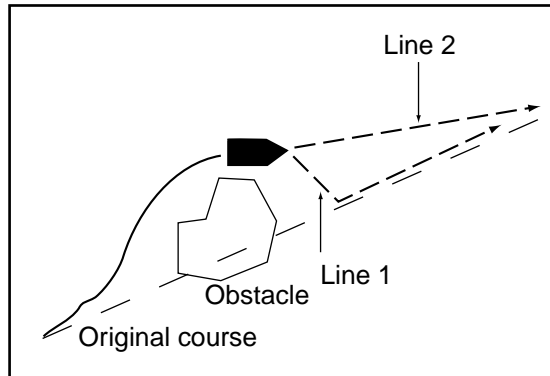
Example of when to restart navigation

1. Set a destination.
2. Press the [MENU] key to open the menu.
3. Press the WAYPOINT/ROUTE soft key.
4. Press the LOG soft key.

TO Waypoint (WPT no. in reverse video)

Passed waypoint (gray characters)

Estimated Time of Arrival at destination
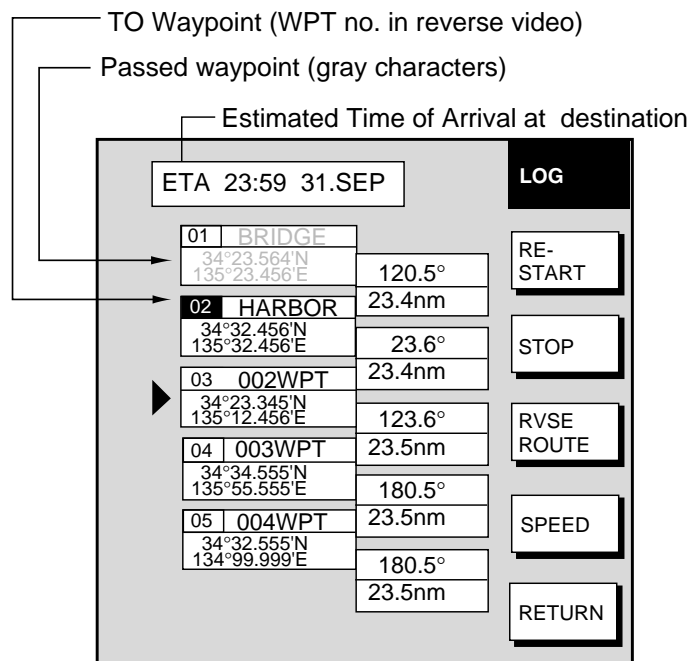
Log display

5. Press the RESTART soft key.

Setting speed for ETA calculation

Speed, which may be input manually or automatically, is required to calculate ETA (Estimated Time of Arrival) to a waypoint.

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the LOG soft key.
4. Press the SPEED soft key.

```
┌─────────────────────┐
│   SELECT SPEED      │
│      FOR ETA        │
│ ▲                   │
│ ⊙ SPD  10.0kt       │
│ ○ GPS AVG SPD       │
│ ▼                   │
└─────────────────────┘
```

Select speed for ETA window

5. Key in speed manually in the SPD field, or use GPS speed data by selecting GPS AVG SPD.
6. Press the ENTER soft key to register your selection.

Switching waypoints

When you arrive to a waypoint on a route, you can switch to the next waypoint three ways: AUTO1, AUTO2 and MANUAL.

AUTO1: Automatically switches the TO waypoint when your boat is within the arrival alarm area. For how to set the arrival alarm area, see "9.3 Arrival Alarm".

AUTO2: Automatically switches the TO waypoint when the boat enters the arrival alarm range or the boat passes an imaginary perpendicular line passing through the center of the destination waypoint.

MANUAL: When the boat enters the arrival alarm area, the TO waypoint may be switched by using the RESTART soft key (on the LOG display). If the arrival alarm is not set, the waypoint will not be switched. To be alerted when you arrive at a waypoint turn on the audio alarm, on the alarm menu.

To select waypoint switching method do the following:

1. Press the [MENU] key.
2. Press the PLOTTER OPTION soft key.
3. Press the DISPLAY OPTION soft key.
4. Select WAYPOINTS SW.
5. Press the EDIT soft key to show the waypoint sw window.
6. Select appropriate waypoint switching method; AUTO1, AUTO2, or MANUAL.
7. Press the ENTER soft key to close the window.

Cancelling route navigation

1. Press the [MENU] key to open the menu.
2. Press the WAYPOINT/ROUTE soft key.
3. Press the LOG soft key.
4. Press the STOP soft key.
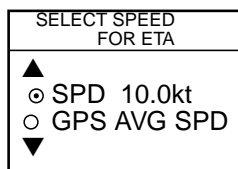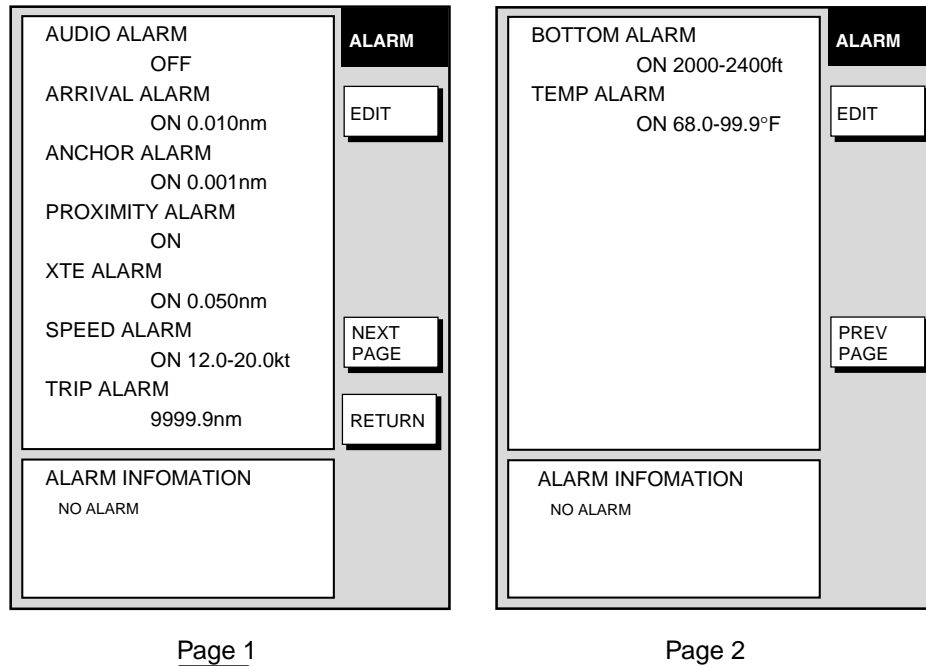5. Push the [ENTER] knob.
6. Press the RELEASE soft key.
7. Push the [ENTER] knob.

3.13 Alarms

The plotter section has eight conditions which generate both audible and visual alarms: Arrival alarm, Anchor Watch alarm, XTE (Cross Track Error) alarm, Proximity alarm, and Speed alarm, and Trip Alarm, Water Temperature Alarm and Bottom Alarm. (The bottom and water temperature alarms require depth and water temperature data respectively, via the blackbox echo sounder.)

The alarm menu may be displayed by pressing the [ALARM] key.

AUDIO ALARM
    OFF
ARRIVAL ALARM
    ON 0.010nm
ANCHOR ALARM
    ON 0.001nm
PROXIMITY ALARM
    ON
XTE ALARM
    ON 0.050nm
SPEED ALARM
    ON 12.0-20.0kt
TRIP ALARM
    9999.9nm
	ALARM
	
	EDIT
	
	NEXT PAGE
	
	RETURN
			BOTTOM ALARM
			    ON 2000-2400ft
			TEMP ALARM
			    ON 68.0-99.9°F
				ALARM
				
				EDIT
				
				PREV PAGE

ALARM INFOMATION NO ALARM			ALARM INFOMATION NO ALARM	

<u>Page 1</u>   <u>Page 2</u>

Plotter alarm menu

3.13.1 Audio alarm on/off

The audio alarm sounds whenever an alarm setting is violated. You can enable or disable the audio alarm as follows:

1. Press the [ALARM] key to show the alarm menu.
2. Select AUDIO ALARM.
3. Press the EDIT soft key to show the audio alarm window.

```
AUDIO ALARM
▲
⊙ INT+EXT
○ INT
○ OFF
▼
```
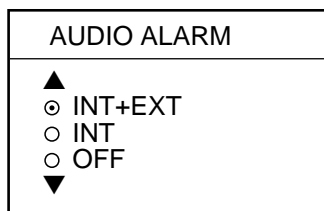
Audio alarm window

4. Select INT+EXT (Internal + External alarm), INT (Internal alarm) or OFF.
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.

3.13.2 Arrival alarm

The arrival alarm informs you that your boat is approaching a destination waypoint. The area that defines an arrival zone is that of a circle which you approach from the outside of the circle. The alarm will be released if your boat enters the circle. When the arrival alarm is active a red dashed circle marks the arrival alarm area.

How the arrival alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Select ARRIVAL ALARM.
3. Press the EDIT soft key to show the arrival alarm window.
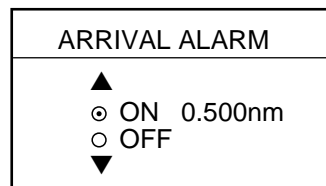
Arrival alarm window

4. Select ON.
5. Operate the cursor pad to place the cursor on the digit desired.
6. Use the [ENTER] knob to set the alarm range desired. The arrival alarm range is 0.001 to 9.999 miles.
7. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.3 Anchor watch alarm

The anchor watch alarm informs you that your boat is moving when it should be at rest. When the anchor watch is active, a red dashed circle marks the anchor watch area.

How the anchor watch alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Select ANCHOR ALARM.
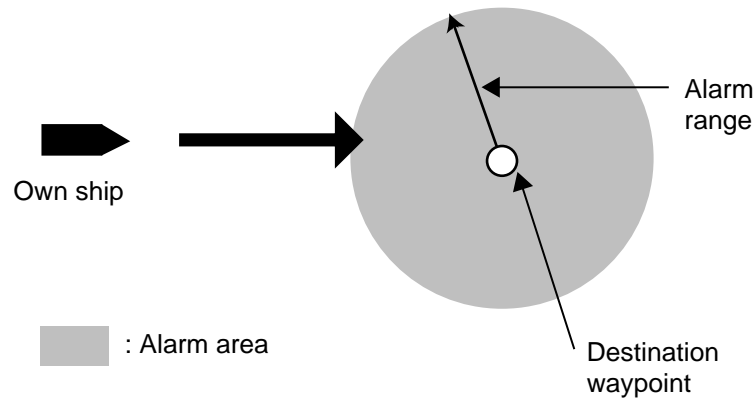3. Press the EDIT soft key to open the anchor alarm window.

Anchor watch alarm window

4. Select ON.
5. Use the [ENTER] knob to set the alarm range desired. The anchor watch range is 0.001 to 9.999 miles.
6. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.4 XTE (Cross Track Error) alarm

The XTE alarm warns you when your boat is off its intended course. When the XTE alarm is active two red dashed lines mark the XTE alarm area.

How the XTE alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Select XTE ALARM.
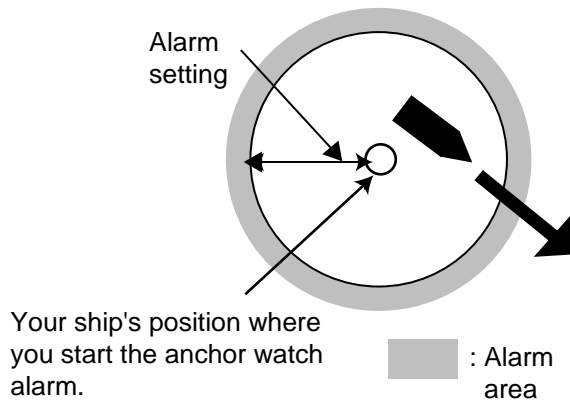3. Press the EDIT soft key to open the XTE alarm window.

```
┌─────────────────────────┐
│   XTE ALARM             │
├─────────────────────────┤
│ ▲                       │
│ ⊙ ON   0.100nm          │
│ ○ OFF                   │
│ ▼                       │
└─────────────────────────┘
```

XTE alarm window

4. Select ON.
5. Use the [ENTER] knob to set the alarm range desired. The XTE alarm range is 0.001 to 9.999 miles.
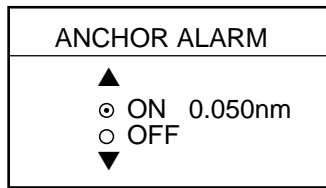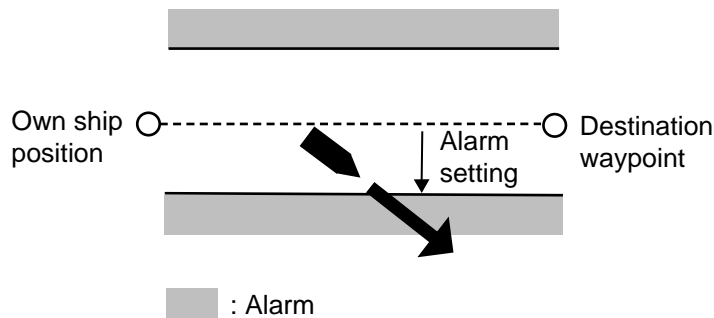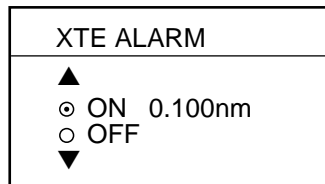6. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.5 Speed alarm

The speed alarm warns when your boat's speed is within, over/under or under the speed range set.

1. Press the [ALARM] key to open the alarm menu.
2. Select SPEED ALARM.
3. Press the EDIT soft key to display the speed alarm window.

```
┌─────────────────────────────┐
│      SPEED ALARM            │
├─────────────────────────────┤
│ ▲                           │
│ ⊙ WITHIN    ▊5.0 ~ 15.3 kt  │
│ ○ OVER/UNDER                │
│ ○ OFF                       │
│ ▼                           │
└─────────────────────────────┘
```

Speed alarm window

4. Select WITHIN, OVER/UNDER, or OFF.
5. Use the [ENTER] knob to set the alarm range desired.
6. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.6 Proximity alarm

The proximity alarm alerts you when your vessels nears a waypoint by the distance set for that waypoint on the waypoint list. You can globally activate or deactivate the proximity alarm here. Waypoints whose proximity alarm is active have a (⊘) mark near them.

1. Press the [ALARM] key to open the alarm menu.
2. Select PROXIMITY ALARM.
3. Press the EDIT soft key to show the proximity alarm window.

```
┌─────────────────────────┐
│   PROXIMITY ALARM       │
├─────────────────────────┤
│ ▲                       │
│ ⊙ ON                    │
│ ○ OFF                   │
│ ▼                       │
└─────────────────────────┘
```

Proximity alarm window

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4. Select ON or OFF by the Omnipad.
5. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.7   Trip alarm

The trip alarm informs you when you traveled a certain distance.

1. Press the [ALARM] key to open the alarm menu.
2. Select TRIP ALARM.
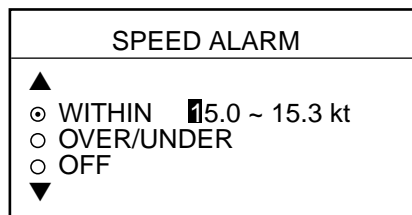3. Press the EDIT soft key to show the trip alarm window.

```
┌────────────────────────┐
│  TRIP ALARM            │
├────────────────────────┤
│  ▲                     │
│  ⊙ ON   ▊0000          │
│  ○ OFF                 │
│  ▼                     │
└────────────────────────┘
```

Trip alarm window

4. Select ON by the cursor pad.
5. Use the [ENTER] knob to set the alarm range desired.
6. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.8   Bottom alarm

The bottom alarm sounds when the bottom echo is within the alarm range set. To activate the bottom alarm the depth must be displayed. This function requires depth data, via the blackbox echo sounder

1. Press the [ALARM] key to open the alarm menu.
2. Select BOTTOM ALARM.
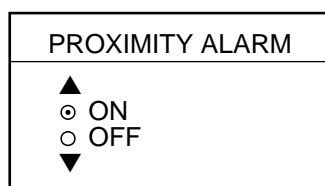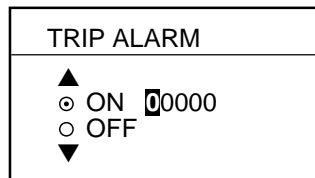3. Press the EDIT soft key to display the speed alarm window.

```
┌──────────────────────────────┐
│      BOTTOM ALARM            │
├──────────────────────────────┤
│ ▲                            │
│ ⊙ ON    ▊0000.0-0000.0ft     │
│ ○ OFF                        │
│ ▼                            │
├──────────────────────────────┤
│ LIMIT: -0-9999.9ft           │
│ DEFAULT: 0ft                 │
└──────────────────────────────┘
```

Bottom alarm window

4. Select ON or OFF.
5. If you selected ON at step 4, use the [ENTER] knob to set the alarm range desired.
6. Press the ENTER soft key or the [ENTER] knob to finish.

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3.13.9 Water temperature alarm

There are two types of water temperature alarms: WITHIN and WITHOUT. The WITHIN alarm sounds when the water temperature is within the range set; the WITHOUT alarm sounds when the water temperature is higher or lower than the range set. This function requires water temperature data via the black box echo sounder.

1. Press the [ALARM] key to open the alarm menu.
2. Select TEMP. ALARM.
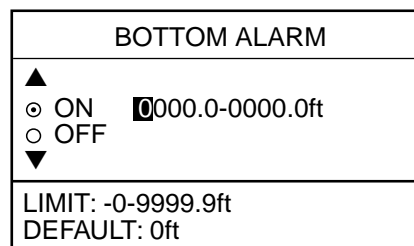3. Press the EDIT soft key to display the speed alarm window.

```
            TEMP. ALARM
  ▲
  ⊙ WITHIN
          0000.0-0000.0ft
  ○ WITHOUT
  ○ OFF
  ▼
 ─────────────────────────────
  LIMIT: -999.9 - 999.9˚F
  DEFAULT: 0 - 0˚F
```
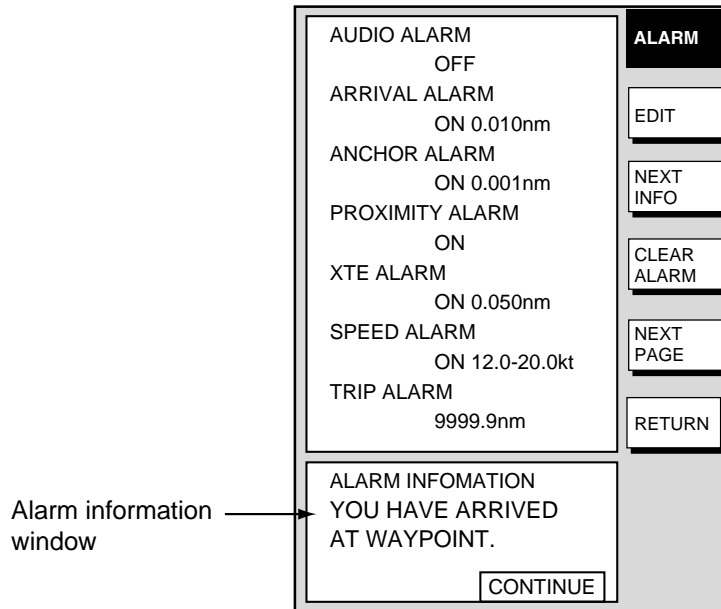
Temperature alarm window

4. Select ON or OFF.
5. If you selected ON at step 4, use the [ENTER] knob to set the alarm range desired.
6. Press the ENTER soft key or the [ENTER] knob to finish.

3.13.10 Alarm information

When an alarm setting has been violated the buzzer sounds and the speaker icon appears. You can see which alarm has been violated, as well as silence the buzzer, on the alarm menu display. In the example below the arrival alarm has been violated.

1. Press the [ALARM] key.

```
┌─────────────────────────┬──────────┐
│ AUDIO ALARM             │ ALARM    │
│         OFF             │          │
│ ARRIVAL ALARM           │ ┌──────┐ │
│         ON 0.010nm      │ │ EDIT │ │
│ ANCHOR ALARM            │ └──────┘ │
│         ON 0.001nm      │ ┌──────┐ │
│ PROXIMITY ALARM         │ │ NEXT │ │
│         ON              │ │ INFO │ │
│ XTE ALARM               │ └──────┘ │
│         ON 0.050nm      │ ┌──────┐ │
│ SPEED ALARM             │ │ CLEAR│ │
│         ON 12.0-20.0kt  │ │ ALARM│ │
│ TRIP ALARM              │ └──────┘ │
│         9999.9nm        │ ┌──────┐ │
│                         │ │ NEXT │ │
│                         │ │ PAGE │ │
├─────────────────────────┤ └──────┘ │
│ ALARM INFOMATION        │ ┌──────┐ │
│ YOU HAVE ARRIVED        │ │RETURN│ │
│ AT WAYPOINT.            │ └──────┘ │
│            ┌──────────┐ │          │
│            │ CONTINUE │ │          │
└────────────┴──────────┴─┴──────────┘
```

Alarm information window →

Alarm menu

2. Press the CLEAR ALARM soft key to silence the buzzer. For the MODEL-1700C the color of the alarm message and the speaker icon change from red to black.

Note: The speaker icon is displayed until all alarms have been acknowledged on the alarm menu display. If more than one alarm has been violated the message CONTINUE appears at the bottom of the display. In this case press the NEXT INFO soft key to see which other alarms have been violated.

Alarm messages

The table below shows the plotter alarm messages and their meanings

Alarm messages and their meanings

| Message	Meaning
YOU HAVE ARRIVED AT WAYPOINT.	Arrival alarm violated.
YOU HAVE EXCEEDED ANCHOR WATCH LIMIT.	Anchor watch alarm violated.
YOU'VE ENTERED AN AVOIDANCE AREA.	Proximity alarm violated.
YOU HAVE EXCEEDED XTE LIMIT.	XTE alarm violated.
YOU HAVE EXCEED BOTTOM ALARM LIMIT	Bottom alarm violated
YOU HAVE EXCEED TEMPERATURE ALARM LIMIT	Water temperature alarm violated.
YOU HAVE EXCEEDED SPEED ALARM LIMIT.	Speed alarm violated.

4. VIDEO SOUNDER OPERATION

With connection of the blackbox echo sounder you can display echo sounder images on the display.

4.1 Principle of Operation

The video sounder determines the distance between its transducer and underwater objects such as fish, lake bottom or seabed and displays the results on screen. It does this by utilizing the fact that an ultrasonic wave transmitted through water travels at a nearly constant speed of 4800 feet (1500 meters) per second. When a sound wave strikes an underwater object such as fish or sea bottom, part of the sound wave is reflected back toward the source (transducer). Thus by calculating the time difference between the transmission of a sound wave and the reception of the reflected sound wave, the depth to the object can be determined.

The entire process begins in the display unit. Transmitter power is sent to the transducer as a short pulse of electrical energy. The electrical signal produced by the transmitter is converted into an ultrasonic signal by the transducer and transmitted into the water. Any returning signals from intervening objects (such as a fish school) are received by the transducer and converted into an electrical signal. The signals are then amplified in the amplifier section, and finally, displayed on screen.

The picture displayed is made up of a series of vertical scan lines, one for each transmission. Each line represents a snapshot of what has occurred beneath the boat. A series of snapshots are accumulated side by side across the screen, and the resulting contours of the bottom and fish between the bottom and surface are displayed.
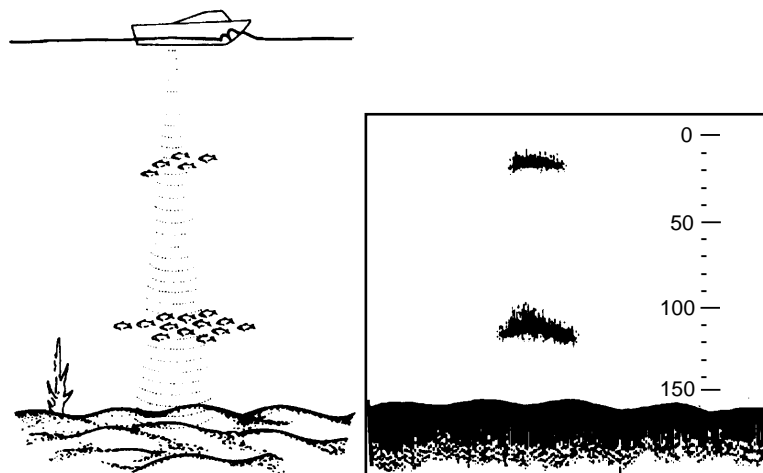
Underwater conditions and video sounder display
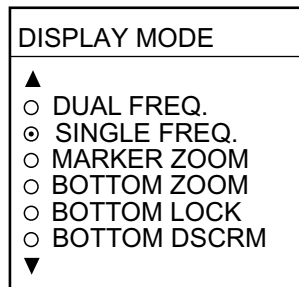
4.2   Sounder Displays

The figure below shows all indications and markers which may appear on the normal sounder display.

4.2.1   Selecting a sounder display

There are six display modes from which to choose: dual frequency, single frequency (normal), marker zoom, bottom zoom, bottom lock bottom discrimination, and a-scope (available only with single and dual frequency displays).

To select a display;

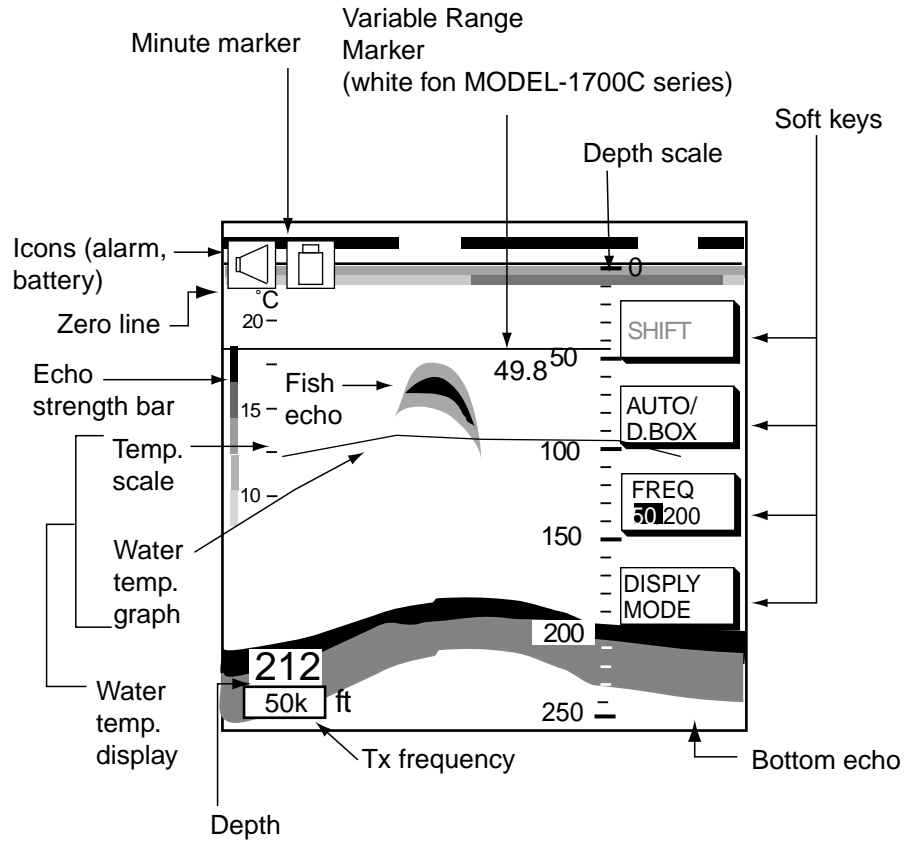1. Press the DISPLY MODE soft key to show the display mode window.

```
┌─────────────────────────┐
│ DISPLAY MODE            │
├─────────────────────────┤
│ ▲                       │
│ ○ DUAL FREQ.           │
│ ⊙ SINGLE FREQ.         │
│ ○ MARKER ZOOM          │
│ ○ BOTTOM ZOOM          │
│ ○ BOTTOM LOCK          │
│ ○ BOTTOM DSCRM         │
│ ▼                       │
└─────────────────────────┘
```

Display mode window

2. Use the cursor pad to select the display.
3. Press the RETURN soft key to close the window.

4.2.2   Description of sounder displays

Single frequency display (normal display)

Indications on the single frequency display

Note: The water temperature graph can be turned on or off.

Selecting transmission frequency

The single frequency display shows either the 50 kHz picture or 200 kHz picture. To select transmission frequency, press the FREQ 50/200 soft key. "50" or "200" is highlighted on its key label with each pressing of the key.

50 kHz picture

The sounder uses ultrasonic pulses to detect bottom conditions. The lower the frequency of the pulse, the wider the detection area. Therefore, the 50 kHz frequency is useful for general detection and judging bottom condition.

200 kHz picture

The higher the frequency of the ultrasonic pulse the better the resolution. Therefore, the 200 kHz frequency is ideal for detailed observation of fish school.
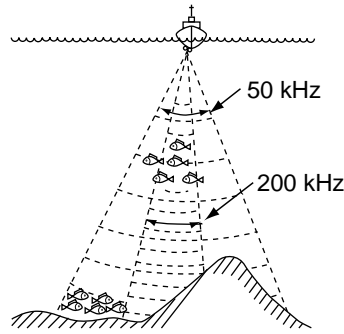
*Sounding area and transmission frequency*

Marker-zoom display

The marker-zoom display expands a selected area of the normal sounder picture to full vertical size of the screen on the left-half window. You may specify the portion to expand by operating the VRM (Variable Range Marker), which you can shift with the cursor pad. The area between the VRM and zoom marker is expanded. The length of the segment is equal to one division of the depth scale.
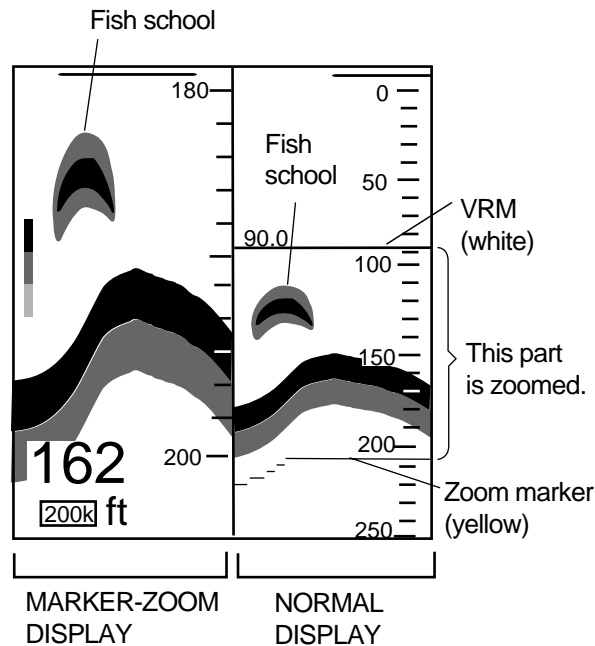
Marker-zoom display plus normal sounder display

Bottom-zoom display

The bottom-zoom display expands bottom and bottom fish echoes two to five times to vertical size of the screen, and is useful for determining bottom hardness. A bottom displayed with a short echo tail usually means it is a soft, sandy bottom. A long echo tail means a hard bottom.
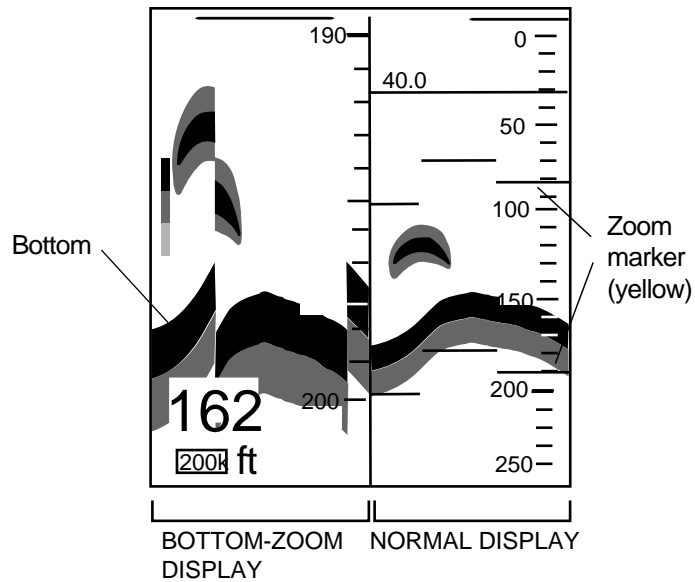
Bottom-zoom display plus normal sounder display

Bottom-lock display

The bottom-lock display provides a compressed normal picture on the right half of the screen and a 5 or 10 meter (10 or 20 feet) wide layer in contact with the bottom is expanded onto the left half of the screen. This mode is useful for bottom discrimination.
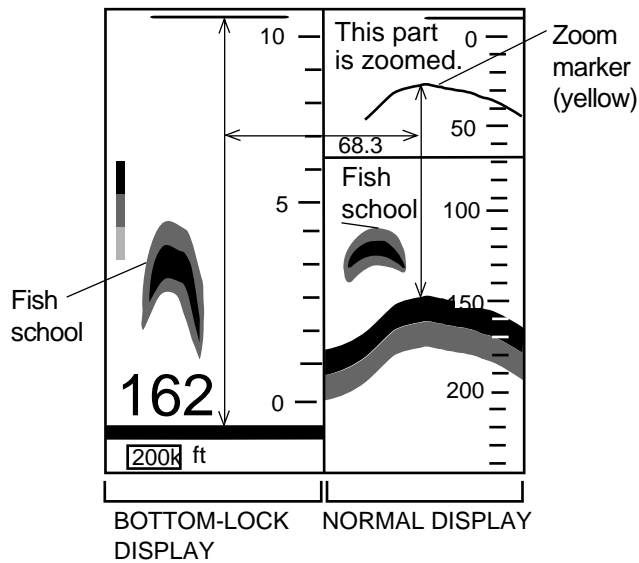

Bottom-lock display plus normal sounder display

Note: The zoom marker is not displayed in the default setting. It may be turned on from the SOUNDER menu.

A-scope display (display only)

The A-scope display shows echoes at each transmission with amplitudes and tone proportional to their intensities, on the right 1/3 of the screen. It is useful for estimating fish species and seabed composition. To show the A-scope display first select SINGLE FREQ. or DUAL FREQ. with the DISPLY MODE soft key and then press the A-SCOPE soft key to show A-SCOPE ON.
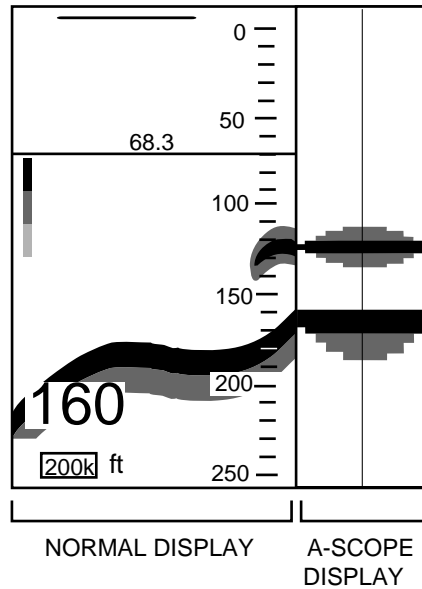
A-scope display

Bottom discrimination display

The bottom discrimination display expands the bottom echo to let you discriminate bottom fish from the bottom echo.
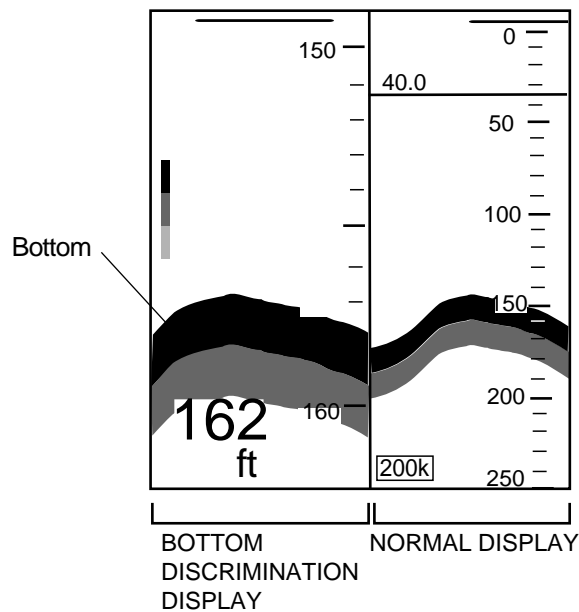
Bottom discrimination display

Dual-frequency display

The 50 kHz picture appears on the left; the 200 kHz picture on the right. This display is useful for comparing the same picture with two different sounding frequencies.
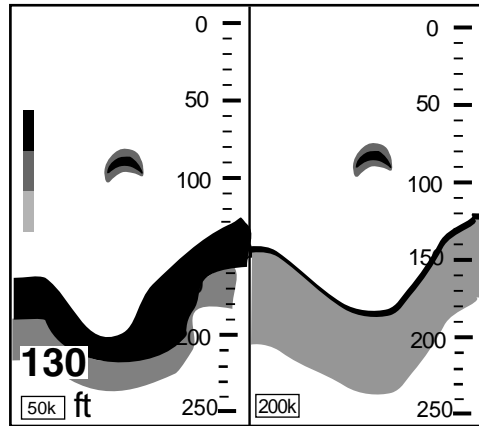
Dual-frequency display

4.2.3 Selecting screen split method in combination displays

On combination displays you can split the screen vertically or horizontally, using the SPLIT soft key as below.
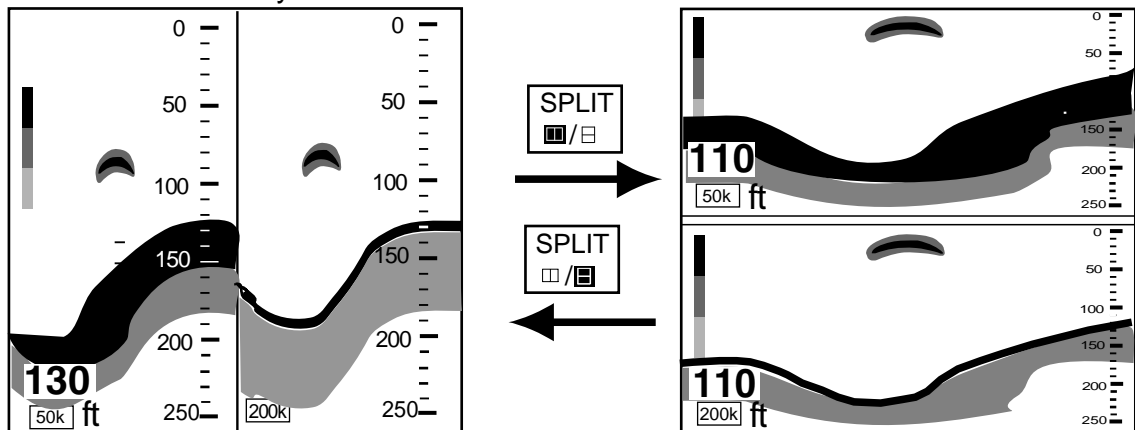
How to use the SPLIT soft key (example: dual frequency display)

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4.3 Automatic Sounder Operation

Automatic sounder operation is useful when you are preoccupied with other tasks and do not have time to adjust the display.

4.3.1 How the automatic sounder works

The automatic sounder function automatically selects the proper gain, range scale and clutter suppression level according to depth. It works as follows:
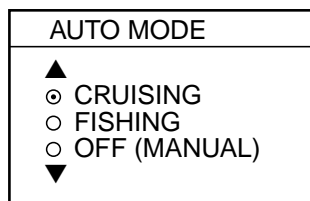
- Range changes automatically to locate the bottom on the lower half of screen. It jumps to one step shallower range when bottom echoes reach a half way point of the full scale from top and to one step deeper range when they come to the lower edge of scale.

- The gain is automatically adjusted to display the bottom echo in reddish brown (default color arrangement).

- Clutter, which suppresses low level noise, is automatically adjusted.

4.3.2 Types of automatic sounder modes

Two types of automatic sounder modes are available: CRUISING and FISHING. CRUISING is for tracking the bottom, and FISHING is for searching fish schools. CRUISING uses a higher clutter rejection setting than FISHING therefore it is not recommended for fish detection - weak fish echoes may be erased by the clutter suppression circuit.

4.3.3 How to enable automatic sounder operation

1. Press the MODE/D. BOX soft key

```
┌─────────────────────┐
│ AUTO MODE           │
│ ▲                   │
│ ⊙ CRUISING          │
│ ○ FISHING           │
│ ○ OFF (MANUAL)      │
│ ▼                   │
└─────────────────────┘
```

Mode/frequency window

2. Use the cursor pad to select CRUISING or FISHING, respectively.
3. Press the RETURN soft key to close the window automatically, or wait 10 seconds and the window closes automatically.

4.4 Manual Sounder Operation

Manual operation is useful for observing fish schools and bottom using fixed gain setting.

The gain, range and range shifting functions used together give you the means to select the depth you can see on screen. The basic range can be thought of as providing a "window" into the water column and range shifting as moving the "window" to the desired depth.

4.4.1 Selecting the manual mode

1. Press the MODE/D. BOX soft key to show the mode/freq window.
2. Select OFF (MANUAL).
3. Press the RETURN soft key.

4.4.2 Selecting display range

Press the [RANGE +] or [RANGE -] key to select a range.

4.4.3 Adjusting the gain

Normally, set the gain to the point where excessive noise does not appear on screen. Use a higher gain setting for greater depths and a lower setting for shallow waters.
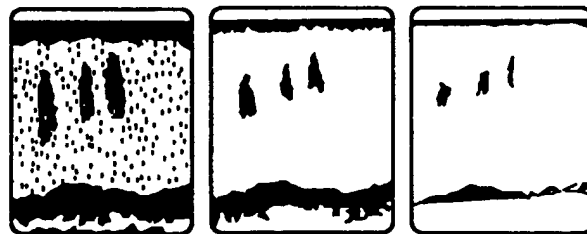
Gain too high   Gain proper   Gain too low
Examples of proper and improper gain

Press the [GAIN] key to show the gain window, and use the cursor pad to set the gain. Current level is shown above the bar. Press the RETURN key or the [GAIN] key to finish.

Gain window

4-9
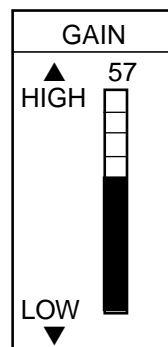
Note1: On the dual-frequency display, the gain can be independently set for 50 kHz and 200 kHz. Use the FREQ soft key to select frequency for which to adjust gain

Note2: Gain cannot be adjusted in the automatic sounder mode. The message "SOUNDER GAIN CANNOT BE ADJUSTED IN AUTO MODE" is displayed when you attempt to do so.

4.4.4 Range shifting

The basic range may be shifted up or down as desired with SHIFT soft key.

Shift concept
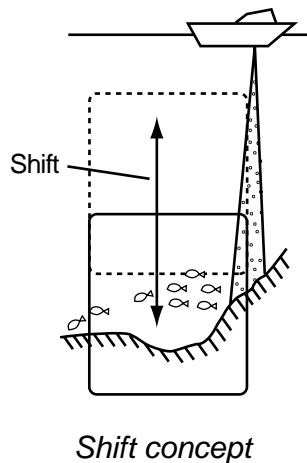
4.5 Measuring Depth, Range

4.5.1 Measuring depth with the VRM

The VRM functions to measure the depth to fish schools, etc.

1. Rotate the [ENTER] knob to shift the VRM; clockwise rotation to shift It downward, counterclockwise rotation to shift it upward. You may also use the cursor pad to shift the VRM.
2. Depth is shown just above the VRM.

4.5.2 Measuring depth, range with the cross-hair cursor

A cross-hair cursor is provided to measure the depth and range to an object This function is not available on the bottom zoom or A-scope display.

1. Press the cursor pad to show the cross cursor on the screen.
2. Use the cursor pad to position the cross-hair cursor
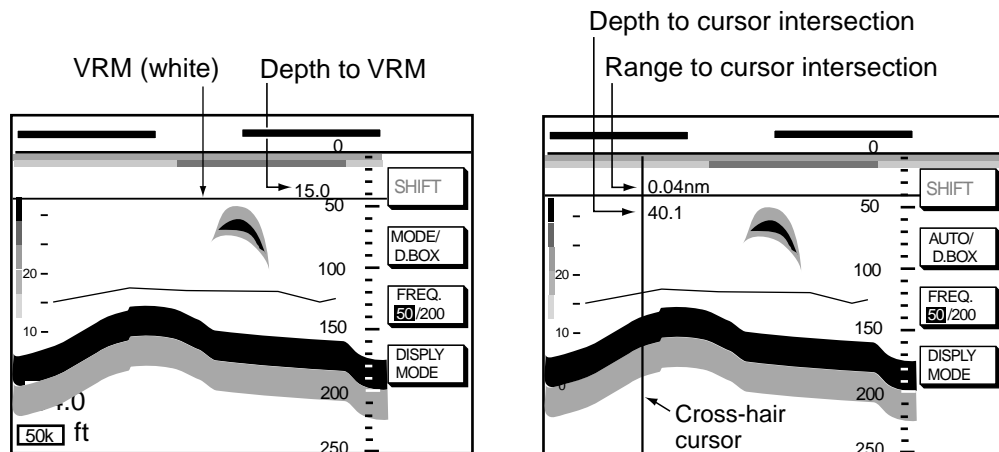
How to use the VRM, cross-hair cursor

4.6 Reducing Interference

Interference from other acoustic equipment operating nearby or other electronic equipment on your boat may show itself on the display as shown below.
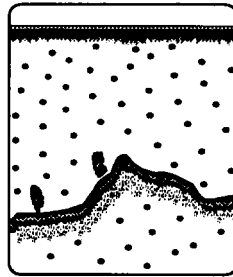
Interference from   Electrical inteference
other sounder

Types of interference

To reduce interference, do the following:

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select NOISE LIMITER and press the EDIT soft key to show the noise limiter window.

```
NOISE LIMITER
▲
⊙ OFF
○ LOW
○ MEDIUM
○ HIGH
▼
```
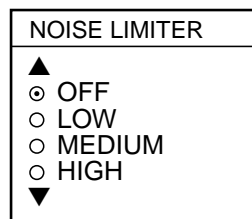
Noise limiter window

3. Use the cursor pad to select degree of suppression desired or turn the noise limiter off.
4. Press the RETURN soft key to finish.

Turn the noise limiter circuit off when no interference exists, otherwise weak echoes may be missed.

4.7   Reducing Low Level Noise

Light-blue dots may appear over most of screen. This is mainly due to dirty water or noise. This noise can be suppressed by adjusting CLUTTER on the SOUNDER menu.

Appearance of clutter

When the sounder mode is Auto, the clutter suppression setting is fixed at AUTO. To reduce low level noise in manual sounder operation do the following:

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select CLUTTER and press the EDIT soft key to show the clutter window.

Clutter window

3. Use the cursor pad to select clutter rejection level desired; 0 (OFF) through 9. The higher the number the higher the degree of suppression. Note that weak echoes may not be displayed when the clutter circuit is on. Therefore turn off the clutter when its use is not required.
4. Press the RETURN soft key to finish.

4.8   Erasing Weak Echoes (MODEL-1700C series)

Dirty water or reflections from plankton may be painted on the display in green or light blue. These weak echoes may be erased as follows:
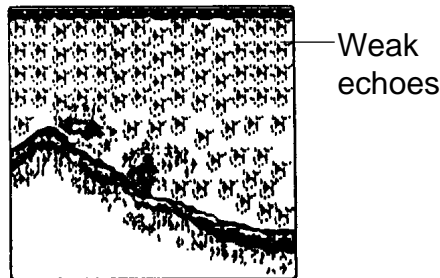
Appearance of weak echoes

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select SIGNAL LEVEL, and press the EDIT soft key to show the signal level window.
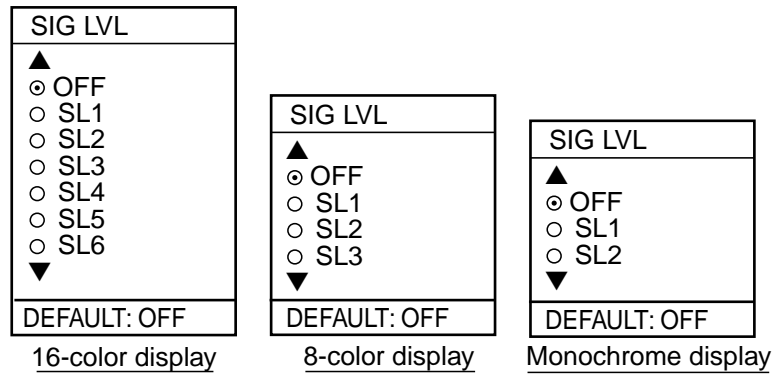
Signal level window

3. Use the cursor pad to select level of erasure or OFF as appropriate. The higher the number the stronger the echo that will be erased.
4. Press the RETURN soft key to finish.

4.9   White Marker (MODEL-1700C series)

The white marker functions to display a particular echo color in white. For example, you may want to display the bottom echo (reddish-brown) in white to discriminate fish echoes near the bottom. Note that the bottom must be displayed in reddish-brown for the white marker to function.

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select WHITE MARKER, and press the EDIT soft key to open the white marker window.

WHITE MARKER	WHITE MARKER
▲	▲
OFF	OFF
▼	▼
LIMITS: OFF, 1-8	LIMITS: OFF, 1-16
8-color display	16-color display
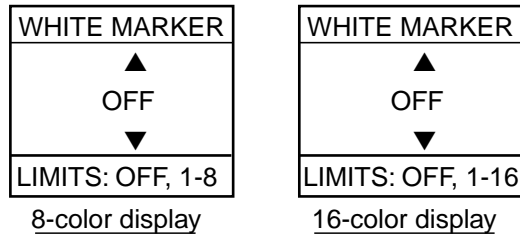
White marker window

3. Use the cursor pad to select color to display in white. As you Use the cursor pad, the number (corresponds to echo number) in the marker window changes, the white marker on the echo strength bar shifts and selected echo color is displayed in white.

White marker shows
← color currently
displayed in white.

Echo strength bar (16 color) when white marker function is active

4. Press the RETURN soft key to finish.

To turn the white marker function off, display "0" in the white marker window.

4.10   Picture Advance Speed

The picture advance speed determines how quickly the vertical scan lines run across the screen. When selecting a picture advance speed, keep in mind that a fast advance speed will expand the size of the fish school horizontally on the screen and a slow advance speed will contract it.

The speed may be set independent or dependent on ship's speed.

4.10.1   Advancement independent of ship's speed

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select PICTURE ADVANCE, and press the EDIT soft key to open the picture advance window.

```
┌────────────────────┐
│  PICTURE ADVANCE   │
│ ▲                  │
│ ⊙ 2/1              │
│ ○ 1/1              │
│ ○ 1/2              │
│ ○ 1/4              │
│ ○ 1/8              │
│ ○ STOP             │
│ ▼                  │
├────────────────────┤
│ DEFAULT: 1/1       │
└────────────────────┘
```
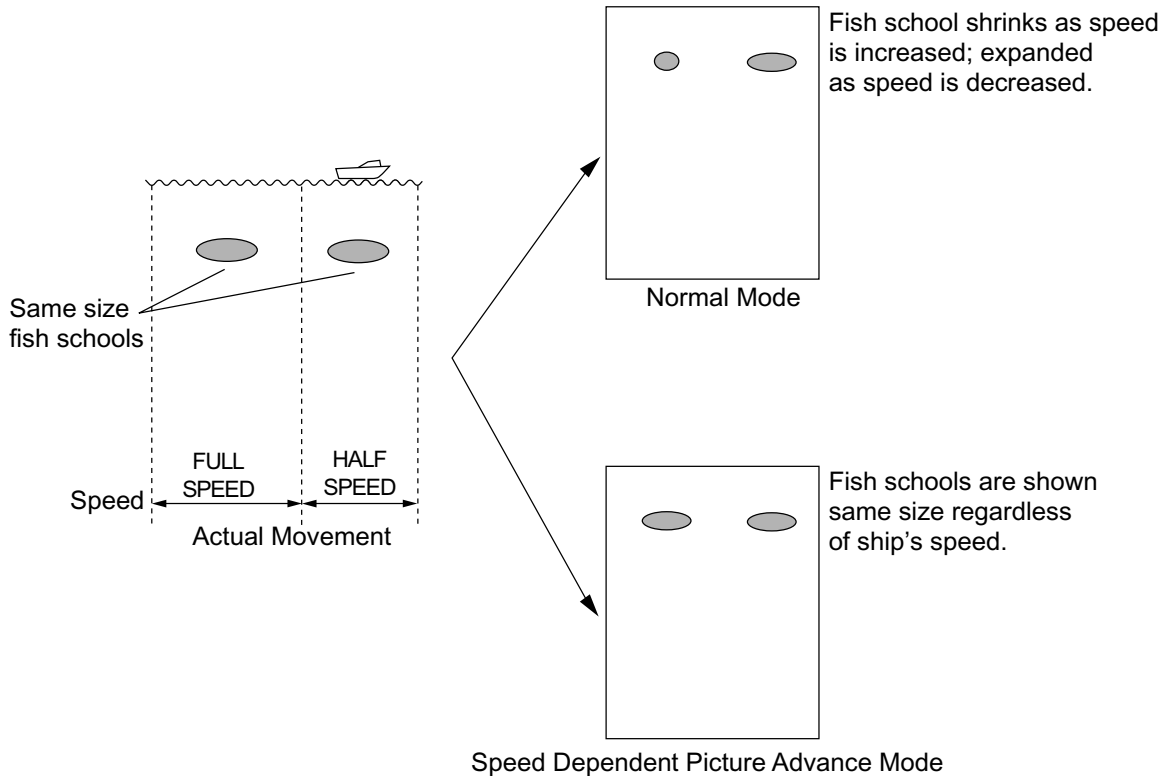
Picture advance window

The fractions in the window denote number of scan lines produced per transmission. For example, 1/8 means one scan line is produced every eight transmissions. STOP freezes the display and it is convenient for observing an echo.

3. Use the cursor pad to select speed desired.
4. Press the RETURN soft key to finish.

4.10.2 Advancement synchronized with ship's speed

With speed data provided by a speed measuring device, picture advance speed may be automatically adjusted with ship's speed. As shown in the figure below the horizontal scale of the display is not influenced with the speed dependent picture advance mode active, thus it permits judgement of fish school size and abundance at any speed. With the advancement synchronized with ship's speed the picture advance speed setting (on the previous page) is ignored.

How the speed dependent advance mode works

Activating/deactivating the speed dependent picture advance mode

1. Press the [MENU] key followed by the SOUNDER MENU soft key.
2. Select SPD SENSING PIC ADV.
3. Press the EDIT soft key to open the setting window.
4. Use the cursor pad to select ON or OFF (default setting) as appropriate.
5. Press the RETURN soft key to finish.

4.11 Display Colors (MODEL-1700C series)

You can select the number of colors to display and background color as follows:

1. Press the [MENU] key followed the SOUNDER MENU soft key.
2. Select HUE, and then press the EDIT soft key to show the hue window.

```
┌─────────────────┐
│       HUE       │
├─────────────────┤
│        ▲        │
│        1        │
│        ▼        │
├─────────────────┤
│ LIMITS: 1-9     │
│ DEFAULT: 1      │
└─────────────────┘
```

Hue window

3. Use the cursor pad to select hue number, referring to the table below. (You can see the result of your selection on the display.)

Available background and echo colors for the sounder display

Hue No.	Echo Color	Background Color
1	16 color	Blue
2	8 color	Blue
3	16 color	Dark blue
4	8 color	Dark blue
5	16 color	White
6	8 color	White
7	16 color	Black
8	8 color	Black
9	Monochrome, eight intensities	

4. Press the RETURN soft key to finish.

4.12 Alarms

The sounder section has five conditions which generate visual and audio alarms: Bottom Alarm, Fish Alarm (bottom lock), Fish Alarm (normal), Water Temperature Alarm, and Speed Alarm.

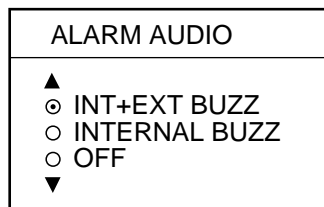The sounder alarm menu may be displayed by pressing the [ALARM] key.

```
▶ ALARM AUDIO                    SOUNDER
        INT                      ALARM
  BOTTOM ALARM
          200.0~ 220.0ft         ┌──────┐
  FISH (B/L) ALARM               │ EDIT │
            BOTTOM~ 20.0ft        └──────┘
  FISH (NORMAL) ALARM            ┌──────┐
          100.0~ 129.0ft         │ NEXT │
  TEMP. ALARM                    │ INFO │
            IN 68.0~ 78.0F        └──────┘
  SPEED ALARM                    ┌──────┐
            In 00.0~ 99.9kt       │ CLEAR│
                                 │ ALARM│
                                  └──────┘

                                  ┌──────┐
                                 │RETURN│
   ALARM INFOMATION               └──────┘
     NO ALARM
```
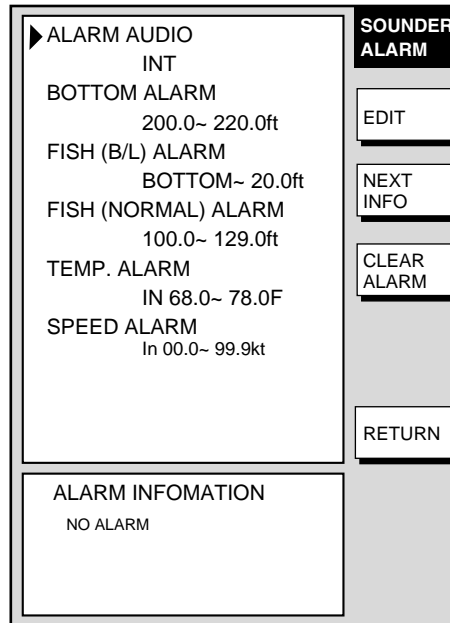
Sounder alarm menu

4.12.1 Audio alarm on/off

The audio alarm sounds whenever an alarm setting is violated. You can enable or disable the audio alarm as follows:

1. Press the [ALARM] key to show the ALARM menu.
2. Use the cursor pad to select ALARM AUDIO.
3. Press the EDIT soft key to show the audio alarm window.

```
┌────────────────────┐
│ ALARM AUDIO        │
├────────────────────┤
│ ▲                  │
│ ⊙ INT+EXT BUZZ     │
│ ○ INTERNAL BUZZ    │
│ ○ OFF              │
│ ▼                  │
└────────────────────┘
```

Audio alarm window

4. Use the cursor pad to select INT+EXT (Internal + External alarm), INTERNAL (Internal alarm) or OFF.
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.
6. Press the [MENU] key to close the menu

4. VIDEO SOUNDER OPERATION

4.12.2 Bottom alarm

The bottom alarm sounds when the bottom echo is within the alarm range set. To activate the bottom alarm the depth must be displayed.

1. Press the [ALARM] key to show the ALARM menu.
2. Use the cursor pad to select BOTTOM ALARM.
3. Press the EDIT soft key to show the bottom alarm window.

```
          BOTTOM ALARM

▲
⊙ ON     █000.0-0000.0ft
○ OFF
▼

LIMIT: -0-9999.9ft
DEFAULT: 0ft
```
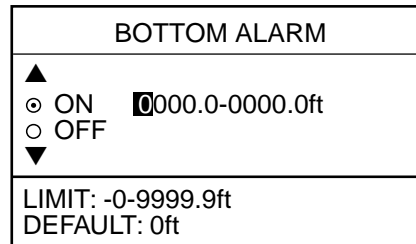
Bottom alarm window

4. Use the cursor pad to select ON or OFF as appropriate. For ON, enter alarm range with the [ENTER] knob.
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.
6. Press the [MENU] key to close the menu.

4.12.3 Fish (B/L) alarm

The bottom-lock fish alarm sounds when a fish echo is within a predetermined distance from the bottom.

1. Press the [ALARM] key to show the ALARM menu.
2. Use the cursor pad to select FISH (B/L) ALARM.
3. Press the EDIT soft key to show the fish alarm (B/L) window.

```
         FISH ALARM(B/L)

▲
⊙ ON  BOTTOM -█00.0ft
○ OFF
▼
LIMIT: -0-20ft
```
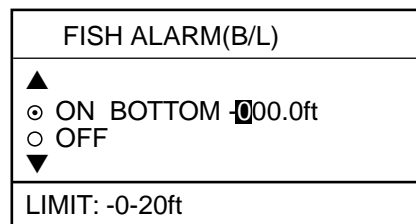
Fish alarm(B/L) window

4. Use the cursor pad to select ON or OFF as appropriate. For ON, enter alarm range with the cursor pad.
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.
6. Press the [MENU] key to close the menu.

4-20

4.12.4 Fish (normal) alarm

The normal fish alarm sounds when a fish echo is within the preset alarm range. Note that the sensitivity of the fish alarm (which echo strength triggers the alarm) can be set on the SOUNDER MENU.

1. Press the [ALARM] key to show the ALARM menu.
2. Use the cursor pad to select FISH ALARM(NORMAL).
3. Press the EDIT soft key to show the fish alarm (normal) window.

```
          FISH ALARM(NORMAL)

 ▲
 ⊙ ON      0000.0-0000.0ft
 ○ OFF
 ▼
─────────────────────────────────
 LIMIT: -0-9999.9ft(m, fa, pb)
```

Fish alarm(normal) window

4. Use the cursor pad to select ON or OFF as appropriate. For ON, enter alarm range with the cursor pad
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.
6. Press the [MENU] key to close the menu

4.12.5 Water temperature alarm

There are two types of water temperature alarms: WITHIN and WITHOUT. The WITHIN alarm sounds when the water temperature is within the range set, the WITHOUT alarm sounds when the water temperature is higher or lower than the range set. This alarm requires water temperature data.

1. Press the [ALARM] key to show the ALARM menu.
2. Use the cursor pad to select TEMP. ALARM.
3. Press the EDIT soft key to show the temp. alarm window.

```
            TEMP. ALARM

 ▲
 ⊙ WITHIN
            0000.0-0000.0ft
 ○ WITHOUT
 ○ OFF
 ▼
─────────────────────────────────
  LIMIT: -999.9 - 999.9˚F
  DEFAULT: 0 - 0˚F
```

Water temperature alarm window

4. Use the cursor pad to select WITHIN, WITHOUT or OFF as appropriate. For WITHIN, enter alarm range with the cursor pad.
5. Press the ENTER soft key or push the [ENTER] knob to register your selection.
6. Press the [MENU] key to close the menu.

4.12.6 When an alarm setting is violated...

When an alarm setting is violated the buzzer sounds, and the speaker icon appears at the bottom of the screen. (The speaker icon is displayed until all alarms have been acknowledged on the alarm menu display.) You can silence the buzzer with the [CLEAR] key, however the buzzer will sound whenever the alarm setting is violated.

To see which alarm(s) has been violated;

1. Press the [ALARM] key. The offending alarm is shown in the ALARM INFORMATION window.

Alarm information window

Means multiple alarms have been violated.
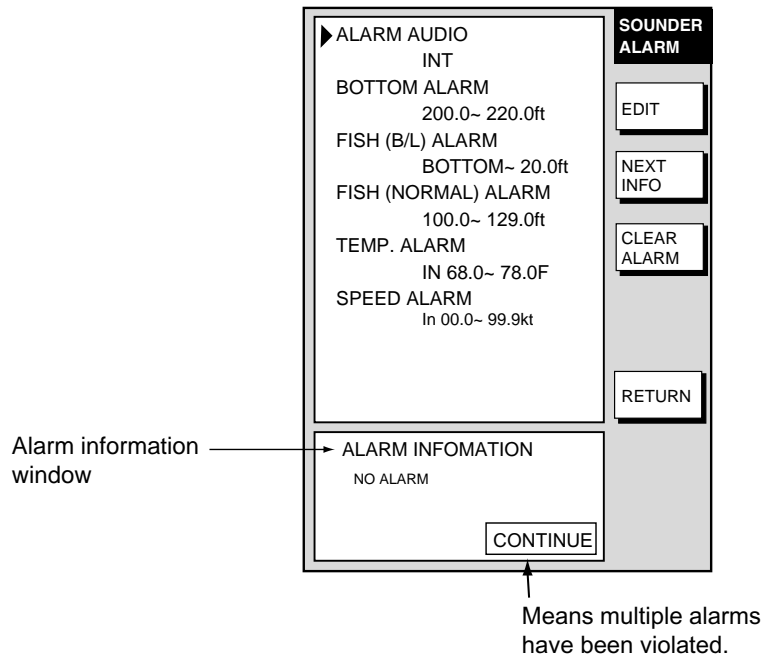
Sounder alarm menu

2. Press the CLEAR ALARM soft key to acknowledge the alarm. For the MODEL-1700C series the color of the alarm message and the speaker icon change from red to black to indicate acknowledgement.

   Note: If more than one alarm has been violated the message CONTINUE appears at the bottom of the alarm information window. In this case press the NEXT INFO soft key to see which other alarms have been violated.

Alarm messages

The table below shows the sounder alarm messages and their meanings

Alarm messages and their meanings

Message	Meaning
EXCEEDED THE FISH (B/L) ALARM.	Fish (bottom lock) alarm violated.
EXCEEDED THE FISH (NORMAL) ALARM.	Fish (normal) alarm violated.
EXCEEDED SPEED ALARM LIMIT.	Speed alarm violated.
EXCEEDED BOTTOM ALARM LIMIT.	Bottom alarm violated.
EXCEEDED TEMPERATURE ALARM LIMIT.	Water temperature alarm violated.

# 4.13   Water Temperature Graph

The water temperature graph (appropriate sensor required) plots water temperature on the sounder display. It can be turned on or off as below.

1. Press the [MENU] key to open the menu.
2. Press the SOUNDER MENU soft key to show the SOUNDER menu.
3. Select TEMP GRAPH and press the EDIT soft key.
4. Select OFF (default setting) or ON as appropriate.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

4.14 Interpreting the Sounder Display

4.14.1 Zero line

The zero line (sometimes referred to as the transmission line) represents the transducer's position, and moves off the screen when a deep phased range is used.
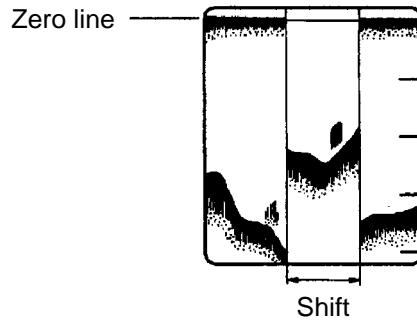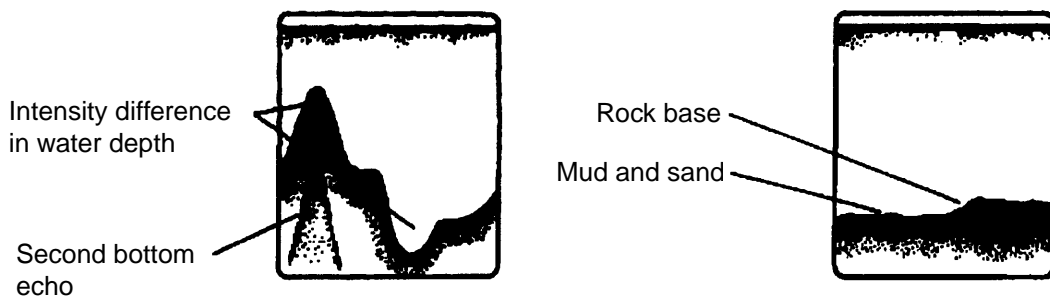

Zero line

4.14.2 Bottom echo

Echoes from the bottom are normally the strongest and are displayed in reddish-brown color but the color and width will vary with bottom composition, water depth, frequency, sensitivity, etc.

In a comparatively shallow depth, a high gain setting will cause a second or sometimes a third or a fourth echo to be displayed at the same interval between them below the first echo trace. This is because the echo travels between the bottom and the surface twice or more in shallow depths.

The color of the bottom echo can be used to help determine the density of the bottom materials (soft or hard). The harder the bottom, the wider the trace. If the gain is set to show only a single bottom echo on mud, a rocky bottom will show a second or third bottom return. The range should be chosen so the first and second bottom echoes are displayed when bottom hardness is being determined.

Bottom echoes

4.14.3 Fish school echoes

Fish school echoes will generally be plotted between the zero line and the bottom. Usually the fish school/fish echo is weaker than the bottom echo because its reflection property is much smaller compared to the bottom. The size of the fish school can be ascertained from the density of the display.
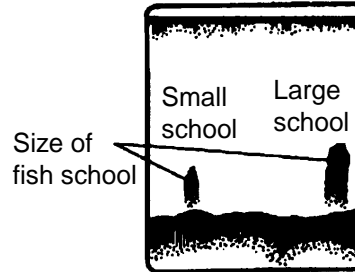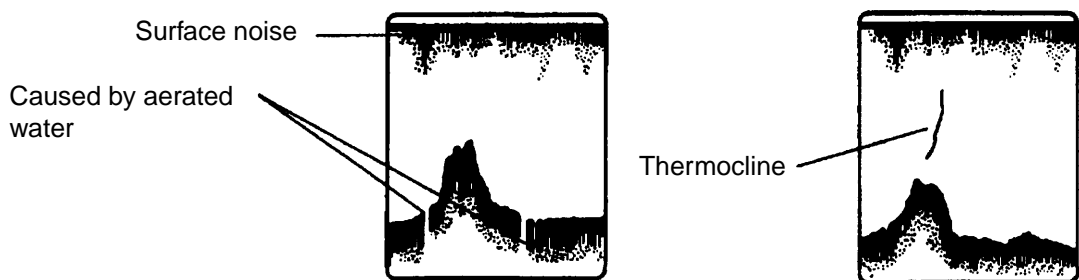

Fish school echoes

4.14.4 Surface noise/Aeration

When the waters are rough or the boat passes over a wake, surface noise may appear near the zero line. As surface turbulence is acoustically equivalent to running into a brick wall, the bottom echo will be displayed intermittently. Similar noise sometimes appears when a water temperature difference (thermocline) exists. Different species of fish tend to prefer different temperature zones, so the thermocline may be useful to help identify target fish. 200 kHz tends to show shallow thermoclines better than 50 kHz.

In rough waters the display is occasionally interrupted due to below-the-ship air bubbles obstructing the sound path. This also occurs when the boat makes a quick turn or reverses movement. Lowering the picture advance speed may reduce the interruption. However, reconsideration of the transducer installation may be necessary if the interruption occurs frequently.

Surface noise/aeration