FURUNO

OPERATOR'S MANUAL
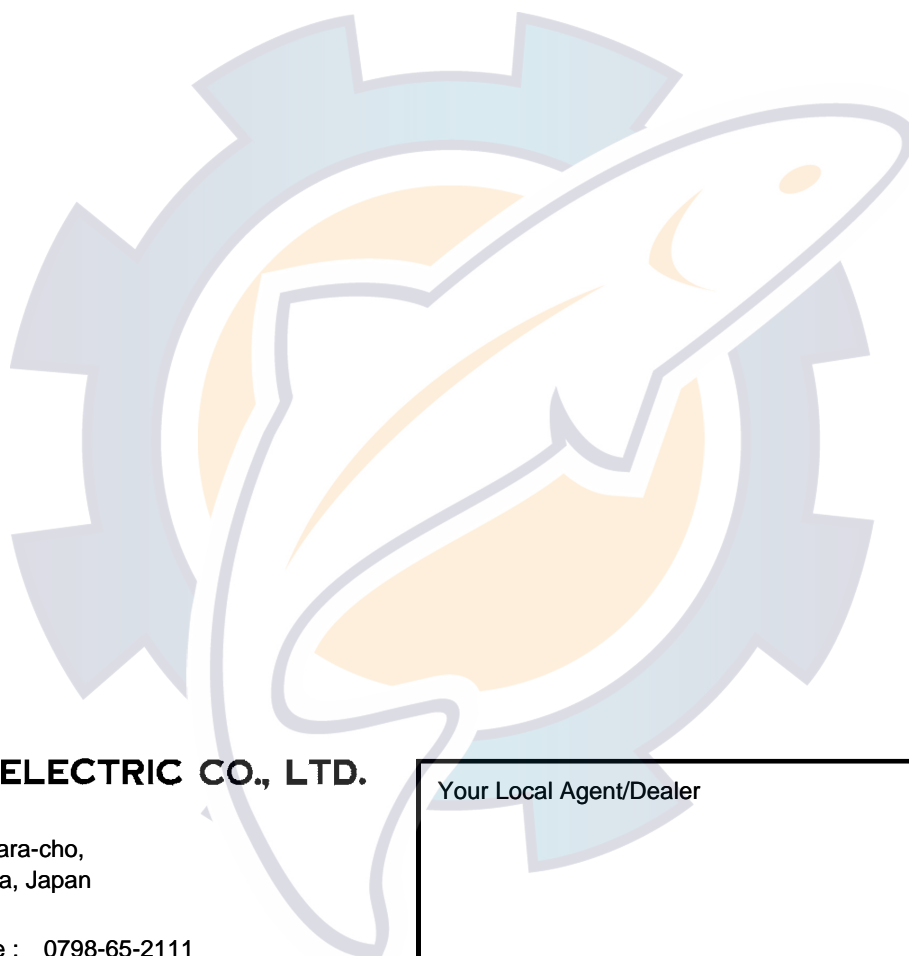
VIDEO PLOTTER

MODEL   RP-340

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Your Local Agent/Dealer

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（DAMI ） RP-340

00080938900

OME30480A0

⚠ SAFETY INSTRUCTIONS

⚠ WARNING

If the headings of like AIS and ARPA targets are not the same, check if the heading shown on the radar matches with that of the gyrocompass.

Collision may result if the headings are not the same.

Confirm battery polarity when changing the battery in memory cards.

Incorrect polarity can result in explosion of the battery.

Turn of the power to the radar at the mains switchboard when conducting the installation.

Fire or electrical shock may result if the power is left on.

⚠ CAUTION

The data generated by this equipment is intended for reference only.

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

Replace the battery in the memory card within 10 minutes.

Loss of data may result if the above time is exceeded.

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FOREWORD

A Word to RP-340 Owners

Congratulations on your choice of the FURUNO RP-340 Video Plotter. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your RP-340 is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

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

Thank you for considering and purchasing FURUNO equipment.

Features

The Video Plotter RP-340 is an optional circuit board which is accommodated in the display unit of the FR/FAR-2805 series radars, and provides video plotter functions such as waypoint making and route creation.

The main features are
- Radar map function
  - Displays/hides the user-made map with one-touch operation
  - Storage for 1,500 marks/lines
- Video plotter function
  - Storage for 20,000 own ship track points
  - Storage for 20,000 marks/lines
  - Chart overlay on radar display
  - Storage for 97 waypoints
  - Storage for 25 nav lines
  - Memory card for storage of track and marks
- AIS function
  - Displays up to 1,000 AIS targets

Function availability depends on radar specification. Refer to the table below to find whether a particular function is available with your radar.

Your 2805's specification	Radar map	Video plotter	AIS
R (Regular) type	Yes	Yes	Yes
IMO type	Yes	No	Yes

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1   OPERATIONAL OVERVIEW

1.1   General

The Video Plotter RP-340 is an optional circuit board (RP board) which is accommodated in the display unit of the FR-2805/FAR-2805 series radar. It permits use of two memory cards, a memory card (RAM card) for storing own ship and other ship's tracks and marks, and the other is a digital chart card (ROM card).

With connection of an AIS (Universal Automatic Identification System) transponder to the RP board, the RP-340 provides navigation data about targets which carry an AIS transponder.

25 nav lines may be stored and each line may contain up to 30 waypoints. Five nav lines may be simultaneously shown on the display. 97 waypoints are available. The user may enter position data in waypoints 01-97. Own ship and other ship tracks may be stored at a selected interval.

Charts are superimposed on the radar picture without disturbing the radar observation. The chart area is dependent on the radar range in use.

Note: The example screens shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.

1.2   Controls
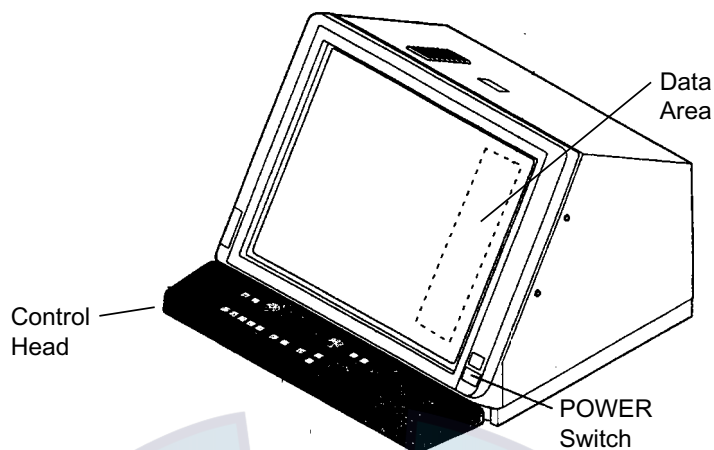
FR/FAR-2805 series radar display unit
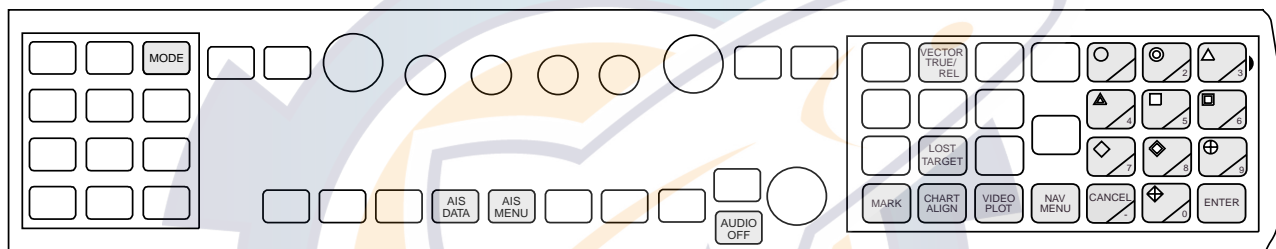
FR-2805 series control head (RP-340-related controls shaded in gray)

Video plotter, radar map controls

MODE:	Choose presentation mode.
NAV MENU:	Open and close the video plotter menu.
MARK:	Enter various marks.
CHART ALIGN:	Align video plotter display with radar display.
VIDEO PLOT:	Choose display mode.
Numeric keys:	Enter data.
ENTER:	Terminate keyboard input.

AIS controls

AIS MENU:	Open AIS menu.
AIS DATA:	Display basic data for selected target.
AUDIO OFF:	Silence AIS-related alarms.
VECTOR TRUE/REL:	Alternately display true and relative speed and course vector.
LOST TARGET:	Erase AIS lost target marks. (ARPA lost target mark is also erased.)

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Note 1: A single beep is produced to signify that the radar has accepted your command. Two beeps sound in case of incorrect key operation.

Note 2: The key labels AIS MENU and AIS DATA provided with the RP-340 should be attached to the radar control head.

1.3   Display Modes

The RP-340 has three display modes: Radar, Video Plotter and Radar/Video Plotter (Combination). Use the [VIDEO PLOT] key to choose a display, in the sequence shown in the illustration below. (When the video plotter mode is displayed more than five seconds, the radar automatically goes into standby.)

Press [VIDEO PLOT] key

Radar Display

Radar/Video Plotter Display (Combination)*

Press [VIDEO PLOT] key

Video Plotter Display*

Press [VIDEO PLOT] key
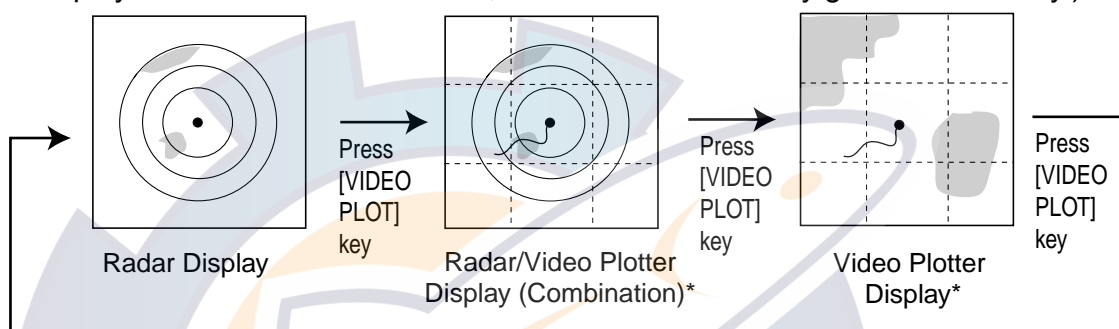
* Not available on IMO specification radar.

Display modes

Note 1: A display cannot be selected when a menu is open. Close the menu (with the [NAV MENU] key) to choose a display.

Note 2: The video plotter feature is not available when the radar map function is active ("MAP" appears at the right side of screen). To use the video plotter feature, press the [VIDEO PLOT] key to choose the Radar/Video Plotter or Video Plotter display ("MAP" disappears).

Note 3: Only the radar display is available on the IMO type radar.

Sample video plotter display

Video plotter display
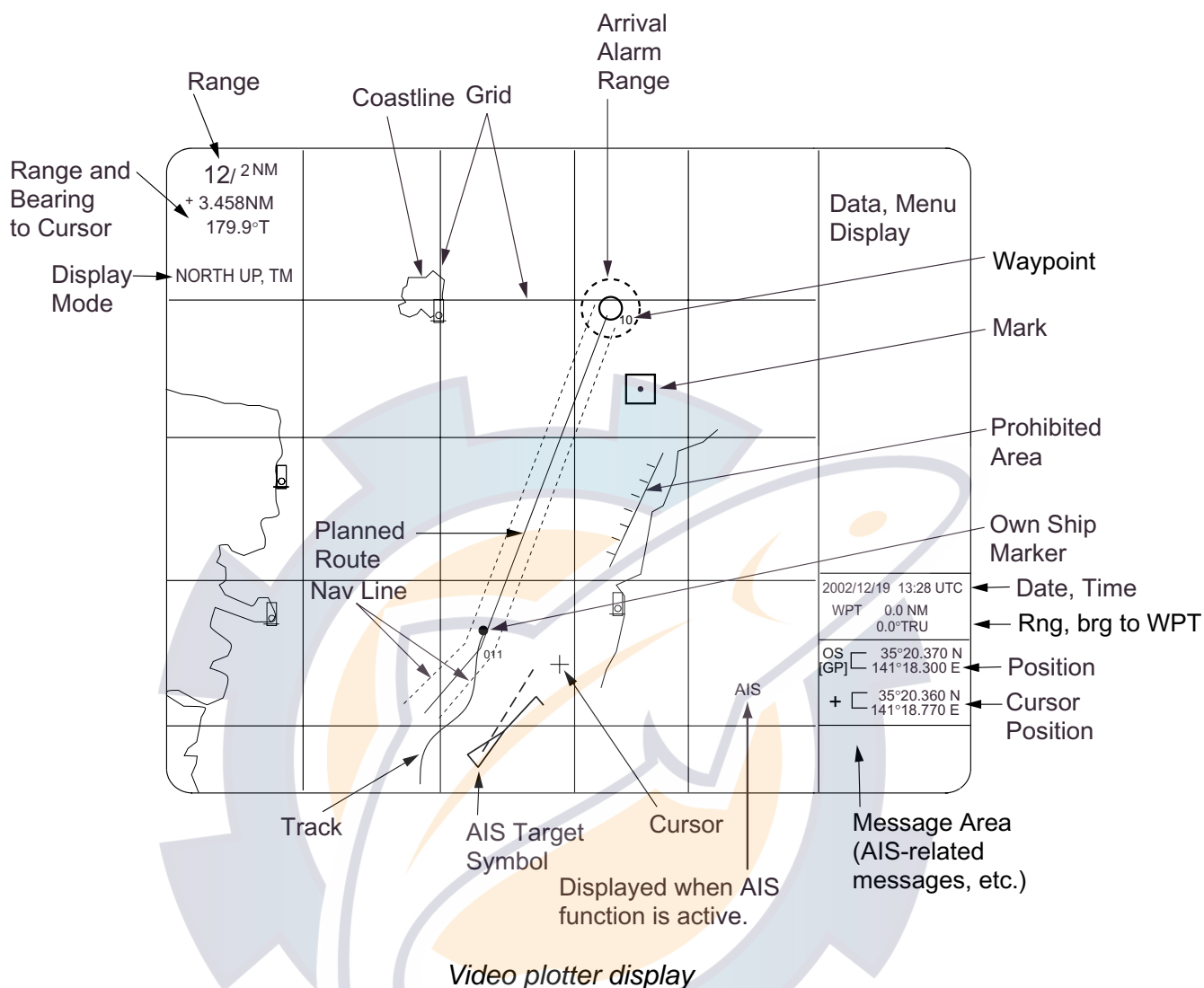
1.4   Presentation Modes

The RP-340 has five presentation modes: North-up, Course-up, Head-up, Head-up TB (True Bearing), North-up TM (True Motion). Use the [MODE] key to choose a mode.

Note 1: Chart data is not displayed on the HEAD UP and HEAD UP TB modes.
Note 2: The screen may flash when using the HEAD UP and HEAD UP TB mode. This occurs whenever the heading is changed one degree or more.

Automatic centering of own ship mark in true motion mode

In the true motion mode, the own ship mark is automatically returned sternward 75% from the screen center when it reaches a location 75% of the display range.

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2 RADAR MAP

A radar map is a combination of map lines and symbols whereby the user can define and input the navigation data, route planning and monitoring data.
The radar map has the capacity of 1,500 points of marks and lines. The map data can be memorized to facilitate repeated use on a routine navigation area. The user can create a radar map on-real time while using the radar for navigation or at leisure time at anchor or while the radar is not being used. Place of a map can be made for any waterways apart from the actual own ship location.

Note: Own ship position display requires an input from radionavigational equipment (such as a GPS receiver) in accordance with the format as defined by IEC 61162-1.
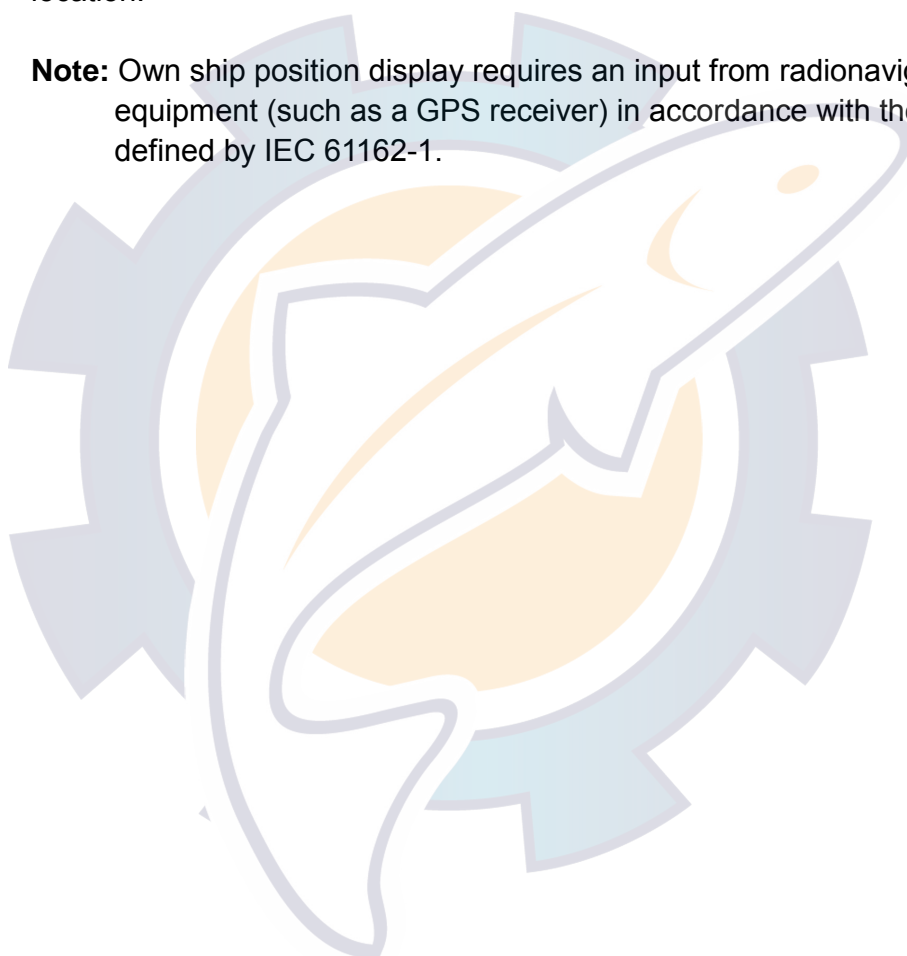
2.1   Making a Radar Map

The radar map feature is available with the R-type radar. All radar map functions are accessed from the radar display. Press the [VIDEO PLOT] key several times to choose the radar display. Then, follow the procedures in this section to create a radar map.

2.1.1   Turning on the radar map feature

1. Press the [NAV MENU] key to show the NAV INFORMATION 1 menu.

[NAV INFORMATION 1]	
1	[RADAR MAP]
2	SELECT NAVAID
	GPS+LC/
	DEAD RECKONING/AIS
3	OWN SHIP POSN
	OFF/L/L
4	POSN
	00°00.000 N/S
	000°00.000 E/W
5	+ CURSOR DATA
	OFF/L/L
6	WPT DATA
	OFF/REL/TRUE
7	[WAY POINT]
8	[NAV LINE]
9	WIND DATA
	OFF/ON
0	[NAV INFORMATION 2]

Nav information 1 menu

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2. Press the [1] key to show the RADAR MAP menu.

```
                    [RADAR MAP]
─────────────────────────────────────────
1        [NAV INFORMATION 1]
2        MAP
         OFF/ON
3        NAV DATA POSN
4        ALIGN + CURSOR
         OFF/ON
5        MARK ENTRY MODE
         CURSOR/L/L/OWN SHIP POSN
6        ERASE MARK
         OFF/AREA/ALL


MEMORY IN USE
MARK = 1000
```

Number of current used mark/line
(Max. 1500 points)

Radar map menu

3. Press the [2] key twice to set MAP to ON, and then press the [ENTER] key. "MAP" appears at the right side of screen.
4. Press the [NAV MENU] key to close the menu.

2.1.2   Entering marks/lines

Choosing mark entry method

1. Press the [NAV MENU] and [1] keys to show the RADAR MAP menu.
2. Press the [5] key to choose CURSOR, L/L or OWN SHIP POSN as appropriate.

CURSOR: Enters mark/line at the position selected by cursor.

L/L: Enters mark/line at the latitude and longitude position entered manually.

OWN SHIP POSN: Enters mark/line at the own ships position.

3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

Entering marks/lines at cursor or own ship position

1. Set the mark entry method to "CURSOR or "OWN SHIP POSN" as appropriate, following "Choosing mark entry method" on page 7.
2. Press the [MARK] key to show ENTER MARK menu.

```
              [ENTER MARK]

   MARK 01
   01      ⟁·
   02      +++
   03      ⊛
   04      ⊠·
   05      ⊡
   06      ⊙
   07      ●
   08      ✕
   09      ⬭✕
   10      ▢
   11      ⚓
   12      ⬤
   13      ◇·
   14      ▬
   15      ─
   16      NAV LINE
   17      COAST LINE
   18      CONTOUR LINE
   19      PROHIBITED AREAS
   20      CABLE
   21      LINE CHANGE
   22      MARK CANCEL
```

Enter mark menu

3. **For entry at own ship's position,** enter mark number to choose desired mark, followed by the [ENTER] key. The chosen mark appears at own ship position.
4. **For entry by cursor,** operate the trackball to place the cursor on the position desired for the mark. Enter mark number to choose desired mark and then press the [ENTER] key. The chosen mark appears at the cursor position.
5. **To inscribe a line,** first set the mark entry method to "cursor," following "Choosing mark entry method" on page 7.) Then, do the following:
   a) Use the trackball to place the cursor on the starting point of the line.
   b) Enter desired line number with the numeric keys and press the [ENTER] key.
   c) Use the trackball to place the cursor on a next point of the line and then press the [ENTER] key.
   d) Repeat c) to continue drawing the line.
6. To escape the mark entry mode, press the [MARK] key.

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Entering marks by manual input of latitude and longitude position

1. Set the mark entry method to "L/L," following "Choosing mark entry method" on page 7.
2. Press the [MARK] key to open the MARK menu.

Enter L/L position here
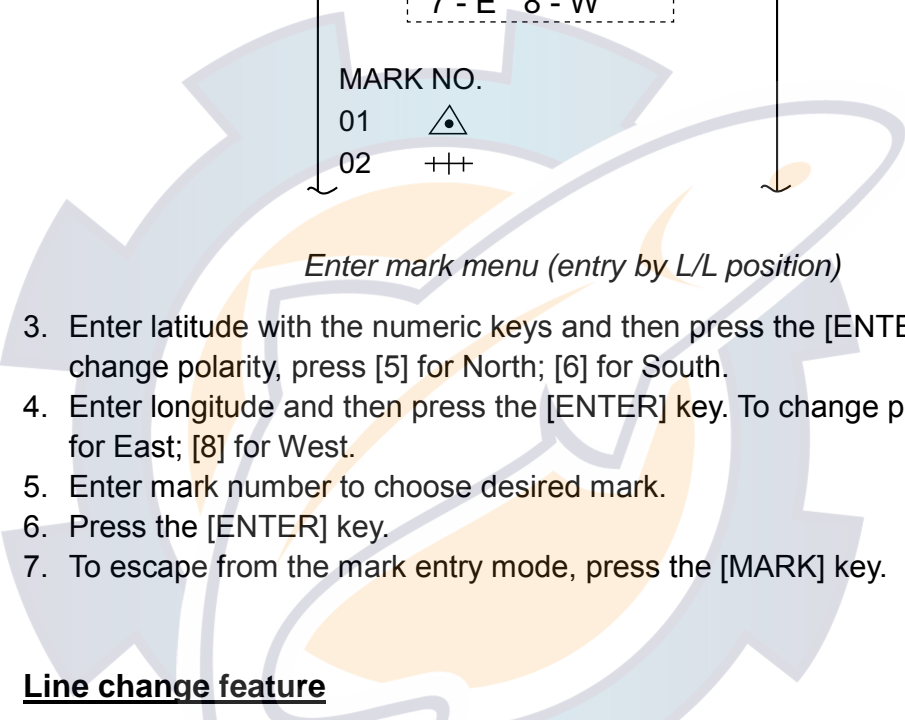
```
        [ENTER MARK]

        00°00.000  N/S
         5 - N   6 - S
         0°00.000  E/W
         7 - E   8 - W


      MARK NO.
      01      ⟨•⟩
      02      +++
```

Enter mark menu (entry by L/L position)

3. Enter latitude with the numeric keys and then press the [ENTER] key. To change polarity, press [5] for North; [6] for South.
4. Enter longitude and then press the [ENTER] key. To change polarity, press [7] for East; [8] for West.
5. Enter mark number to choose desired mark.
6. Press the [ENTER] key.
7. To escape from the mark entry mode, press the [MARK] key.

Line change feature

The line change feature allows you to change line type or continue drawing the same line type at a different location. For example, you may want to quit making nav lines and start making a coastline.

1. Press the [MARK] key to open the ENTER MARK menu.
2. Inscribe a line as mentioned in the paragraph above.
3. Press the [2] and [1] keys to choose LINE CHANGE and then press the [ENTER] key.
4. Enter new line type number.
5. Use the trackball to place the cursor at the beginning point for the line and then press the [ENTER] key.
6. Use the trackball to place the cursor at the next line point and then press the [ENTER] key.
7. Repeat step 6 to continue drawing the line.
8. Press the [MARK] key to close the menu.

2.2   Erasing Contents of the Radar Map

A total of 1,500 points may be used to inscribe lines and marks. When this amount is exceeded, no more marks or lines may be entered unless you unnecessary marks or lines in order to enter new ones. The number of mark/line memory points used appears at the bottom of the RADAR MAP menu (see page 7), next to "MEMORY IN USE."

2.2.1   Erasing individual marks/lines

1. Choose CURSOR from the MARK ENTRY MODE on the RADAR MAP menu.
2. Press the [MARK] key to show the ENTER MARK menu.
3. Press the [2] key twice to choose MARK CANCEL.
4. Operate the trackball to place the cursor on the mark or line point you want to erase.

> **Note:**   When erasing a line, the cursor location determines how the line will be processed. Place the cursor on the starting or ending point of a line to erase a single line. To erase two lines connected to a point, place the cursor at the connecting point between the lines.

Starting/ending point

Erased line

Connecting point

Erased line
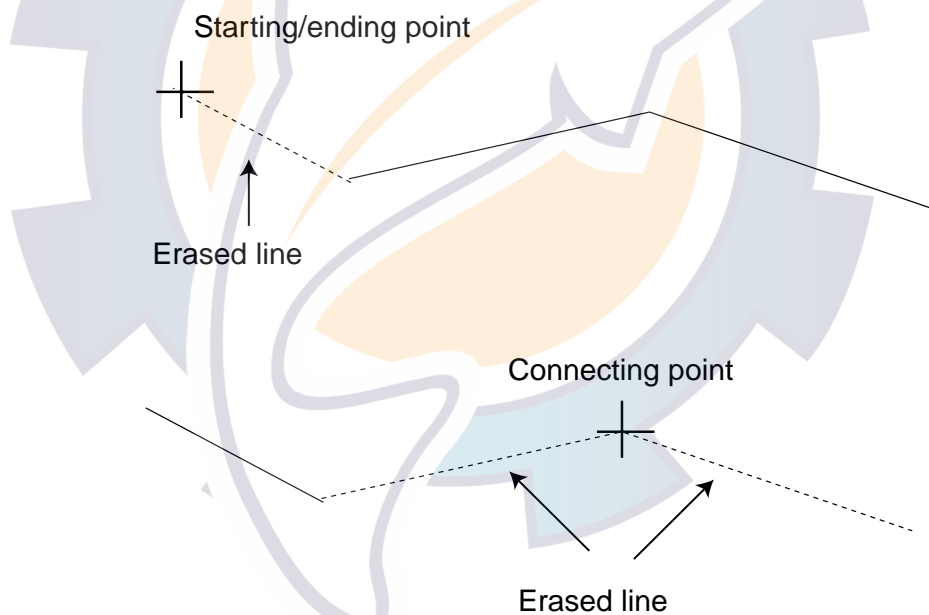
5. Press the [ENTER] key.

2.2.2   Erasing all marks/lines on the screen

You can erase all marks/lines displayed on the screen as follows:

1. Press the [NAV MENU] and [1] keys to show the RADAR MAP menu.
2. Press the [6] key several times to choose AREA or ALL.

    AREA: Erases all marks/lines within a square which is 20% larger than the effective radar display.
    ALL: Erases all marks/lines which you have entered.

3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

About mark and line storage

Marks and lines are stored in a memory device on the RP Board and are backed up with a battery. When the voltage of the battery is low, all marks and lines are erased. For that reason it is recommended to save important marks and lines to a memory card, before the voltage of the battery becomes too low. After changing the battery, reenter the marks/lines if necessary.

2.3   Position and Bearing Correction

2.3.1   Radar map correction

When there is positional error between the radar screen and marks/lines, do the following to correct it.

1. Press the [CHART ALIGN] key. "MAN ALIGN" appears at the right side of screen.
2. Operate the trackball to align the radar screen and radar map.
3. Press the [CHART ALIGN] key again. "MAN ALIGNED" replaces "MAN ALIGN".

2.3.2   Cursor data correction

You can correct cursor L/L position data as below.

1. Press the [NAV MENU] and [1] keys to show the RADAR MAP menu.
2. Press the [4] key twice to choose ON from ALIGN +CURSOR and then press the [ENTER] key. "M. AL" (Manual Aligned) appears next to cursor position in the text area. (To remove the correction, choose OFF. If you are using the AIS function, choose ON.)
3. Press the [NAV MENU] key to close the menu.

2.3.3   Releasing the radar map correction

1. Press the [NAV MENU] and [1] keys to show the RADAR MAP menu.
2. Press the [3] key to choose NAV DATA POSN.
3. Press the [ENTER] key. The correction is released and "MAN ALIGNED" disappears.
4. Press the [NAV MENU] key to close the menu.

3 VIDEO PLOTTER

The video plotter function is available only with the R-type radar.

3.1 Chart Cards

┌───┐
│   ⚠ **CAUTION**   │
├───┤
│ **Handle chart cards and memory cards** │
│ **with care.**   │
│   │
│ • Keep cards away from direct sunlight, │
│   heat sources, and active gases.   │
│ • Keep cards away from water and   │
│   chemicals.   │
│ • Keep the connector free foreign   │
│   material.   │
│ • Do not drop the cards.   │
├───┤
│ **Chart cards are intended as an aid to**│
│ **navigation. The navigator has the**   │
│ **responsibility to check all aids available** │
│ **to confirm position.**   │
└───┘

3.1.1 Displaying a chart

To display a chart;

1. Insert a chart card in left side slot of the two chart card drives.

Eject button
for left card drive

Card Drive
Right: RAM card
Left: Chart card

Display unit

Eject button
for right card
drive
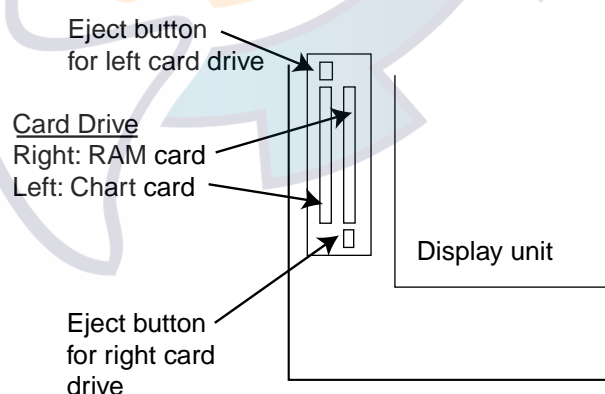
Card slot location

2. Press the [POWER] button to turn the power on. Chart data appears (NU, CU, TM modes only) after the radar is in transmit status.

When a chart card is inserted after turning the power on, press the [RANGE+] or [RANGE-] key to change the range to display the chart.

3.1.2   Chart position correction

There may be a case where the radar picture does not match the chart overlay. This is due to an error in the position fixing system (GPS, Loran, etc.) or the different coordinates between the position fixing system and the radar. In this case, align the chart with the radar image as below.

Note: Track is neither recorded nor displayed while "MAN ALIGN" is displayed.

1. Press the [CHART ALIGN] key. "MAN ALIGN" appears at right side of the screen.
2. Rotate the trackball to shift the chart (or own ship) to the correct position.
3. Press the [CHART ALIGN] key. "MAN ALIGN" is replaced with "MAN ALIGNED".

3.1.3   Canceling chart correction

1. Press the [NAV MENU] and [0] keys to show the VIDEO PLOTTER 2 menu.

```
              [VIDEO PLOTTER 2]

1      [VIDEO PLOTTER 1]
2      NAV DATA POSN
3      ALIGN + CURSOR
       OFF/ON
4
5      MARK ENTER MODE
       CURSOR/L/L/OWN SHIP POSN
```

Video plotter 2 menu

2. Press the [2] key to display NAV DATA POSN in reverse video.
3. Press the [ENTER] key. MAN ALIGNED disappears from the screen.
4. Press the [NAV MENU] key to close the menu.

3.1.4   Correcting cursor data

Cursor position data can be corrected as follows:

1. Press the [NAV MENU] and [0] keys to show the VIDEO PLOTTER 2 menu.
2. Press the [3] key to choose OFF (no correction added) or ON (correction added) from ALIGN +CURSOR.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

Note: When using AIS choose ON.

3.2   Setting up the Video Plotter

3.2.1   Hiding/showing graphics

1. Press the [NAV MENU] and [8] keys in order to show the DISPLAY SELECT menu.

```
                [DISPLAY SELECT]
1      [VIDEO PLOTTER 1]
2      SYMBOL
       OFF/ON
3      COAST LINE
       OFF/ON
4      LAND DENSITY
       OFF/ON
5      PLACE NAME
       OFF/ON
6      MARK
       OFF/ON
7      OWN SHIP PLOT
       OFF/ON
8      TARGET PLOT
       OFF/ON
9      CONTOUR LINE
       OFF/ON
0      GRID
       OFF/ON
```

Display select menu

Note 1: Items turned off on the VIDEO PLOTTER INITIAL SETTING menu are not displayed on the DISPLAY SELECT menu.

Note 2: LAND DENSITY fills (ON) or hollows (OFF) land on an electronic chart. Land will be hollow when wrong card or wrong scale is used, regardless of LAND DENSITY setting.

2. Press the appropriate numeric key twice.
3. Press the [ENTER] key.
4. Repeat steps 2 and 3 for other items.
5. Press the [NAV MENU] key to close the menu.

Note: TARGET PLOT is not available when your radar does not have the ARPA function.

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3.2.2   Choosing navigation data to display

Choose the navigation data to display on the video plotter display as follows:

1. Press the [NAV MENU] and [1] keys in to show the NAV INFORMATION 1 menu.

```
          [NAV INFORMATION 1]

 1    [RADAR MAP]
 2    SELECT NAVAID
      GPS+LC/
      DEAD RECKONING/AIS
 3    OWN SHIP POSN
      OFF/L/L
 4    POSN
       00°00.000 N/S
      000°00.000 E/W
 5    + CURSOR DATA
      OFF/L/L
 6    WPT DATA
      OFF/REL/TRUE
 7    [WAY POINT]
 8    [NAV LINE]
 9    WIND DATA
      OFF/ON
 0    [NAV INFORMATION 2]
```

Nav information 1 menu

2. For items 2, 3, 5, 6 and 9, press the appropriate numeric key several times to choose the setting desired, and then press the [ENTER] key.

   Note1: Item 2 chooses the source of position data.
   GPS+LC: Own ship position data fed from GPS or Loran C navigator.
   DEAD RECKONING: Position data entered at item 4 (POSN) is used as starting point for dead reckoning.
   AIS: Own ship position data fed from AIS transponder.

   Note 2: When changing from GPS+LC to AIS or vice versa, the alarm indication "EPFS" appears. Press the [CANCEL] key to erase the alarm indication.

   If you selected DEAD RECKONING, do the following to enter position.
   a) Press the [4] key.
   b) Enter current latitude position.
   c) Press the [ENTER] key.
   d) Press the [4] key to choose North or South.
   e) Press the [ENTER] key.
   f) Enter current longitude position.

g) Press the [ENTER] key.

h) Press the [4] key to choose East or West.

i) Press the [ENTER] key.

3. Press the [0] key to show the NAV INFORMATION 2 menu.

```
            [NAV INFORMATION 2]

1       [NAV INFORMATION 1]
2       WIND GRAPH
        OFF/ON
3       WIND UNIT
        M/S/KT
4       CURRENT DATA
        OFF/ON
5       CURRENT GRAPH
        OFF/ON
6       DEPTH DATA
        OFF/ON
7       DEPTH GRAPH
        OFF/ON
8       DEPTH SCALE
        10/20/50/100/200/500
9       DEPTH UNIT
        M/FT/FA
0       [NAV INFORMATION 3]
```

Nav information 2 menu

4. Set up data similar to how you set the data on the NAV INFORMATION 1 menu.

5. Press the [0] key to show NAV INFORMATION 3 menu.

```
            [NAV INFORMATION 3]

1       [NAV INFORMATION 2]
2       WATER TEMP
        OFF/ON
3       DATE
        OFF/UTC/LOCAL
            +00:00
4*      USED WPL
        NAV LINE/WP
5
6
7
8
9
0       [AIS 1]
```

Nav information 3 menu

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6. Press the [2] key several times to turn water temperature data on or off as appropriate.

7. Press the [3] key several times to choose date format: OFF, no date; UTC, UTC time, or LOCAL, local time. For LOCAL, enter time as follows:

 a) Press the [ENTER] key.

 b) Press the [3] key to choose "+."

 c) Press the [ENTER] key.

 d) Key in time difference between local time and UTC time.

 e) Press the [ENTER] key.

8. Press the [NAV MENU] key.

Note: Item 4 in the NAV INFORMATION 3 menu is only displayed on the R-type radar. It is used to choose what nav data (WPL, RTE) from the external navigator to use. Normally, set it for NAV LINE. For the navigator which does not output nav line data choose WP.

3.3   Track
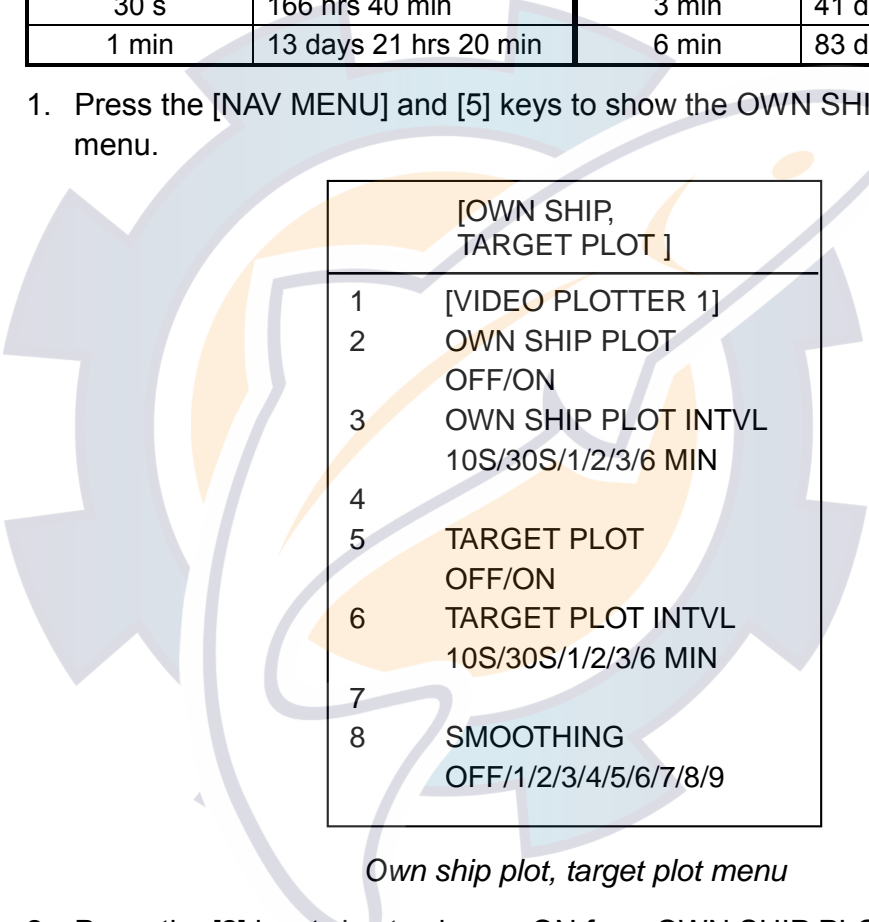
3.3.1   Recording own ship's track

Maximum of 20,00 points of own ship's track can be stored in the memory. When the track memory becomes full, the oldest track is deleted to make room for the latest.

The table below shows the relation between plotting interval and maximum recording time.

Interval	Max. Recording Time	Interval	Max. Recording Time
10 s	55 hrs 30 min	2 min	27 days 18 hr 40 min
30 s	166 hrs 40 min	3 min	41 days 16 hr
1 min	13 days 21 hrs 20 min	6 min	83 days 8 hr

1.   Press the [NAV MENU] and [5] keys to show the OWN SHIP, TARGET PLOT menu.

```
        [OWN SHIP,
         TARGET PLOT ]

  1     [VIDEO PLOTTER 1]
  2     OWN SHIP PLOT
        OFF/ON
  3     OWN SHIP PLOT INTVL
        10S/30S/1/2/3/6 MIN
  4
  5     TARGET PLOT
        OFF/ON
  6     TARGET PLOT INTVL
        10S/30S/1/2/3/6 MIN
  7
  8     SMOOTHING
        OFF/1/2/3/4/5/6/7/8/9
```

Own ship plot, target plot menu

2.   Press the [2] key twice to choose ON from OWN SHIP PLOT.
3.   Press the [ENTER] key.
4.   Press the [3] key several times to choose appropriate plotting interval for own ship's track.
5.   Press the [ENTER] key.
6.   Press the [NAV MENU] key to close the menu.

When your ship is at anchor or returning to port you probably will not need to plot (record) the track. In this case, choose OFF at step 2.

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3.3.2 Recording other ship's track

When your radar has the ARPA function, tracks of 10 targets (other ships) can be recorded. Memory capacity for other ship's track is 20,000 points, but this value is divided equally among ten targets, so there are 2,000 points per target. When the track memory becomes full the oldest track is deleted to make room for the latest.

The table below shows the relation between plotting interval and maximum recording time for other ship's track.

Other target plot interval and storage time

Interval	Max. Recording Time	Interval	Max. Recording Time
10 s	5 hrs 33 min	2 min	66 hrs 40 min
30 s	16 hrs 40 min	3 min	100 hrs
1 min	33 hrs 20 min	6 min	200 hrs

1. Press the [NAV MENU] and [5] keys to show the OWN SHIP, TARGET PLOT menu.
2. Press the [5] key twice to choose ON from TARGET PLOT.
3. Press the [ENTER] key.
4. Press the [6] key several times to choose appropriate plotting interval for other ships track.
5. Press the [ENTER] key.
6. [NAV MENU] key to close the menu.

3.3.3 Smoothing

Even when the vessel is sailing in a straight line the track shown on the display looks irregular. This is due to signal variation of the external navigator. You can compensate for this irregularity with smoothing.

A smoothing factor between 1 and 9 is available, and the higher the setting the greater the smoothing. "OFF" provides no smoothing. In most cases a smoothing setting between 1 and 5 will provide satisfactory results

1. Press the [NAV MENU] and [5] keys to show the OWN SHIP PLOT, TARGET PLOT menu.
2. Press the [8] key several times to choose the smoothing setting desired.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

3.3.4   Erasing track

The display may become full of track when, for example, own ship traces the same route several times. You can erase all or a percentage of the track to clear the display. Further, you can erase the tracks of other ships.

1. Press the [NAV MENU] and [9] keys to show the ERASE menu.

[ERASE]
1   [VIDEO PLOTTER 1]
2   OWN SHIP PLOT
30/50/80/ALL
3   TARGET PLOT
30/50/80/ALL
4   MARKS
OFF/AREA/ALL
5   WAYPOINTS
OFF/ALL
6   NAV LINES
OFF/ALL

Erase menu

2. To erase own ship's track, press the [2] key several times to choose OWN SHIP PLOT and the amount of track you wish to erase. For example, "30" erases the oldest 30% of the track points stored in the track memory.
3. Press the [ENTER] key.
4. To erase other ship's track, press the [3] key to choose TARGET PLOT and the amount of track to erase.
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

3   VIDEO PLOTTER

3.4   Marks, Lines

3.4.1   Entering marks

You can inscribe marks on the display to denote important points, for example, a buoy or a wreck. The mark memory capacity is 20,000 points.

Choosing mark entry method

Marks can be entered with the cursor, at own ship's position or specific location by entering latitude and longitude data manually.

1. Press the [NAV MENU] and [0] keys to show the VIDEO PLOTTER 2 menu.

```
┌─────────────────────────────────────┐
│          [VIDEO PLOTTER 2]          │
├─────────────────────────────────────┤
│   1      [VIDEO PLOTTER 1]          │
│   2      NAV DATA POSN              │
│   3      ALIGN + CURSOR             │
│          OFF/ON                     │
│   4                                 │
│   5      MARK ENTER MODE            │
│          CURSOR/L/L/OWN SHIP POSN   │
└─────────────────────────────────────┘
```

Video plotter 2 menu

2. Press the [5] key several times to choose CURSOR, L/L or OWN SHIP POSN as appropriate.

    CURSOR: Enters the mark at the cursor position, which is selected with the trackball.

    L/L: Enters mark at position entered manually.

    OWN SHIP POSN: The mark selected is entered at the own ship's position.

3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

Entering marks/lines at cursor or own ship position

1. Set the mark entry method to "CURSOR" or "OWN SHIP POSN" as appropriate, following "Choosing mark entry method" on page 22.
2. Press the [MARK] key to show ENTER MARK menu.

Enter mark menu

2. **For entry at own ship's position,** enter mark number to choose desired mark, followed by the [ENTER] key. The chosen mark appears at own ship position.
3. **For entry by cursor,** operate the trackball to place the cursor on the position desired for the mark. Enter mark number to choose desired mark and then press the [ENTER] key. The mark appears at the cursor position.
4. **To inscribe a line,** first select the mark entry method for "cursor." (See the previous page for the procedure.) Then, do the following:
    a) Use the trackball to place the cursor on the starting point of the line.
    b) Enter desired line number with the numeric keys and press the [ENTER] key.
    c) Use the trackball to place the cursor on the next point of the line and then press the [ENTER] key.
    d) Repeat c) to continue drawing the line.
5. To escape from the mark entry mode, press the [MARK] key.

Entering marks by manual input of latitude and longitude position

1. Set mark entry method to "L/L," following "Choosing mark entry method" on page 22.
2. Press the [MARK] key to open the MARK menu.
3. Enter latitude with the numeric keys and then press the [ENTER] key. To change polarity, press [5] for North; [6] for South.
4. Enter longitude and then press the [ENTER] key. To change polarity, press [7] for East; [8] for West.
5. Enter mark number to choose desired mark.
6. Press the [ENTER] key.
7. To escape from the mark entry mode, press the [MARK] key.

Line change feature

The line change feature allows you to change line type or continue drawing the same line type at a different location. For example, you may want to quit making nav lines and start making a coastline.

1. Press the [MARK] key to open the ENTER MARK menu.
2. Inscribe a line as mentioned in the paragraph above.
3. Press the [2] and [1] keys to choose LINE CHANGE.
4. Enter new line type number.
5. Use the trackball to place the cursor at the beginning of the line and then press the [ENTER] key.
6. Use the trackball to place the cursor at the next line point and then press the [ENTER] key.
7. Repeat step 6 to continue drawing the line.
8. Press the [MARK] key to close the menu.

3.5   Erasing Marks, Lines

Up to 20,000 points of marks and lines may be entered. When this amount is exceeded no more marks or lines can be entered unless unnecessary marks or lines are erased.

3.5.1   Erasing individual marks/lines

1. Choose CURSOR from MARK ENTRY MODE on the VIDEO PLOTTER 2 menu.
2. Press the [MARK] key to show the ENTER MARK menu.
3. Press the [2] key twice to choose MARK CANCEL.
4. Operate the trackball to place the cursor on the mark (or starting/ending point of line) which you want to erase.

> **Note:** When erasing a line, the cursor location determines how the line will be erased. Place the cursor on the starting or ending point of a line to erase a single line. To erase two lines connected to a point, place the cursor at the connecting point between the lines.

Starting/ending point

Erased line

Connecting point

Erased line
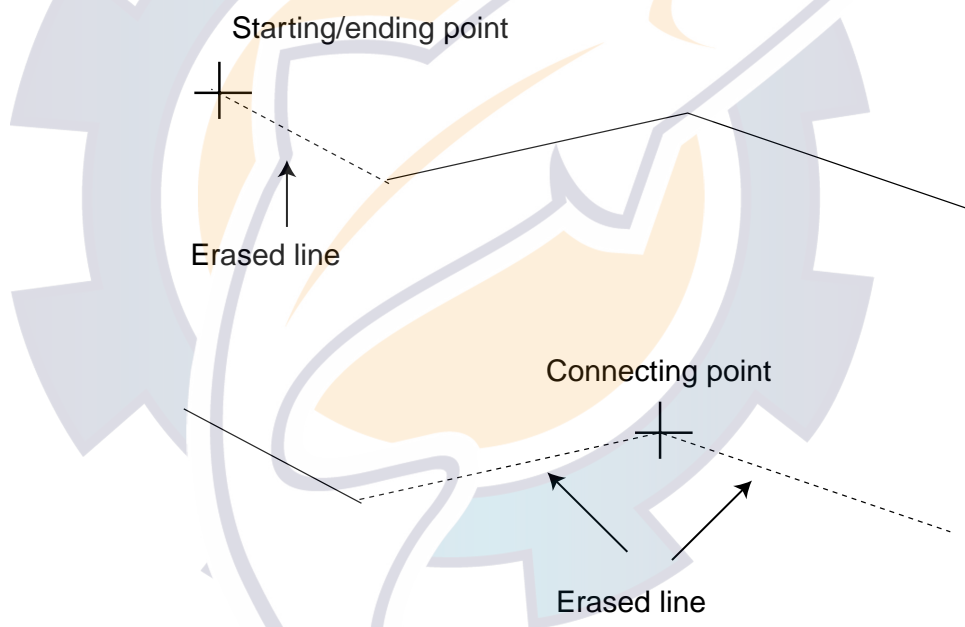
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

3.5.2   Erasing marks/lines from an area

The following procedure erases all marks and lines within a square which is 20% larger than the effective display area.

1.   Press the [NAV MENU] and [9] keys to show the ERASE menu.

[ERASE]	
1	[VIDEO PLOTTER 1]
2	OWN SHIP PLOT
	30/50/80/ALL
3	TARGET PLOT
	30/50/80/ALL
4	MARKS
	OFF/AREA/ALL
5	WAYPOINTS
	OFF/ALL
6	NAV LINES
	OFF/ALL

Erase menu

2.   Press the [4] key several times to choose AREA from MARKS, and then press the [ENTER] key.
3.   Press the [NAV MENU] key to close the menu.

3.5.3   Erasing all marks and lines

To erase all marks and lines from the memory, follow the procedure below.

1.   Press the [NAV MENU] and [9] keys to show the ERASE menu.
2.   Press the [4] key three times to choose ALL from MARKS.
3.   Press the [ENTER] key.
4.   Press the [NAV MENU] key to close the menu.

3.6   Waypoints

3.6.1   Entering waypoints

In navigation terminology, a particular location is known as a "waypoint," whether it be a starting point, a destination point or an intermediate on a voyage. This unit can store 97 waypoints, numbered 01 to 97. Waypoints may be entered by the cursor, by manual input of latitude and longitude, or own ship's position. Waypoint 00 is reserved for own ship position when setting destination. Waypoint 99 is for a waypoint entered from the navigator. Waypoint 98 does not exist.

Entering waypoints by the cursor

1. Press the [NAV MENU] and [4] keys to show the ENTER WPT, NAV LINE menu.

	[ENTER WPT, NAV LINE]
1	[VIDEO PLOTTER 1]
2	[ENTER WPT]
3	[WPT LIST]
4	
5	[ENTER NAV LINE]
6	[NAV LINE LIST]

Enter wpt, nav line menu

2. Press the [2] key to show the ENTER WPT menu.

	[ENTER WPT]
1	[ENTER WPT, NAV LINE]
2	WPT NO. 00°00.000 N/S 000°00.000 E/W
3	WPT ENTER MODE CURSOR/L/L OWN SHIP POSN

Enter wpt menu

3. Press the [3] key several times to choose CURSOR from WPT ENTER MODE, and then press the [ENTER] key.
4. Operate the trackball to place the cursor at the location where you want to enter a waypoint.
5. Press the [2] key to choose WPT NO.
6. Enter waypoint number, in two digits.

7. Press the [ENTER] key. The position selected is memorized as a waypoint and that position appears on the display.
8. To enter another waypoint, repeat steps 4 through 7.
9. Press the [NAV MENU] key to close the menu.

Entering waypoints by latitude and longitude position

1. Press the [NAV MENU], [4] and [2] keys to show the ENTER WPT menu.
2. Press the [3] key several times to choose L/L from ENTER WPT, and then press the [ENTER] key.
3. Press the [2] key to choose WPT NO.
4. Enter waypoint number, in two digits.
5. Enter the latitude and longitude position as below.
    a) Enter latitude in seven digits, and then press the [ENTER] key. If necessary, press the [2] key to choose North or South.
    b) Press the [ENTER] key.
    c) Enter longitude in eight digits, and then press the [ENTER] key. If necessary, press the [2] key to choose East or West.
    d) Press the [ENTER] key.
6. To enter another waypoint, repeat steps 4 and 5.
7. Press the [NAV MENU] key to close the menu.

Entering waypoints at own ship's position

1. Press the [NAV MENU], [4] and [2] keys to show the ENTER WPT menu.
2. Press the [3] key to choose OWN SHIP POSN from WPT ENTER MODE, and then press [ENTER] key.
3. Press the [2] key to choose WPT NO.
4. Enter waypoint number in two digits, and then press the [ENTER] key.
5. Press the [NAV MENU] key to close the menu.
6. To register another waypoint at own ship's position, repeat the above procedure.

3.6.2   Waypoint list

The waypoint list stores position data of all registered waypoints. You can display it as follows.

1. Press the [NAV MENU] and [4] keys to show the ENTER WPT, NAV LINE menu.

```
┌─────────────────────────────┐
│        [ENTER WPT,          │
│        NAV LINE]            │
├─────────────────────────────┤
│ 1      [VIDEO PLOTTER 1]    │
│ 2      [ENTER WPT]          │
│ 3      [WPT LIST]           │
│ 4                           │
│ 5      [ENTER NAV LINE]     │
│ 6      [NAV LINE LIST]      │
└─────────────────────────────┘
```

Enter wpt, nav line menu

2. Press the [3] key to show the WPT LIST.

```
┌─────────────────────────────┐
│       [WPT LIST 1]          │
├─────────────────────────────┤
│ 1 [ENTER WPT, NAV LINE]     │
│    WPT                      │
│    00      **°**.** N       │
│            ***°**.** E      │
│    01     34°42.11 N        │
│           136°31.58 E       │
│    02     33°97.69 N        │
│           134°64.35 E       │
│    03      **°**.** N       │
│            ***°**.** E      │
│    04      **°**.** N       │
│            ***°**.** E      │
│    05      **°**.** N       │
│            ***°**.** E      │
│    06      **°**.** N       │
│            ***°**.** E      │
│    07      **°**.** N       │
│            ***°**.** E      │
│ 9     ERASE WPT 00          │
│ 0     [WPT LIST 2]          │
└─────────────────────────────┘
```

Wpt list menu

The list shows waypoints 01 through 07, and asterisks appears where there is no date entered. Waypoint 00 is own ship position when setting a destination waypoint, and asterisks are shown when there is no destination waypoint set. Waypoint 99 is reserved for the waypoint from a navigator. There is no waypoint 98. To show the next page, press the [0] key. Press the [1] key to return to the previous page.

3.6.3   Displaying waypoints

Note: Before displaying waypoints, turn off nav lines. Turning on both waypoints and nav lines creates clutter the screen.

Internal waypoint

1. Press the [NAV MENU] and [2] keys to show the WAY POINT menu.
2. Press the [7] key twice to choose VIDEO PLOTTER from WPT DATA.
3. Press the [ENTER] key.

```
┌─────────────────────────────────────┐
│            [WAY POINT]               │
├─────────────────────────────────────┤
│                                      │
│  1       [VIDEO PLOTTER 1]           │
│  2       WPT                         │
│          OFF/ON                      │
│  3       WPT NO. 00                  │
│           00˚ 00.000 N               │
│          000˚ 00.000 E               │
│                                      │
│  4                                   │
│  5                                   │
│  7       WPT DATA                    │
│          VIDEO PLOTTER/NAVIGATION    │
│  8       ARRIVAL ALARM               │
│          OFF/ON           0.00 NM    │
│                                      │
└─────────────────────────────────────┘
```

Waypoint menu (VIDEO PLOTTER selected at item 7)

4. Press the [2] key twice to choose ON from WPT.
5. Press the [ENTER] key.
6. Press the [3] key.
7. Enter the waypoint no. (in two digits) you want to display.
8. Press the [ENTER] key. The L/L data of the internal waypoint appears and a line is drawn between it and own ship's position on the display.
9. Press the [NAV MENU] key to close the menu.

Note: To display no waypoints, choose OFF at step 4 in above procedure.

External waypoint

The waypoint from the external navigator can be displayed as follows:

1. Press the [NAV MENU] and [2] keys to show the WAY POINT menu.
2. Press the [7] key twice to choose NAVIGATION from WPT DATA.
3. Press the [ENTER] key.

```
┌─────────────────────────────────────┐
│            [WAY POINT]               │
├─────────────────────────────────────┤
│                                      │
│   1      [VIDEO PLOTTER 1]           │
│   2      WPT                         │
│          OFF/ON                      │
│   3                                  │
│   4      WPT LINE                    │
│          OFF/ON                      │
│   5      WPT NO.                     │
│          OFF/ON                      │
│   7      WPT DATA                    │
│          VIDEO PLOTTER/NAVIGATION    │
│   8      ARRIVAL ALARM               │
│          OFF/ON          0.00 NM     │
│                                      │
└─────────────────────────────────────┘
```

Way point menu (NAVIGATION selected at item 7)

4. Press the appropriate key as follows to choose waypoint display method.

   [2] key: Show the waypoint mark.

   [4] key: Connect own ship mark and waypoint with line.

   [5] key: Show the waypoint number.

5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

Note: Route data fed from a navigator is displayed waypoint by waypoint.

3.6.4   Erasing waypoints

Erasing individual waypoints

1. Press the [NAV MENU], [4] and [3] keys to show the WPT LIST.

[WPT LIST 1]
1 [ENTER WPT, NAV LINE]
WPT
00        $**°**.**$ N
$***°**.**$ E
01        $34°42.11$ N
$136°31.58$ E
02        $33°97.69$ N
$134°64.35$ E
03        $**°**.**$ N
$***°**.**$ E
04        $**°**.**$ N
$***°**.**$ E
05        $**°**.**$ N
$***°**.**$ E
06        $**°**.**$ N
$***°**.**$ E
07        $**°**.**$ N
$***°**.**$ E
9   ERASE WPT 00
0   [WPT LIST 2]

Wpt list menu

2. Press the [0] key to display the page containing the waypoint you wish to erase.
3. Press the [9] key and enter waypoint number in two digits.
4. Press the [ENTER] key. (A waypoint which is part of a nav line cannot be erased unless the nav line is erased.)
5. Press the [NAV MENU] key to close the menu.

Erasing all waypoints

1. Press the [NAV MENU] and [9] keys.
2. Press the [5] key twice.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

3.7   Nav Lines

25 nav lines may be entered, and each line may have up to 30 waypoints.

3.7.1   Entering nav lines

Entering a new nav line

1. Press the [NAV MENU] and [4] keys to show the ENTER WPT, NAV LINE menu.

```
        [ENTER WPT,
        NAV LINE]
───────────────────────────────
 1      [VIDEO PLOTTER 1]
 2      [ENTER WPT]
 3      [WPT LIST]
 4
 5      [ENTER NAV LINE]
 6      [NAV LINE LIST]
```

Enter wpt, nav line menu

2. Press the [5] key to show the ENTER NAV LINE menu.

```
        [ENTER NAV LINE]
───────────────────────────────
 1      [ENTER WPT, NAV LINE]
 2      NAV LINE      01
        WPT   ->    ->  ->
              ->    ->  ->
              ->    ->  ->
              ->    ->  ->
 8      ADDING  WPT 00 -> 00
 9      DESELECTING WPT 00 -> 00
```

Enter nav line menu

3. Press the [2] key to choose NAV LINE.
4. Enter nav line number in two digits and then press the [ENTER] key.
5. Enter waypoint number in two digits to show waypoints on the nav line and press the [ENTER] key.
6. Repeat step 5 to complete the nav line.
7. Press the [NAV MENU] key to close the menu.

Adding waypoints to nav lines

To add waypoints to a nav line, do the following:

1. Press the [NAV MENU], [4] and [5] keys to show the ENTER NAV LINE menu.
2. Press the [2] key. Enter nav line number and then press the [ENTER] key.
3. Press the [CANCEL] key.
4. Press the [8] key.
5. Enter new waypoint number with numeric keys.
6. Enter the waypoint which is one number before for the insertion point (number) and then press the [ENTER] key.

Newly added waypoint

```
8 ADDING
  WPT00 -> 00
9 ...
```

Waypoint which comes just before waypoint to be inserted

Add waypoint screen
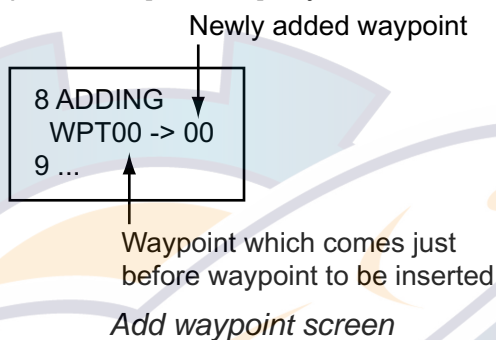
7. Press the [NAV MENU] key to close the menu.

Removing waypoints from nav lines

To remove waypoints from a nav line, do the following:

1. Press the [NAV MENU], [4] and [5] keys in to show the ENTER NAV LINE menu.
2. Press the [2] key, enter nav line number and press the [ENTER] key.
3. Press the [CANCEL] key.
4. Press the [9] key to choose DESELECTING.
5. Enter waypoint number (two digits) you wish to remove.
6. Press the [ENTER] key.
7. Press the [NAV MENU] key to close the menu.

If there are same-numbered waypoints in a nav line, the one nearest the end of the line will be erased.

3.7.2 Nav line list

The nav line list, which shows all nav lines registered, can be displayed by pressing the [NAV MENU], [4] and [6] keys.

```
            [NAV LINE LIST]

1    [ENTER WPT, NAV LINE]
     NAV LINE
     01  02  03 - - - -




9    ERASE NAV LINE  00
```

Nav line list

3.7.3 Deleting nav lines

25 nav lines may be entered. You may erase unnecessary nav lines as follows:

Deleting individual nav lines

1. Press the [NAV MENU], [4], [6] and [9] keys to choose ERASE NAV LINE from the NAV LINE LIST menu.
2. Enter nav line number you wish to delete.

    Note: A nav line in use cannot be deleted.

3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

Deleting all nav lines

1. Press the [NAV MENU] and [9] keys to choose ERASE NAV LINE from the ERASE menu.
2. Press the [6] key twice to choose ALL from NAV LINE.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

3.7.4   Setting up nav lines

Nav lines can be set up as follows:

1. Press the [NAV MENU] and [3] keys to show the NAV LINE menu.

```
┌─────────────────────────────────┐
│            [NAV LINE]            │
├─────────────────────────────────┤
│                                 │
│  1      [VIDEO PLOTTER 1]        │
│  2      NAV LINE                 │
│          OFF/ON                  │
│  3      NAV LINE No.             │
│         -> -> ->                 │
│         ->                       │
│  4      NAV WIDTH                │
│          OFF/ON      0.00NM      │
│  5      WPT NO.                  │
│          OFF/ON                  │
│  6      WPT                      │
│         WPT**                    │
│         (**)->@->(**)            │
│         (**)->(**)               │
│  7      NAV LINE DATA            │
│         VIDEO PLOTTER/NAVIGATION │
│  8      ARRIVAL ALARM            │
│          OFF/ON      0.00 NM     │
│  9      TURNING LINE             │
│          OFF/ON/REVISED          │
│                                 │
└─────────────────────────────────┘
```

Nav line menu (VIDEO PLOTTER selected at item 7)

2. Press the [7] key twice to choose VIDEO PLOTTER from NAV LINE DATA.
3. Press the [ENTER] key.
4. Press the [4] key twice to choose ON from NAV WIDTH.
5. Press the [ENTER] key.
6. Enter the width for the nav line.
7. Press the [ENTER] key. Dashed lines appears at both sides of the nav line. If unnecessary, choose OFF at step 4.
8. Press the [5] key twice to choose ON from WPT NO.
9. Press the [ENTER] key.
10. If you want to be alerted when own ship nears a waypoint, press the [8] key twice to choose ON from ARRIVAL ALARM.
11. Press the [ENTER] key.
12. Enter the arrival alarm range, and then press the [ENTER] key.

13. Press the [9] key several times to choose desired TURNING LINE option.

OFF: Turns turning lines off.

ON: Use this setting when the vessel is not to correct cross track error to return to course set, after arriving at turning line location.

REVISED: Use this setting when vessel is to return to course set after correcting cross track error, after arriving at turning line location.
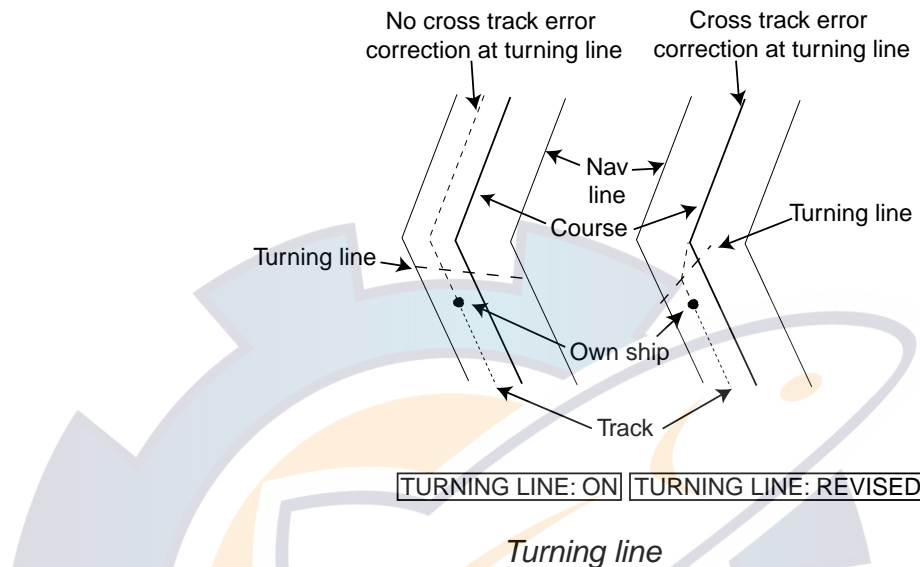
Turning line

14. Press the [ENTER] key.
15. Press the [NAV MENU] key to close the menu.

Note: The turning line function requires the correct settings of TURN RATE and SPEED RATE (on SHIP INFORMATION menu). For details, ask your dealer.

3.7.5   Displaying nav lines

Internal nav lines

1. Press the [NAV MENU] and [3] keys to show the NAV LINE menu.
2. Press the [7] key twice to choose VIDEO PLOTTER from NAV LINE DATA.
3. Press the [2] key twice to choose ON from NAV LINE.
4. Press the [ENTER] key.
5. Press the [3] key to choose NAV LINE NO.
6. Enter the nav line number you want to display and press the [ENTER] key.
7. Press the [CANCEL] key.
8. To specify the waypoint where to head, or skip the waypoint you are currently heading for and go to next waypoint, press the [6] key and then enter the waypoint number to go to.
9. Press the [ENTER] key. For example, you are traversing waypoints 11, 12, 13 and 14 in that order. Then, to skip waypoint 11 and go to waypoint 12, the display shows (11) → ● →12 → (13) → (14). "●" denotes own ship position.
10. Press the [ENTER] key.

External nav lines

Nav lines from an external navigator can be displayed as below. To do this, set USED WPL to NAV LINE on the NAV INFORMATION 3 menu. RTE and WPL sentences are necessary to display a nav line from a navigator.

1. Press the [NAV MENU] and [3] keys to show the NAV LINE menu.
2. Press the [7] key twice to choose NAVIGATION from NAV LINE DATA.
3. Press [4], [5] or [9] as appropriate. (4: Nav width setting, 5: WPT ON/OFF, 9: Turning line ON/OFF.

3.8   Recording and Replaying Data

3.8.1   Formatting memory (RAM) cards

Before you can use a memory (RAM) card with the RP-340, the card must be formatted. Formatting prepares the recording surface of the card for use with the system, and deletes all data recorded in the memory card.

Note: You can format cards you've used before, however, in which case all prior information on them is erased.

1.   Insert the memory card in the right side card slot.

Card slot
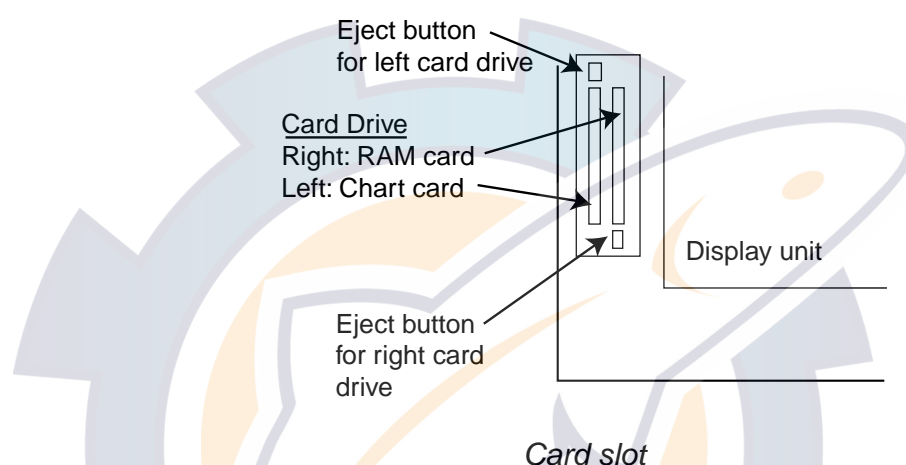
2.   Press the [NAV MENU] and [6] keys to choose CARD.
3.   Press the [6] key to choose RECORD.
4.   Press the [ENTER] key to show the RECORD CARD menu.

```
            [RECORD CARD]

    1    [VIDEO PLOTTER 1]
    2    OWN SHIP PLOT
         FILE T
    3    TARGET PLOT
         FILE A
    4    MARK
         FILE M

    0    FORMAT
         NO/YES
```

Record card menu

5.   Press the [0] key twice to choose YES from FORMAT.
6.   Press the [ENTER] key. When formatting is completed the message "COMPLETED" appears.
7.   Press the [NAV MENU] key to close the menu.

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3.8.2 Recording data

When the track memory becomes full, the oldest track is erased to make room for the latest. Further, when the mark memory becomes full you cannot enter another mark unless you erase a mark. Thus you should save important data to a memory card.

1. Insert a formatted memory card in the right hand card slot.
2. Press the [NAV MENU] key.
3. Press the [6] key several times to choose RECORD from CARD.
4. Press the [ENTER] key.
5. Press the appropriate numeric key to choose item to record:

   Own ship's track: [2] key
   Target track: [3] key
   Marks: [4] key
6. Enter the file title (max. seven digits).
7. Press the [ENTER] key.
8. Press the [NAV MENU] after recording has been completed, which is announced by displaying "COMPLETED" at the bottom of the menu.
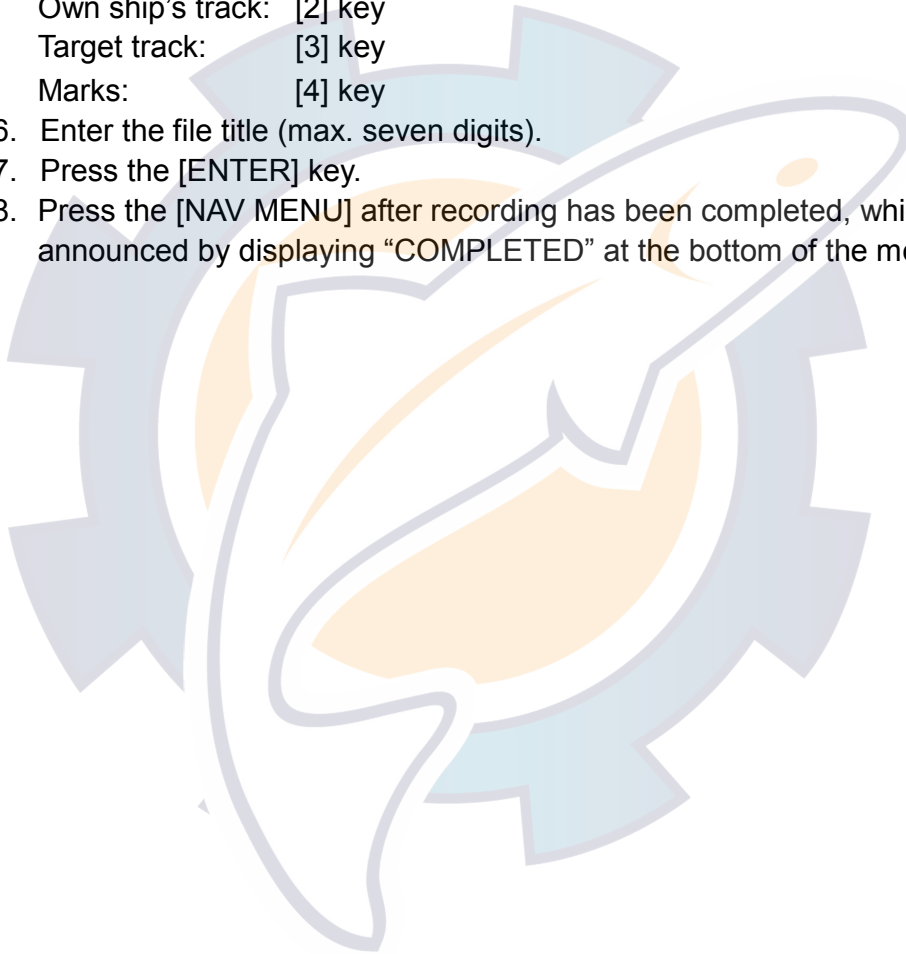
3.8.3   Replaying data

1. Insert appropriate memory card in the right hand card slot.
2. Press the [NAV MENU] key.
3. Press the [6] key several times to choose REPLAY.
4. Press the [ENTER] key.

[REPLAY CARD 1]	
1	[VIDEO PLOTTER 1]
2	FILE
3	FILE
4	FILE
5	FILE
6	FILE
7	FILE
8	FILE
9	FILE
0	NEXT PAGE

Replay card menu
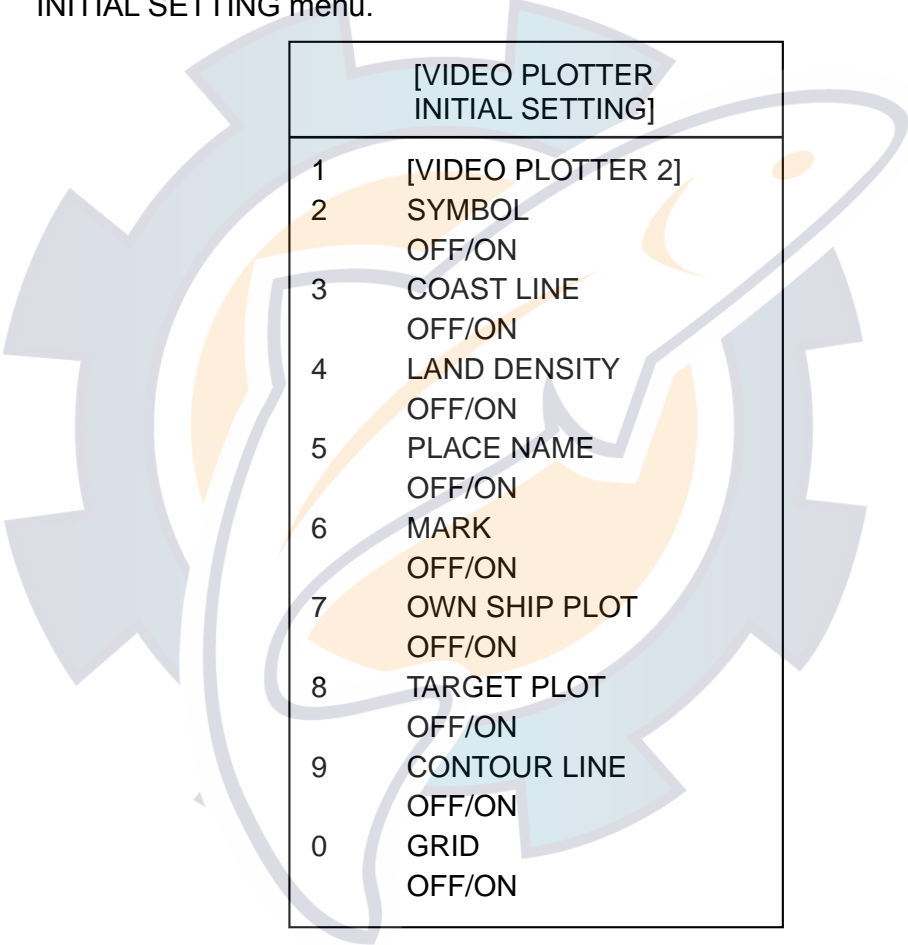
5. Enter file number you wish to replay. You can choose a next page by entering "0".
6. Press the [NAV MENU] after recording has been completed, which is announced by displaying "COMPLETED" at the bottom of the menu.

3.9   Initial Settings

Items displayed on the plotter display are usually set on the DISPLAY SELECT menu. You can turn these items off from the VIDEO PLOTTER INITIAL SETTING menu as below, and any item turned off will not appear on the DISPLAY SELECT menu.

Note: Normally, the VIDEO PLOTTER INITIAL SETTING menu is not displayed. To display it, press the [RADAR MENU] key five times while pressing and holding down the [HL OFF] key. Then, follow the procedure below.

1. Press the [NAV MENU], [0] and [0] keys to show the VIDEO PLOTTER INITIAL SETTING menu.

```
            [VIDEO PLOTTER
            INITIAL SETTING]

1    [VIDEO PLOTTER 2]
2    SYMBOL
     OFF/ON
3    COAST LINE
     OFF/ON
4    LAND DENSITY
     OFF/ON
5    PLACE NAME
     OFF/ON
6    MARK
     OFF/ON
7    OWN SHIP PLOT
     OFF/ON
8    TARGET PLOT
     OFF/ON
9    CONTOUR LINE
     OFF/ON
0    GRID
     OFF/ON
```

Video plotter initial setting menu

2. Press appropriate numeric key to turn item on or off as desired.
3. Press the [ENTER] key.
4. Repeat steps 2 and 3 to set the other items.
5. Press the [RADAR MENU] key to close the menu.

Only those items turned on in the above menu are displayed on the DISPLAY SELECT menu (see page 15).

4 AIS OPERATION

When equipped with an AIS transponder, the AIS (Automatic Identification System) feature automatically provides navigation data on AIS-equipped ships. Normally, radar function key F4 is the [AIS MENU] key and function key F3 is the [AIS DATA] key.

4.1 Turning AIS Feature On/Off

1. Press the [AIS MENU] key to open the AIS 1 menu.

```
[AIS 1]
1 ACTIVATE TARGET
2 SLEEP TARGET
3 BASIC DATA
4 [EXTENDED DATA]
5 LOST TARGET
6 [MESSAGE]
7 ACTIVATE ALL
     TARGETS
8 SLEEP ALL
     TARGETS
9 AIS
  OFF/ON
0 [AIS 2]
```

AIS1 menu

2. Press the [9] key twice to choose OFF or ON as appropriate.
   ON: All targets received from the AIS transponder are displayed with symbols.
   OFF: All AIS symbols disappear.
3. Press the [ENTER] key. "AIS" appears at the bottom right-hand corner on the display when the AIS function is active.
4. Press any menu key to close the AIS menu.

Then, AIS targets are marked with appropriate AIS symbol as below.

Activated target   Sleeping target   Dangerous target   Lost target   Target selected
                                                                                   for data display

AIS symbols

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Note 1: The RP-340 continues to process AIS targets when the AIS feature is switched off. When the AIS is again turned on, symbols are immediately displayed.

Note 2: AIS symbols are momentarily erased after the screen is redrawn when the heading is changed in the Head-up mode.

Note 3: The AIS menu can also be opened without using the [AIS MENU] key as below.
   1) In the plotter mode or combination mode, press the [NAV MENU] key to show the VIDEO PLOTTER 1 menu.
   2) Press the [1] key.
   3) Press the [0] key three times to open the AIS 1 menu.

4.2   Activating Targets

When you convert an AIS symbol to an activated target, that target's course and speed are shown with a vector. You can easily judge target movement by monitoring the vector.

1.   Use the trackball to place the cursor on the sleeping AIS target (indicates only the presence of a vessel equipped with AIS in a certain location) you wish to activate; that is, know more about a vessel's motion.
2.   Press the [AIS MENU] key to open the AIS menu.
3.   Press the [1] key (ACTIVATE TARGET) to activate the target.
4.   Press any menu key to close the menu.

Turning direction

SOG and COG vector*

Heading line#

* = Length adjustable on ARPA's ARPA1 menu or EPA electronic plot. With ARPA display, the vector shows speed through water and course through water.

= If there is no heading data, the line points in direction of COG.
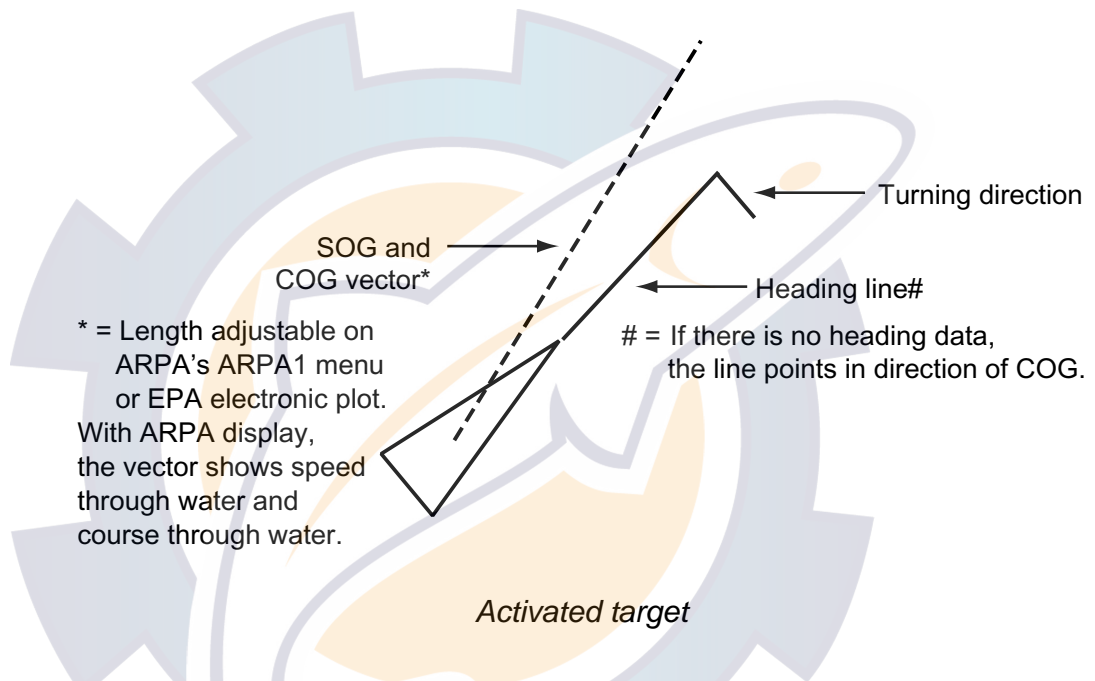
Activated target

Dangerous target

When an activated target violates the CPA/TCPA alarm setting its symbol changes to the dangerous target symbol (red and flashing) and the indication "A-CLSN" appears. (CPA and TCPA may be set in the ARPA on the E, AUTO PLOT MENU or on the EPA menu in the EPA mode.) Press the [AUDIO OFF] key to acknowledge the CPA/TCPA alarm. The audio alarm is silenced and the symbol stops flashing. Take appropriate action to avoid collision.

Thicker than activated target
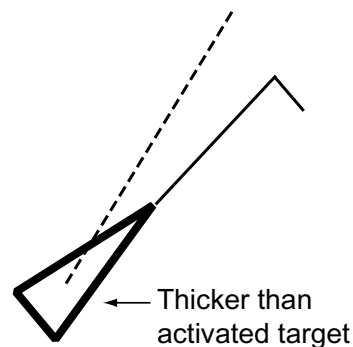
Dangerous target

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4.3　Sleeping Targets

4.3.1　Sleeping an AIS target

You may "sleep" an AIS target as below when the screen becomes filled with targets. Note that targets that have been activated automatically cannot be "slept." (See paragraph 4.7.)

1. Use the trackball to place the cursor on an activated AIS target symbol.
2. Press the [AIS MENU] key to open the AIS menu.
3. Press the [2] key (SLEEP TARGET) to sleep the target.
4. Press any menu key to close the menu. The target is marked with the sleeping target symbol, whose triangle is smaller than that of the activated target symbol.

Sleeping target

4.3.2　Sleeping all AIS targets

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [8] key (SLEEP ALL TARGETS) to sleep all targets.
3. Press any menu key to close the menu.

4.3.3　Activating all sleeping AIS targets

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [7] key (ACTIVATE ALL TARGETS).
3. Press any menu key to close the menu.

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4.4   Displaying Target Data

You may display an AIS target's by selecting it on the display.

4.4.1   Basic target data

To display basic target data first close any open menu, and then do the following:

1.   Place the cursor on an AIS target symbol.
2.   Press the [AIS DATA] key to show the target's basic data. The target is marked as below.

Activated target selected for data display

Fusion target no.

Call sign ⟶	CALL	1436782 02 ◀	
Range from own ship to target ⟶	RNG	9.92NM	
Bearing from own ship to target ⟶	BRG	234.1°	
Course over ground*1 ⟶	TRU COG 321.2°		
Speed over ground*1 ⟶	TRU SOG 21.1KT		
CPA, TCPA ⟶	CPA	2.8NM TCPA 23.5MIN	

*1 = Course thru water and speed thru water is displayed
       when the AIS is used with ARPA.
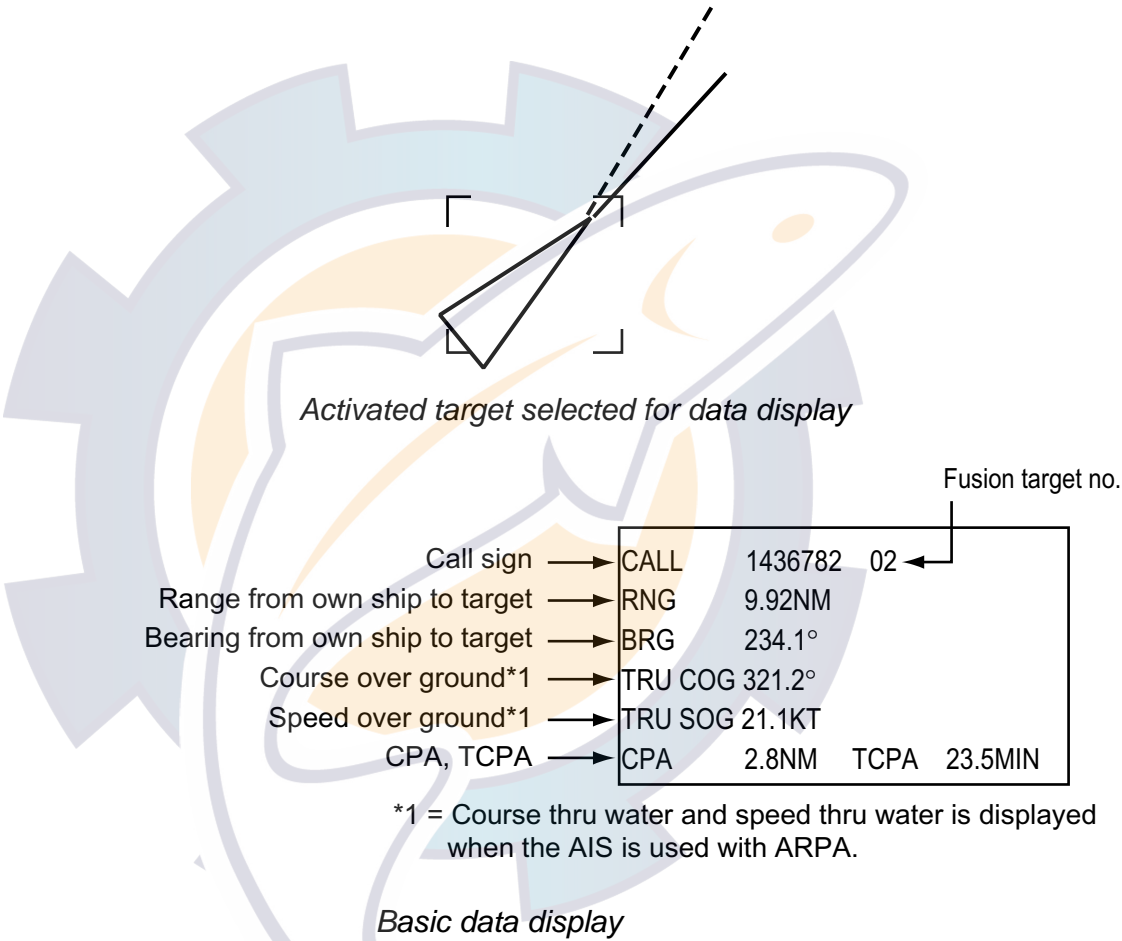
Basic data display

3.   Press any menu key to close the data display.

Note: You may also show basic data by pressing the [AIS MENU] key followed
         by the [3] key (BASIC DATA).

4.4.2   Extended target data

1. With basic data displayed as in paragraph 4.4.1, press the [AIS MENU] key to open the AIS menu.

2. Press the [4] key (EXTENDED DATA) to display the selected target's extended data.

```
                                      ┌──────────────────────────┐
                                      │ [EXTENDED DATA]          │
                                      ├──────────────────────────┤
                                      │ 1 [AIS1]                 │
                                      │                          │
              Ship's name ──────────▶ │ NAME    VOYAGER          │
                                      │                          │
                Call sign ──────────▶ │ CALL SIGN 1436782        │
                  Heading ──────────▶ │ HDG  270°                │
             Rate of turn* ─────────▶ │ ROT  R10.0°/MIN          │
                 Latitude ──────────▶ │ LAT   34°44.234 N        │
                Longitude ──────────▶ │ LON 135°32.189 E         │
      Position fixing device ───────▶ │ POS FIXING DEVICE        │
                                      │   GPS                    │
  Position accuracy (HIGH, LOW) ────▶ │ POSITION ACCURACY HIGH   │
          Navigation status ───────▶ │ NAV STATUS               │
                                      │  at anchor               │
                 MMSI No. ──────────▶ │ MMSI NO.  107374182      │
                  IMO No. ──────────▶ │ IMO NO.  123548760       │
                   Length ──────────▶ │ SHIP LENGTH 187m         │
                    Width ──────────▶ │ SHIP WIDTH 28m           │
                    Draft ──────────▶ │ SHIP DRAFT 12.2m         │
              Destination ──────────▶ │ DESTINATION              │
                                      │  Osaka                   │
                                      │                          │
   Estimated Time of Arrival ───────▶ │ ETA 01/FEB 12:59         │
           AIS version no. ─────────▶ │ AIS VERSION 0            │
Fusion (AIS and ARPA combined) target no. ─▶ │ ARPA FUSION TGT  02 │
       Type of ship and cargo ──────▶ │ SHIP & CARGO TYPE        │
                                      │  Fishing                 │
                                      └──────────────────────────┘
                                      * = ROT R (Right) or ROT L (Left)
```

Extended data display

3. Press any menu key to close the data display.

4.5 Messages

You may display messages received by the AIS transponder as below.

4.5.1 Displaying messages

1. Press the [AIS MENU] key to display the AIS menu.
2. Press the [6] key ([MESSAGE]) to display the MESSAGE menu.

Safety message addressed to your ship ⟶

Safety messge addressed to all ships ⟶

Binary message addressed to your ship ⟶

Binary message addressed to all ships ⟶

Automatic displaying of message ⟶

```
[MESSAGE]

1 [AIS 1]
2 SAFETY RELATED          1
  MESSAGE
  (ADDRESSED)
3 SAFETY RELATED          1
  MESSAGE
  (BROADCAST)
4 BINARY MESSAGE*         1
  (ADDRESSED)
5 BINARY MESSAGE*         1
  (BROADCAST)
6 AUTO DISPLAY
  OFF/ON
```

No of messages saved
(Max. 5 for each type of message)

* = Binary messages are messages other than safety messages.

Message menu

3. Press appropriate numeric key among 2-5 to choose the type of message you want to see. The example below shows a safety related message (addressed).
4. To see other messages, key in same number entered at step 3.

```
┌─────────────────────────────────┐
│          [MESSAGE]              │
├─────────────────────────────────┤
│ 1 [AIS 1]                       │
│ 2 SAFETY RELATED        ┌─┐     │
│   MESSAGE               │1│     │
│   (ADDRESSED)           └─┘┌─┐  │
│ 3 SAFETY RELATED          │1│  │
│   MESSAGE                 └─┘   │
│   (BROADCAST)           ┌─┐     │
│ 4 BINARY MESSAGE        │1│     │
│   (ADDRESSED)           └─┘┌─┐  │
│ 5 BINARY MESSAGE          │1│  │
│   (BROADCAST)             └─┘   │
│ 6 AUTO DISPLAY                  │
│    OFF/ON                       │
│ ============================    │
│ SAFETY MESSAGE (OWN SHIP)       │
│ SOURCE ID:                      │
│           012343215             │
│ DEST. ID:                       │
│           0456732891            │
│ DATE:      2002/03/03           │
│ TIME:      10:32:41             │
│    MESSAGE                      │
│ STORM WARNING VICINITY          │
│ OF 35°N 135°W.                  │
└─────────────────────────────────┘
```

Message type → SAFETY MESSAGE (OWN SHIP)
Ship sending message → SOURCE ID:
Ship receiving message → DEST. ID:
Date of message (D/M/Y) → DATE:
Time of message → TIME:
Text of message → MESSAGE

Safety related message

5.   Press any menu key to close the menu.

4.5.2   Automatically displaying messages

You can automatically display a message when it is received.

1.   Press the [AIS MENU] key to display the AIS menu.
2.   Press the [6] key ([MESSAGE]) to show the MESSAGE menu.
3.   Press the [6] key (AUTO DISPLAY) to choose ON.
4.   Press the [ENTER] key.
5.   Press any menu key to close the menu.

When a message is received the "message" display is automatically opened, showing the received message. To close the display, press any key.

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4.6   History Display

The history display shows equally time-spaced dots marking past positions of activated targets being tracked. A new dot is added at preset time intervals until the preset number is reached. If a target changes its speed, the spacing will be uneven. If it changes course, its plotted course will not be a straight line.

Below are sample history displays.

| (a) Ship turning | (b) Ship running straight | (c) Ship reduced speed | (d) Ship increased speed |
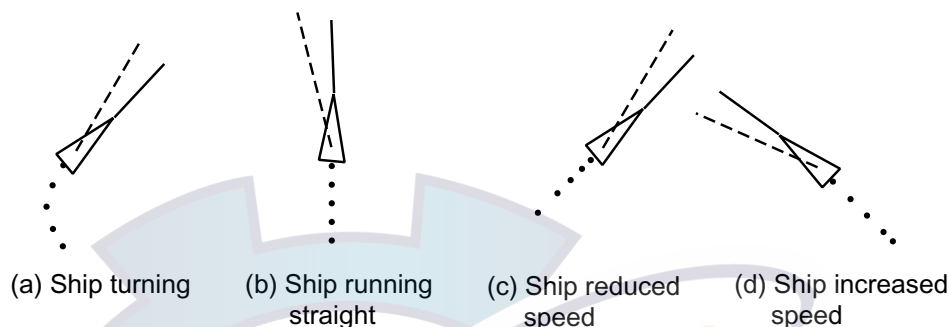
Sample history displays

4.6.1   Turning history display on/off

1.   Press the [AIS MENU] key to open the AIS menu.
2.   Press the [0] key to show the AIS2 menu.

```
[AIS 2]
1 [AIS 1]
2 HISTORY
  OFF/ON
3 HISTORY POINTS
  5/10
4 HISTORY INTERVAL
  10/30SEC/
  1/2/3/6MIN
5


6



7 ROT TAG
  000.1° /MIN
8 AUTO ACTIVATE
  OFF/ON
  RANGE  000.0NM
9 LOST TARGET RANGE
          000.0NM
0 [AIS 3]
```

AIS2 menu

3.   Press the [2] key (HISTORY).
4.   Further press the [2] key to turn the history display on or off as appropriate.
5.   Press the [ENTER] key.
6.   Press any menu key to close the menu.

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4.6.2   Choosing history display attributes

You may choose the number of history points to show per history plot interval and the history plot interval as below.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [3] key (HISTORY POINTS).
4. Further press the [3] key to choose number of history points to display per plotting interval: 5 or 10.
5. Press the [ENTER] key.
6. Press the [4] key (HISTORY INTERVAL).
7. Press the [4] key again to choose history interval desired among 10, 30 s; 1, 2, 3 and 6 min.
8. Press the [ENTER] key.
9. Press any menu key to close the menu.

4.7   Automatic Target Activation

You may automatically activate all targets within a specific distance from own ship as below. Note that you may also automatically activate all targets within the ARPA's automatic acquisition zone or guard zone. When a target enters the ARPA's automatic acquisition zone or guard zone, it is automatically marked with the activated target symbol. If the activated target goes out of the ARPA automatic acquisition zone or the guard zone it still is an activated target. When a target enters the guard zone, the display shows "A-GZ" at the lower right hand corner of the display.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [8] key (AUTO ACTIVATE).
4. Press the [8] key again to choose ON and then press the [ENTER] key.
5. Use the numeric keys to enter automatic activation range (000.1 to 999.9 nm).
6. Press the [ENTER] key.
7. Press any menu key to close the AIS menu.

4.8   Lost Target

A target is declared a lost target when no data is received for six minutes or five reporting intervals, whichever is the shorter. When this occurs, the target is marked with the (flashing) lost target symbol, the indication "A-LOST" appears. Press the [LOST TARGET] key to acknowledge the lost target.
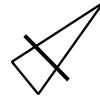
Lost target

Note: If an ARPA lost target mark is displayed when the [LOST TARGET] key is pressed to acknowledge a lost target, the ARPA lost target will also be erased. To erase only the AIS lost target, do the following:

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [5] key (LOST TARGET) to erase the lost target symbol and then press any key to close the menu.

Note: The AIS data transmission interval depends on own ship speed. For example, the data is transmitted every 10 seconds on ship speed of 0 –14 kts and every two seconds on the ship speed of more than 23 knots. For details see the owner's manual of the AIS.

4.9   Lost Target Range

Set the distance at which an AIS target is declared a lost target when no AIS data is received for six minutes or five reporting intervals, whichever is the shorter. When this feature is activated the following occurs:

- Sleeping targets within the lost target range for which no data is received are marked with the lost target symbol.
- Sleeping targets out of the lost target range are erased.
- Any activated AIS target from which you are not receiving AIS data is marked with the lost target symbol regardless of range to the target.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [9] key (LOST TARGET RANGE).
4. Use the numeric keys to enter lost target range (000.1 to 999.9 nm).
5. Press the [ENTER] key.
6. Press any menu key to close the AIS menu.

To disable this feature, enter all zeroes at step 4 in the above procedure.

4.10   ROT Display Setting

You may set the lower limit of the ROT (Rate Of Turn) at which the heading line on target symbols will point in direction of turning.
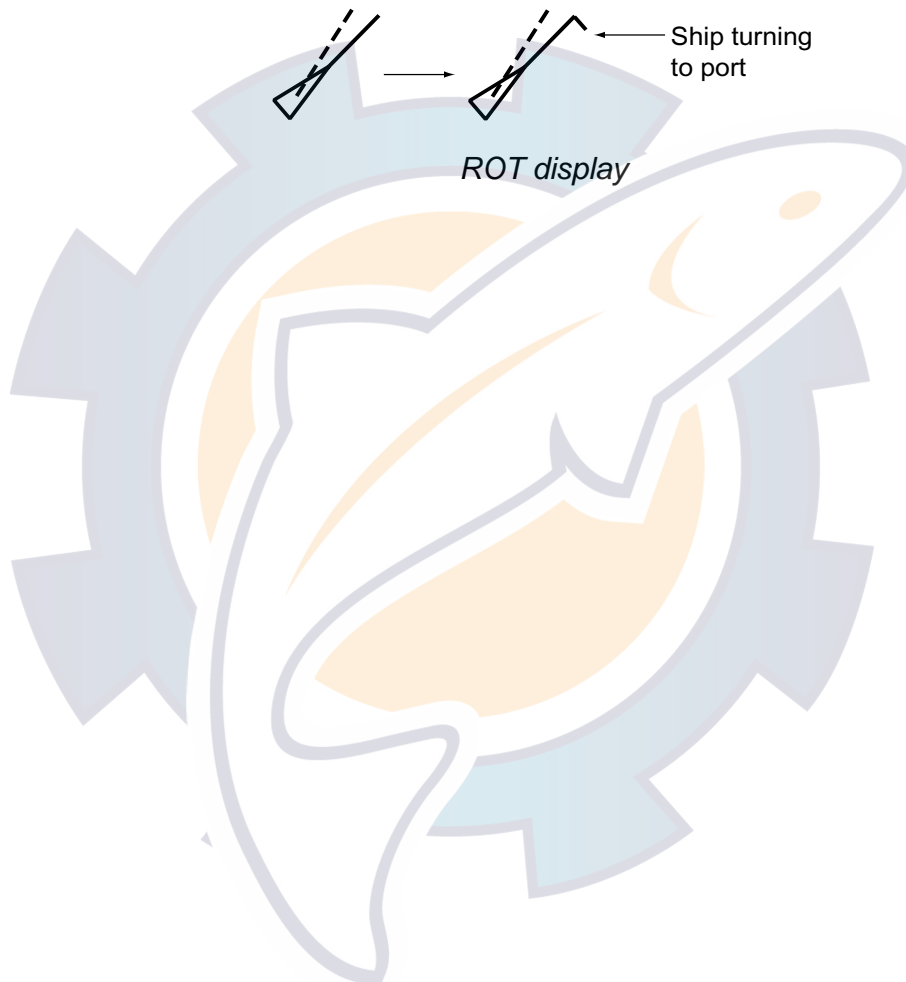
1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [7] key (ROT TAG).
4. Use the numeric keys to enter ROT (0.1 to 720.0°/min).
5. Press the [ENTER] key.
6. Press any menu key to close the AIS menu.

Ship turning to port

ROT display

4.11   Combining AIS with ARPA (fusion)

If equipped with ARPA both ARPA and AIS symbols may be displayed. To use the fusion feature, specify the parameters for which an ARPA target is converted to an AIS target.

1. Confirm that "ARPA" is shown at the top right-hand corner of the display and then press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key.
3. Press the [0] key again to show the AIS3 menu.

```
 [AIS 3]
1 [AIS 2]
2 FUSION
  OFF/ON
       POSN  0.000NM
       RNG   0.000NM
       BRG   00.0°
       SPD   0.0KT
       CSE   00.0°
```

AIS3 menu

4. Press the [2] key (FUSION).
5. Press the [2] key again to choose ON and press the [ENTER] key.
6. Enter the information below, pressing the [ENTER] key after entering each data. This information will be used to determine which ARPA targets to convert.

   POSN: Range between AIS target and ARPA target.

   RNG: Enter the range difference from own ship to AIS target and ARPA target.

   BRG: Enter the bearing difference from own ship to AIS target and ARPA target.

   SPD: Enter the speed difference between AIS target and ARPA target.

   CSE: Enter the course difference between AIS target and ARPA target.

7. Press any menu key to close the AIS menu.

If the information above is within the corresponding value of the ARPA and AIS targets, the targets are judged to be the same, the ARPA symbol is erased and only the AIS symbol is displayed. Further, "A-FSN" appears at the bottom right corner of the display at the time of conversion and the ARPA target no. appears next to the AIS symbol.

Note: An ARPA target whose speed is less than 1 kt is converted to an AIS target if it meets all other criteria other than course.
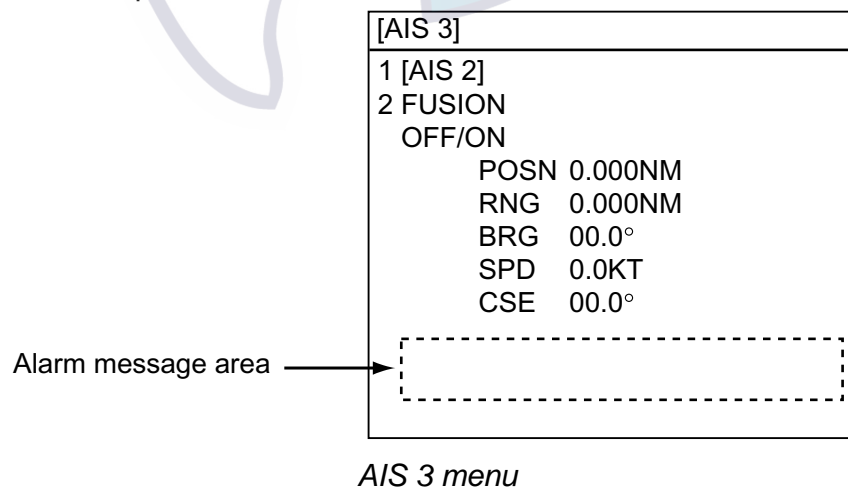
4.12   AIS System Messages

AIS system messages are displayed at the bottom right corner of the screen. The table below shows the AIS system messages and their meanings.

AIS system messages

Message	Meaning
A-FSN	ARPA target converted to AIS target. The indication disappears when the target no longer meets the criteria set in paragraph 4.11. When the message A-RCV is displayed, A-FSN is not displayed.
A-CLSN	CPA and TCPA of an activated AIS target are below value set on the menu.
A-LOST	Lost target
A-RCV	Not receiving AIS data
A-WT	When both ARPA and AIS symbols are shown, the AIS symbol's vector shows speed through water and course through water (instead of SOG and COG). If speed through water or speed thru course cannot be displayed this message appears. Note the target vectors are not displayed in this condition.
A-GZ	Displayed when a target enters the ARPA guard zone.
A-CPA	CPA/TCPA cannot be calculated because the "A-WT" alarm has been violated. Further the CPA/TCPA value in the basic data display is marked with an asterisk to indicate that it is not reliable.

4.13   AIS Alarm Messages

The AIS3 menu provides AIS alarm message information ($AIALR sentence) from the AIS transponder.

```
[AIS 3]

1 [AIS 2]
2 FUSION
  OFF/ON
        POSN  0.000NM
        RNG   0.000NM
        BRG   00.0°
        SPD   0.0KT
        CSE   00.0°
```

Alarm message area ──────→

AIS 3 menu

5   MAINTENANCE

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

5.1   Replacing the Battery in the Memory Card

The life of the battery in the memory card is about three years. When the battery voltage is low, NG (No Good) appears at the diagnostic test for the memory card. Replace the battery at your earliest convenience to prevent loss of data.

Note: Replace the battery within 10 minutes after removal to prevent loss of data.

Battery for	Battery Type	Code Number
Memory card	CR2025	000-141-093

1. Use your finger to slide the battery case release switch in the direction shown in the illustration below.
2. Pull out the battery case and remove the battery.

Battery case release switch

"+" side UP.
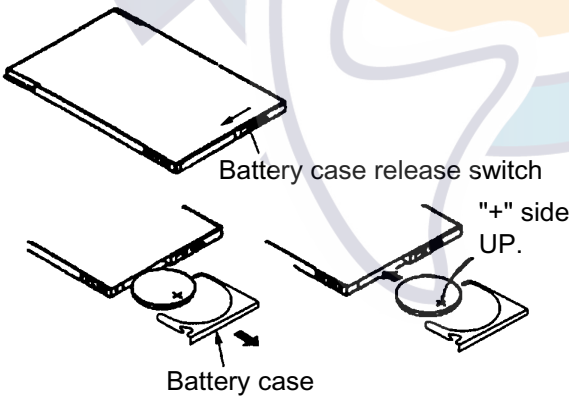
Battery case

⚠ WARNING

Be sure the battery is inserted correctly.

Explosion may result if the polarity is incorrect.

3. Insert new battery "+" side up.
4. Set the battery case to the memory card.
5. Close the battery case release switch.

5.2 Replacing the Battery on the RP Board

A battery installed on the RP board inside the radar display unit preserves video plotter setting data when the power is turned off. The life of the battery is about five years. When the battery voltage is low, NG (No Good) appears at the diagnostic test for the RP board. Contact your dealer about replacement, at your earliest convenience.

Battery for	Battery Type	Code Number
RP board	CR2450-F2ST2L	000-144-941

6 INSTALLATION OF VIDEO PLOTTER KIT

6.1 Necessary Parts

RP-340-2E-N (Code No. 000-080-210)

Name	Type	Code No.	Qty	Remarks
M-card Assy.	RP-340	008-530-660	1	M-card fixing plate, IF Board, Washer head screw B, Cable assy., EMI core
RP Board (Choose one)	14P0371C	008-528-990	1	FURUNO, NAVIONICS
Programmed ROM (2 pcs.)	PROM 03591902xx	008-529-060	1 set	For SPU Board, 2 pcs.
Cable Tie	CV-250	000-570-326	1	
Washer Head Screw A	M4 x 8 C2700W	000-881-144	2	CP03-24701
NH Connector Assy.	03-2059 (5P)	008-528-260	1	
RP Film	03-133-1635	100-244-480	1	Video plotter key labels
Key Sheet	14-069-0002	100-301-520	1	AIS key labels
Arrow Label (M-card)	03-123-1293	100-227-730	1	For M-card

6.2   Installation Procedure

1. Turn off the power.
2. Remove the top cover.
3. Remove the four plastic plugs from each side of the display unit and then remove the right and left side covers.
4. Unfasten screws from the pcb compartment, and then stand it vertically with the hook at the rear of the compartment.

From the rear of the radar:
SPU, ARP
and RP Boards

PCB Compartment

ROM

U8
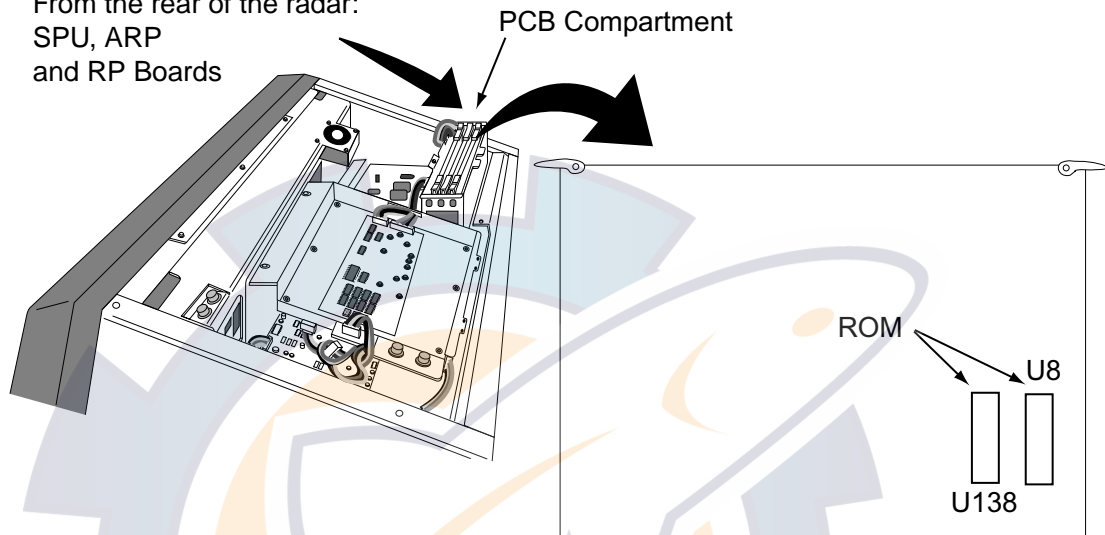
U138

U8:   03591901xx
U138: 03591902xx

5. Set the RP Board (14P0371) in the pcb compartment.
6. Remove the SPU Board (03P9111) from the pcb compartment.
7. Replace two ROMs (U8, U138) in the SPU Board with the ones supplied.
8. Set the SPU Board in the pcb compartment.
9. Unfasten three screws from the top of the front panel and two screws from each side of the front panel.

Three screws

Two screws
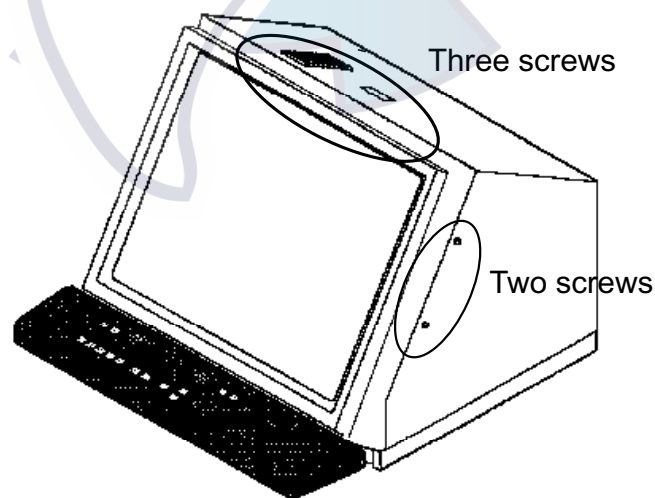
10. Lift up the front panel slightly to remove it. (Be careful not to pull the wire of the power switch.)

60

11. Install the M-card assy. as follows:

   a) Insert the M-card assy. in its slot at the left side of the display unit, and fasten it with two M4 x 8 screws.

   b) Run the cable assembly between J2 on the M-card assy. and J1 on the RP Board.

   c) Fix the cable assembly with the cable tie so as to prevent movement of the EMI core.

   d) Fasten the ground wire of the cable assembly to the screw on the pcb compartment.
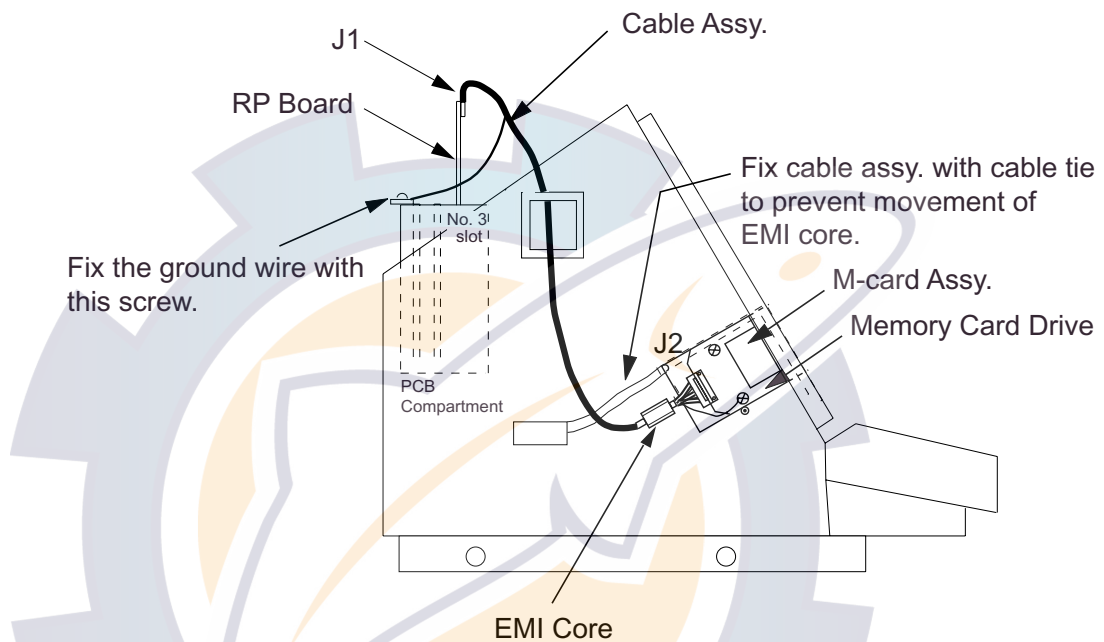
12. Lead in the AIS cable through the cable clamp at the rear (tabletop type) or bottom (pedestal type) of the display unit. The armor of the cable should be lying in the clamp. Fasten the cable with the cable clips shown in the illustration below.
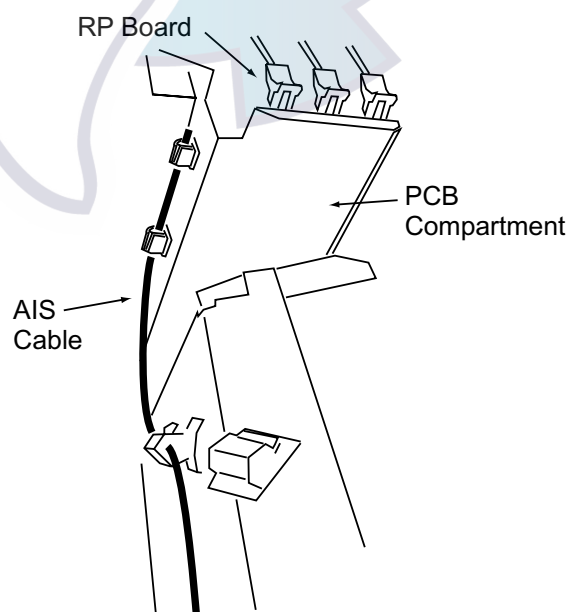
Display unit, top view, cover opened

13. Attach the NH connector assy. (supplied) to the AIS cable and then connect the NH connector to J4 on the RP Board.

FR/FAR-2805 series

FA-100 AIS TRANSPONDER
Junction Box

RP BOARD
14P0371   J4   Solder

Armor

RD-A > 1 >   25
                              Pair
RD-B > 2 >   26

GND > 5 >   Pair   27   GNDiso

*

*

* = Clamp armor
by cable clamp.

Use JIS cable TTYCS-4 or
equivalent. (See FA-100's
installation manual.)
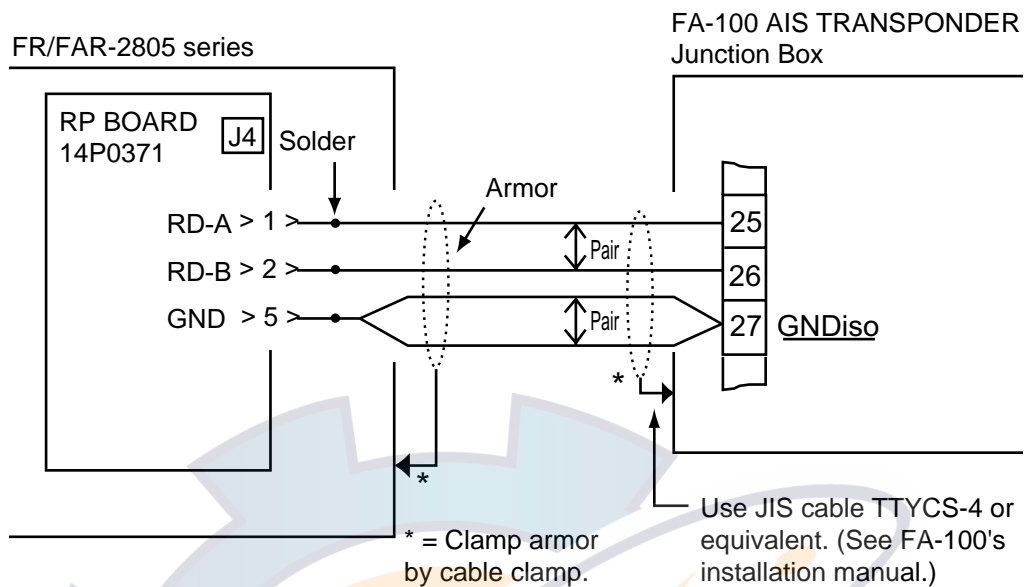
HOW TO ATTACH NH CONNECTOR

Shrink tubing

20 mm

Solder

(1) Cut shrink tubing in 20 mm lengths and slip onto each wire.

(2) Solder connector to signal cable.

(3) Heat shrink tubing with soldering iron.
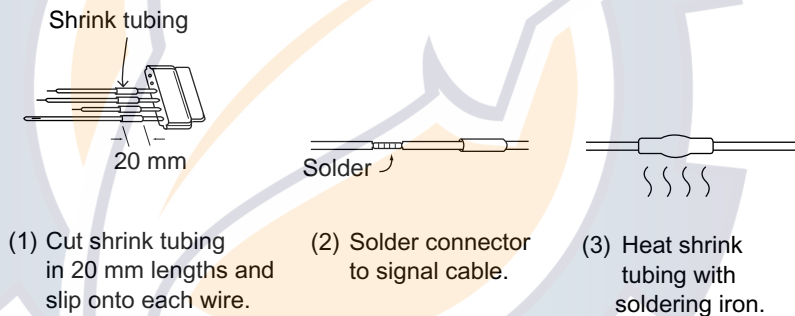
14. Refasten the pcb compartment and the front panel.
15. Attach the top, right and left covers.
16. Attach key labels as below.

Function keys
#1   #2   #3   #4
            AIS   AIS
            DATA MENU

MARK   CHART   VIDEO
       ALIGN   PLOT

AIS labels   Video plotter labels

62
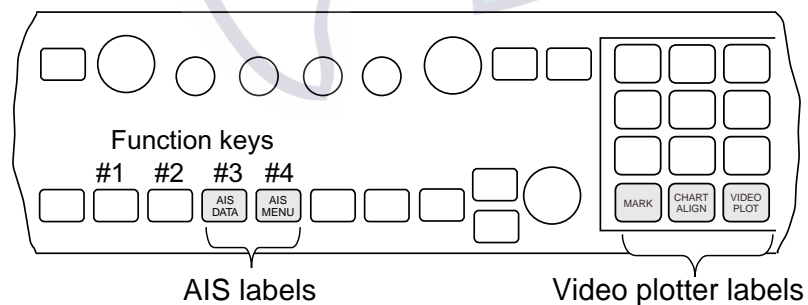
17. Attach the "arrow label" (supplied) to the location shown in the illustration below.

ARROW LABEL
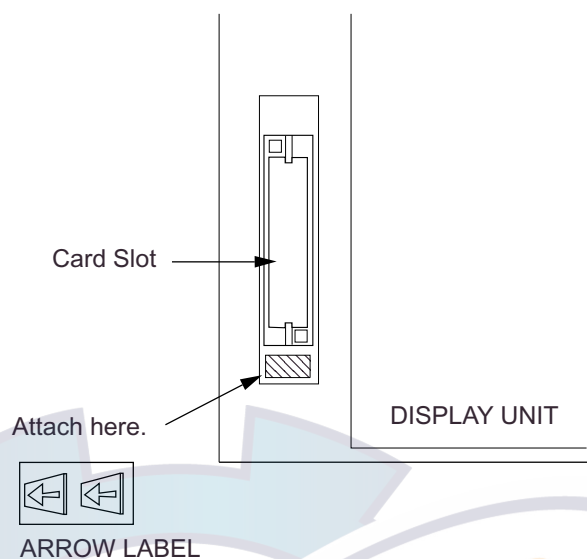
18. Set the #3 and #4 function keys as follows:

a) Press the [RADAR MENU], [0] and [5] keys.

b) Press the [2] key to choose OPERATION and then press the [ENTER] key.

c) Press the [3] key to choose AIS DATA.

d) Press the [ENTER] key.

e) Press the [1] and [6] keys.

f) Press the [2] key to choose OPERATION and press the [ENTER] key.

g) Press the [3] key to choose AIS MENU.

h) Press the [ENTER] key.

i) Press the [RADAR MENU] key to close the menu.

Note: Confirm RP program no. by pressing [RADAR MENU], [0], [0], [3] and [ENTER]. (** in the illustration below means program version number.) To escape from the test screen, turn the power off and on again.

```
FR/FAR-2805 TEST
PROGRAM NO.      ROM    RAM    CRAM   DIPSW
MAIN 03591901**    OK     OK     OK     1111
SUB  03590571**    OK     OK

ARP  18590381**    OK     OK     OK     0000
DSP  18590391**    OK     OK     OK

RP-1 03591921**    OK     OK     OK      00
RP-2 03591941**    OK            OK      00
     DRAM
     RP BOARD BAT  OK            SIO     - -
     RP CARD1      OK    CARD2        OK
       CARD 1 BAT  OK    CARD 2 BAT   OK
```

APPENDIX

1. Digital Interface (IEC 61162-2)

Input sentences (RP Board, J4)

ALR, VDM, VDO

Data reception

Data is received in serial asynchronous form in accordance with the standard referenced in IEC 61162-2.

The following parameters are used:
Baud rate: 38400
Data bits: 8 (D7 = 0)
Parity: none
Stop bits: 1

```
┌───┬───┬───┬───┬───┬───┬───┬───┐
│D0 │D1 │D2 │D3 │D4 │D5 │D6 │D7 │
└───┴───┴───┴───┴───┴───┴───┴───┘
Start ◄───────────────────────► Stop
bit           Data bits          bit
```
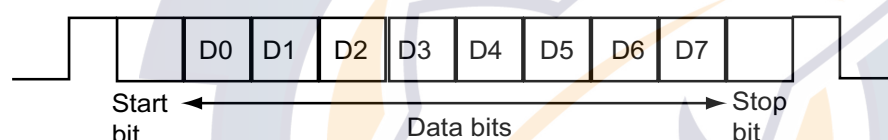
Data sentences

ALR – Set alarm state

```
$AIALR,hhmmss.ss,xxx,A,A,c--c*hh<CR><LF>
         │        │  │ │ │   │
         │        │  │ │ │   +---------------- 6
         │        │  │ │ +---------------- 5
         │        │  │ +------------------ 4
         │        │  +-------------------- 3
         │        +----------------------- 2
         +------------------------------ 1
```
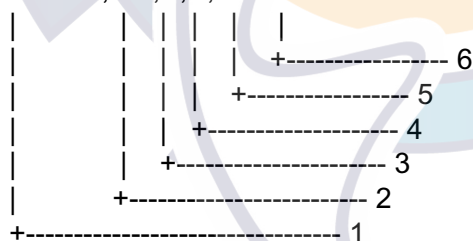
1. Time of alarm condition change, UTC
2. Local alarm number(identifier)
3. Alarm condition(A=threshold exceeded, V=not exceeded)
4. Alarm's acknowledge state, A=acknowledged V=unacknowledged
5. Alarm's description text
6. Checksum

VDM – VHF data-link message

```
!AIVDM,x,x,x,a,s--s,x*hh<CR><LF>
        | || |   |   |   |
        | || |   |   |   +----- 7
        | || |   |   +----- 6
        | || |   +-------- 5
        | || +----------- 4
        | | +------------- 3
        | +--------------- 2
        +----------------- 1
```
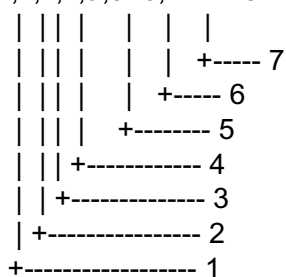
1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel Number
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

VDO – UAIS VHF Data-link Own-vessel report

```
!AIVDO,x,x,x,x,s--s,x*hh<CR><LF>
        | | || |   |   |   |
        | | || |   |   |   +--- 7
        | | || |   |   +----- 6
        | | || |   +-------- 5
        | | | +----------- 4
        | | +------------- 3
        | +--------------- 2
        +----------------- 1
```
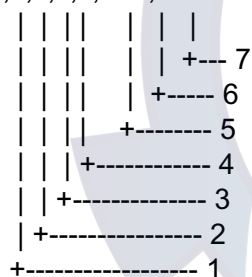
1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel Number
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

AP-2

Schematic diagram
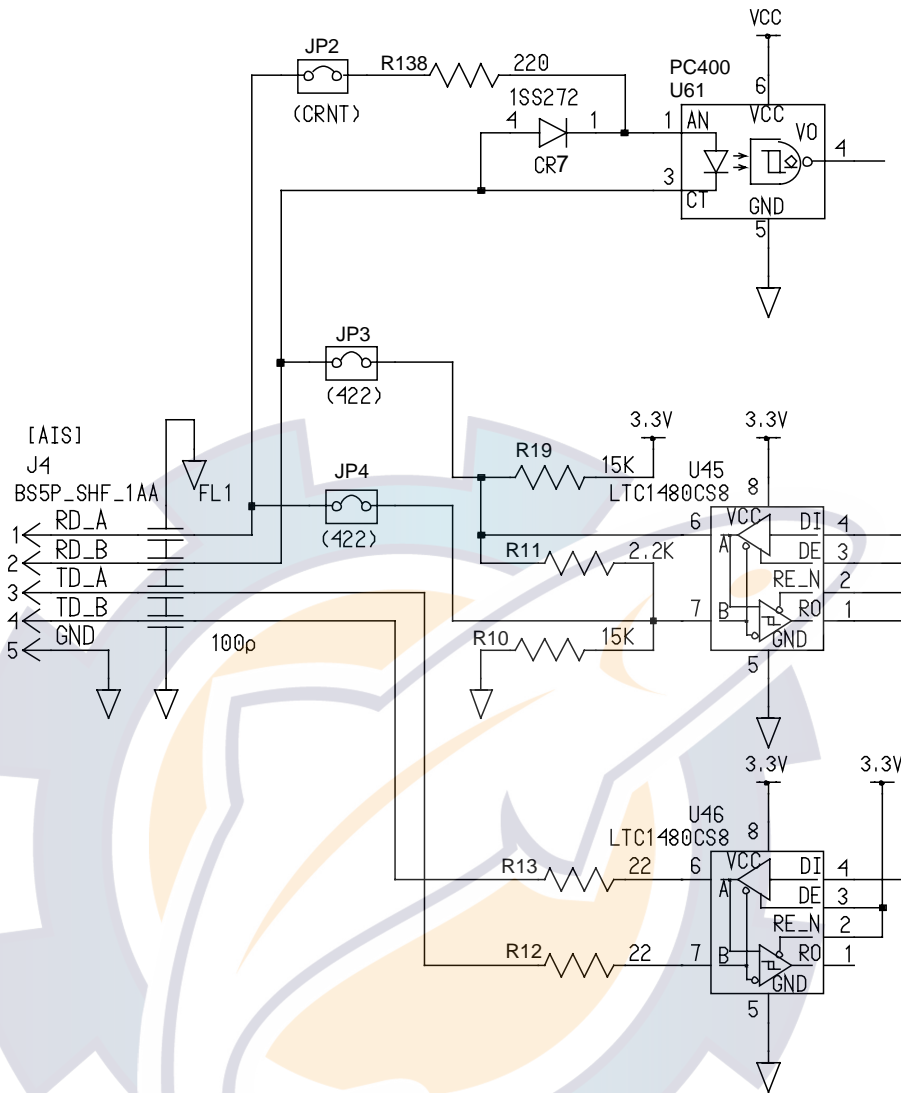
Load requirements as listener

220 ohms

AP-3

2. Interface Function

(1) Data displayed in the Basic data display
  - !AIVDM message 1-3
    COG, SOG
  - !AIVDM message 5
    call sign

(2) Data displayed in the Extended data display
  - !AIVDM message 1-3
    HDG, ROT, ship's position (latitude, longitude), position accuracy, navigational status, MMSI number
  - !AIVDM message 5
    call sign, ship's name, IMO number, AIS version indication, type of ship and cargo type, dimensions of ship, electronic position fixing equipment, ETA, maximum present static draught, destination

(3) Data displayed in the Message display
  - safety related message (addressed)
    - !AIVDM message 12
      source ID, destination ID, safety-related text
  - safety-related message (broadcast)
    - !AIVDM message 14
      source ID, safety-related text
  - binary message (addressed)
    - !AIVDM message 6
      source ID, destination ID, binary data (text telegram)
  - binary message (broadcast)
    - !AIVDM message 8
      source ID, binary data (text telegram)

(4) Data displayed in the own ship position display area
  - !AIVDO message 1-3
    ship position (latitude, longitude)

(5) Data displayed in the AIS alarm message display area
  - $AIALR (alarm's description text)

AP-4

3. Main Board Modification (IEC 60936-1 related items)

When the RP-340 is installed in the radar display unit of the FR-2805 series radar, the following modifications are done to the main board (SPU board, 03P9111):

- The main program of the main board (SPU board) is changed. The program no. after the change is 03591901XX. The previous program no. is 03590961XX.
  (XX = Program Version No.).

- Modifications
  - Communication feature added between the RP-340 and the SPU board.
  - AIS menu display is added.

These modifications do not affect radar features or IEC 60936-1 related features.

4. Conditions Which Display the Alarm for WT and CPA/TCPA

- When both VHW and VBW are input, priority is VBW>VHW.
- When only VHW is received, status is as below.
- When only VBW is received, status is as below.
- When neither VHW or VBW is input, log error is displayed.

STW selected on menu

When data sentence VHW is present, and set, drift and VTG are on or off:

	VHW	Set, Drift	VTG	Mode to be selected	AIS alarm display
STW displayed		ON		BT	CPA/TCPA
(Note 3)	ON	OFF	OFF	WT	WT, CPA/TCPA
STW displayed		ON		BT	CPA/TCPA
(Note 3)	ON	OFF	ON	WT	None

When data sentence VBW is present, and set, drift and VTG are on or off:

VBW	Set, Drift	VTG	Mode to be selected	AIS alarm display
	ON		WT	WT, CPA/TCPA
ON	OFF	OFF	WT	WT, CPA/TCPA
	ON		WT	None
ON	OFF	ON	WT	None

SOG selected on menu

When data sentence VHW is present, and set, drift and VTG are on or off:

	VHW	Set, Drift	VTG	Mode to be selected	AIS alarm display
		ON		BT	CPA/TCPA
SOG displayed	ON	OFF	OFF	WT	WT, CPA/TCPA
(Note 4)		ON		BT	CPA/TCPA
SOG displayed	ON	OFF	ON	WT	None
(Note 4)					

When data sentence VBW is present, and set, drift and VTG are on or off:

VBW	Set, Drift	VTG	Mode to be selected	AIS alarm display
	ON		BT	None
ON	OFF	OFF	BT	None
	ON		BT	None
ON	OFF	ON	BT	None

Notes

1. ▭▭▭▭ Because drift is ON.
2. ▭▭▭▭ Because of error (no VTG data).
3. STW shown in red. BT is selected because set and drift is input even though setting is STW.
4. SOG shown in red. SOG is selected, however only VHW is input, therefore SOG cannot be displayed.
5. LOG error. Neither VHW or VBW are input.

AP-6

5. Menu Tree

Video plotter menu

[NAV MENU] key   *Default settings in bold italics.*

```
VIDEO PLOTTER 1 ── 1 [NAV INFORMATION 1] ── 1 [VIDEO PLOTTER 1]
                                          ── 2 SELECT NAVAID (GPS+LC, DEAD RECKONING, AIS)
                                          ── 3 OWN SHIP POSN (OFF, L/L)
                                          ── 4 POSN (Enter own ship position.)
                                          ── 5 +CURSOR DATA (OFF, L/L)
                                          ── 6 WPT DATA (OFF, REL, TRUE)
                                          ── 7 [WAY POINT]
                                          ── 8 [NAV LINE]
                                          ── 9 WIND DATA (OFF, ON)
                                          ── 0 [NAV INFORMATION 2]

                                                 ── 1 [NAV INFORMATION 1]
                                                 ── 2 WIND GRAPH (OFF, ON)
                                                 ── 3 WIND UNIT (m/s, KT)
                                                 ── 4 CURRENT DATA (OFF, ON)
                                                 ── 5 CURRENT GRAPH (OFF, ON)
                                                 ── 6 DEPTH DATA (OFF, ON)
                                                 ── 7 DEPTH GRAPH (OFF, ON)
                                                 ── 8 DEPTH SCALE (10, 20, 50, 100, 200, 500)
                                                 ── 9 DEPTH UNIT (m, ft, fa)
                                                 ── 0 [NAV INFORMATION 3]

                                                        ── 1 [NAV INFORMATION 2]
                                                        ── 2 WATER TEMP (OFF, ON)
                                                        ── 3 DATE (OFF, UTC, LOCAL: Enter time difference.)
                                                        ── 4 USED WPL (NAV LINE, WP) (R-type radar only.)
                                                        ── 0 [AIS 1] (See AIS menu.)

                ── 2 [WAY POINT] ──────── 1 [VIDEO PLOTTER 1]
                                        ── 2 WPT (OFF, ON)
                                        ── 3 WPT NO.* (Enter waypoint no. to display.)
                                        ── 4 WPT LINE** (OFF, ON)
                                        ── 5 WPT NO.** (OFF, ON)
                                        ── 7 WPT DATA (VIDEO PLOTTER, NAVIGATION)
                                        ── 8 ARRIVAL ALARM (OFF; ON: Enter arrival alarm range.)

                ── 3 [NAV LINE] ──────── 1 [VIDEO PLOTTER 1]
                                        ── 2 NAV LINE (OFF, ON)
                                        ── 3 NAV LINE NO.  # (Enter nav line no. to display.)
                                        ── 4 NAV WIDTH (OFF; ON: Enter nav line width.)
                                        ── 5 WPT NO. (OFF, ON)
                                        ── 6 WPT  # (Enter waypoint no. to head to.)
                                        ── 7 NAV LINE DATA (VIDEO PLOTTER, NAVIGATION)
                                        ── 8 ARRIVAL ALARM (OFF; ON: Enter arrival alarm range.)
                                        ── 9 TURNING LINE (OFF/ON/REVISED)

①
```

**: Item 7 selected to NAVIGATION

*: Item 7 selected to VIDEO PLOTTER

#: Item 7 selected to VIDEO PLOTTER

Video plotter menu (con't from previous page)

(1)

4 [ENTER WPT, NAV LINE]
— 1 [VIDEO PLOTTER 1]
— 2 [ENTER WPT]
— 3 [WPT LIST]
— 5 [ENTER NAV LINE]
— 6 [NAV LINE LIST]

1 [ENTER WPT]
2 WPT NO. (Enter waypoint no.)
3 ENTER WPT (*CURSOR*, L/L, OWN SHIP POSN)

1 [ENTER WPT, NAV LINE]
9 ERASE (Enter waypoint to erase.)
0 [WPT LIST 2] (Waypoint list 2 - 10)

1 [ENTER WPT, NAV LINE]
2 NAV LINE (Enter nav line and waypoint nos.)
8 ADDING (Enter waypoint no. to add.)
9 DESELECTING (Enter waypoint no. to erase.)

1 [ENTER WPT, NAV LINE]
9 ERASE NAV LINE (Enter nav line no. to erase.)

5 [OWN SHIP, TARGET PLOT]
— 1 [VIDEO PLOTTER 1]
— 2 OWN SHIP PLOT (*OFF*, ON)
— 3 OWN SHIP PLOT INTVL (*10*, 30 s, 1, 2, 3, 6 min)
— 4
— 5 TARGET PLOT (*OFF*, ON)
— 6 TARGET PLOT INTVL (*10*, 30 s, 1, 2, 3, 6 min)
— 7
— 8 SMOOTHING (*OFF*, 1, 2, 3, 4, 5, 6, 7, 8, 9)

6 [CARD] (*REPLAY*, RECORD)
REPLAY
— 1 [VIDEO PLOTTER 1]
— 2-9 (File name disp.)

RECORD
1 [VIDEO PLOTTER 1]
2 OWN SHP PLOT (Enter file name.)
3 TARGET PLOT (Enter file name.)
4 MARK (Enter file name.)
0 FORMAT (*NO*, YES)

8 [DISPLAY SELECT]
— 1 [VIDEO PLOTTER 1]
— 2 SYMBOL** (OFF, *ON*)
— 3 COAST LINE** (OFF, *ON*)
— 4 LAND DENSITY** (OFF, *ON*)
— 5 PLACE NAME** (OFF, *ON*)
— 6 MARK** (OFF, *ON*)
— 7 OWN SHIP PLOT** (OFF, SEPARATE, *CONTINUE*)
— 8 TARGET PLOT** (OFF, *ON*)
— 9 CONTOUR LINE** (OFF, *ON*)
— 0 GRID** (OFF, *L/L*)

**: Not shown when "VIDEO PLOTTER INITIAL SETTING" is set to "OFF."

9 [ERASE]
— 1 [VIDEO PLOTTER 1]
— 2 OWN SHIP PLOT (*30%*, 50%, 80%, ALL)
— 3 TARGET PLOT (*30%*, 50%, 80%, ALL)
— 4 MARKS (*OFF*, ALL)
— 5 WAYPOINTS (*OFF*, ALL)
— 6 NAV LINES (*OFF*, ALL)

0 [VIDEO PLOTTER2]
— 1 [VIDEO PLOTTER 1]
— 2 NAV DATA POSN
— 3 ALIGN +CURSOR (*OFF*, ON)
— 4
— 5 MARK ENTER MODE (*CURSOR*, OWN SHIP POSN, L/L)
— 0 [VIDEO PLOTTER INITIAL SETTING]***
  — 1 (VIDEO PLOTTER 2)
  — 2 SYMBOL (OFF, *ON*)
  — 3 COAST LINE (OFF, *ON*)
  — 4 LAND DENSITY (OFF, *ON*)
  — 5 PLACE NAME (OFF, *ON*)
  — 6 MARK (OFF, *ON*)
  — 7 OWN SHIP PLOT (OFF, *ON*)
  — 8 TARGET PLOT (OFF, *ON*)
  — 9 CONTOUR LINE (OFF, *ON*)
  — 0 GRID (OFF, *ON*)

***: To display this menu, press [RADAR MENU] key while pressing and holding down [HL OFF] key.

AP-8

Radar map menu

[RADAR MAP display]

NAV MENU key

↓

NAV INFORMATION 1 menu

```
1 [RADAR MAP] ──────── 1 [NAV INFORMATION 1]
                       2 MAP (OFF/ON)
                       3 NAV DATA POSN
                       4 ALIGN + CURSOR (OFF/ON)
                       5 MARK ENTRY MODE (CURSOR/L/L/OWN SHIP)
                       6 ERASE MARK (OFF/AREA/ALL)

2 SELECT NAVAID (GPS+LC/DEAD RECKONING/AIS)

3 OWN SHIP POSN (OFF/L/L)

4 POSN (00°00.000 N/S, 000°00.000 E/W)

5 + CURSOR DATA (OFF/L/L)

6 WPT DATA (OFF/REL/TRU)

7 [WAY POINT] ──────── 1 [NAV INFORMATION 1]        * = Item 7 selected to
                       2 WPT (OFF/ON)                    VIDEO PLOTTER
                       3 WPT NO.*                    # = Item 7 selected to
                       4 WPT LINE# (OFF/ON)               NAVIGATION
                       5 WPT NO.# (OFF/ON)
                       7 WPT DATA (VIDEO PLOTTER/NAVIGATION)
                       8 ARRIVAL ALARM (OFF/ON)

8 [NAV LINE] ──────── 1 [NAV INFORMATION 1]
                      2 NAV LINE (OFF/ON)            ** = Item 7 selected to
                      3 NAV LINE NO.**                    VIDEO PLOTTER
                      4 NAV WIDTH (OFF/ON)
                      5 WPT NO. (OFF/ON)
                      6 WPT (**)->@->(**)->(**)**
                      7 NAV LINE DATA (VIDEO PLOTTER/NAVIGATION)
                      8 ARRIVAL ALARM (OFF/ON)**
9 WIND DATA (OFF/ON)  9 TURNING LINE (OFF/ON/REVISED)

0 [NAV INFORMATION 2] ──────── 1 [NAV INFORMATION 1]
                               2 WIND GRAPH (OFF/ON)
                               3 WIND UNIT (m/s/KT)
                               4 CURRENT DATA (OFF/ON)
                               5 CURRENT GRAPH (OFF/ON)
                               6 DEPTH DATA (OFF/ON)
                               7 DEPTH GRAPH (OFF/ON)
                               8 DEPTH SCALE (10/20/50/100/200/500)
                               9 DEPTH UNIT (m/FT/FA)
                               0 [NAV INFORMATION 3] ── 1 [NAV INFORMATION 2]
                                                        2 WATER TEMP (OFF/ON)
                                                        3 DATE (OFF/UTC/LOCAL)
                                                        4 USED WPL (NAV LINE/WP)
                                                        0 [AIS 1] (See AIS menu.)
```

AIS menu

[AIS MENU] Key

```
├─ 1 ACTIVATE TARGET
├─ 2 SLEEP TARGET
├─ 3 BASIC DATA
├─ 4 [EXTENDED DATA] ──── Detailed data for selected target
├─ 5 LOST TARGET
├─ 6 [MESSAGE] ─────────────────┬─ 1 [AIS 1]
├─ 7 ACTIVATE ALL TARGETS       ├─ 2 SAFETY RELATED MESSAGE (ADDRESSED)
├─ 8 SLEEP ALL TARGETS          ├─ 3 SAFETY RELATED MESSAGE (BROADCAST)
├─ 9 AIS (OFF, ON)              ├─ 4 BINARY MESSAGE (ADDRESSED)
└─ 0 [AIS 2]                    ├─ 5 BINARY MESSAGE (BROADCAST)
                                └─ 6 AUTO DISPLAY (OFF, ON)

       ├─ 1 [AIS 1]
       ├─ 2 HISTORY (OFF, ON)
       ├─ 3 HISTORY POINTS (5, 10)
       ├─ 4 HISTORY INTERVAL (10, 30 s; 1, 2, 3 , 6 min)
       ├─ 5
       ├─ 6
       ├─ 7 ROT TAG (Enter ship's rate of turn.)
       ├─ 8 AUTO ACTIVATE (OFF, ON: Enter auto activation range.)
       ├─ 9 LOST TARGET RANGE (Enter lost target range.)
       └─ 0 [AIS 3]

              ├─ 1 [AIS 2]
              └─ 2 FUSION* (OFF; ON: Position, range, bearing, speed, course)
```

6. Longitude Error Table (on 96 nm range scale)

The longitude lines concentrate on the north pole and south pole, namely, 1 nm is equivalent to 1 minute at 0 degree latitude, 2 minutes at 60 degrees latitude, 3 minutes at 70 degrees latitude and so on. For this reason, a longitude error occurs on the radar display. For example, when own ship is at 60°N and 135°E, even if the cursor indication is 62°N and 139°E, the real cursor position is deviated to the left (west) side. The table below shows the longitude error, represented from 0° to 90° at 96 nm from the radar center (own ship).

Distance error in direction of longitude due to latitude

APPENDIX

(nm)
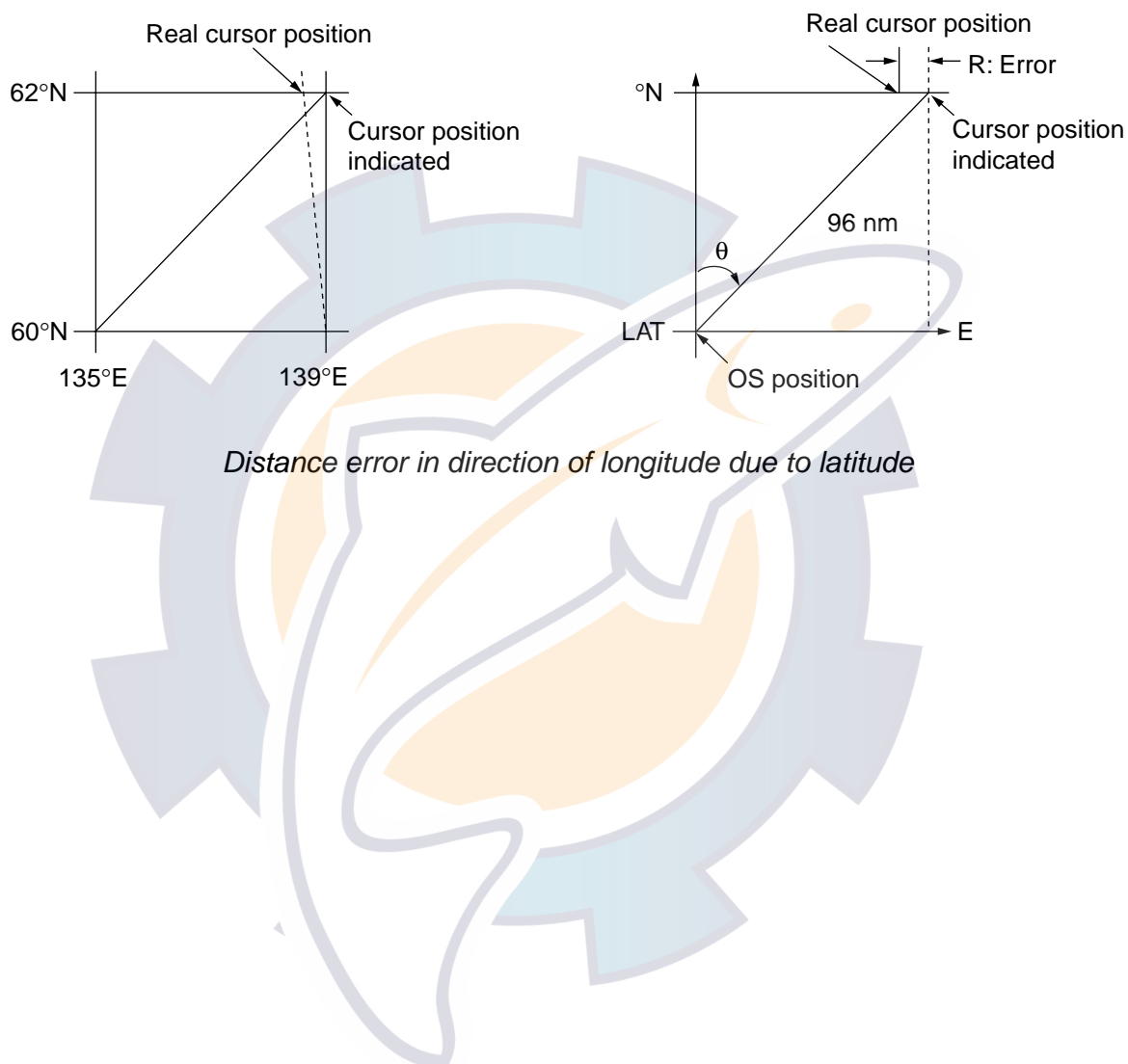
θ / LAT	5°	10°	15°	20°	25°	30°	35°	40°	45°
75°	0.2256	0.4444	0.6496	0.8350	0.9950	1.1248	1.2202	1.2786	1.2980
70°	0.21980213	0.43290201	0.632803	0.8134132	0.96923215	1.09551918	1.1884382	1.24517456	1.26402037
65°	0.21229339	0.41810678	0.61115946	0.78556318	0.93600295	1.05790007	1.14755221	1.20224625	1.22034042
60°	0.20316898	0.40012949	0.58486463	0.75173456	0.89565021	1.0122297	1.09793265	1.15016811	1.16737294
55°	0.19249832	0.37910698	0.55411863	0.71218478	0.84848102	0.95885565	1.03998717	1.08933651	1.10552105
50°	0.18036264	0.35519924	0.51915545	0.66721485	0.79485438	0.89818413	0.97406698	1.02021439	1.03525547
45°	0.16685429	0.32858822	0.48024119	0.61716701	0.73517843	0.83067689	0.90076355	0.94332783	0.95711098
40°	0.15207608	0.29947644	0.437672	0.56242216	0.66990732	0.7568477	0.82060477	0.85926197	0.87168229
35°	0.13614047	0.26808546	0.39177186	0.53339693	0.59953781	0.67725844	0.73420069	0.76865661	0.77961957
30°	0.11916876	0.2346542	0.3428901	0.44054055	0.52460545	0.59251483	0.6422089	0.67220131	0.68162348
25°	0.10129001	0.19943707	0.29139874	0.37433139	0.44568053	0.50326182	0.54532952	0.57063015	0.57843983
20°	0.08264056	0.16270211	0.23768966	0.30527334	0.36336372	0.41017869	0.44429984	0.46471615	0.47085389
15°	0.06336208	0.12472888	0.18217162	0.23389198	0.27828148	0.31397386	0.33988878	0.35526538	0.35968447
10°	0.04360137	0.0858064	0.12526714	0.16073056	0.19108136	0.21537949	0.23289096	0.24311083	0.24577764
5°	0.02350833	0.04623087	0.0674093	0.08634588	0.10242699	0.11514595	0.1241207	0.12910605	0.13000029
0°	0.00323737	0.0063035	0.00903844	0.01130406	0.01299309	0.01403609	0.0144058	0.0141187	0.01323356

(nm)

θ / LAT	50°	55°	60°	65°	70°	75°	80°	85°	90°
75°	1.2780	1.2192	1.1233	0.9933	0.8332	0.6479	0.4431	0.2249	0
70°	1.24442563	1.18701379	1.09356117	0.96694117	0.81103484	0.3061092	0.43117887	0.21881975	0
65°	1.20131324	1.14577786	1.05546143	0.93315023	0.78260251	0.60843159	0.41596331	0.21107193	0
60°	1.14905813	1.09582188	1.00932899	0.89225746	0.74821409	0.58162173	0.397582	0.20171772	0
55°	1.08805799	1.03752602	0.95551494	0.84457408	0.70813132	0.55038538	0.37617487	0.19082831	0
50°	1.0187708	0.97133397	0.89442885	0.79046297	0.66265924	0.51496026	0.35190481	0.17848659	0
45°	0.94174265	0.89774948	0.82653562	0.73033596	0.61214392	0.47561599	0.32495654	0.16478648	0
40°	0.85754099	0.81733258	0.75235195	0.66465066	0.55696981	0.43265198	0.29553516	0.14983224	0
35°	0.76681293	0.73069528	0.63744242	0.59390696	0.49755683	0.38639524	0.26386458	0.13373769	0
30°	0.67024897	0.63849695	0.58741521	0.51864327	0.43435714	0.33719779	0.23018583	0.11662531	0
25°	0.568584	0.54143927	0.49791741	0.43943239	0.36785173	0.28543407	0.19475522	0.09862535	0
20°	0.46259176	0.44026091	0.40463016	0.35687717	0.29854675	0.23149802	0.15784242	0.07987479	0
15°	0.35307892	0.3357319	0.30826343	0.2716059	0.22696965	0.17580013	0.11972833	0.06051633	0
10°	0.2487894	0.22864776	0.20955062	0.18426754	0.15366517	0.1187643	0.08070304	0.0406973	0
5°	0.12684572	0.11982348	0.10624302	0.09552679	0.0791912	0.04106355	0.04106355	0.02056855	0
0°	0.01184713	0.01008727	0.008104	0.00605903	0.00411455	0.00111154	0.00111154	0.00028325	0

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SPECIFICATIONS OF VIDEO PLOTTER
RP-340

1   GENERAL

1.1	Display	Display of FAR/FR-2805 series Radar
1.2	Display Mode	Radar picture overlaid on plotter picture
1.3	Presentation Mode	North-up (NU), True motion (TM), Course-up (CU), Heading up (HU), Cursor Gyro (CG)
		HU and CG mode display ship's course, marks and course line only.
1.4	Display Range	depends on the Range of connected radar.
1.5	Usable-grounding	80° latitude or below
1.6	Coastline Data	Furuno card and Navionics card.
1.7	Track	
	Memory capacity	20,000 for own ship, 20,000 for other ship
	Plot Interval	10 s, 30 s, 1, 2, 3, or 6min and OFF
1.8	Marks	
	Memory capacity	20,000 points
	Marks' Type	Fish school, Wreck, Lighthouse, Buoy illuminated, Buoy, Radio Station, Measuring point, Obstacle, Reef, Wharf, Anchor, Line end mark, Line (three pattern), Waypoint Number
1.9	Alphanumeric Data Indications	
		Own ship's position (L/L)
		Cursor intersection (L/L)
		Range and bearing to a selected waypoint
		Range and bearing from the origin mark to the cursor intersection
		Range and bearing to waypoint
		Water temperature and depth, date and time
1.10	Alarm	Waypoint closing alarm

2   AIS INDICATION

2.1	Symbol	Sleeping/ Activated/ Dangerous/ Selected/ Lost targets
2.2	Number of Target	1,000 max.
2.3	Data Indication	Basic and Extended data
2.4	Track	10 points per 1 target
2.5	Alarm	CPA/TCPA alarm

E3048S01B

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