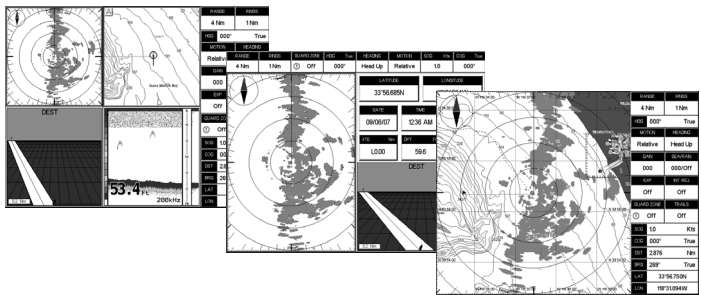
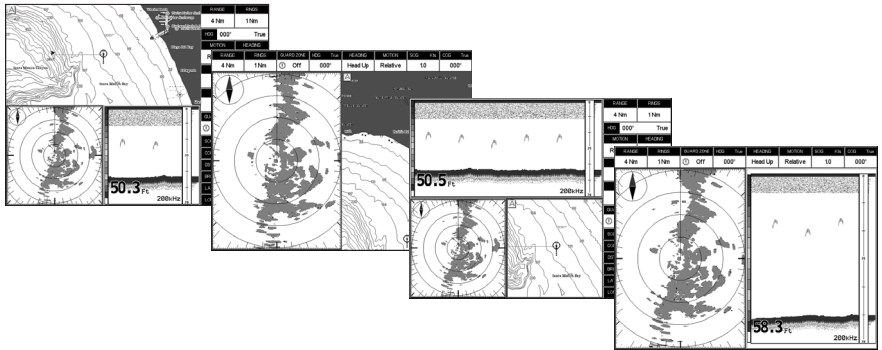


RADAR OPERATION MANUAL



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1. INTRODUCTION

1.0 CONVENTIONS USED

Please refer to the legend below:

[MENU]	If you see brackets around a bold and capital letter word this refers to a key press.
[CHART]	If you see brackets around a bold and small capital letter word this refers to a Soft Key press.
<u>GENERAL SETUP</u>	When a word(s) is in bold capital letters and underlined, this refers to a menu selection item.

1.1 INTRODUCTION

Any menu operation and functions activation in this Operation Manual is related to the following Chart Plotter models with software capable to operate a Radar Antenna. Whenever it is necessary, a note has been inserted for those models with operational differences.

- CP180
- CP180i
- CP300
- CP300i
- CPV350
- CP500
- CPV550

To confirm the Chart Plotter has the software to operate a Radar Antenna:

1. Turn on the Chart Plotter, select the chart page.
2. Press **[MENU]** and look for a Radar selection.

If the Chart Plotter has a Radar selection, it has the software. If the Chart Plotter does not have the software, it is available by contacting Standard Horizon Marine Product Support at 800/767-2450 (USA) or Standard Horizon/Vertex Standard authorized dealers (outside the US and Canada) for a Software Card. Refer Si-Tex Installation Manual for software update procedure.

1.2 GENERAL INFORMATION

PRODUCT SUPPORT INQUIRIES

If you have any questions or comments, we invite you to visit www.standardhorizon.com to send an E-Mail or contact the Product Support team at 800-767-2450 M-F 7:00-5:00PST (in USA or Canada) or Standard Horizon/Vertex Standard authorized dealers (Outside USA or Canada).

2. RADAR PAGES

2.0 DISPLAYING THE RADAR PAGES

The Chart Plotter has the capability to select the following Radar pages*:

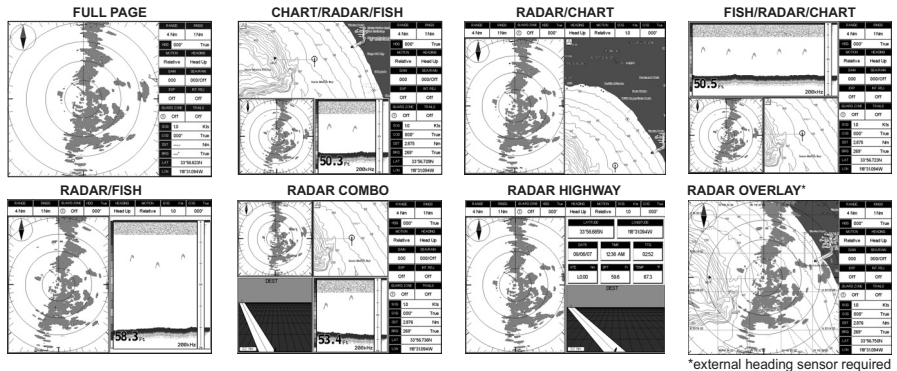


Figure 2.0 - Radar pages

To select a Radar page:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **RADAR** (or **RADAR/FISH** FOR CP180/CP180i) and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight the desired Radar page* and press **[ENT]**.

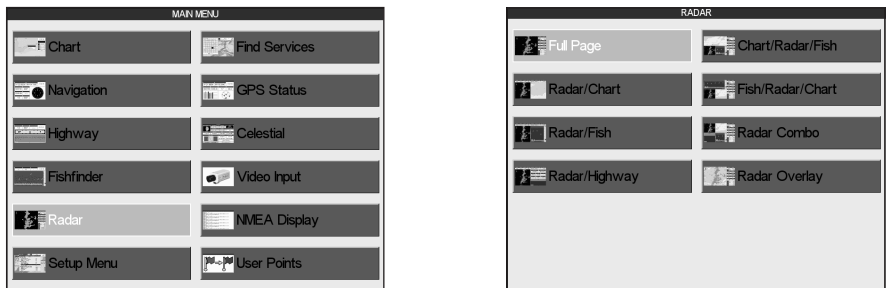


Figure 2.0a - Example of Radar page selection

NOTE for CP180/CP180i*

Only the Full Page and Radar Overlay Page (when optional compass is connected) are available.

2.1 SELECTING PAGE USING SOFT KEY (EXCEPT CP180/CP180i)

It is possible to select the Radar page you want using Soft Keys.

When the Radar is connected, any Soft Key can be assigned any of the Radar pages (the default Soft Keys configuration can be customized (for details see the next paragraph).

1. Press any of the Soft Keys to show the key descriptions.

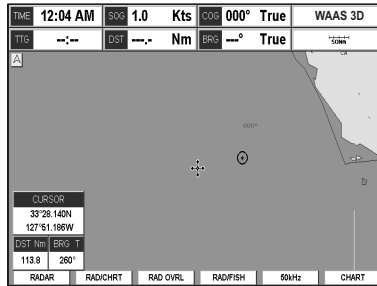


Figure 2.1 - Example of Radar page selection by Soft Keys

2. Press the selected Soft Key (if it has been customized to see the Radar page you want).

2.1.0 Customizing the Soft Keys

To customize a Soft Key, from Chart page:

1. Press any of the Soft Keys.
2. Press and hold one of the Soft Keys until the menu is shown (see the following picture).

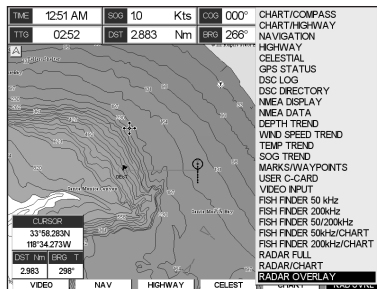


Figure 2.1.0 - Customing Soft Keys

3. Move the ShuttlePoint knob to highlight the desired Radar page and press [ENT].

2.2 SOFT KEY OPERATION IN RADAR PAGE (EXCEPT CP180/CP180i)

When the Radar page is shown [TRANSMIT], [RANGE], [GAIN], [RAIN], [SEA] and [PAGE] are used to perform specific functions described below.

The TRANSMIT Soft Key

After the completion of the Warm Up sequence (see Par. 3.0), press [TRANSMIT] to turn On the transmission. The Radar image is displayed on the screen.

The RANGE Soft Key

Selects the Radar range among 1/8, 1/4, 1/2, 3/4, 1, 1 + 1/2, 2, 3, 4, 6, 8, 12, 16, 24, 36 and 48 Nm (the maximum range depends on the antenna used).

The GAIN Soft Key

Controls the Radar Gain. To see more details on the screen, increase the receiver sensitivity by selecting a higher gain percentage. If there is too much detail or if the screen is cluttered, lowering the sensitivity may increase the clarity of the display.

The RAIN Soft Key*

Reduces the effects of rain, snow, fog and cloud that can adversely affect displayed targets.

The SEA Soft Key*

Reduces the effects of the sea clutter that can adversely affect displayed targets.

NOTE

At low scales (as 1/4 of mile) some attempts are necessary to adjust Rain and Sea values.

The PAGE Soft Key

Used to select the desired Radar page, instead of the Procedure described at Par. 2.0.

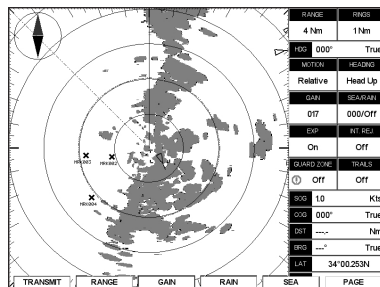


Figure 2.2 - Full Radar page with Soft keys

NOTE*

In the split pages [RAIN] and [SEA] became a one Soft Key [RAINSEA], because another Soft Key is present, [Focus] (see next paragraph).

2.3 ACTIVE WINDOW (EXCEPT CP180/CP180i)

When in split pages, the active window is highlighted by red boarder around the window. The keyboard commands are related to that focused view.

To move the focus follow the procedure:

1. Press any Soft Key. The Soft Key labels appear on the bottom of the screen.
2. Press **[Focus]**. A popup window appears where the active focus window label is highlighted.

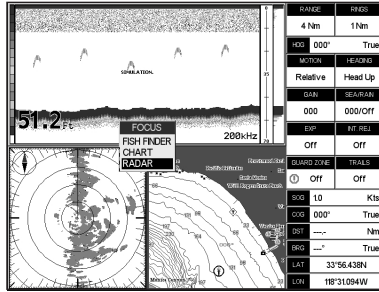


Figure 2.3 - Selection of active window

3. Move the ShuttlePoint knob to highlight the desired window and press **[ENT]**. The red boarder is moved to the focused window.

3. OPERATIONS

3.0 WARMING UP

The Radar needs time from 90 to 120 seconds to heat up the magnetron (microwave emitting tube). To warm up the magnetron, turn on the Radar switch connected to the Green and Blue wires discussed in the Installation Manual. During this time it is not possible to turn on the transmission. Radar pages are visible but with a small overlapping message window showing the time remaining to Warm Up completion:

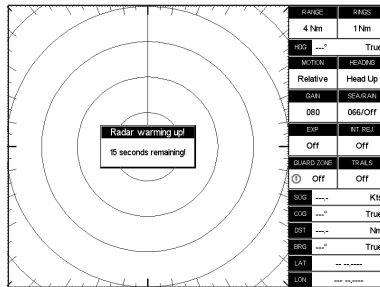


Figure 3.0 - Radar Warming Up (I)

At completion of the Warm Up sequence the following message will be displayed:

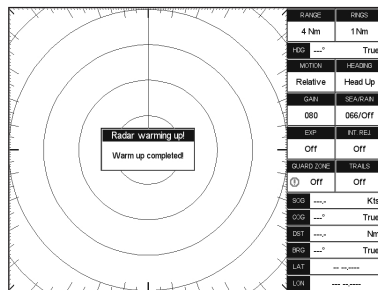


Figure 3.0a - Radar Warming Up (II)

This window shall remain open for 2 seconds, then it will close automatically.

At this point the Radar is ready for operation. Transmission is turned Off and **STAND BY** message is displayed at the center of the Radar page.

To turn on the transmission press **[ENT]** or follow the procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **TRANSMISSION** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** and press **[ENT]**.

NOTE except CP180/CP180i

Or using Soft Keys: press any Soft Key and then press **[TRANSMIT]**.

3.1 SET UP

After the Radar Antenna is installed, select **FULL PAGE** and perform the following steps in the order shown below.

3.1.0 Transmission Trigger Delay

Tuning the Transmission Trigger Delay sets up the Radar to accurately show distance of targets.

- From the Full Page Radar display, press **[MENU]**. Move the ShuttlePoint knob to highlight **RANGE** and press **[ENT]**.

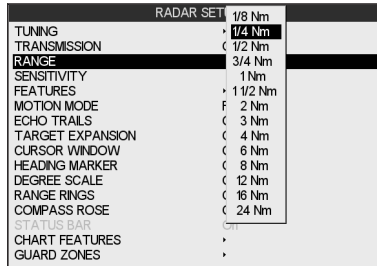


Figure 3.1.0 - Range Menu

- Move the ShuttlePoint knob to highlight **1/4 NM** range and press **[ENT]**.
- Move the ShuttlePoint knob to highlight **SENSITIVITY** and press **[ENT]**.

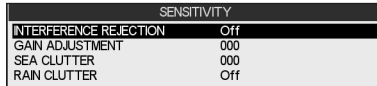


Figure 3.1.0a - Sensitivity Menu

- Move the ShuttlePoint knob to highlight **SEA CLUTTER** and press **[ENT]**.
- Move the ShuttlePoint knob until 000 is shown, then press **[ENT]**.
- Move the ShuttlePoint knob to highlight **RAIN CLUTTER** and press **[ENT]**.
- Move the ShuttlePoint knob to the right to highlight **OFF**, then press **[ENT]**.
- Press **[CLR]**.
- Move the ShuttlePoint knob up to highlight **TUNING** and press **[ENT]**.
- Move the ShuttlePoint knob to highlight **TX TRIGGER DELAY** and press **[ENT]**.

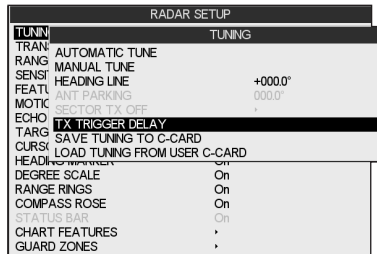


Figure 3.1.0b - Tuning Menu

- Move the ShuttlePoint knob right or left to adjust the GAIN to show targets (example 017).

12. Move the ShuttlePoint knob down to highlight **MBS** and adjust to 000 by moving the ShuttlePoint knob to the right.
13. Move the ShuttlePoint knob down to highlight **TX TRIGGER DELAY** and adjust moving the ShuttlePoint knob to the right to a point that the center looks as a solid circle as shown in the diagram below.
14. To save the TX Trigger Delay setting, move the ShuttlePoint knob down to **Done** and press [ENT].

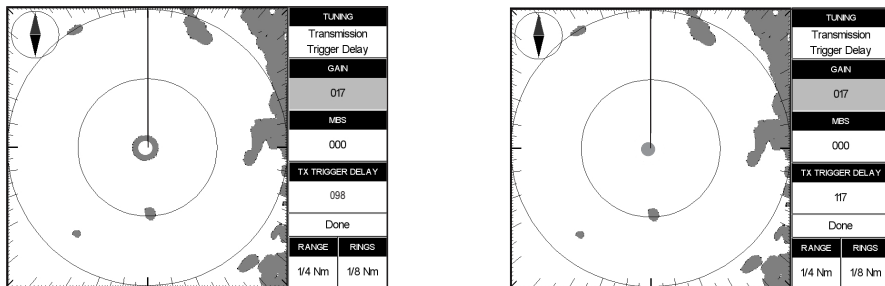


Figure 3.1.0c - Adjusting Trigger Delay

MBS (Main Bang Suppression) Adjustment

(ONLY FOR MDS-9 DOME & MDS-10-4/MDS-10-5 OPEN ARRAY ANTENNAS)

The MBS is used to remove the echo closest to the vessel as shown in the right image in figure 3.1.0c. If Main Bang appears at the screen center (it looks like a as a circular dot) suppress it as follows:

1. Transmit on a long range about ten minutes.
2. Press [MENU]. Move the ShuttlePoint knob to highlight **TUNING** and press [ENT].
3. Move the ShuttlePoint knob to highlight **TX TRIGGER DELAY** and press [ENT].
4. Move the ShuttlePoint knob to highlight **GAIN** and press [ENT]. Adjust the Gain in such a way that the circular dot is clearly displayed.
5. Move the ShuttlePoint knob to highlight **MBS** and press [ENT]. Increase the MBS value until the circular dot is completely erased from the screen. Do not increase the MBS more than the value required to completely erase the main bang it otherwise you run the risk to suppress also target echoes.

3.1.1 Automatic Tune (NOT NECESSARY AT FIRST INSTALLATION)

The Tune control is used to tune the receiver in the Radar antenna for maximum target returns on the display. The Radar comes from the factory already tuned so this operation is not necessary at first installation. In general Radar tuning may be necessary if the Radar antenna was serviced.

Automatic Tune

In Automatic Tune mode, the Radar tunes itself automatically on all range scales. It is recommended to execute the Tune function in Automatic mode. This generally ensures that the Radar receiver is always tuned to receive the maximum signal.

After the Radar Antenna is installed (or has been on the vessel for a year or longer) perform the Automatic Tune procedure, which adjusts the receiver Gain to show targets on all ranges.

1. Select the Full Page Radar window (see Par. 2.0).
2. Turn the external Radar Switch On. After the magnetron warms up (refer to previous Par. 4.0) follow the procedure:
 - a. Press **[MENU]**.
 - b. Move the ShuttlePoint knob to highlight **TUNING** and press **[ENT]**.
 - c. Move the ShuttlePoint knob to highlight **AUTOMATIC TUNE** and press **[ENT]**.

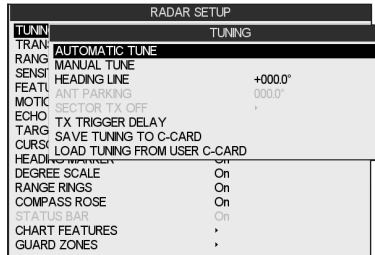


Figure 3.1.1 - AutomaticTune (I)

- d. A warning screen will be shown, move the ShuttlePoint knob to highlight **YES** and press **[ENT]**.



Figure 3.1.1a - AutomaticTune (II)

- e. When Automatic Tune is finished the Radar will show a **STAND BY** window.

NOTE

The Standard Horizon Chart Plotter remembers the Gain, Sea and Rain clutter settings for each Range and allows the user to manually tune these settings for maximum target returns on the display.

3.1.2 Save Tuning to User C-CARD

This is useful to avoid the user having to retune up Radar after a Clear RAM operation or a software update.

The following data will be saved:

Heading Line Angle	Antenna Parking Position	Sector Transmission Off Start Angle
Sector Transmission Off Start Angle	Transmission Trigger Delay	

To save this information to a User C-CARD:

1. Insert the optional User C-CARD into the Chart Plotter.
2. Press **[MENU]**. Move the ShuttlePoint knob to highlight **TUNING** and press **[ENT]**.

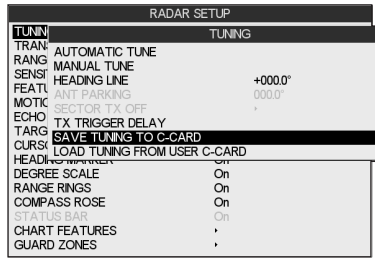


Figure 3.1.2 - Save Tuning

3. Move the ShuttlePoint knob to highlight **SAVE TUNING TO C-CARD** and press [ENT].
4. The file name is given automatically as TUNING1.

3.1.3 Load Tuning from User C-CARD

Loads the complete settings from the User C-CARD and changes the active menu settings. To load this information from a User C-CARD:

1. Insert the optional User C-CARD into the Chart Plotter.
2. Press [MENU]. Move the ShuttlePoint knob to highlight **TUNING** and press [ENT].

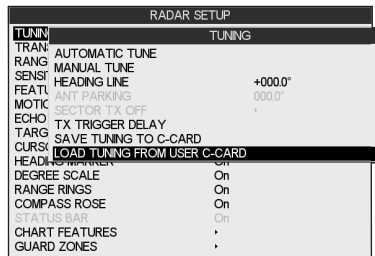


Figure 3.1.3 - Load Tuning

3. Move the ShuttlePoint knob to highlight **LOAD TUNING FROM C-CARD** and press [ENT].

3.1.4 Heading Line

This function is used if the Radar Antenna was not installed pointing directly parallel with the centerline of the vessel. Adjusting the heading line ensures that targets are shown relative to your ship's bow.

1. Select Head Up mode:
 - a. Press [MENU]. Move the ShuttlePoint knob to highlight **FEATURES** and press [ENT].
 - b. Move the ShuttlePoint knob to highlight **ORIENTATION** and press [ENT].
 - c. Move the ShuttlePoint knob to highlight **HEAD UP** and press [ENT].

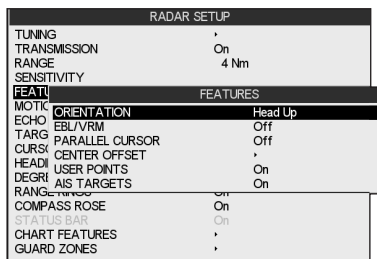


Figure 3.1.4 - Heading Line (I)

- d. Press **[CLR]** until the Radar page is shown.
2. Select a target about 1- 2NM and adjust the vessels speed to accurately head to the to the target (preferably on a flat calm day).
3. If the target is not shown directly ahead on the Radar full page display, adjust heading the line to correct the target heading.
4. Press **[MENU]**. Move the ShuttlePoint knob to highlight **TUNING** and press **[ENT]**.
5. Move the ShuttlePoint knob to highlight **HEADING LINE** and press **[ENT]**.
6. Apply the heading correction.

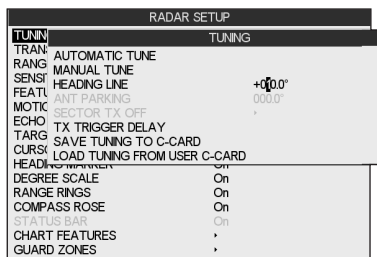


Figure 3.1.4a - Heading Line (II)

7. Press **[ENT]**. The screen updates as the heading line is adjusted.
8. Press **[CLR]** to exit from menu.
9. Repeat the steps 4-8 until the target is shown correctly.

3.1.5 Antenna Parking Position

(ONLY FOR MDS-9 DOME & MDS-10-4/MDS-10-5 OPEN ARRAY ANTENNAS)

When the Radar is turned Off, the Antenna comes to a stop. If you want to have the Antenna to stop in a specific position, the Antenna Parking Position function can be used to choose the desired Antenna position. This function only controls the Antenna position at which the power to the motor is cut off. The distance through which it comes to a stop from this point depends on temperature and wind conditions. The setting of Antenna Parking Position does not affect the operation of the Radar at all.

The Antenna Parking Position can be set as follows:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **TUNING** and press **[ENT]**.

RADAR SETUP	
POWER	On
TUNING	TUNING
TRAN	AUTOMATIC TUNE
RANG	MANUAL TUNE
SENSI	HEADING LINE +0000°
FEATI	ANT PARKING 0000
PAGE	SECTOR TX OFF
MOTIO	TX TRIGGER DELAY
ECHO	SAVE TUNING TO C-CARD
TARG	LOAD TUNING FROM USER C-CARD
CURSL	
HEADING MARKER	On
DEGREE SCALE	On
RANGE RINGS	On
COMPASS ROSE	On
STATUS BAR	On
CHART FEATURES	
GUARD ZONES	

Figure 3.1.5 - Antenna Position setting

2. Move the ShuttlePoint knob to highlight **ANT PARKING** and press [ENT].
3. Use the ShuttlePoint knob to adjust the position (between 0 and 90). The displayed number represents the change from the default setting. The final setting that parks the Antenna straight ahead will likely be a few degrees left or right from the default setting.

3.1.6 Sector Transmission Off

(ONLY FOR MDS-9 DOME & MDS-10-4/MDS-10-5 OPEN ARRAY ANTENNAS)

This is used to block transmission and target reflection in some special application for fixed installation like sea watching. Within this sector, targets can not be detected.

Selecting the Sector Transmission Off from the menu:

1. Press [MENU]. Move the ShuttlePoint knob to highlight **TUNING** and press [ENT].

RADAR SETUP	
POWER	On
TUNING	TUNING
TRAN	AUTOMATIC TUNE
RANG	MANUAL TUNE
SENSI	HEADING LINE +0000°
FEATI	ANT PARKING 0000
PAGE	SECTOR TX OFF
MOTIO	TX TRIGGER DELAY
ECHO	SAVE TUNING TO C-CARD
TARG	LOAD TUNING FROM USER C-CARD
CURSL	
HEADING MARKER	On
DEGREE SCALE	On
RANGE RINGS	On
COMPASS ROSE	On
STATUS BAR	On
CHART FEATURES	
GUARD ZONES	

Figure 3.1.6 - SectorTransmissionOff (I)

2. Move the ShuttlePoint knob to highlight **SECTOR TX OFF** and press [ENT].

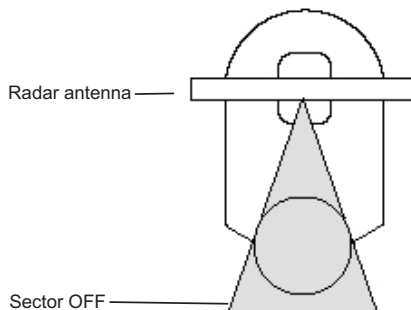


Figure 3.1.6a - SectorTransmissionOff (II)

4. UNDERSTANDING THE RADAR DISPLAY

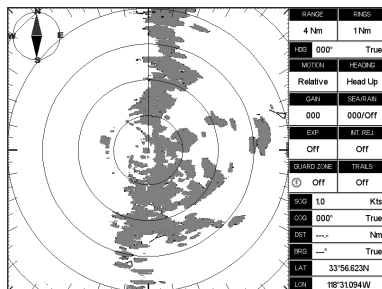


Figure 4 - Example of Radar Display page

4.0 RADAR WINDOW

4.0.0 Cursor

When on the Full Radar page or when the focus is on the Radar window, moving the ShuttlePoint knob will show the cursor on the screen. It is automatically hidden when the Cursor is not used for more than 5 seconds. It can temporarily be hidden to check for small targets under it by pressing **[CLR]**.

When the ShuttlePoint knob is moved a popup window will show the position of the Cursor, the Distance and Bearing from the cursor to the vessels position.

4.1 BASIC

4.1.0 Range

Are selectable among 1/8, 1/4, 1/2, 3/4, 1, 1 + 1/2, 2, 3, 4, 6, 8, 12, 16, 24, 36 and 48 Nm (the maximum range depends on the Antenna used).

The range can be changed following this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **RANGE** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight the desired range value and press **[ENT]**.

Another method is:

1. Press a Soft Key.
2. Press **[RANGE]**. Move the ShuttlePoint knob to the desired range and press **[ENT]**.

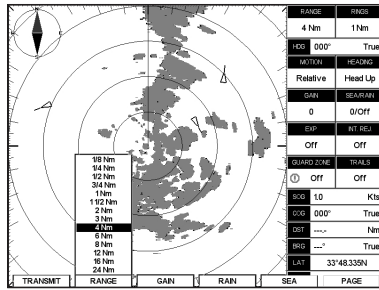


Figure 4.1.0 - Range selection by Soft Key

4.1.1 Motion Mode

Allows choosing between two different presentation of targets and ship position over the Radar screen Relative Motion (RM) and True Motion (TM). See the following table:

True	In True Motion, fixed Radar targets maintain a constant position on the screen, while your own ship moves across the Radar image at the appropriate speed and heading. A map-like image is thus displayed, with all moving vessels travelling in true perspective to each other and to fixed landmasses. As your ship's position approaches the edge of the screen, the Radar center offset is automatically reset to reveal the area ahead of your ship.
Relative	In Relative Motion your own ship's position remains fixed on the Radar screen and all Radar targets move relative to your own ship. It is the default for the Radar display.

NOTE

True Motion is only available in North Up and Track Up modes (not in Head Up mode). Also True Motion requires a compass heading sensor and GPS position information.

To change the Motion Mode follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **MOTION MODE** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **RELATIVE** or **TRUE** and press **[ENT]**.

4.1.2 Echo Trails

Echo Trails causes the persistence of the Radar targets on the screen for the time specified. Selecting an appropriate trail plotting time help determining the speed and course of a target vessel and help prevent collision with it. Selects Radar Trails among Continuous, 15 seconds, 30 seconds, 1 Minute, 3 Minutes, 6 Minutes (or disables - Off).

To choose the Echo Trails follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **ECHO TRAILS** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight the desired trail plotting interval and press **[ENT]**.

4.1.3 Target Expansion

Target Expansion is used to enlarge the target size without changing the range. This function is useful to see and detect very small targets in open seas. To enable (On) or disable (Off) the Target Expansion follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **TARGET EXPANSION** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.4 Cursor Window

The content of the Cursor Window depends on cursor location. It shows detailed information of the cursor Lat/Lon, the cursor bearing and range from the ship, the center of the screen, EBL/VRM, Guard Zone, Heading Marker and Parallel Cursor. It is hidden when the cursor is hidden.

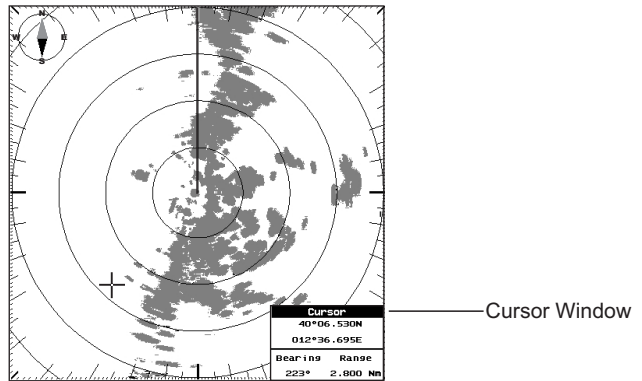


Figure 4.1.4 - Cursor Window

Additionally when Marks, Waypoints in a Route or AIS targets (requires optional AIS receiver) are shown, moving the cursor over the top of the icon, a popup window will be shown with additional information.

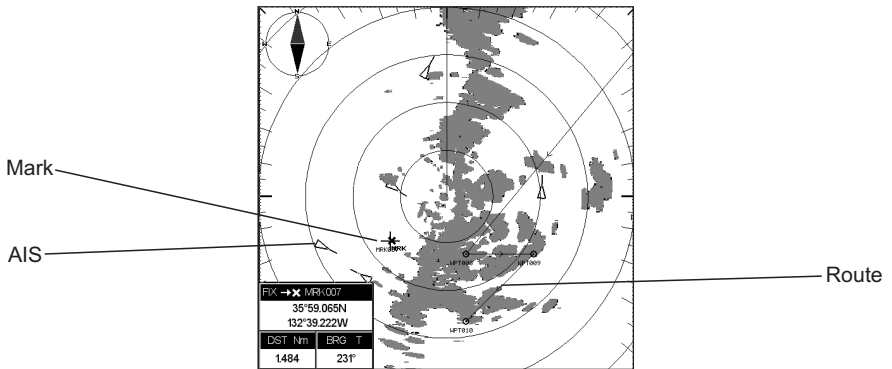


Figure 4.1.4a - Example of cursor over a Mark

It is possible to turn the Cursor Window display On or Off by following this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **CURSOR WINDOW** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.5 Heading Marker

The Heading Marker (HM) is the line from the vessel's position to the edge of the picture at the vessel's current heading with respect to the North indicated by the compass. The Heading

Marker is updated each time the Radar image is updated. It can temporarily be hidden to check for small targets under it by positioning the Cursor over it and pressing **[CLR]**.

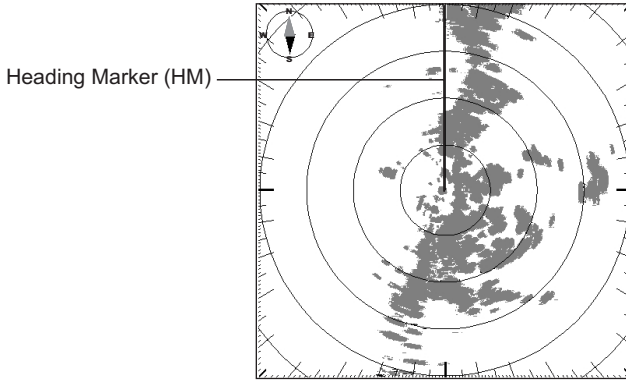


Figure 4.1.5 - Heading Marker

To turn the Heading Marker display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **HEADING MARKER** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.6 Degree Scale

The Degree Scale is the graduated scale located on the most external visible range ring edge of the Radar page, with major ticks at 0, 10, 20, ..., 350 degrees and minor ticks at 5, 15, 25, ..., 355 degrees.

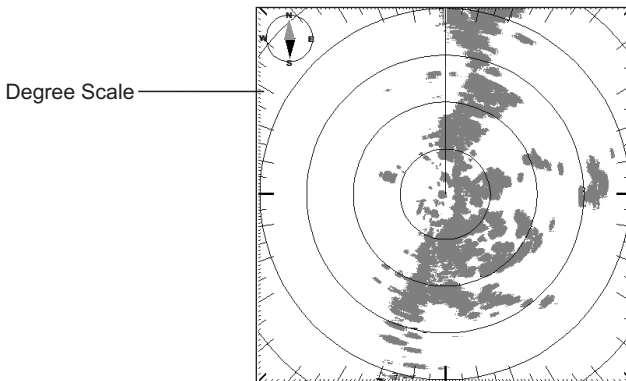


Figure 4.1.6 - Degree Scale

To turn the Degree Scale display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **DEGREE SCALE** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.7 Range Rings

The Range Rings are concentric rings centered on the ship position, equally spaced. They are used to give an immediate idea of the range of targets from the ship. Their number and

spacing are adjusted automatically accordingly with the Range Scale. The indication of the Range Rings interval is indicated in the top right window on the full.

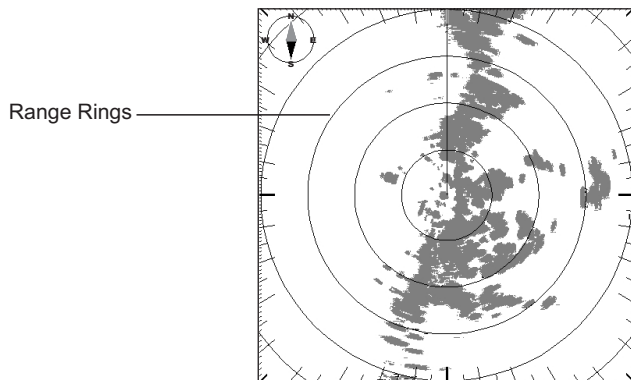


Figure 4.1.7 - Range Rings

To turn the Range Rings display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **RANGE RINGS** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.8 Compass Rose

The Compass Rose is an icon used to identify four main directions: North, South, East and West.

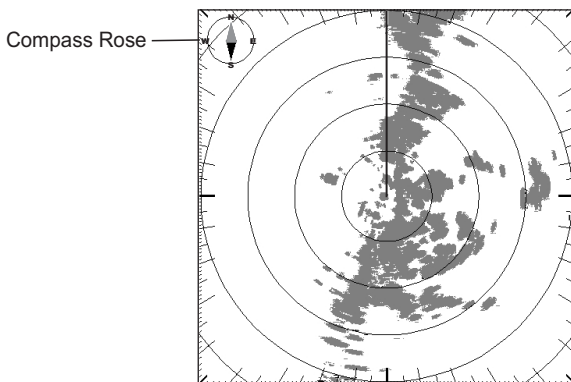


Figure 4.1.8 - Compass Rose

To hide or show Compass Rose display, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **COMPASS ROSE** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.1.9 Status Bar (EXCEPT CP180/CP180i)

AVAILABLE ONLY IN THE RADAR SPLIT PAGES

Allows the Status Bar to be displayed on the screen. Note that in Radar Split pages the

Status Bar displayed always in compact mode to allow more space for the graphical data. To enable (On) or disable (Off) the Status Bar display, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **STATUS BAR** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

- ① RANGE and Range rings interval
- ② Guard Zone alarms
- ③ Current Heading
- ④ Heading Mode indication
- ⑤ Motion Mode indication
- ⑥ Ship Speed Over Ground
- ⑦ Course Over Ground

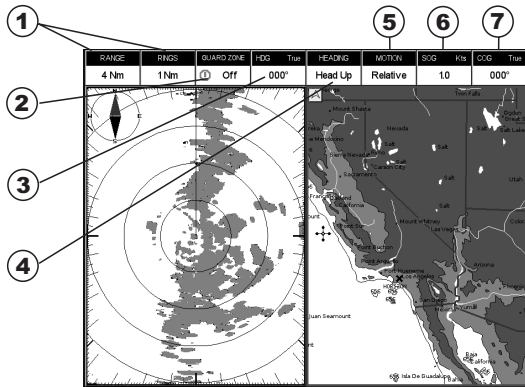


Figure 4.1.9 - Status Bar

4.2 SENSITIVITY

To select the Sensitivity menu follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **SENSITIVITY** and press **[ENT]**.

NOTE

The Sensitivity menu can be also opened by pressing **[ENT]** directly from the Radar page when the Cursor is not placed over any features.

4.2.0 Interference Rejection

Reduces the interference caused by signals from other Radar units. It is possible to turn Interference Rejection to Off, Level 1 (weak), Level 2 (middle), Level 3 (strong). The higher you set the Interference Rejection value the less interference you will receive.

To select the Interference Rejection value, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **SENSITIVITY** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **INTERFERENCE REJECTION** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight the desired Interference value and press **[ENT]**.

4.2.1 Gain Adjustment

Controls the Radar Gain. To see more details on the screen, increase the receiver sensitivity by selecting a higher gain percentage. If there is too much detail or if the screen is cluttered, lowering the sensitivity may increase the clarity of the display.

To select the Gain value, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **SENSITIVITY** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **GAIN ADJUSTMENT** and press **[ENT]**.
3. Move the ShuttlePoint knob up/down to insert the desired value and left/right to move the cursor. When finished, press **[ENT]**.

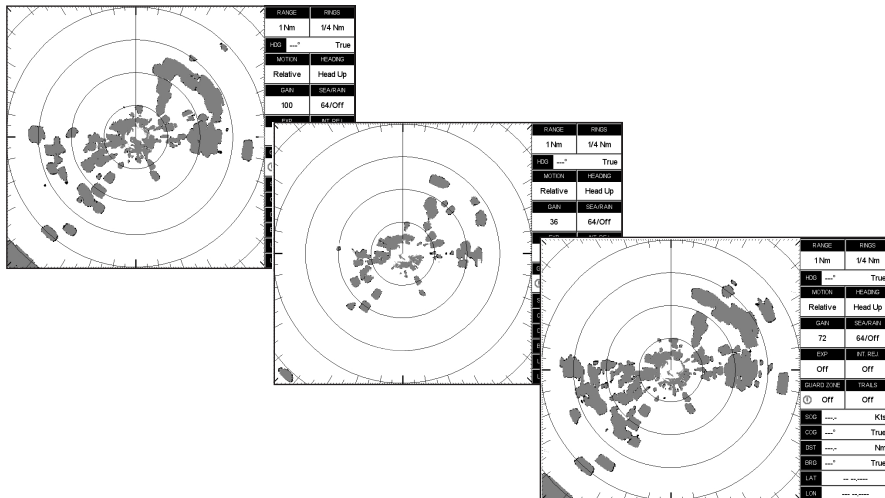


Figure 4.2.1 - Gain Adjustment

NOTE (EXCEPT CP180/CP180i)

The Gain can be also controlled by pressing [GAIN] directly from the Radar page, after pressing any Soft Keys.

4.2.2 Sea Clutter

Reduces the effects of the sea clutter that can adversely affect displayed targets. To select the Sea Clutter value, follow this procedure:

1. Press [MENU]. Move the ShuttlePoint knob to highlight **SENSITIVITY** and press [ENT].
2. Move the ShuttlePoint knob to highlight **SEA CLUTTER** and press [ENT].
3. Move the ShuttlePoint knob up/down to insert the desired value and left/right to move the cursor. When finished, press [ENT].

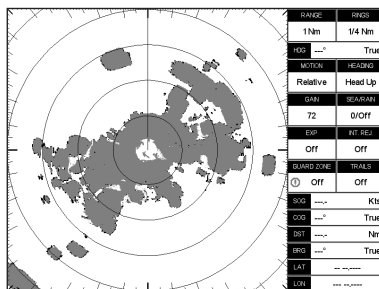


Figure 4.2.2 - Sea Clutter

NOTE (EXCEPT CP180/CP180i)

The Sea Clutter can be also controlled by pressing [SEa] directly from the Radar page, after pressing any Soft Keys.

4.2.3 Rain Clutter

Reduces the effects of rain, snow, fog and cloud that can adversely affect displayed targets. To turn On or Off the Rain Clutter, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **SENSITIVITY** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **RAIN CLUTTER** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

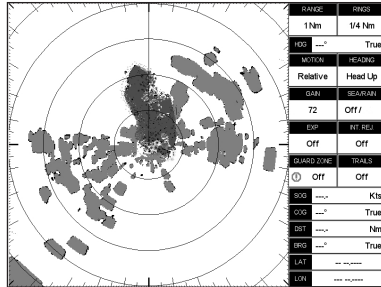


Figure 4.2.3 - Rain Clutter

NOTE (EXCEPT CP180/CP180i)

The Rain Clutter can be also controlled by pressing **[RAIN]** directly from the Radar page, after pressing any Soft Keys.

4.3 FEATURES

4.3.0 Orientation

The Radar orientation option allows to choose the display mode, Head Up (HU), North Up (NU) or Track Up (TU), that refers to the top of the screen as it relates to the direction of the boat. The Radar direction modes are described in the following table:

Head Up*	The Radar picture is displayed with the vessel's current heading upwards. As the heading changes the picture will rotate. It doesn't require heading information. It is the default value.
North Up	The Radar picture is stabilized and displayed with north upwards. As heading changes, the ship's Heading Marker moves. Requires a heading sensor connected to the Chart Plotter.
Track Up	The Radar picture is stabilized and displayed with the currently selected Course Leg upwards. As heading changes, the ship's heading marker moves. If you select a new course leg, the picture rotates to display the new course leg upwards. Requires a heading sensor connected to the Chart Plotter.

To select the preferred Orientation, follow the procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **ORIENTATION** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **HEAD UP**, **NORTH UP** or **TRACK UP** and press **[ENT]**.

4.3.1 EBL & VRM

Electronic Bearing Lines (EBL) and Variable Range Marker (VRM) are used to measure the range (distance) and the bearing between two points. A standard VRM is displayed by default as a circle with its center located on your vessel's position, and EBL is displayed as

a line from the vessel's position to the edge of the Radar picture display.

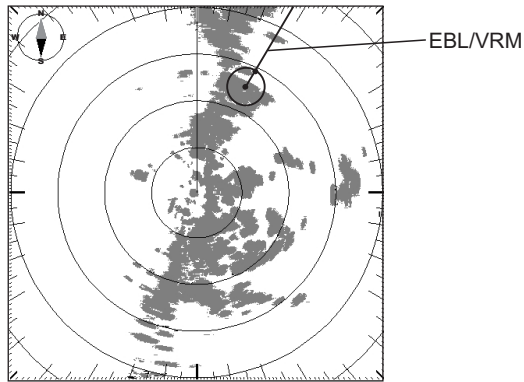


Figure 4.3.1 - EBL & VRM

Handling of EBL & VRM

Positioning the Cursor on the EBL/VRM activates a pop up message **E/V** underneath the cursor. It is possible to allow to Move, Hook and turn it off by using the Soft Keys (EXCEPT CP180/CP180i)*.

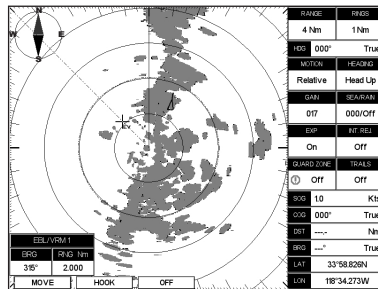


Figure 4.3.1a - EBL & VRM Handling

[Move]	Moves the EBL/VRM from the ship's position to any location on the Radar page.
[Hook]	Hooks the EBL/VRM on the Radar page. When hooked and the ShuttlePoint knob is moved: 1) Up/Down increases or decrease the VRM Circle; 2) Left/Right moves the RB to the port or starboard on the Radar display.
[Off]	Disables the EBL/VRM.

NOTE for CP180/CP180i*

Pressing **[ENT]** opens an Options window with **MOVE**, **HOOK** and **OFF** items, move the ShuttlePoint knob to highlight what you want and press **[ENT]** to select.

Up to 2 EBL/VRM's may be shown on the Radar page.

To turn EBL/VRM On or Off or to select 1 EBL/VRM, 2 EBL/VRM or both (1+2) EBL/VRM, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **EBL/VRM** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight the desired choice and press **[ENT]**.

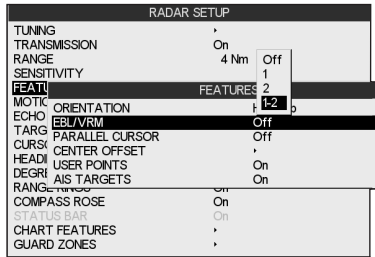


Figure 4.3.1b - EBL & VRM

4.3.2 Parallel Cursor

A set of parallel lines with first line passing through the ship's position and next lines being placed equally spaced and extending from the ship's position towards one direction. The user can change the angle of the lines and the range between lines. It is used to measure the bearing of other boats, navigate at a fixed distance from the coast and measure the distance between two points.

Parallel Cursor is used to avoid running under a minimum distance from the coast. Let's say you are navigating parallel to the coast and you need to avoid getting closer than 1000 feet to it. By properly setting the Parallel Cursor you can may sure that your course will never take you nearer than 1000 feet from the coast.

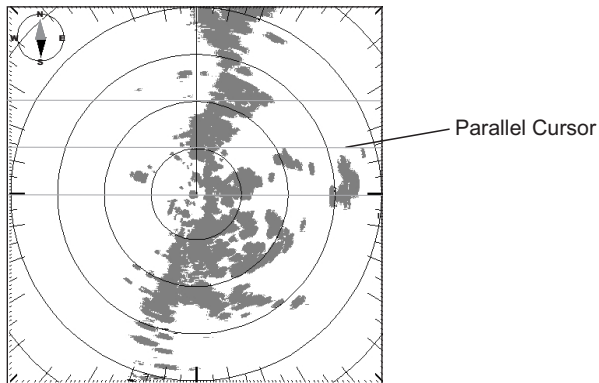


Figure 4.3.2 - Parallel Cursor

To turn the Parallel Cursor display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **PARALLEL CURSOR** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.3.3 Center Offset

In some cases, the location of the Radar antenna may not be directly on the center line of the boat. This selection allows you to offset the current position to the center line of the vessel.

Handling of Center Offset

If the Radar is in Relative Motion mode, positioning the Cursor on the center of the Radar image, allows editing the Center Offset ("CTR" message is shown under the cursor position). The Soft Keys are automatically displayed (EXCEPT CP180/CP180i)*:

[MOVE]	When selected allowing the ShuttlePoint knob to move it at any location on the Radar screen
[ENTER]	Confirms the new position of the center.
[CLEAR]	Resets the position of the Radar image at 0,0.
[OFFSET]	Opens an edit window where it is possible to edit the X Offset and Y Offset position in pixel at which the center of the screen is positioned.

NOTE for CP180/CP180i*

Pressing **[ENT]** opens an Options window with **MOVE**, **ENTER**, **CLEAR** and **OFFSET** items, move the ShuttlePoint knob to highlight what you want and press **[ENT]** to select.

To use the Radar menu to set the Center Offset follow the procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **CENTER OFFSET** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight the desired choice and press **[ENT]**.

4.3.4 User Points

AVAILABLE ONLY IN THE RADAR FULL PAGES

It is possible to show the Marks and Waypoints in a Route on the Full Radar pages: when the Cursor is moved over top of icon, Mark information window appears.

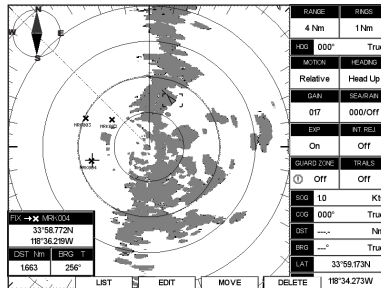


Figure 4.3.4 - Marks display on Full Radar page

To turn the Marks display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **USER POINTS** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.3.5 AIS Targets

AVAILABLE ONLY IN THE RADAR FULL PAGES

It is possible to show the AIS Targets on the Full Radar pages: when the Cursor is moved over top of icon, a AIS popup window appears.

NOTE

This function is only available when a optional AIS receiver is connected to the Chart Plotter.

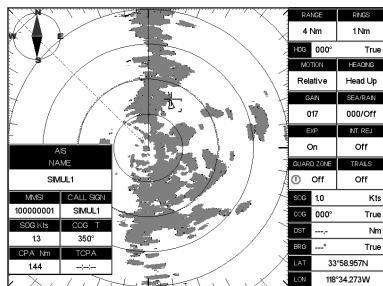


Figure 4.3.5 - AIS Target on Full Radar page

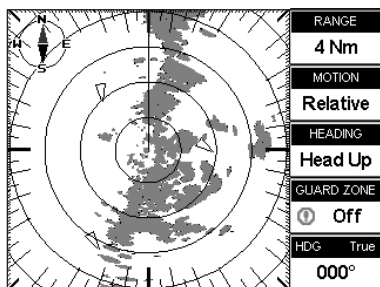
To turn the AIS Target display On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **AIS TARGET** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.3.6 Data Window (ONLY For CP180/CP180i)

It is possible to show the text area in two different modes, Advanced (with more information displayed on the screen) or Simple.

SIMPLE



ADVANCED

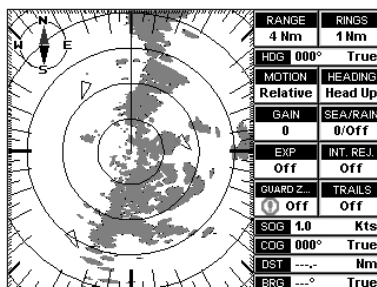


Figure 4.3.6 - Data Window types

To select the desired text area, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **DATA WINDOW** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ADVANCED** or **SIMPLE** and press **[ENT]**.

4.4 CHART FEATURES

4.4.0 Chart Overlay

AVAILABLE ONLY IN THE RADAR FULL PAGE

Chart Overlay function merges Radar and chart data into a single picture by drawing Radar targets over the cartography.

NOTE

This function is only available when an optional compass heading sensor with NMEA 0183 with HDG sentence is connected to the Chart Plotter.

To select the desired Chart Overlay Mode, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **CHART FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **OVERLAY DISPLAY MODE** and press **[ENT]**.

NOTE

OVERLAY DISPLAY MODE will be shaded gray and not selectable if a NMEA 0183 compass sensor is not connected to the Chart Plotter.

3. Select which cartographic objects are to be displayed when Chart Overlay function is active in Radar Full page. The following chart presets shall be available:
 - Full : Full cartographic representation.
 - Medium : Includes "Low" settings plus Ports & Services and Auto Chart Boundaries.
 - Low : Includes also area fills, important city names, Nav-Aids & Lights and Underwater Object icons.
 - Minimum : Only the coast lines and elevation objects, no area fill.
 - As Cartography : Inherits settings from the current cartography setting.
 - Custom : Custom chart representation.

To turn the Chart Overlay On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **RADAR** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **RADAR OVERLAY** page and press **[ENT]**.

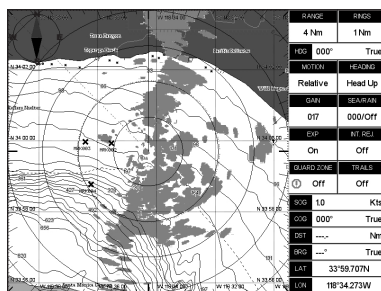


Figure 4.4.0 - Chart Overlay

4.4.1 Chart Synchronization (EXCEPT CP180/CP180i)

AVAILABLE ONLY IN THE RADAR CHART SPLIT PAGE

When Chart Synchronization is enabled, the chart display is synchronized to the Radar display. This function is enabled when Home mode is active (e.g. by pressing **[CLR]** from the chart screen). An alert window showing the message **RADAR - CHART SYNCHRONIZATION MODE ON** is displayed.

To turn the Chart Synchronization On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **CHART FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **CHART SYNCHRONIZATION** and press **[ENT]**.

3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.4.2 Cursor Echo (EXCEPT CP180/CP180i)

AVAILABLE ONLY IN THE RADAR CHART SPLIT PAGE

When Radar/Chart page is selected turning on this function allows the cursor to be shown and moved simultaneously on the Radar and Chart page.

The cursor over the Chart shall be positioned over the same Lat/Lon of the cursor over the Radar. When the Cursor Echo function is enabled, the Radar cursor in the chart display is always shown even if the cursor in the Radar display is hidden.

To turn the Cursor Echo On or Off, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **CHART FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **CURSOR ECHO** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight **ON** or **OFF** and press **[ENT]**.

4.4.3 Color Palette

Allows you to change the color of the Radar display from Green and Red.

To select the desired color, follow this procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **CHART FEATURES** and press **[ENT]**.
2. Move the ShuttlePoint knob to highlight **COLOR PALETTE** and press **[ENT]**.
3. Move the ShuttlePoint knob to highlight the desired color and press **[ENT]**.

4.5 GUARD ZONES

Your Radar allows a function to help you avoid a collision. It is possible to set an alarm to trigger when a target is within a specified zone, the Guard Zone.

It is allowed to display up to 2 Guard Zones, Sector or Circular.

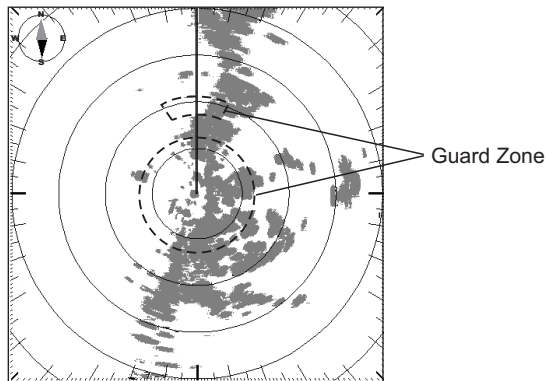


Figure 4.5 - Guard Zone display

When a Guard Zone is active, the Guard Alarm sounds when a target enters its area.

NOTE

A Guard Zone only operates when the whole zone is displayed on the screen. Moreover, a Guard

Zone is inactive for 10 seconds after it is placed or re-sized, to avoid inappropriate alarms during positioning.

4.5.0 Handling of Guard Zone

Positioning the Cross Cursor over a Guard Zone causes the message **GZ** to be displayed under the cursor. It is possible to handle the Guard Zone by using the Soft Keys (EXCEPT CP180/CP180i)*.

[HOOK]	Allows changing Guard Zone range by moving up/down ShuttlePoint knob. Pressing [CONFIRM] to confirm, [CANCEL] otherwise.
[TYPE]	Allows changing Guard Zone type: press [SECTOR] to select the Sector Guard Zone, press [CIRCULAR] to select the Circular Guard Zone.
[OFF]	Disables the Guard Zone.

NOTE for CP180/CP180i*

Pressing **[ENT]** opens an Options window with **MOVE**, **HOOK** and **OFF** items, move the ShuttlePoint knob to highlight what you want and press **[ENT]** to select.

4.5.1 Guard Zone Sensitivity

It defines a limit (selectable from 0 to 100) under which echoes activate an alarm condition, when detected inside a Guard Zone. Guard Zone Sensitivity default is 50.

The value 100 is the most sensitive (the system is always on, every detected echo causes an alarm condition) and the value 000 is the least sensitive (same as switching the alarm off).

To turn the alarm On or Off follow the procedure:

1. Press **[MENU]**. Move the ShuttlePoint knob to highlight **GUARD_ZONE** and press **[ENT]**.

5. TROUBLESHOOTING

5.0 The Radar page is not available

Configure the I/O setup. Enter the I/O Connections menu, see procedure at Par. 2.7 and select the Radar on the serial port to which the Radar is connected.

5.1 The message "Turn Radar On" is displayed on the Radar window

- Check the Radar On/Off switch. It is in the off position or has not been wired.
- Verify that the correct serial port is set in the I/O Connections menu, in case try setting the Radar on another serial port (following procedure shown at Par. 2.7).
- Check that the Radar is connected to the chart plotter, to the same serial port as set in the I/O Connections menu, in case try connecting it to another serial port.
- Verify that all the connections in the Junction box are done properly.
- Verify using a Voltage Meter that the Radar power supply level at the Junction Box is at least 12V. The Radar is able to operate with 10V but some volts may be dropped due to the cable length.

If everything above is correct, try shortening the green and the blue cable coming from the Radar. If the Radar still doesn't work you need to call the Standard Horizon Marine Product support for assistance at (800)767-2450 for assistance.

5.2 After the Radar On/Off Switch is turned on the "Radar warming up" window counts down but restarts counting down over and over.

The power supply level is too low. This may be caused by battery low, cable too long, cable section to narrow.

5.3 Too much clutter near the Radar screen center

This is a typical phenomenon with Radar. Echoes from nearby vessel may hit other objects like other vessels or other objects randomly and reflections can be received by Radar antenna due to very short distance between the objects. This is normal condition in a port where nearby targets (such as sailboat masts) may cause multiple reflections. In this case, increase the SEA clutter and decreasing the GAIN.

If during navigation in open sea the center of the screen is covered by a large spot. If this happens it means the most probably the Transmission Trigger Delay and/or the Main Bang Suppression need to be correctly tuned (refer to Par. 3.1).

5.4 The screen center is always covered by a spot

The Transmission Trigger Delay or the Main Bang Suppression needs to be tuned (refer to Par. 3.1).

5.5 After turning transmission On, the Radar page remains completely black

The Radar is probably not properly tuned. Execute the Automatic Tuning procedure to restore optimal performance (refer to Par. 3.1).

5.6 The Radar sensitivity appears to be low

Radar sensitivity depends on several factors. To increase sensitivity act as follows:

- Execute the Automatic Tuning procedure to ensure that the Radar is perfectly tuned.
- Increase the GAIN.
- Reduce the SEA clutter, since the SEA clutter has the effect to reduce the echo intensity of nearby targets.
- Turn Off the RAIN clutter, since it has the effect to reduce the echoes intensity of big targets.

5.7 Radar targets are delayed with respect to the antenna rotation?

The Radar image on the GPS is updated every 2.5 seconds as information is acquired from the antenna. This could cause a mis-match between the actual target position and the targets shown on the screen.

5.8 Radar target appear to be pulsing

This is a rather common problem for any Radar. For long distance targets, when the Radar pulse hits a target, the reflection strength which depends on the hit angle. Perpendicular hits give the strongest echo. Hard objects give stronger echo and soft objects give weaker echo. To eliminate the pulsing effect of Radar targets the Trails function may be used.

5.9 Stationary target appear to be oscillating around their actual position

Radar targets may appear to be oscillating around their actual position due to the movement of your vessel. In fact even a minimum oscillation of the position where the Radar is located may cause an apparent movement of the targets detected.

For short distance targets, surface waves lower the detectivity. The SEA clutter should be adjusted to properly to maximize the detectivity.

6. FREQUENTLY ASKED QUESTIONS

6.0 What should I do at first Radar installation?

At first installation its necessary to:

1. Set up the I/O to detect the Radar.
2. Perform the Transmit Trigger Delay and Heading Line setup in Par. 3.1.

6.1 How can I turn Radar power On/Off

Radar power On/Off can be controlled by acting on the external switch.

6.2 How can I turn Radar Transmission On/Off?

Press [ENT] in the Radar page or follow the procedure describe at Par. 3.0.
Transmission can be set in Stand-by only from the Radar menu.

6.3 What is the preheating?

Each time you power On the Radar you must allow 90 to 120 seconds (depending on the Radar model) to warm up the Radar. Operating the Radar before this time could cause damage to it. For this reason the Chart Plotter doesn't allow operating the Radar until the preheating is complete.

6.4 Some time the preheating takes less than 90 seconds, is this normal?

Yes it is. It means that the Radar was already powered on at the time you turned On the Chart Plotter.

6.5 What is the Radar calibration?

Radar calibration is a set of options that allows to properly set the Radar to work on your boat.

You can set up the Heading correction, to compensate for orientation errors due to the installation, the Radar trigger delay to properly adjust the Radar beam as to correctly measure ranges, and finally the sensitivity of the Radar to maximize the Radar sensitivity.

6.6 When and how should I adjust the Radar heading?

At first installation you should correct the Radar heading as to ensure that it is perfectly aligned with your bow (refer to Par. 3.1).

6.7 When and how should I adjust the Radar Trigger delay?

At first installation. It is required to ensure the Radar is capable to perfectly measure ranges and avoid distortions. Please follow the procedure described at Par. 3.1.0.

6.8 When should I do the Radar tuning?

Radar tuning is generally not necessary since it is already tuned at the factory. However in the long run or in case some components are replaced it could be necessary to perform tuning to achieve the maximum sensitivity.

6.9 What is SEA clutter (STC), and how should it be used?

It is used to reduce the sensitivity and thus the clutter in the range closer to the Radar. Operate the STC as to reduce the echoes coming from the closer ranges to an acceptable range.

6.10 What is RAIN clutter (FTC), and how should it be used?

It is used to reduce the echoes coming from large objects that can hide other small objects. It is also called the rain control since it is capable to reduce the effects of the rain on the display.

6.11 What is the MBS (Main Bang Suppression)?

It is used to suppress the stronger echoes caused by Radar transmission in the receiver. It is like the Sea Clutter but its operates in a shorter range.

6.12 Why do I need a Heading Sensor and a GPS to use all Radar functionalities?

Because the Radar needs to know the current position of the boat and its current heading.

6.13 I can't turn Chart Overlay On, why?

To turn Chart Overlay On you must have a compass heading sensor connected to the Chart Plotter. If the Chart Plotter doesn't detect such devices it will automatically disable the Chart Overlay option.

6.14 I can't set the North Up or Course Up navigation mode, why?

To turn On the North Up or Course Up navigation modes you must have a compass heading sensor connected to the Chart Plotter. If the Chart Plotter doesn't detect such devices it will automatically disable such option.

6.15 I can't set up the True Motion mode, why?

To turn On the True Motion mode you must have a heading sensor connected to the Chart Plotter. If the Chart Plotter doesn't detect such devices it will automatically disable such option.

6.16 What are the functions that require a GPS fix or a Compass Heading Sensor?

Function	Heading	GPS Fix
North Up Radar orientation	Y	N
Track Up Radar orientation	Y	N
True Motion mode	Y	Y
Chart Overlay	Y	Y
Radar/Chart Synchronization	Y	Y
Cursor Echo	Y	Y
Head Up Mode	N	N
Relative Motion mode	N	N

6.17 Is a gyrocompass or a flux gate compass better?

The gyrocompass is a better choice because it is faster but it is much more expensive. The flux gate compass is slower but it is much cheaper. Using a fluxgate you have to expect to see delays in the rotation of the chart when in Chart Overlay mode.

6.18 How can I be advised of potential dangers for the navigation?

Using the Guard Zone alarms.

6.19 What are Guard Zones?

Guard Zones are zones defined by the user that causes an audible and visual alarm to be triggered when a target exceeding a certain density enters into it. The density of the target that may trigger the alarm is regulated by mean of the Guard Zone sensitivity. There are two types of Guard Zones: Circular or Sectorial. They are fixed with respect to the ship position and heading but their range and orientation (only for sector type) are user defined.

6.20 How should I set the Guard Zone sensitivity?

Guard Zone sensitivity must be regulated accordingly to the current Gain of the Radar. The higher the sensitivity the smaller the target that may trigger the alarm. In general if you regulated your Radar to obtain a clean picture you can set the Guard Zone sensitivity very high to detect even the smaller targets. In case in the Radar picture is present clutter due to the higher gain set, you'll have to reduce the Guard Zone sensitivity to avoid triggering false alarms. In general a way to set the maximum sensitivity for a Guard Zone is to start increasing the sensitivity until an alarm is triggered and then reduce the sensitivity until the alarm stops.

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PLEASE NOTE

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In the event of a defect, malfunction or failure of the Product during the warranty period, Standard Horizon's liability for any breach of contract or any breach of express or implied warranties in connection with the sale of Products shall be limited solely to repair or replacement, at its option, of the Product or part(s) therein which, upon examination by STANDARD HORIZON, appear to be defective or not up to factory specifications. STANDARD HORIZON may, at its option, repair or replace parts or subassemblies with or reconditioned parts and subassemblies.

To receive warranty service, the purchaser must deliver the Product, transportation and Insurance prepaid, to STANDARD HORIZON (Marine Division of Vertex Standard) - Attention Factory Service - 10900 Walker Street - Cypress, CA 90630, include proof of purchase indicating model, serial number and date of purchase.

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