

The background of the left side of the page features a large school of fish swimming in clear blue water. A white grid pattern, representing a sonar scan, is overlaid on the fish. The grid lines curve and warp as they move from left to right, illustrating the perspective of a sonar beam. The Furuno logo is positioned in the upper left corner of this graphic area.

FURUNO[®]

Sonar Tips

Revised 2010

ECHOSOUNDER vs SONAR

To understand what scanning sonar is, we must be sure of an echo sounder's function. In a typical echo sounder installation the transducer is fixed in one position and sends a sound beam downward at a 90-degree angle. The seabed and fish will send a reflected echo of sound back to the vessel. This reflection, or mechanical energy, is received back through the transducer, converted to electrical energy by the transducer, then amplified and displayed to the operator as target information. The first echo sounders recorded and displayed this target information on a paper graph. Later generations of sounders used flashers, Cathode Ray Tubes (CRT) video displays and today Liquid Crystal Displays (LCD) all showing seabed depth and fish targets.

The echo sounder's primary function is to give depth information, while the more sophisticated machines give excellent fish and ground discrimination. This information is vital in the fishing operation but is very limited because of the small area of search it provides. With sonar we have the ability to search around the vessel 360 degrees and tilt the sound beam from the seabed to the surface.

Furuno has three versions of sonar. The smallest is the Searchlight type, which uses a narrow sound beam that can be pointed (trained), in any desired direction. The largest is the Multi-beam Omni sonar; this sonar transmits a large area of sound energy and presents the received target information around the vessel all at once. The third type is Sector sonar, which is a mixture of the other two. It uses a Multi-beam transducer that can be trained in any direction.

The main reason for having sonar is its ability to search a wide area quicker than can be done with an echo sounder. Each of the three types of sonar has a different scan speed or time it takes to update its entire screen (360 degrees). On average, Searchlight sonar set to a range of 200m (600ft) will take 16 seconds to scan 360 degrees. Sector sonar updates every 5.4 seconds and Omni sonar in less than 2 seconds. The quicker sonar can update the information on the screen the easier it is for the operator to keep track of what is going on around the vessel. The scan speed or update rate will also coincide with the price tag of a sonar, with the quicker updating Omni being the most expensive and the Searchlight sonar being the least expensive.

All of the Furuno sonar models use an audio circuit giving the operator sound information from the various targets. Simply stated, the stronger the echo, the louder the sound. With the audio, the operator is allowed more free time to tend to the many other tasks in the fishing operation, since he doesn't have to watch the screen continuously. The more experienced sonar operators can pick out the various pitches of sound that represent different echo types.

While it may seem that sonar is the perfect answer for locating underwater objects of all sorts, sonar can only be an aid to you. Your experience and fishing ground knowledge are the vital ingredients to properly utilize the sonar information. For instance, if you know fish will be at a certain place during a particular time, you would use your GPS to travel to that location, and then use the sonar and echo sounder to find and identify the fish. When the fish are not visually present and the best spots are fished out, then a sonar can help increase your chances of a successful trip. PRACTICE using your sonar, it will greatly increase the knowledge you already have.

Getting started

Congratulations on your purchase of a Furuno sonar. If you have used sonar before you probably already understand just how powerful a tool it can be. But like any other of your onboard tools (Radar, GPS, Fish finder, etc) initially there is a brief learning curve to go through.

This booklet contains some helpful information to start you pinging. The best way to get started is right at the dock. Here you can learn how easily your sonar will display a target. Unlike radar where you have the added benefit of seeing a target with your eyes and then being able to compare it to a target on the radar screen, with sonar you usually will not have that luxury (unless the target is floating on or near the surface). So while at the dock lower the soundome and take a look around you. What can you see? Piling, rows of docks, the breakwater or does the sonar screen look like a colorful blob? If it is the latter, let's spend a little time now to learn how to fine-tune and clean up the picture.

First set the sonar on the 200ft Range, 0 degree tilt, front panel Gain to 3 and scan 360 degrees. Since you are at the dock and probably in fairly shallow water, reset the sonar's output power to minimum and the pulse length to short. To do this press the MENU key and use the cursor to highlight the COM 1 menu. Use the arrow keys on the cursor pad to highlight and change the OUTPUT POWER from high to low and the PULSE LENGTH from long to short. **REMEMBER TO RESET THESE LEVELS TO HIGH AND LONG BEFORE YOU LEAVE THE DOCK.** Press the MENU key again to clear the menu from the screen. Watch the sonar display as the pulse length and power is lowered; after a few sweeps you should see much less red in the sonar picture. These next steps will be the most critical in the fine-tuning process; they are the GAIN, TVG and CLUTTER settings. The front panel Gain control sets the total system gain for the sonar and the two TVG controls (LEVEL and DISTANCE) are used to reduce short-range clutter. The rule-of-thumb on the TVG controls is "Less is more" or the lower the TVG settings the more short-range targets you will see. TVG stands for "Time Varied Gain" and acts the same as STC "Sensitively Time Constant" on your radar. To find these controls press the MENU key and use the cursor to highlight HORZ. Use the cursor pad to highlight and change both the TVG LEVEL and DISTANCE settings to "0". Once this is done press the MENU key to hide the menu. What happened to the targets on the sonar screen? Now turn both of the TVG controls to "9" to see what effect they have. With this high of TVG setting you probably have very few (if any) targets left on the screen. Now gradually lower the TVG levels and watch the targets as they return. Normally the TVG controls will end up with a setting of between 1-4. How are the targets now?

Now that you have cleaned up the screen with the TVG controls let see what effect the CLUTTER control has. Again as with the TVG settings "Less is more". Press the MENU key and find the CLUTTER control under the HORZ column. Use the cursor keys to set the CLUTTER at 0 and press the MENU key to look at the sonar display. Note the amount of blues and greens that are being displayed. Now press the MENU key again and set the CLUTTER to 3 and press the MENU key. See how most of the blues and green have been deleted from the sonar display leaving the harder orange and red targets? Normally once you find a good CLUTTER setting you will rarely need to change it.

Ok, were you able to fine-tune the sonar so you could see your current underwater surroundings? Great if not give me a call and we can walk through the controls again. If you were successful you are ready for the next step, using the sonar in open waters. Remember to use your sonar in conjunction with your echo sounder. When you see a target on the sonar, steer towards that target and confirm what you saw with the sonar on your echo sounder.

Hopefully this introduction will start you off in the right direction but if you should have any questions please give me a call. Good fishing.

Steve Bradburn
Furuno USA
Office 206-706-4093

What to look for.

Now that you have a good idea of what settings to use, what are you supposed to be looking for?

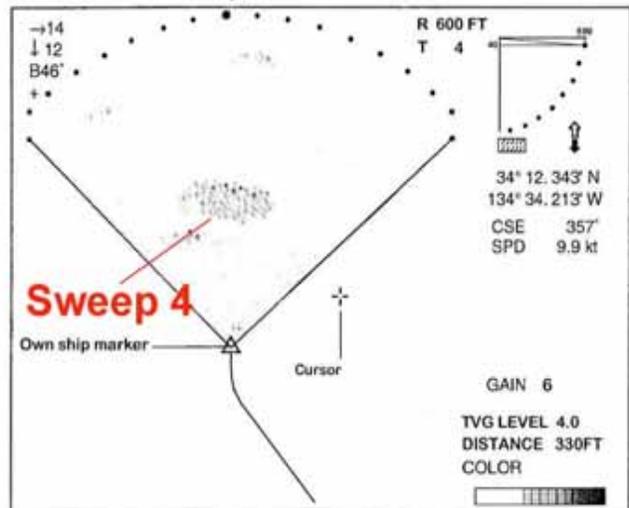
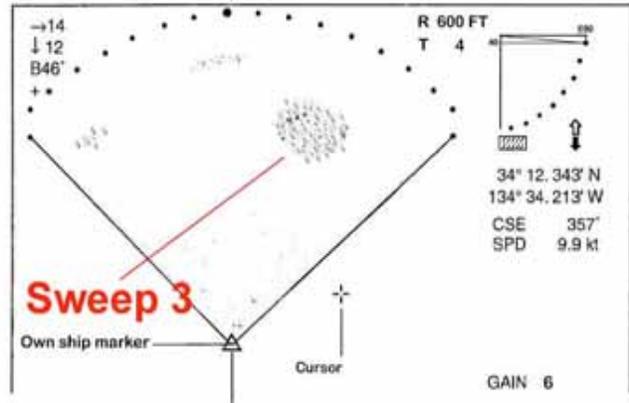
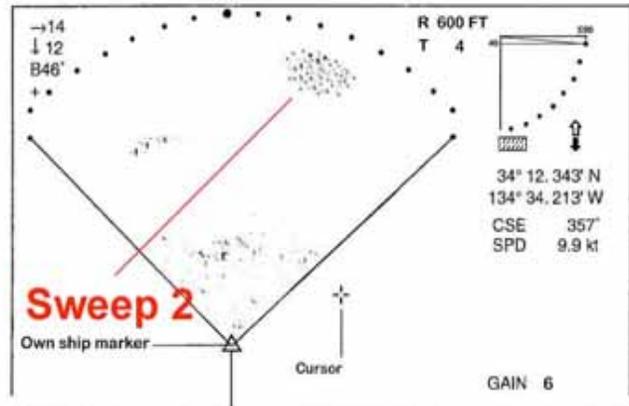
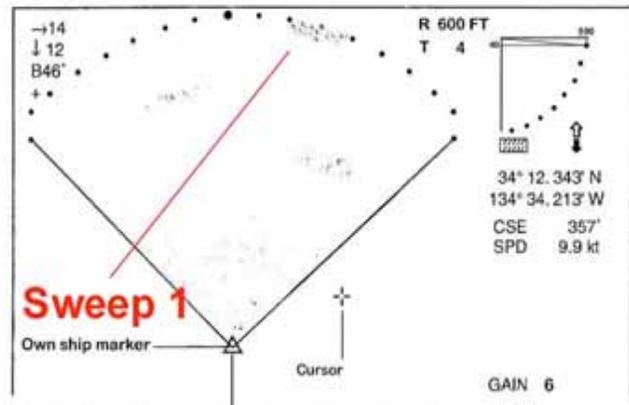
For Fishing

You want to look for targets that are repeatable in roughly the same location or relative heading. Once you have painted a target 2 or 3 times it is worth turning your vessel and driving over it. This way can confirm what you have seen and get a more detailed look with your echo sounder.

For Navigation

The opposite technique is applied to these targets when navigating. These type of targets are pretty shallow and you will need to steer away from them or risk grounding your vessel.

**Remember
Fishing--Steer to
Navigation--Steer away**

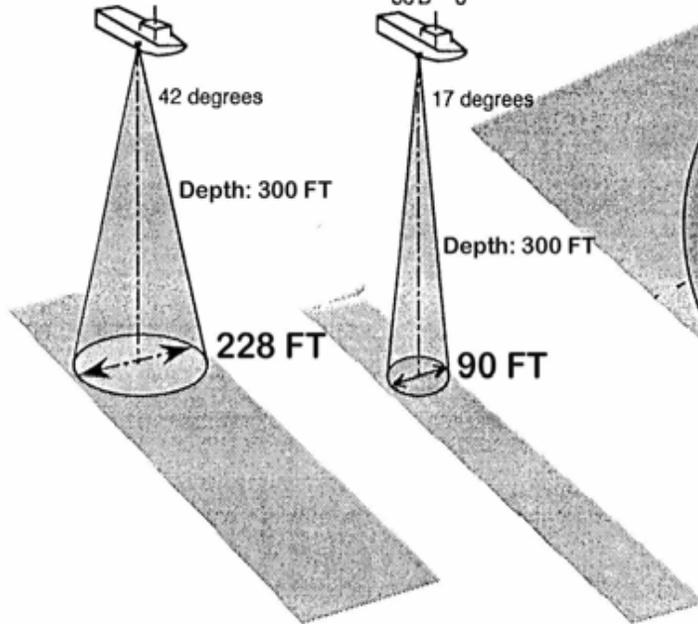


Difference of detectable area between fish finder and sonar

● Fish Finder

Example

50 kHz
50B-6

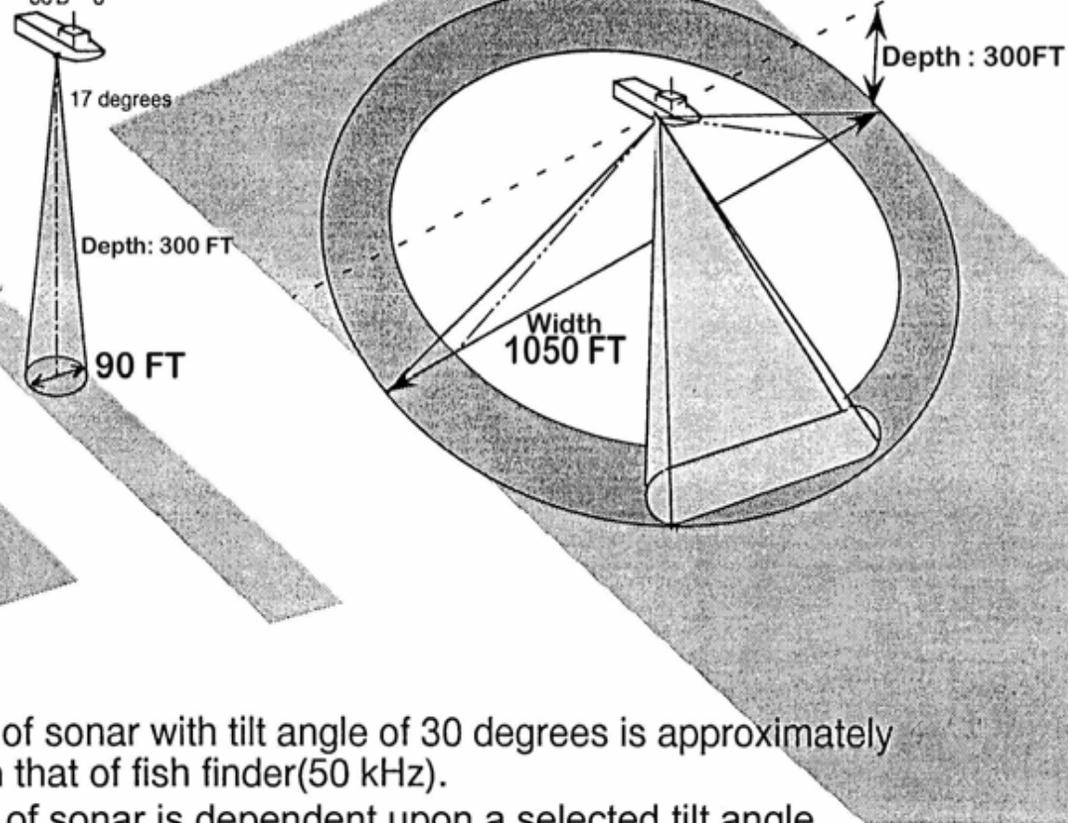


● Scanning Sonar and multi-sector sonar

Example: when tilt angle is 30 degrees,

Example

88 kHz
88B-8

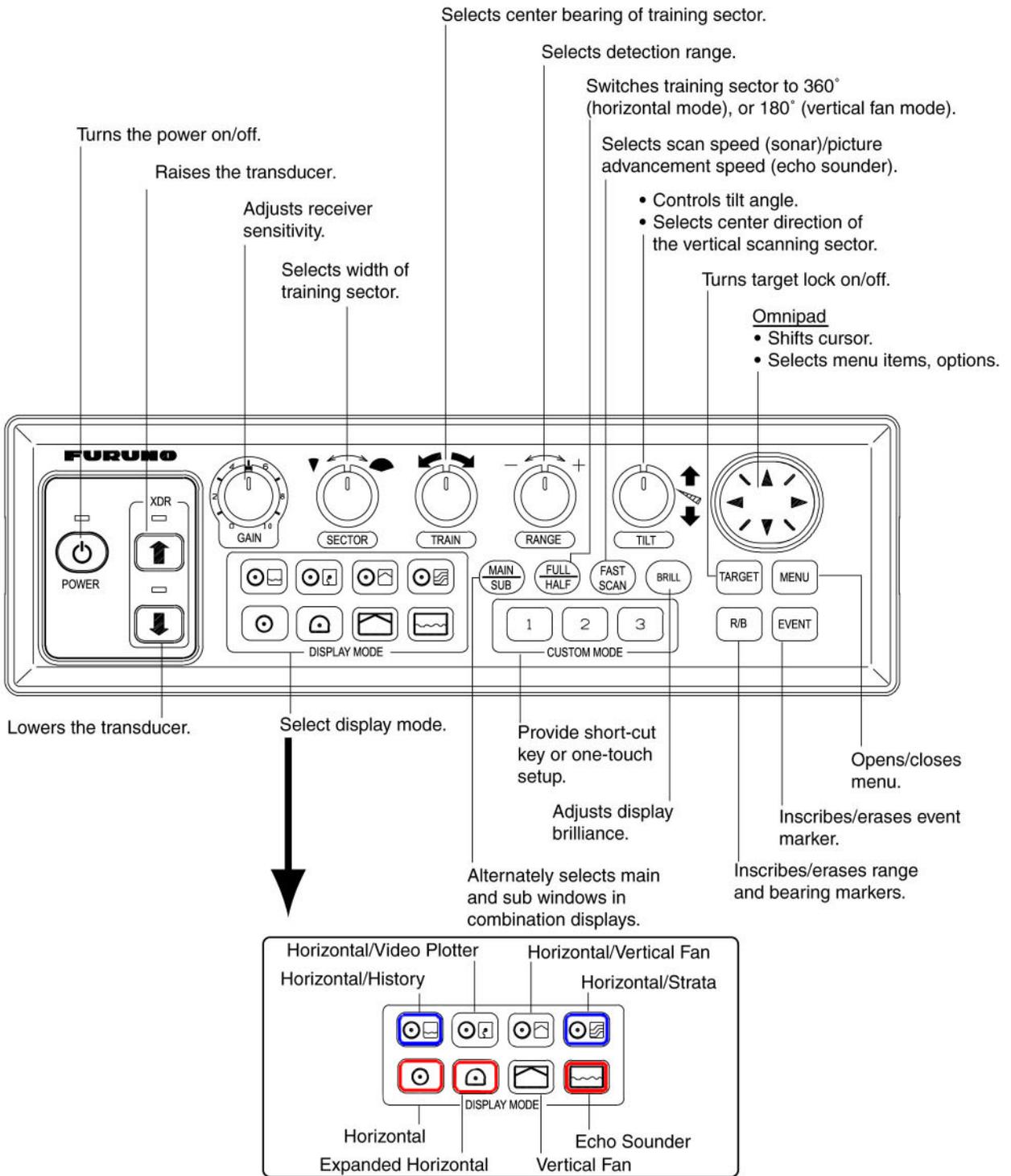


The detectable area of sonar with tilt angle of 30 degrees is approximately 4.6 times wider than that of fish finder(50 kHz).

The detectable area of sonar is dependent upon a selected tilt angle.

CH-250/270 OPERATIONAL OVERVIEW

Control Description

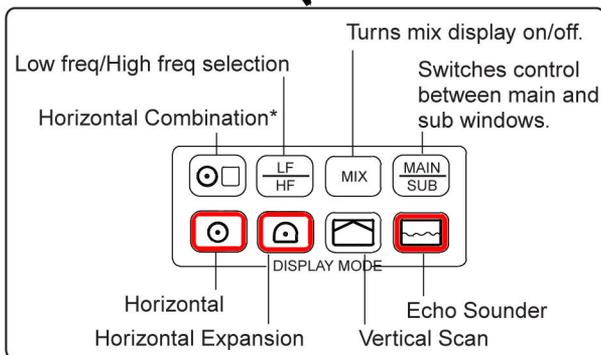
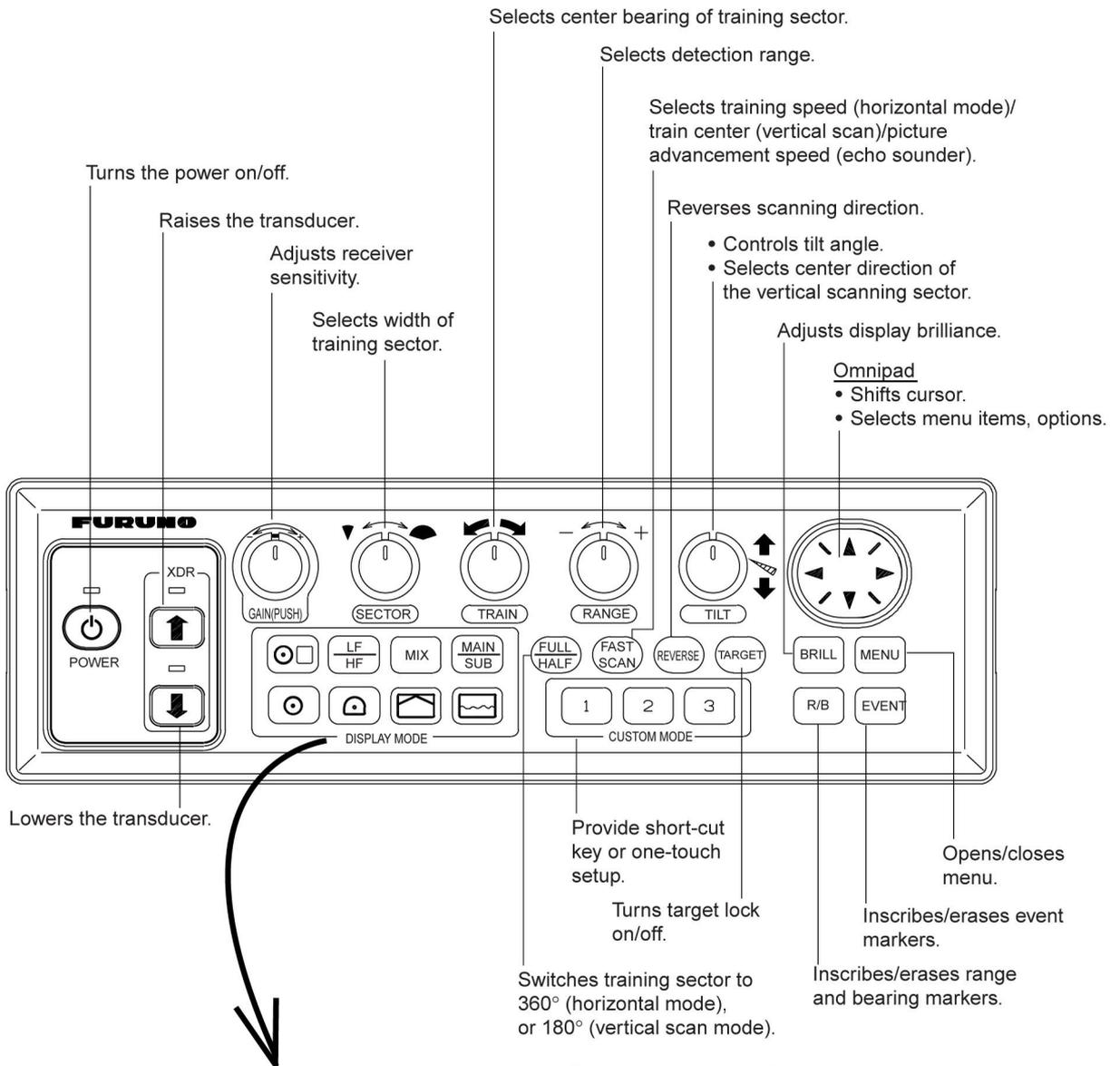


The commonly used Displays will be the Horizontal, Expanded Horizontal and Echo Sounder.

The Horizontal/History and Horizontal/Strata are the least used.

CH-300 OPERATIONAL OVERVIEW

Control Description



The most commonly used Displays will be the Horizontal, Expanded Horizontal and Echo Sounder.

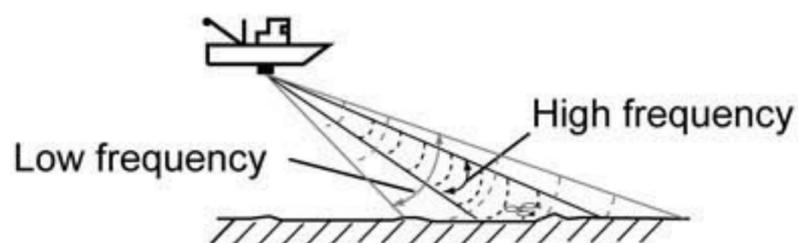
* Horizontal/History, Horizontal/Vertical scan, Horizontal/Vertical zoom, Horizontal/Video plotter

CH-300 Choosing a Frequency

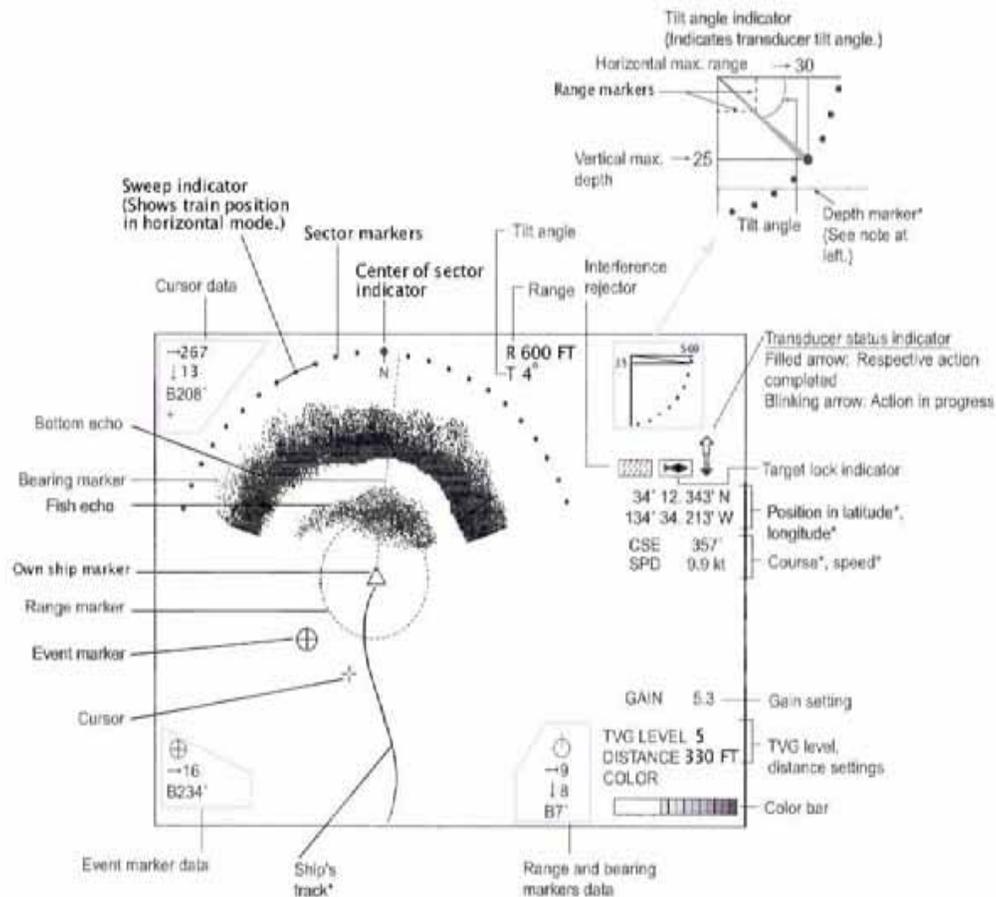
You may choose low frequency or high frequency, with the **LF/HF** key. The display shows HI or LO at the top of the screen depending on your selection. Use the table below to determine which frequency to use.

| Item | Low Frequency 60-85Khz | High Frequency 153-215Khz |
|--|---|--|
| Long-range detection | PREFERABLE Attenuation loss is small on low frequency. | NOT RECOMMENDED Attenuation loss is great on high frequency. |
| Use in shallow waters | NOT RECOMMENDED Bottom echo is prominent because of wide beam width so fish echoes are hidden. | PREFERABLE Bottom echo is less prominent because of narrow beam width so fish echoes are easy to find. |
| Detection range | PREFERABLE Detection area is wide (beam width is wide). | NOT RECOMMENDED Detection area is narrow (beam width is narrow). |
| Detection of bottom fish | NOT RECOMMENDED Fish echo and bottom echo overlap. (Wide beam width) | PREFERABLE Fish echo and bottom echo are displayed separately. (Narrow beam width) |
| Detection of bait fish | NOT RECOMMENDED Not suited for this purpose. (Bait fish are not easily detected with low frequency.) | PREFERABLE Well suited for this purpose. (Bait fish are more easily detected with high frequency.) |
| Affected by air bubbles from other vessels | NOT RECOMMENDED Low frequency is easily interfered by cavitation from other vessels. | PREFERABLE High frequency is not easily interfered by cavitation from other vessels. |

The dual-frequency display is useful for comparing the picture from one frequency against the other to overcome deficiencies in both. Use the single-frequency for objective-specific fishing.



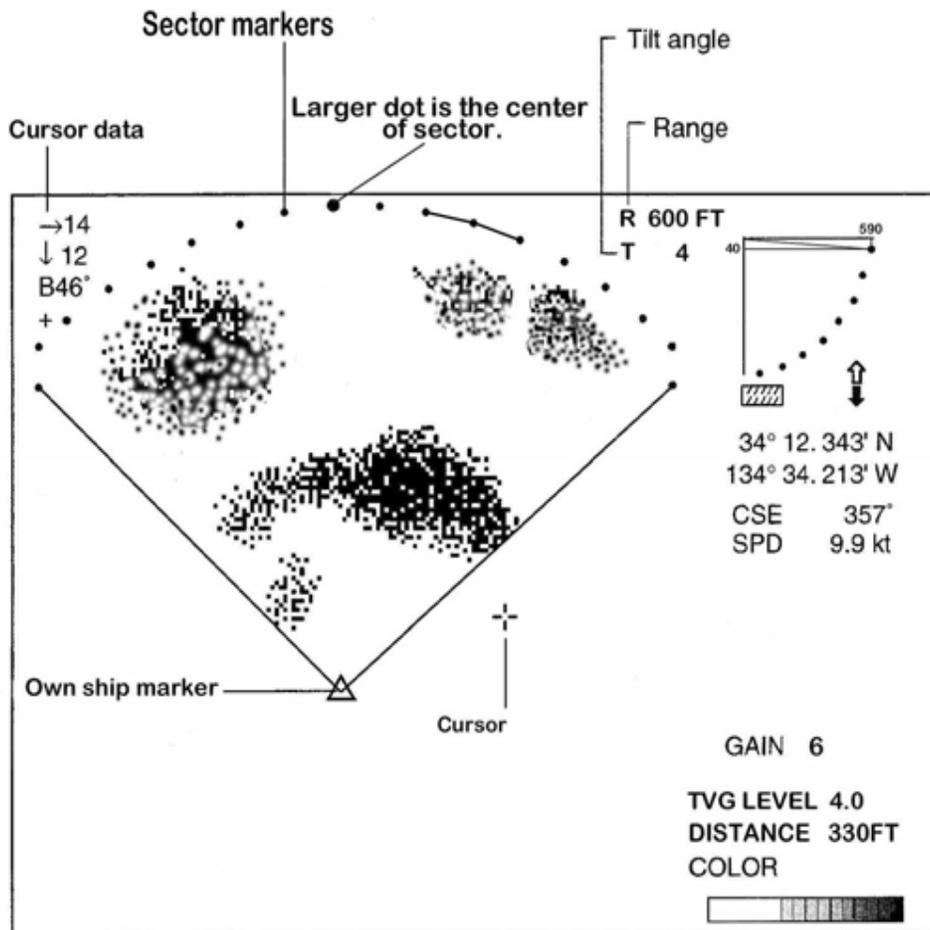
Typical Horizontal Mode Display



When searching for fish in the Horizontal Display Mode, the most efficient sector widths are 144 and 120 degrees.

Enlarge fish echoes by using the Expanded Horizontal Display.

When using this mode it is best to scan a Sector of 96 degrees.



MENU OPERATION

COM1 Menu

Displaying the COM1 menu

1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU, and then press ◀ to choose COM1.

| MENU | COM1 | COM2 | HORZ | VERT | ES | PRESET | SYS |
|-------------|------|------|------|------|----|--------|-----|
| TX POWER | MAX | | | | | | |
| PULSELENGTH | LONG | | | | | | |
| TX RATE | 10 | | | | | | |
| INT REJECT | OFF | | | | | | |
| AGC | OFF | | | | | | |
| AUDIO LEVEL | 0 | | | | | | |

▲▼ : SELECT ◀▶ : CHANGE MENU: END

COM1 menu

COM1 menu description

TX POWER: Chooses transmitter output power to maximum or minimum.

PULSELENGTH: Chooses pulselength to short or long.

TX RATE: The Tx rate may be set between 1-10 in the case of the internal transmitter, or an external synchronous signal may be used. The higher the number the greater the number of transmissions. For operation in shallow waters, choose the Tx rate which displays the second reflection from the bottom between the sea surface and bottom. For use of an external video sounder or sonar, choose EXT.

INT REJECT: Turns the interference rejector on or off.

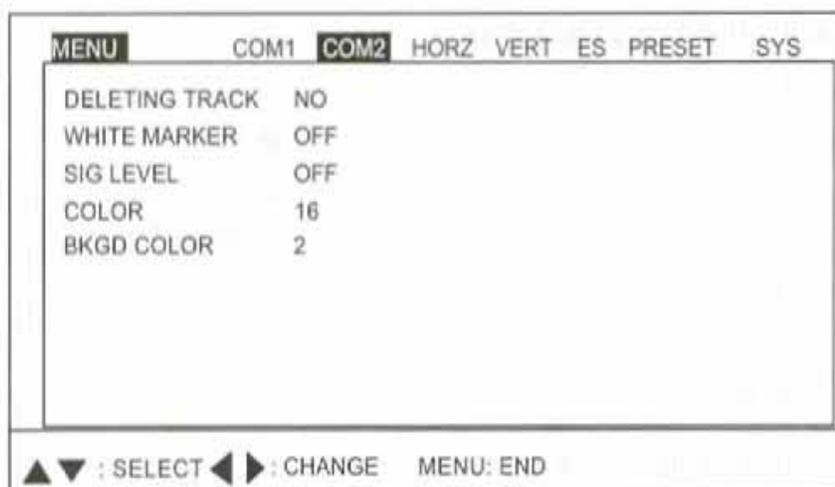
AGC: Automatically lowers sensitivity against strong echoes (such as those from the bottom and large fish schools) to emphasize weak echoes such as those from fish close to the bottom.

AUDIO LEVEL: Adjust the volume of the optional speaker.

COM2 Menu

Displaying the COM2 menu

1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU, and then press ◀ or ▶ to choose COM2.



COM2 menu

COM2 menu description

DELETING TRACK: Choose ON to delete all ship's track (from horizontal and horizontal/video plotter displays).

WHITE MARKER: Displays desired echo in white. It is useful for discriminating bottom fish from the bottom echo. The setting range for the 8-color display is OFF, 1-7, and for the 16-color display, OFF, 1-15.

SIG LEVEL: Refer to page 2-17.

COLOR: Chooses 8- or 16-color display.

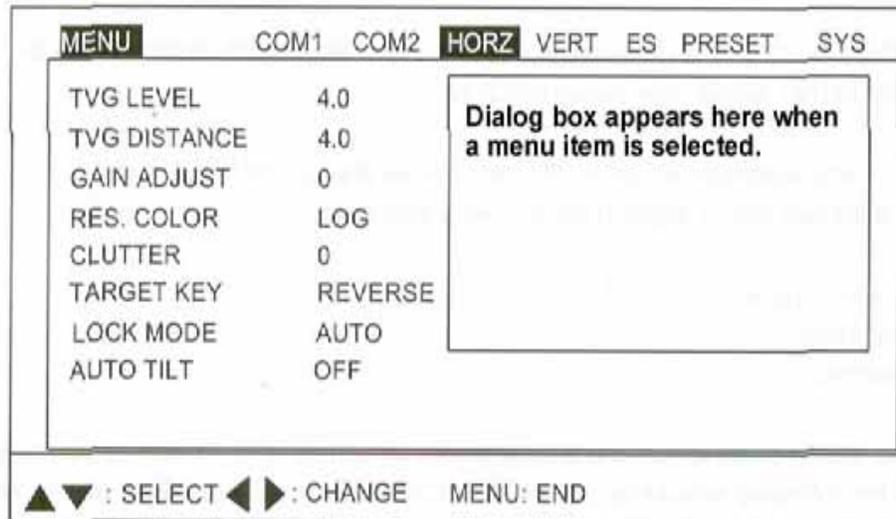
BKGD COLOR: Chooses color of background, text and menu. Three choices are available and these are shown in the table below.

| BKGD COLOR | Background | Text | Menu |
|------------|------------|-------|-------------|
| 1 | Black | Gray | Dark-blue |
| 2 | Dark-blue | White | Medium blue |
| 3 | White | Black | Gray |

Horizontal Menu Overview

This section presents an overview of the items on the HORZ menu.

1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU and then press ◀ or ▶ to choose the HORZ menu.



HORZ menu

Horizontal menu description

TVG LEVEL: Compensates for propagation loss of sound in water.

TVG DISTANCE: Sets distance at which TVG works.

GAIN ADJUST: Adjust the gain here when there is disparity in gain level between the main and sub windows.

RES. COLOR: Sets transfer characteristics of input signal level versus display echo level. Echo strength is emphasized in order of CUBE, SQUARE, LINEAR, LOG, and you can observe the characteristics of each by watching the color bar as you change the setting.

LOG: Displays weak to strong echoes in their respective levels. This is the default setting, and is suitable for general use.

LINEAR: Downplays the weak echoes when compared with LOG. Effective for suppressing weak echoes such as plankton.

SQUARE: Strong echoes are emphasized more than in LINEAR.

CUBE: Strong echoes are emphasized even more than in SQUARE.

HORIZONTAL MODE

CLUTTER: Low intensity echoes, often caused by sediments in water, are painted on the screen as a large number of random dots. This noise can be suppressed. The higher the number (setting) the weaker the echoes which are erased.

TARGET KEY: Chooses target lock function among reverse, position and echo.

LOCK MODE: Chooses how to track fish echo in "echo" target lock, automatically or manually.

AUTO TILT: Turns automatic tilt on or off. The choices are $\pm 2^\circ$, $\pm 4^\circ$, $\pm 6^\circ$, and $\pm 10^\circ$. Automatic tilt adjusts the tilt angle in the following sequence:

$B \rightarrow (B-A) \rightarrow B \rightarrow (B+A) \rightarrow B \rightarrow (B-A) \rightarrow B \rightarrow (B+A) \dots$

B: Current tilt angle

A: Auto tilt setting

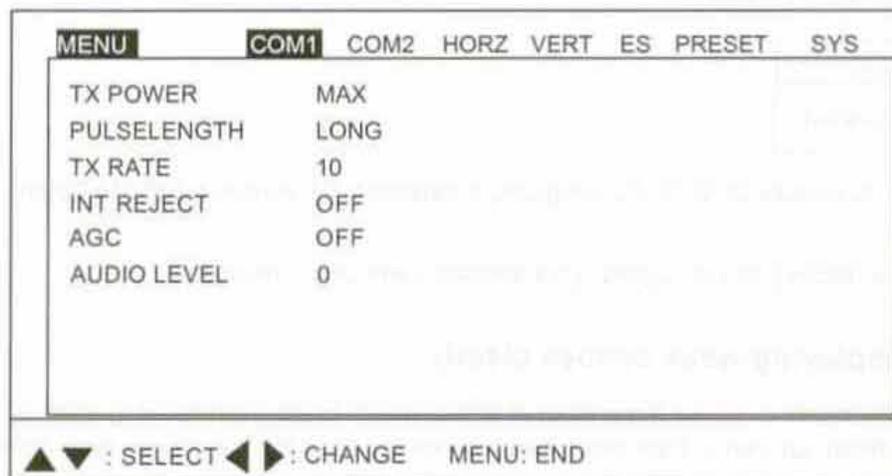
For example, the tilt angle is 30° and the automatic tilt setting is 4° . Then, the tilt angle is changed in the following sequence: $30^\circ \rightarrow 26^\circ \rightarrow 30^\circ \rightarrow 34^\circ \rightarrow 30^\circ \rightarrow 26^\circ \rightarrow 30^\circ \rightarrow 34^\circ \dots$

Adjusting the Picture

Suppressing bottom and surface reflections

In shallow fishing grounds, excessive sea surface and bottom reflections often interfere with wanted fish echoes and they cannot be eliminated sufficiently with the TVG controls. In such cases, try to reduce the output power, without turning down the gain. The picture becomes clearer when output power is reduced rather than when the gain is decreased.

1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU and then press ◀ to choose the COM1 menu.



COM1 menu

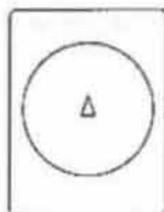
3. Press ▲ or ▼ to choose TX POWER and then press ▶ to show the TX POWER dialog box.



4. Press ▶ to choose MIN. (For long range detection be sure to return the setting to MAX.)
5. Press the [MENU] key to register your selection and close the menu.

Adjusting front panel Gain

The [GAIN] control adjusts the sensitivity of the receiver. Normally, the control is adjusted so that the bottom echo is displayed in reddish-brown mixed with red. Initially set the gain between "4 and 6" and then fine tune according to fishing ground, etc.



Too Low



Proper



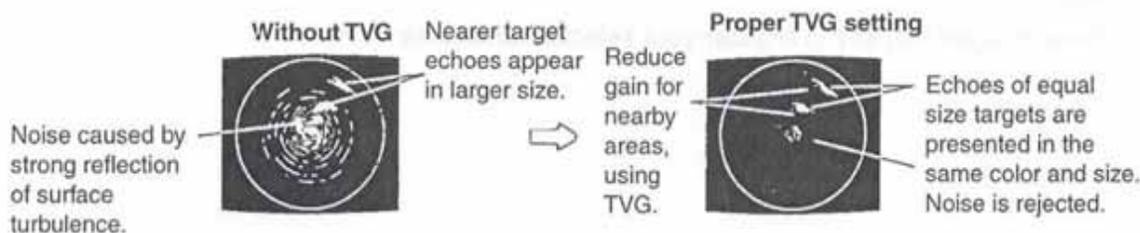
Too High

How to adjust the gain

Displaying weak echoes clearly

Echoes from targets (such as the bottom or a fish) return to the transducer in order of the distance to them, and when their intensities are compared at the transducer face, those from nearer targets are generally stronger when their reflecting properties are nearly equal. The sonar operator will be quite inconvenienced if these echoes are directly displayed on the screen, since he won't be able to judge the actual size of the target from the size of echoes displayed on the screen. To overcome this inconvenience, use the TVG function. It compensates for propagation loss of sound in water: amplification of echoes on short range is suppressed and gradually increased as range increases, so that similar targets are displayed in similar intensities irrespective of the ranges to them.

The TVG also functions to suppress unwanted echoes and noise which appear in a certain range area on the screen.



How TVG works

NOTE: Excessive TVG may eliminate short-range echoes.

To adjust TVG:

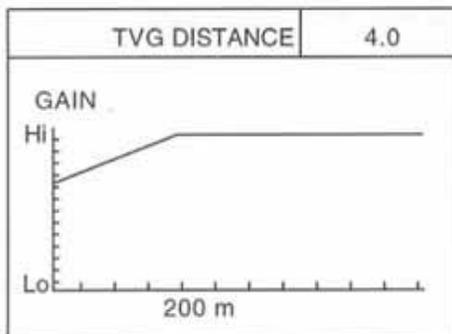
1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU and then press ◀ or ▶ to choose HORZ.

| MENU | COM1 | COM2 | HORZ | VERT | ES | PRESET | SYS |
|--------------|---------|------|--|------|----|--------|-----|
| TVG LEVEL | 4.0 | | Suggested settings between 2 and 5 | | | | |
| TVG DISTANCE | 4.0 | | Suggested settings between 1.5 and 3.5 | | | | |
| GAIN ADJUST | 0 | | | | | | |
| RES. COLOR | LOG | | | | | | |
| CLUTTER | 0 | | | | | | |
| TARGET KEY | REVERSE | | | | | | |
| LOCK MODE | AUTO | | | | | | |
| AUTO TILT | OFF | | | | | | |

▲▼ : SELECT ◀▶ : CHANGE MENU: END

HORZ menu

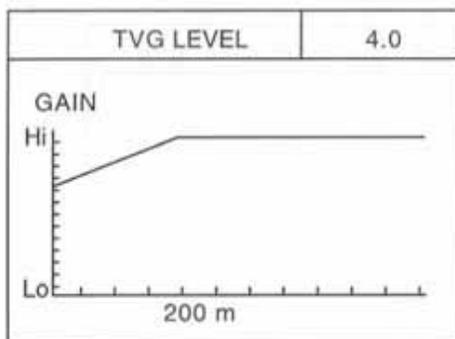
- Press ▲ or ▼ to choose TVG DISTANCE and then press ►. The following dialog box appears.



- Press ◀ or ▶ to set TVG distance between **1.5 and 3.5 (130-520ft)** to decrease amplification of echoes on short range. As a general rule, use a higher setting for low frequency transducer; a lower setting for high frequency transducer. The larger the figure the greater the distance at which TVG works. When you change a TVG setting (DISTANCE or LEVEL), the TVG line changes from solid to dashed; the solid line denotes current TVG setting.

| | | | | | | | | | | | | | |
|----------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| TVG Distance Setting | 0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | | 10.0 |
| Meters | 3 | 8 | 20 | 40 | 60 | 100 | 130 | 160 | 200 | 250 | 320 | | 1000 |
| Feet | 10 | 30 | 70 | 130 | 210 | 330 | 410 | 520 | 660 | 820 | 1040 | | 3280 |
| Passi/braza | 2 | 5 | 10 | 20 | 40 | 60 | 80 | 100 | 120 | 150 | 180 | | 600 |
| Fathoms | 2 | 5 | 10 | 20 | 40 | 60 | 80 | 100 | 110 | 140 | 170 | | 550 |

- Press the [MENU] key to register your selection and close the menu.
- To suppress reflections from the sea surface or plankton, choose TVG LEVEL and then press ►.

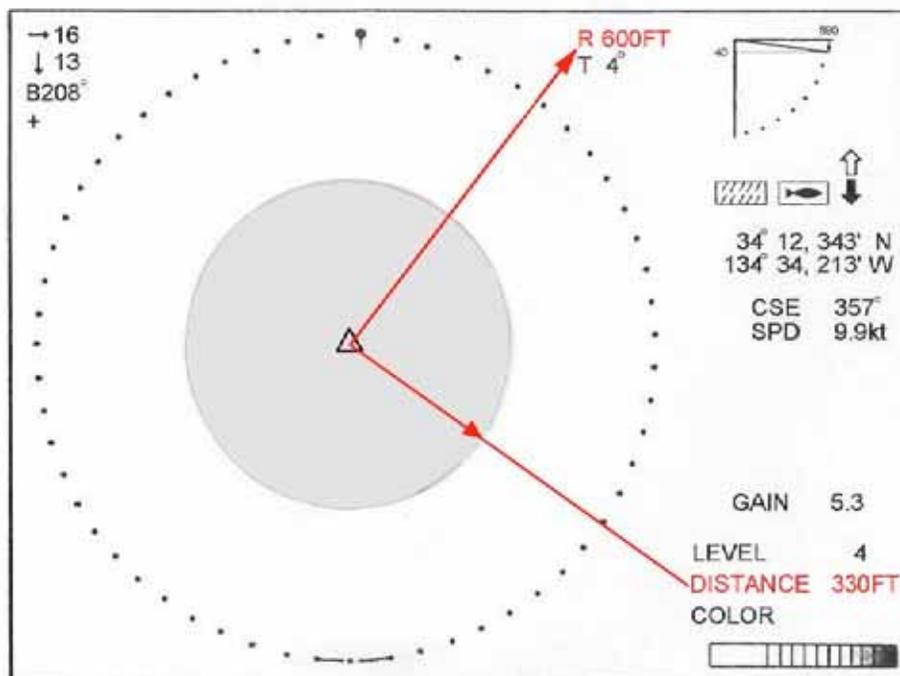


- Press ◀ or ▶ to adjust TVG LEVEL, considering sea conditions. The setting range is 0 to 10, however a setting between **2.0 and 5.0** should provide satisfactory results. The higher the figure the less the gain over distance.
- Press the [MENU] key to register your selection and close the menu.

Watch a distant fish echo which is approaching own ship. Observe the color of the fish echo while adjusting tilt angle so the fish echo is within the sounding beam. If the color and size of the echo stay the same as the echo approaches own ship, the TVG setting is proper. If the echo suddenly becomes smaller, the TVG level may be too high.

TVG (Time Varied Gain)

The TVG controls help suppress unwanted echoes and noise which appears in a certain range area on the screen.



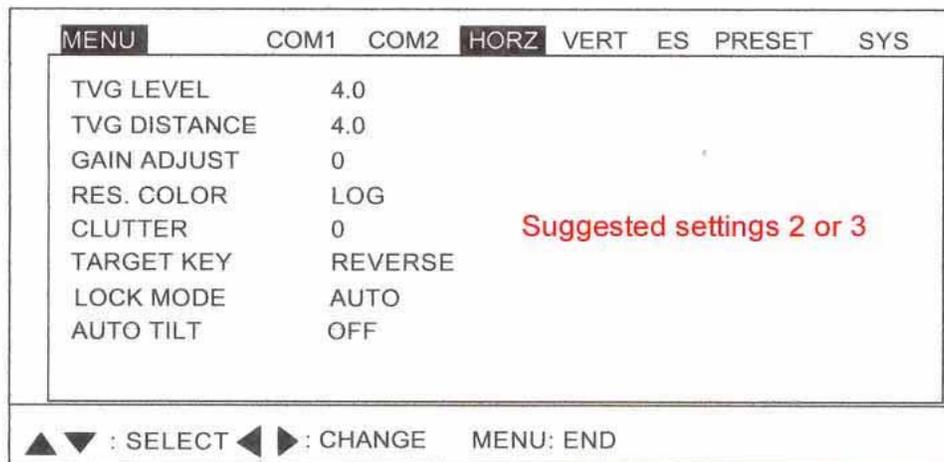
The sonar's TVG controls work in the same manner as your radar's Sea Clutter control does. The higher it's set the more targets it will suppress. If the TVG levels are set too high they can override the front panel gain control.

Suggestion: Try to keep the TVG distance setting about half the sonar range.

3.11.5 Suppressing clutter

Low intensity echoes, often caused by sediments in water, are painted on the screen as a large number or random dots. This noise can be suppressed.

1. Press the [MENU] key to open the menu.
2. Press ▲ to choose MENU at the top of the screen.
3. Press ◀ or ▶ to choose the HORZ menu.
4. Press ▲ or ▼ to choose CLUTTER.
5. Press ▶ to open the dialog box.
6. Press ◀ or ▶ to choose 0, 1, **2 or 3** as appropriate. The higher the number (setting) the weaker the echoes which are erased.
7. Press the [MENU] key to register your selection and close the menu.



HORZ menu

Selecting the Training Speed

The training speed selects how fast the transducer scans the sounding sector. Two choices are available, normal speed (default setting) and high speed, select a speed by using the [FAST SCAN] key. Each time the key is pressed "NORM" (normal speed) or "FAST" (high speed) momentarily appears at the screen top.

NORM (6°): 60 transmissions required to complete full 360° picture (default setting).

FAST (12°): 30 transmissions required to complete the full 360° picture.

The time necessary to train a full circle depends on range and transducer used. The table below shows the time required to complete one full circle in the horizontal mode using the 150 kHz transducer.

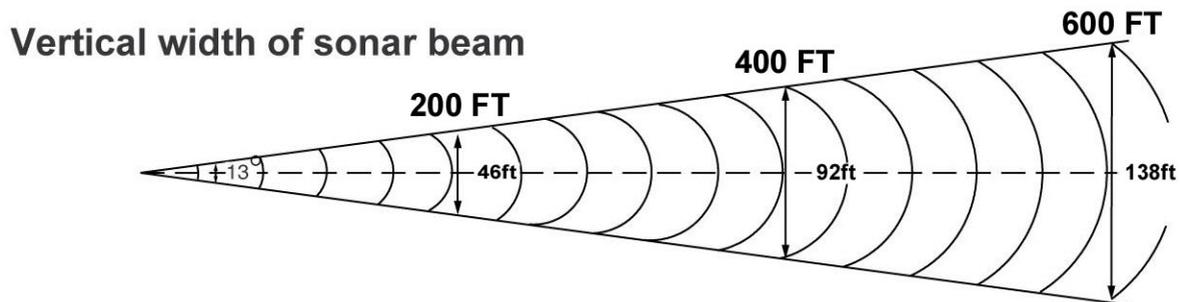
| Ranges | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| Unit | m | 10 | 20 | 40 | 60 | 80 | 120 | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| | ft | 40 | 80 | 120 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 1000 | 1500 | 2000 | 2500 | 3500 |
| Time required (sec) for one full circle | Norm | 7 | 7 | 7 | 7 | 7 | 10 | 13 | 16 | 20 | 24 | 32 | 40 | 48 | 64 | 81 |
| | Fast | 7 | 7 | 7 | 7 | 7 | 9 | 11 | 13 | 15 | 17 | 21 | 25 | 28 | 36 | 45 |

Note 1: Above data for soundome having serial no. 1000 and higher.

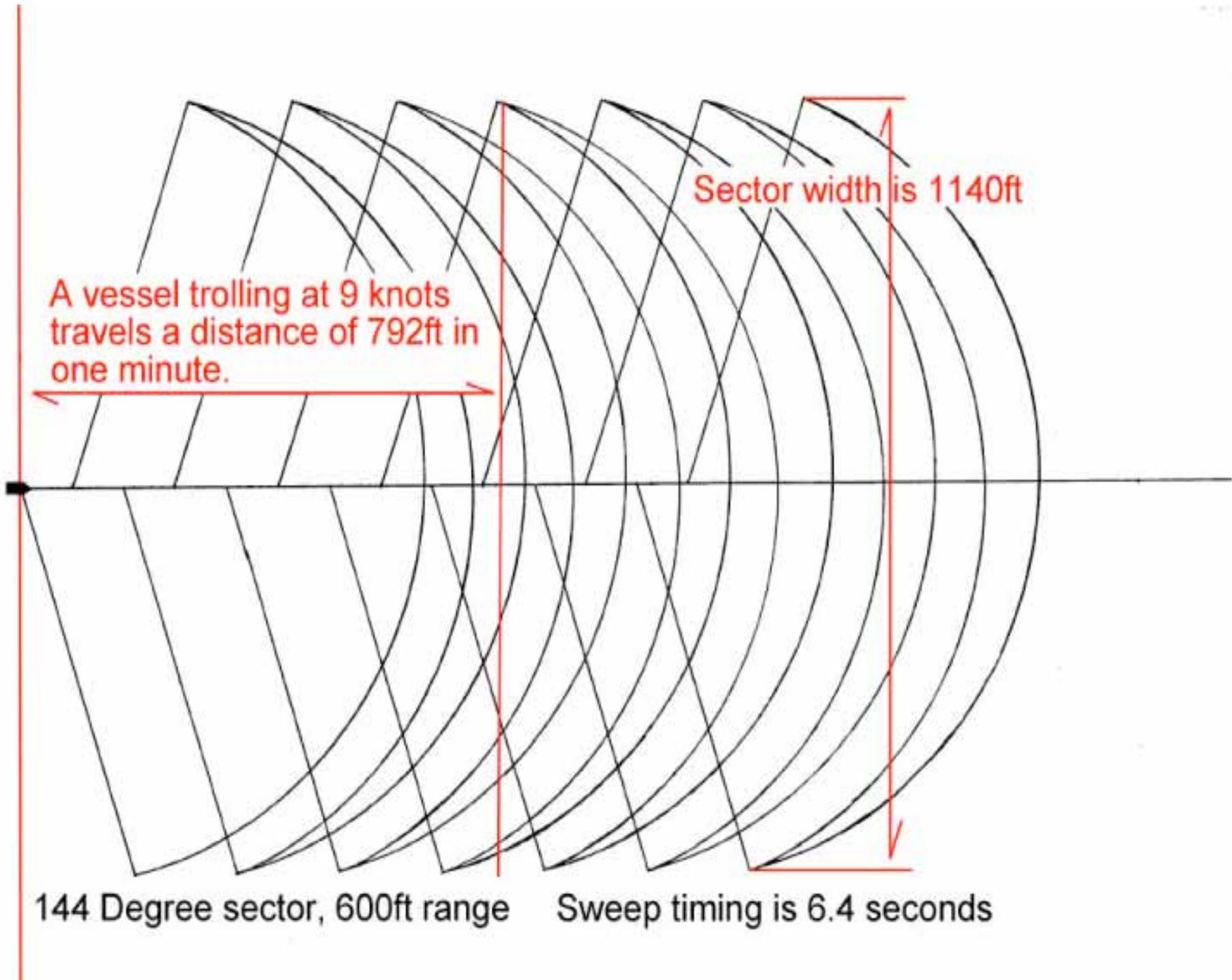
Note 2: The range setting must be at least 160 m to activate high speed training, using the 150 kHz transducer. The [FAST SCAN] key is inoperative when the range setting is less than 160 meters.

Important Note:

Since the CH-270, CH-250 (150Khz) and CH-300 (156 & 215Khz) have narrow beam angles we suggest that a **NORM** (Normal Train Speed) setting be used for optimum performance. The CH-250 (60 or 88Khz) and CH-300 (60 or 85Khz) can be used at either train speed, however your best resolution will be with the **NORM** setting.



| Sonar model | Frequency | Vertical beam angle in degrees | Distance from vessel | | | | | | | | |
|-------------|-----------|-----------------------------------|----------------------|-------|--------|--------|---------|---------|---------|---------|---------|
| | | | 200 ft | 400ft | 600 ft | 800 ft | 1000 ft | 1500 ft | 2000 ft | 2500 ft | 3000 ft |
| CH-250 | 60 Khz | 12 | 42 ft | 84 ft | 126 ft | 168 ft | 210 ft | 315 ft | 420 ft | 525 ft | 630 ft |
| | 88 Khz | 9.5 | 33 ft | 66 ft | 99 ft | 132 ft | 166 ft | 249 ft | 332 ft | 415 ft | 498 ft |
| | 150 Khz | 6.5 | 23 ft | 46 ft | 69 ft | 92 ft | 113 ft | 170 ft | 227 ft | 284 ft | 340 ft |
| CH-270 | 180 Khz | 8 | 28 ft | 56 ft | 84 ft | 112 ft | 140 ft | 210 ft | 280 ft | 350 ft | 420 ft |
| CH-300L | 60 Khz | 14 | 49 ft | 98 ft | 147 ft | 196 ft | 246 ft | 369 ft | 492 ft | 614 ft | 737 ft |
| | 153 Khz | 5 | 17 ft | 34 ft | 52 ft | 70 ft | 87 ft | 131 ft | 175 ft | 218 ft | 262 ft |
| CH-300H | 85 Khz | 10 | 35 ft | 70 ft | 105 ft | 140 ft | 175 ft | 262 ft | 350 ft | 437 ft | 525 ft |
| | 215 Khz | 4 | 14 ft | 28 ft | 42 ft | 56 ft | 70 ft | 105 ft | 140 ft | 175 ft | 210 ft |
| CH-37 | 60 Khz | 13 | 46 ft | 92 ft | 138 ft | 184 ft | 230 ft | 345 ft | 460 ft | 575 ft | 690 ft |
| | 113 Khz | 7 | 24 ft | 48 ft | 72 ft | 96 ft | 120 ft | 180 ft | 240 ft | 300 ft | 360 ft |
| | 162 Khz | 6 | 21 ft | 42 ft | 63 ft | 84 ft | 105 ft | 157 ft | 210 ft | 262 ft | 315 ft |

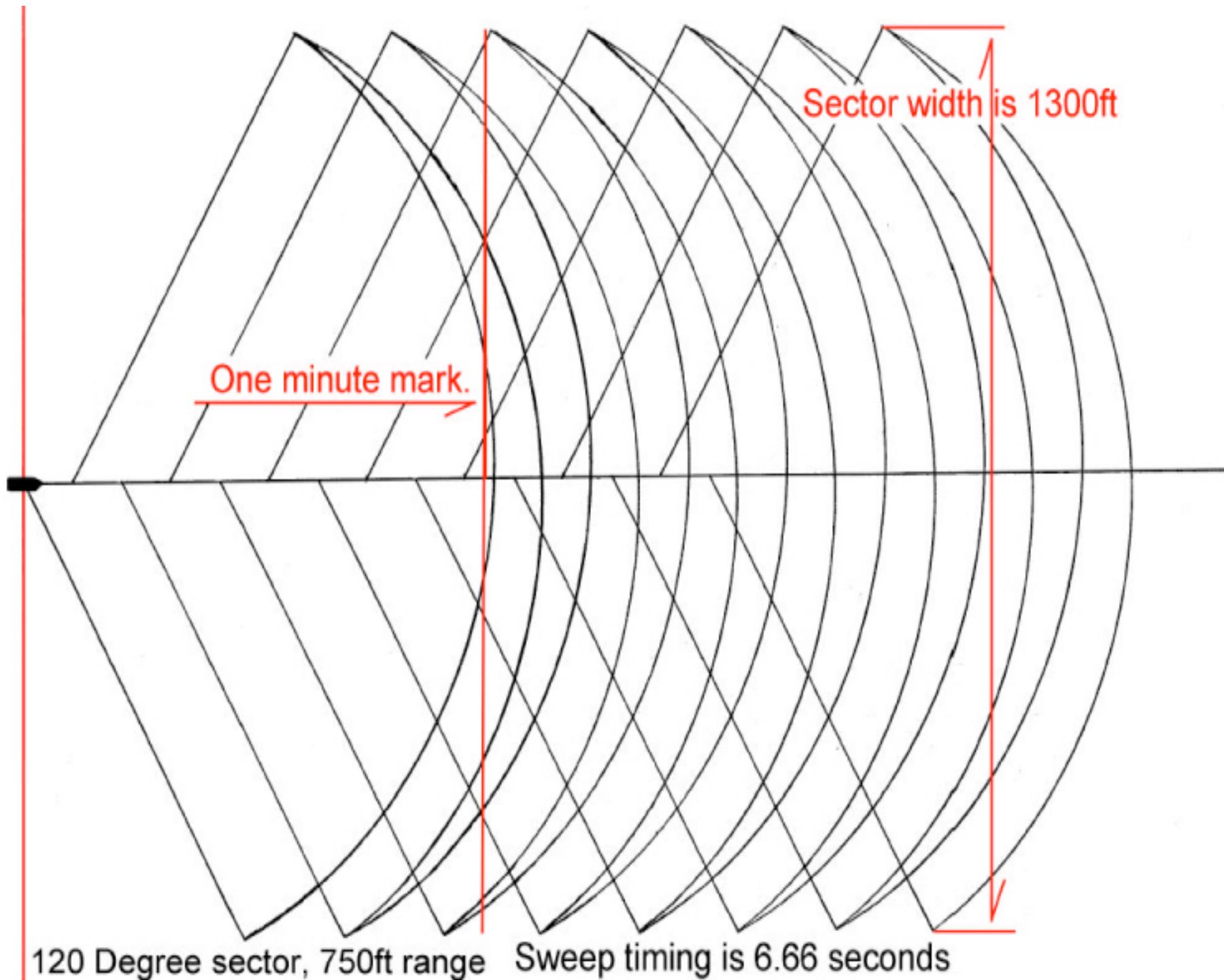


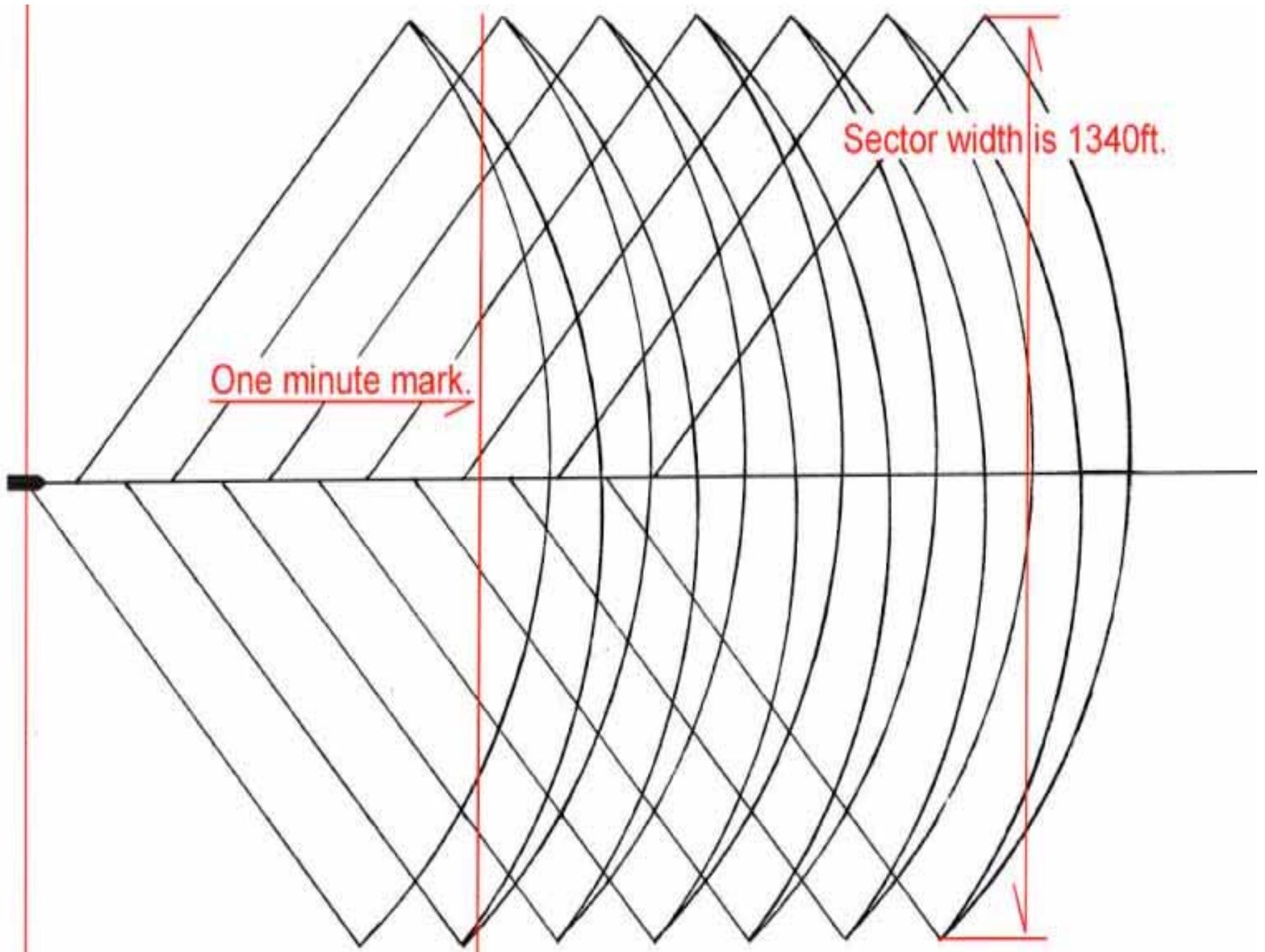
A vessel trolling at 9 knots travels a distance of 792ft in one minute.

Sector width is 1140ft

144 Degree sector, 600ft range

Sweep timing is 6.4 seconds





96 Degree sector, 900ft range. Sweep timing is 6.4 seconds.

Favorite sonar settings

| | Recommended starting settings | #1 | Additional user settings | | | #4 |
|----------------|-------------------------------|----|--------------------------|----|--|----|
| | | | #2 | #3 | | |
| COM 1 | | | | | | |
| TX Power | MAX | | | | | |
| Pulselength | Long | | | | | |
| TX Rate | 10 | | | | | |
| INT Reject | On (if needed) | | | | | |
| AGC | Off | | | | | |
| Audio level | 3 | | | | | |
| COM 2 | | | | | | |
| Deleting track | No | | | | | |
| White marker | Off | | | | | |
| Sig Level | Off | | | | | |
| Colors | 16 | | | | | |
| BKGD color | 1,2 or 3 | | | | | |
| HORZ | | | | | | |
| TVG Level | Between 2 to 5 | | | | | |
| TVG Distance | Between 1.5 to 3.5 | | | | | |
| Gain Adjust | 0 | | | | | |
| RES. Color | Log | | | | | |
| Clutter | 2 or 3 | | | | | |
| Target key | Reverse | | | | | |
| Lock mode | Auto | | | | | |
| Auto tilt | Off | | | | | |
| Gain | | | | | | |
| Range | 4 to 6 | | | | | |
| Tilt | 600ft | | | | | |
| Sector size | Between 6 to 10 degrees | | | | | |
| Scan speed | 144 or 120 degrees | | | | | |
| | NORM | | | | | |