Contents

PART 5

Interpreting Acoustic Images

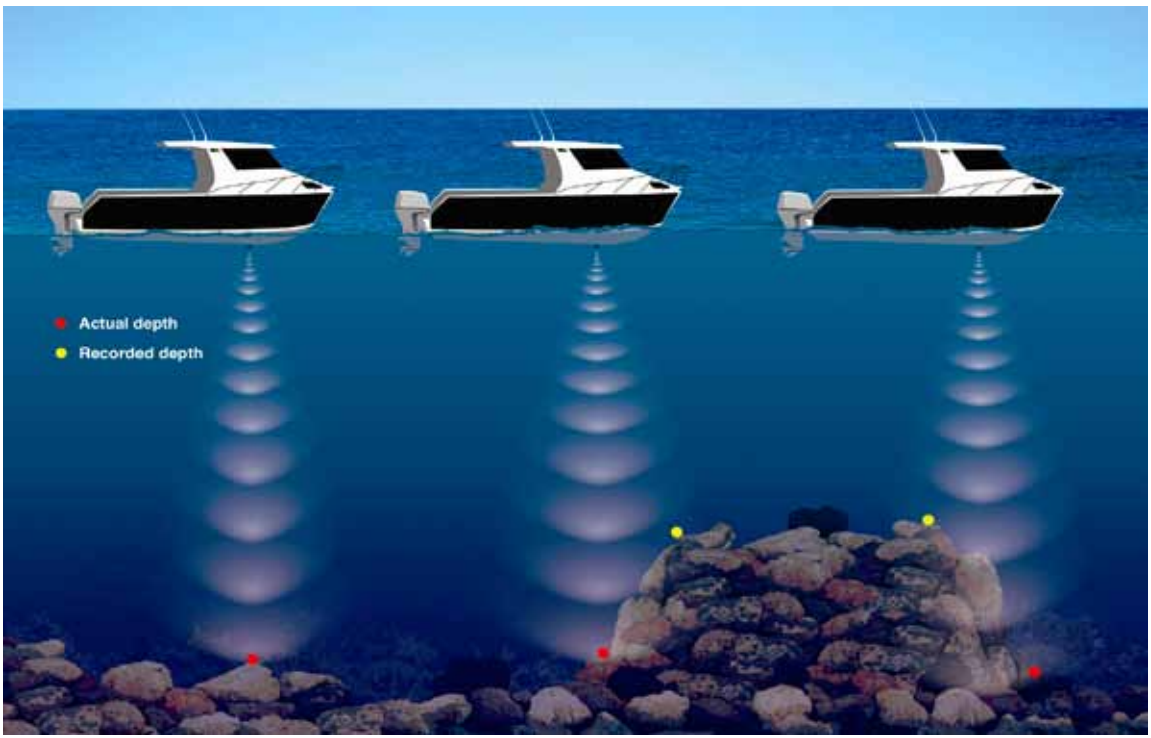
Recording Water Depth

The relationship between 'Recorded Depth' and 'Actual Depth' is shown in Figure 13 where the yellow dots represent recorded water depth and red dots represent actual water depth.

If the topography of the bottom is flat, the first echo signal to return from directly under the boat back to the transducer's receiver will have travelled the shortest distance and will be the recorded depth of water to the bottom.

This is shown in Figure 13 by the red dot under the left hand boat. The first echo to return back to the transducer's receiver from the side of an inclined structure is called a 'Side Echo' as shown by the yellow dots under the centre and right hand boats. Having travelled the shortest distance, this will be the recorded depth and not the actual depth of water under the boat as indicated by the red dots.

Figure 13: The Relationship Between 'Recorded Depth' and 'Actual Depth'

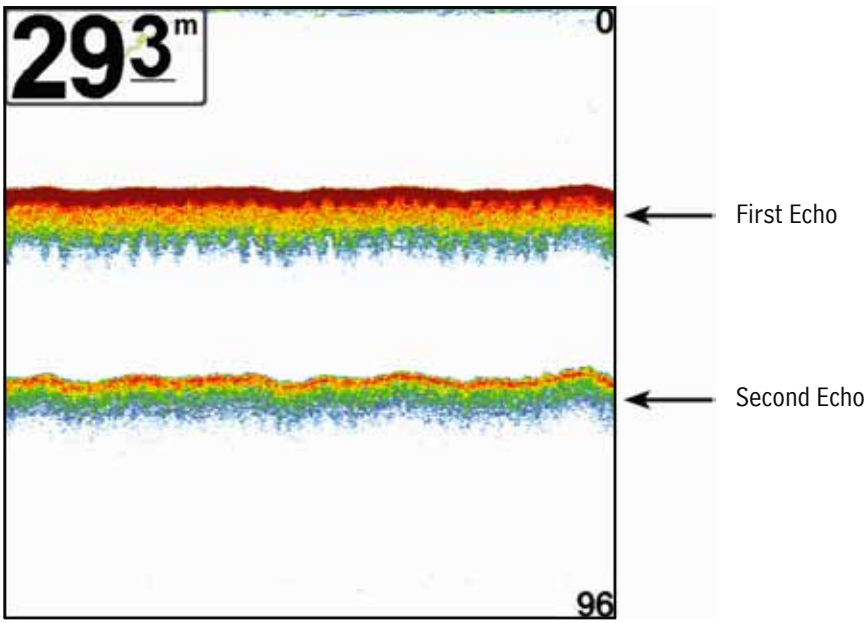


Multiple Echos from the Bottom

The recording of multiple echoes is common when echo sounding over a hard rocky bottom as shown in Figure 14. A double echo signal is produced when the first bottom echo returns to the surface, only to be reflected from the water surface and back to the bottom a second time, before again returning to the transducer's receiver. Multiple echoes may also appear on the display screen when echo sounding in shallow water or when the Sensitivity/Gain control is set too high. This can be resolved by lowering the Gain Control setting.
See Part 4; “Using Your Echo Sounder”.

In Figure 14, the Depth Range was set at 0-96 metres and the recorded depth is 29.3 metres. Because the echo makes two trips to the surface, the returning echo signal is recorded twice on the display screen. The first bottom echo signal recorded on the display screen is the true water depth. The second echo signal is always recorded as a lighter signal because it has made two trips to the bottom and back. It is always recorded as twice the distance from the surface.
Triple echoes can also appear.

Figure 14: First and Second Echos From the Bottom



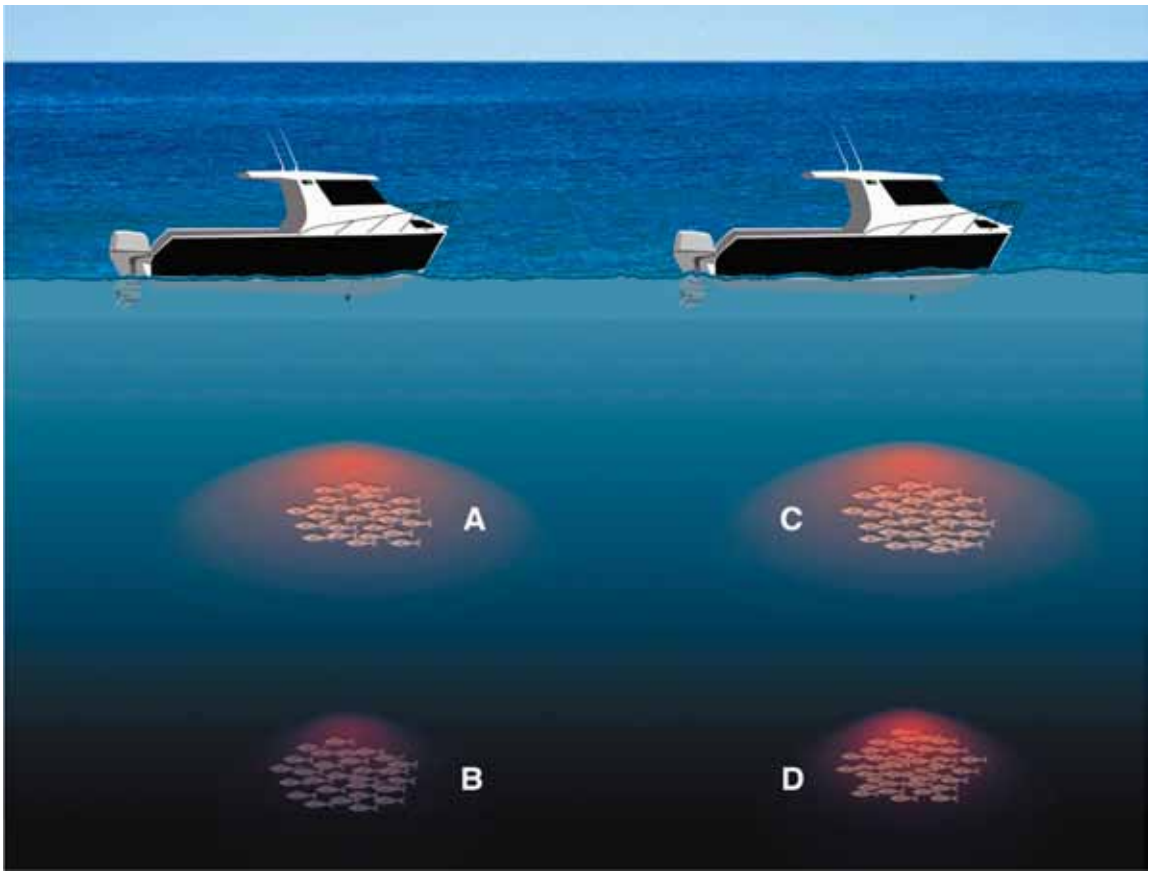
Time Variable Gain (TVG)

The Time Variable Gain (TVG) function is used to obtain a proportionally balanced view of similar size fish targets located at different depths. For example, a fish school located in 20 metres of water will produce a stronger echo signal on the display screen than that produced by the same size school of fish located in 140 metres of water. This is due to the shorter distance the sound waves have travelled to and from their target. The advantage of using TVG is to avoid the illusion that fish located in deeper water look a lot smaller than they actually are, or that they may go undetected.

The TVG function looks at the overall strength of the fish targets and records it proportionally to their depth as shown in Figure 43.

It does this by reducing the signal strength of the fish targets located in the shallower water and increasing the signal strength of the fish targets in the deeper water.

Figure 43: Effect of Time Variable Gain in Reducing Image Distortion of Fish Size



In Figure 43, the TVG is "Off" for the boat on the left hand side and two schools of fish of similar size are located at different depths at A and B. The school of fish at A will produce a stronger echo signal on the display screen than the same size fish school at B. For the boat on the right hand side with TVG "On", the schools of fish at C and D are recorded proportionally to their size and depth.

This function can be operated in "Auto" mode where the TVG automatically increases with depth or alternatively, it can be operated in "Manual" mode where the operator can adjust the TVG setting according to the depth.

Tuning

Sensitivity or Gain Control

The Sensitivity or Gain control function amplifies the signal received from the returning echoes. The signal is processed by the software in the processor and then displayed on the screen. The signal strength from the echoes is stronger in shallow water than in deeper water due to the lesser distance the echo has to travel back to the transducer.

This function can be operated in "Manual" or "Automatic" mode. When operated in "Automatic" mode, the signal received from the echoes is automatically amplified. When operated in "Manual" mode, the volume control setting is manually adjusted according to the depth range and the underwater conditions.

If the Sensitivity/Gain control is set too low, the signals received from the returning echoes will be weak, thus reducing the signal strength and the amount of detail recorded on the display screen. This can result in failure to detect fish targets as shown in Figure 44. This can be corrected by gradually increasing the volume on the gain control setting until more detail appears on the display screen as shown in Figure 45.

If the Sensitivity/Gain control is set too high, the screen will become cluttered as too many signals are received. This can result in a failure to detect which of these are fish targets. It can be corrected by gradually decreasing the volume on the gain control setting until less clutter appears on the display screen.

Figure 44: Sensitivity/Gain Set Low, and Failure to Detect Some Fish

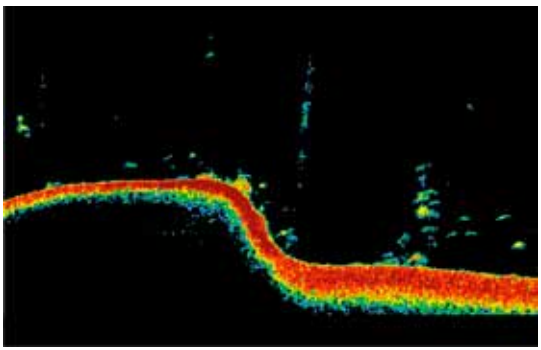
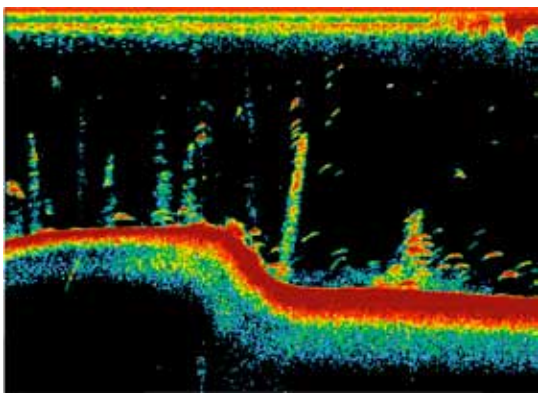
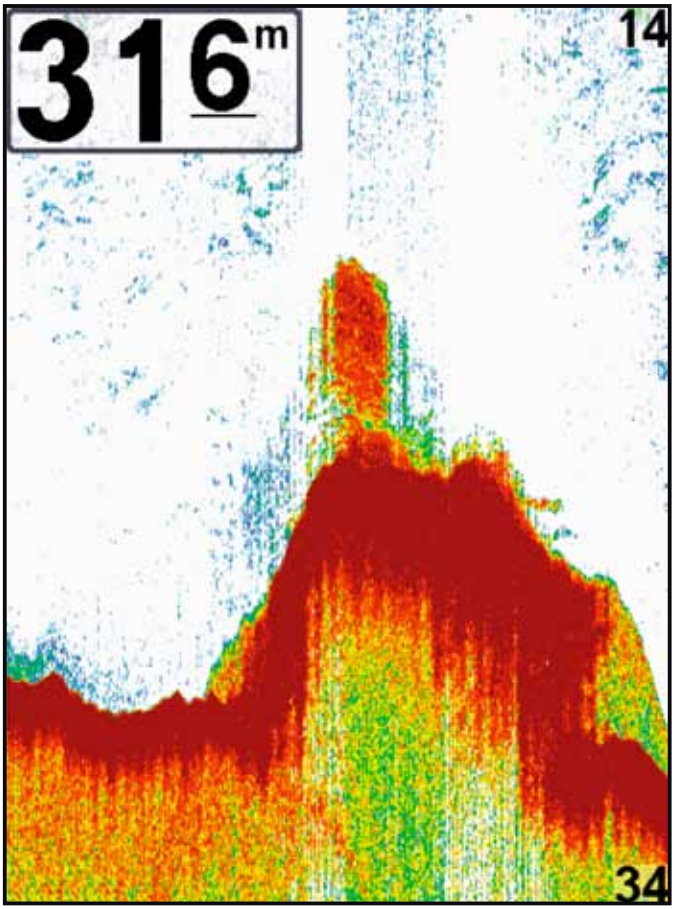


Figure 45: Sensitivity/Gain Increased to Show More Fish



Note: Figures 44 and 45 are adapted from Humminbird® simulations.

Screen Capture 26



Setting and Recordings

The operating frequency is 200 kHz.

Depth Range is 14-34 metres and the recorded depth is 31.6 metres.

Points of Interest

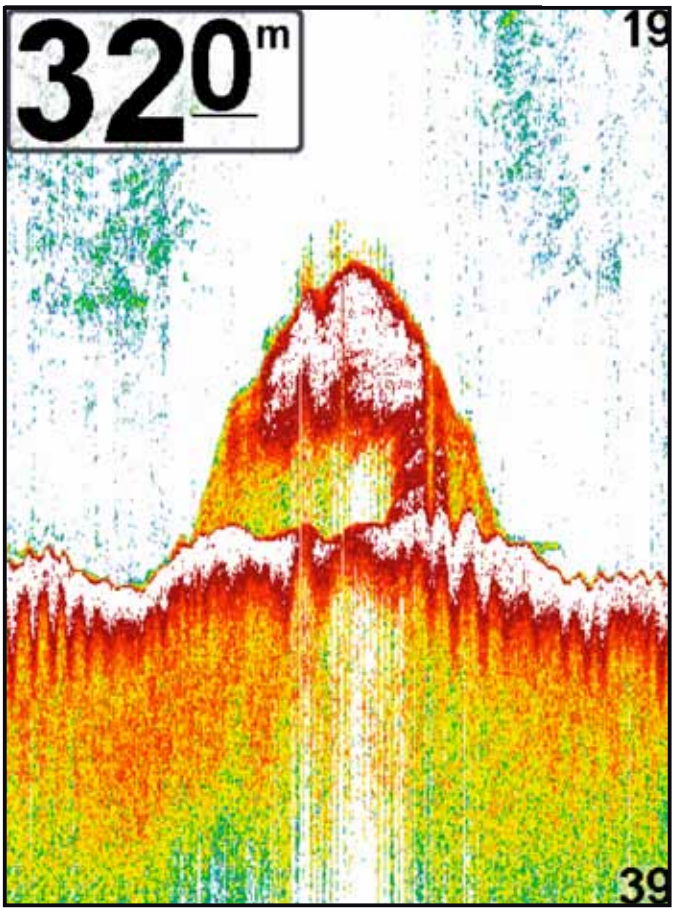
The echo signals from the fish in Screen Capture 26 were originally detected on a full screen view at 0-50 metres.

Screen Capture 26 shows the echo signals from a school of fish positioned above a small mound and also from others positioned closer to the top of the mound.

Turning the White Line function “On” would have given a much clearer visual separation between the surface at the top of the mound and the fish above it.

The light blue scattering of echo signal in the upper section of the image is created from algae/seaweed and not baitfish. The algae/seaweed was suspended in the water column and could be seen from the surface.

Screen Capture 27



Setting and Recordings

The operating frequency is 200 kHz.
Depth Range is 19-39 metres and the recorded depth is 32 metres.
The White Line is “On”.

Points of Interest

Screen Capture 27 shows how a school of fish positioned in the middle of the screen has activated the White Line function.

This indicates that part of the school has a similar signal strength to that of the bottom.

Observe how the tails within the left part of the bottom echo signal are different to those on the right.

Notice also how a small section of the White Line signal is weaker under the fish school. This is because the sheer density of the school has weakened the return echo from the bottom.

The light blue green scattering of echo signal in the upper section of the image is from algae/seaweed suspended in the water column which could be seen from the surface.