Seminar Agenda

- Overview of CHIRP technology compared to traditional fishfinder technology – What's different?
- Importance of proper transducer selection & installation
- Maximize the performance of your electronics system
- Give feedback, offer product suggestions, and ask tough transducer questions

Xducer ID CHIRP

AIRMAR® TECHNOLOGY CORPORATION

Sensing Technology

DEEPER. BROADER. CLEARER.

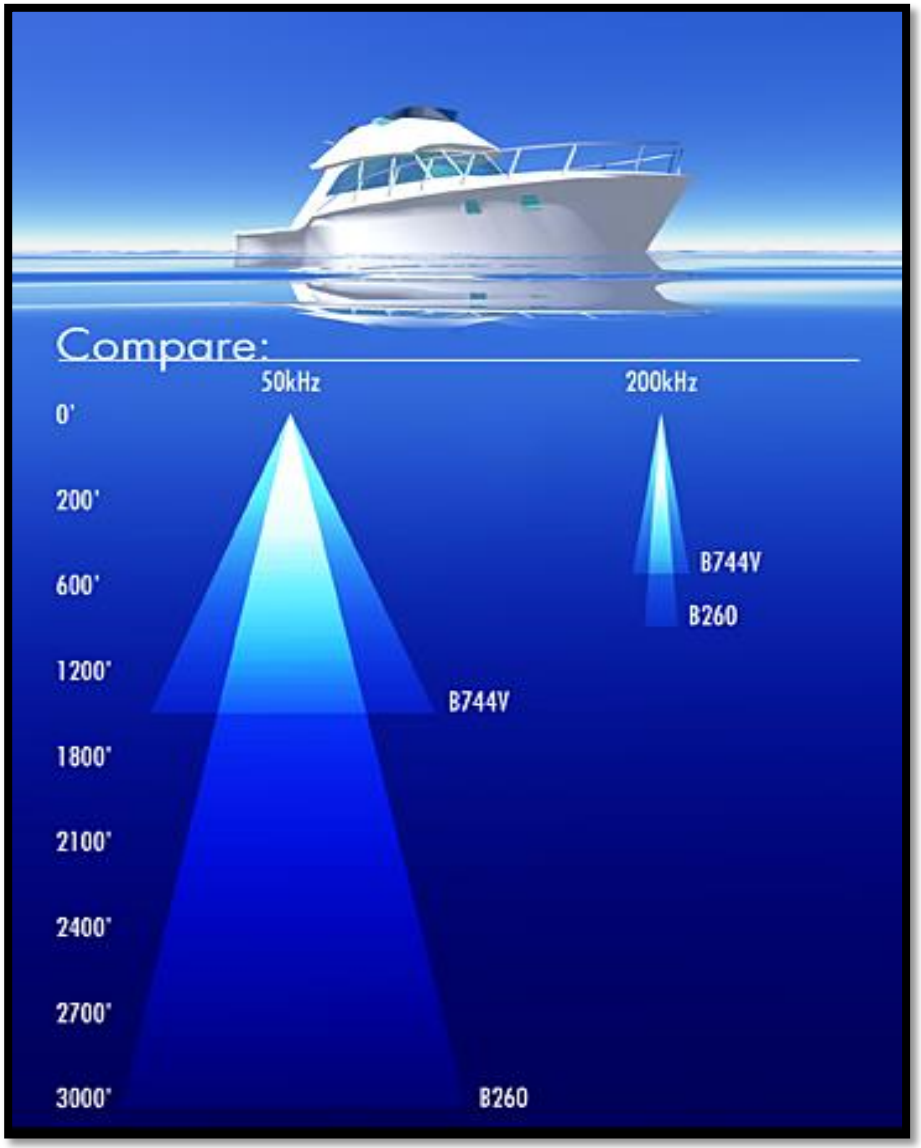
Traditional “Toneburst” Fishfinder

- Traditional fishfinders operate at discrete frequencies such as 50kHz and 200kHz.

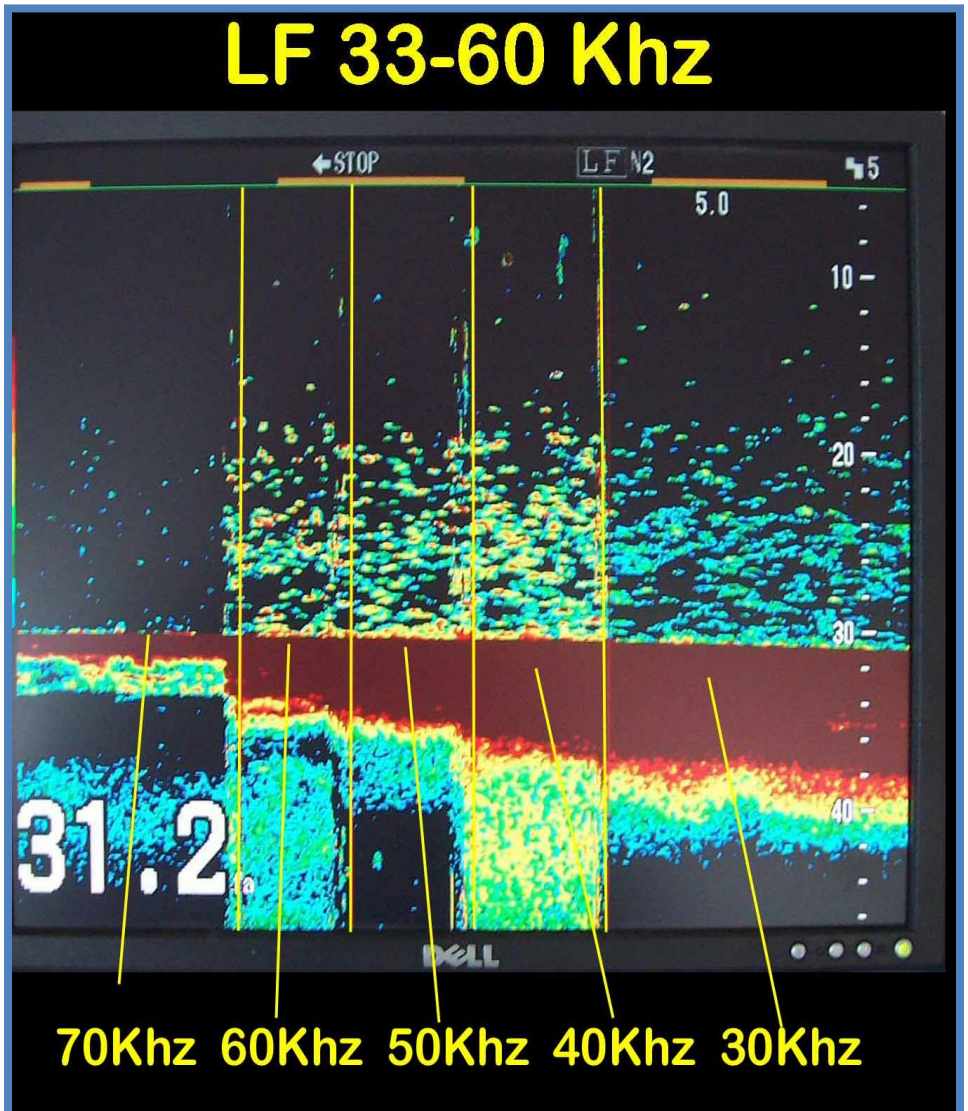
- This limits depth range, range resolution, and ultimately, what targets can be detected in the water column.

Xducer AIRMAR ID CHIRP

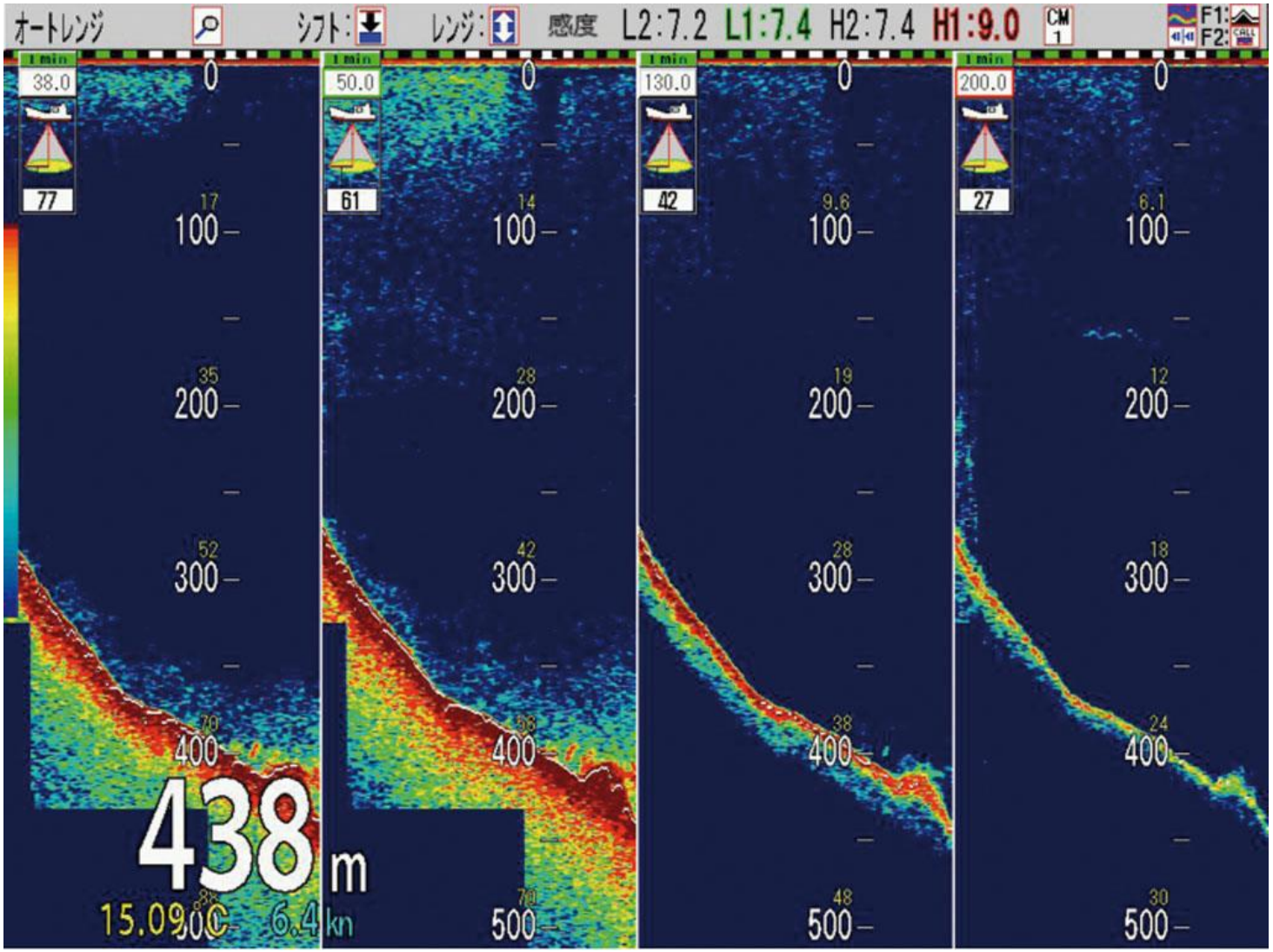
AIRMAR® TECHNOLOGY CORPORATION
Sensing Technology


Compare:
50kHz
200kHz
0'
200'
600'
1200'
1800'
2100'
2400'
2700'
3000'
B744V
B744V
B260
B260

Fish Imaging at Different Frequencies

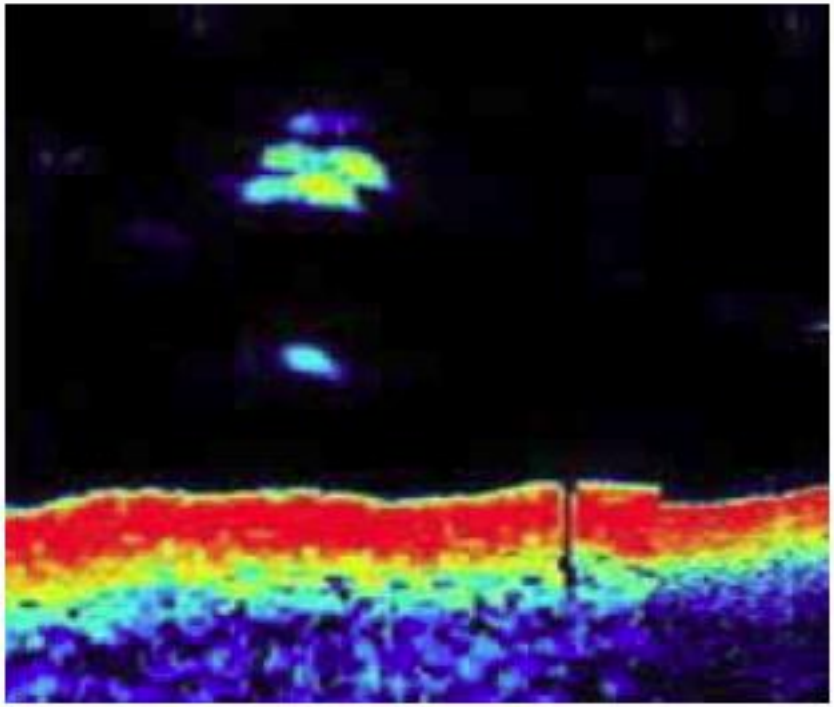


Koden CVS-FX1 at 4 Different Frequencies

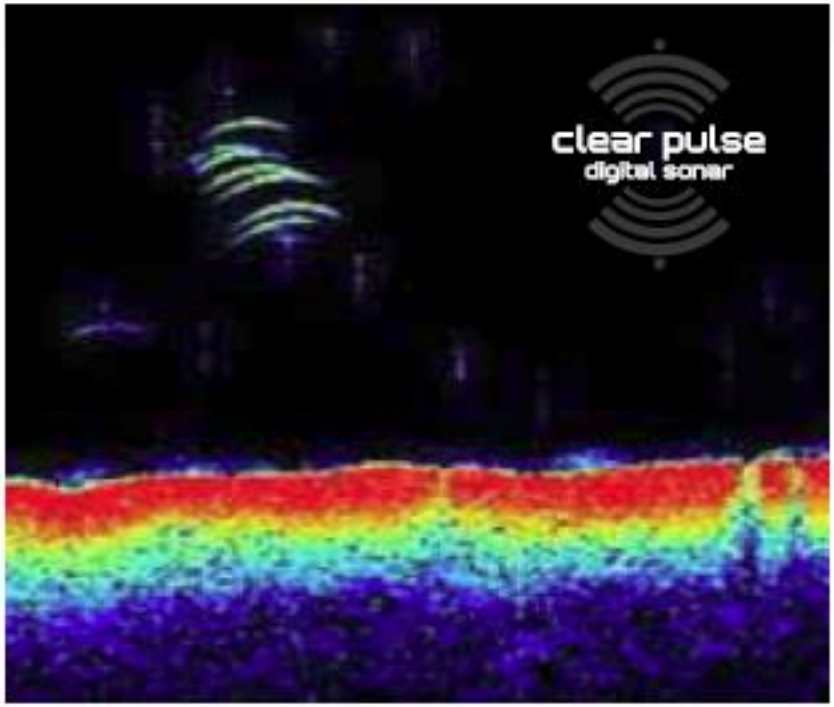


Range Resolution Comparison

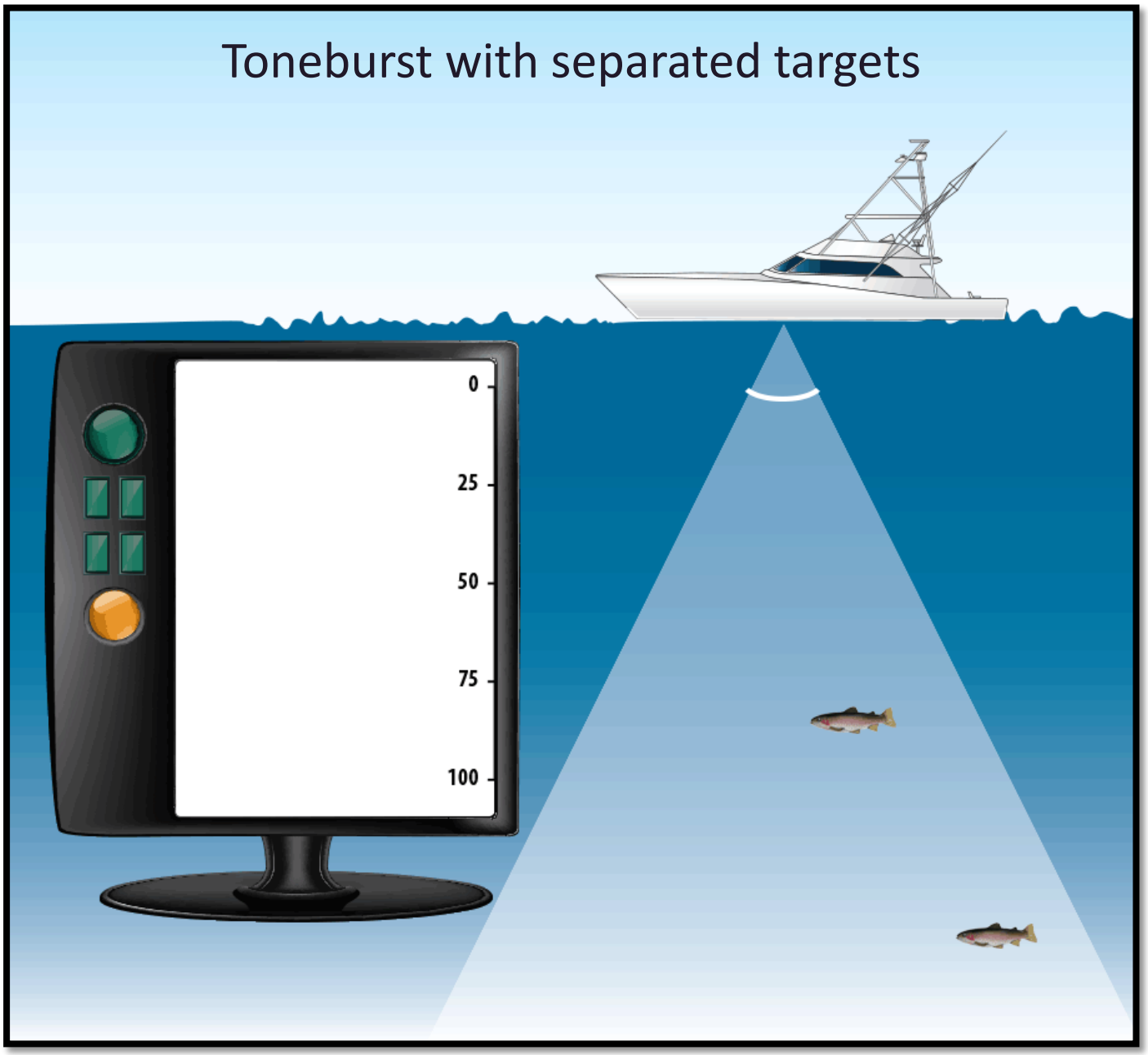
Conventional sonar



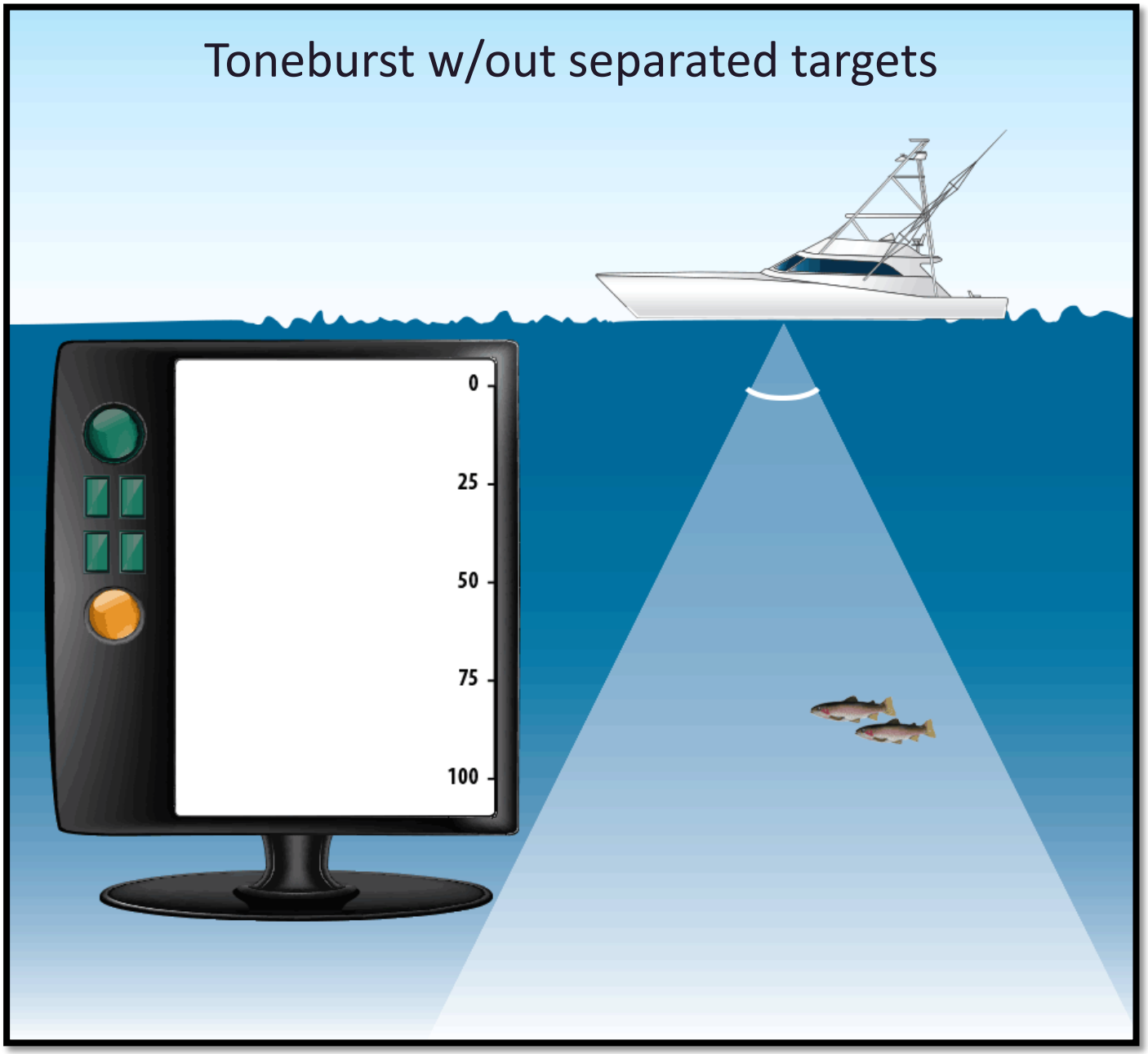
ClearPulse™ CHIRP Sonar



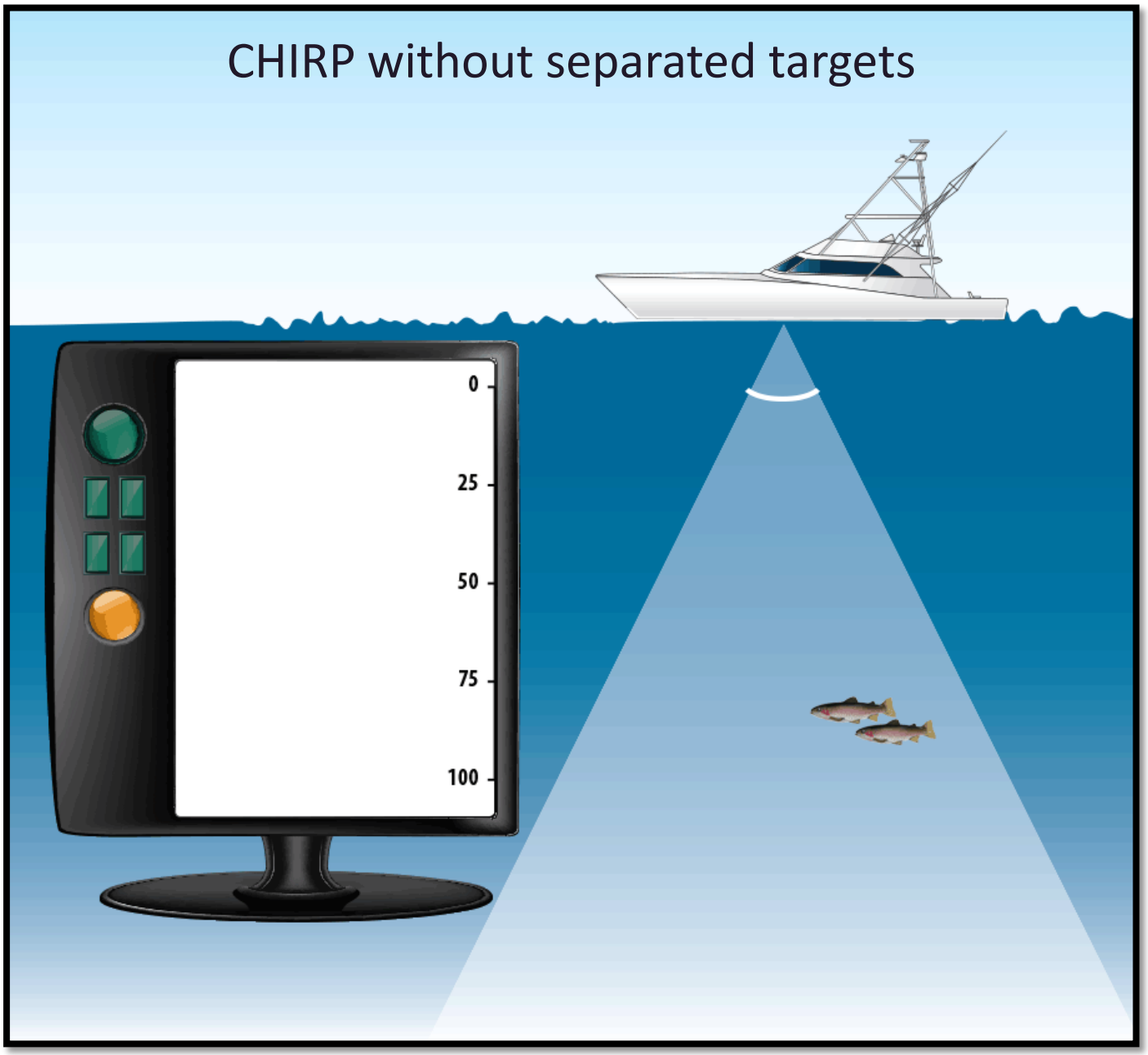
Toneburst with separated targets



Toneburst w/out separated targets



CHIRP without separated targets



Traditional “Toneburst” Fishfinder

- Traditional sounders operate at discrete frequencies such as 50kHz and 200kHz.
- This limits resolution, range and ultimately, what targets can be detected in the water column.
- Tone burst transmit pulse may be *high power* but very *short duration*. This limits *the total energy* that is transmitted into the water column

Xducer AIRMAR ID CHIRP

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CHIRP

A major technical advance in Fishing

What is CHIRP?

- CHIRP has been used by the military, geologists and oceanographers since the 1950's
- Marine radar systems have utilized CHIRP technology for many years
- This is the first time that CHIRP technology has been available to the recreational, sport fishing and light commercial industries….. and at an affordable price

Xducer AIRMAR ID CHIRP

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CHIRP Starts with the Transducer

- AIRMAR *CHIRP-ready* ***transducers are the enabling technology*** for manufacturers designing CHIRP sounders

- Only sounders using AIRMAR CHIRP-ready transducers can operate as a true CHIRP system

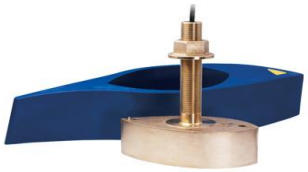
FURUNO GARMIN Raymarine®

HUMMINBIRD SIMRAD

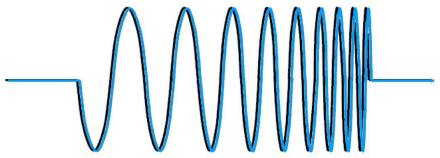
SI-TEX MARINE ELECTRONICS LOWRANCE AIRMAR TECHNOLOGY CORPORATION Sensing Technology

CHIRP is a technique that involves three principle steps

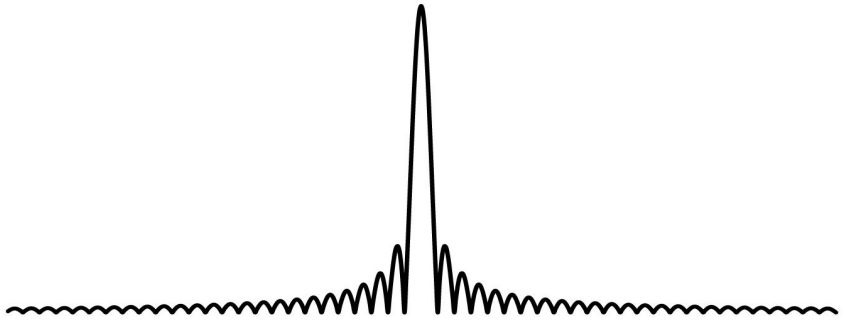
1. Use *broadband* transducer (Airmar)



2. Transmit CHIRP pulse into water

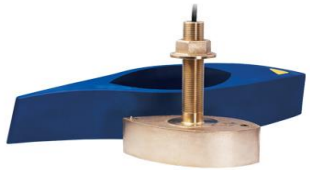


3. Processing of return echoes by method of pattern matching (pulse compression)



It’s all about BANDWIDTH!!

1. **Use of a *broadband* transducer (Airmar)**



What is bandwith?

Why is it important?

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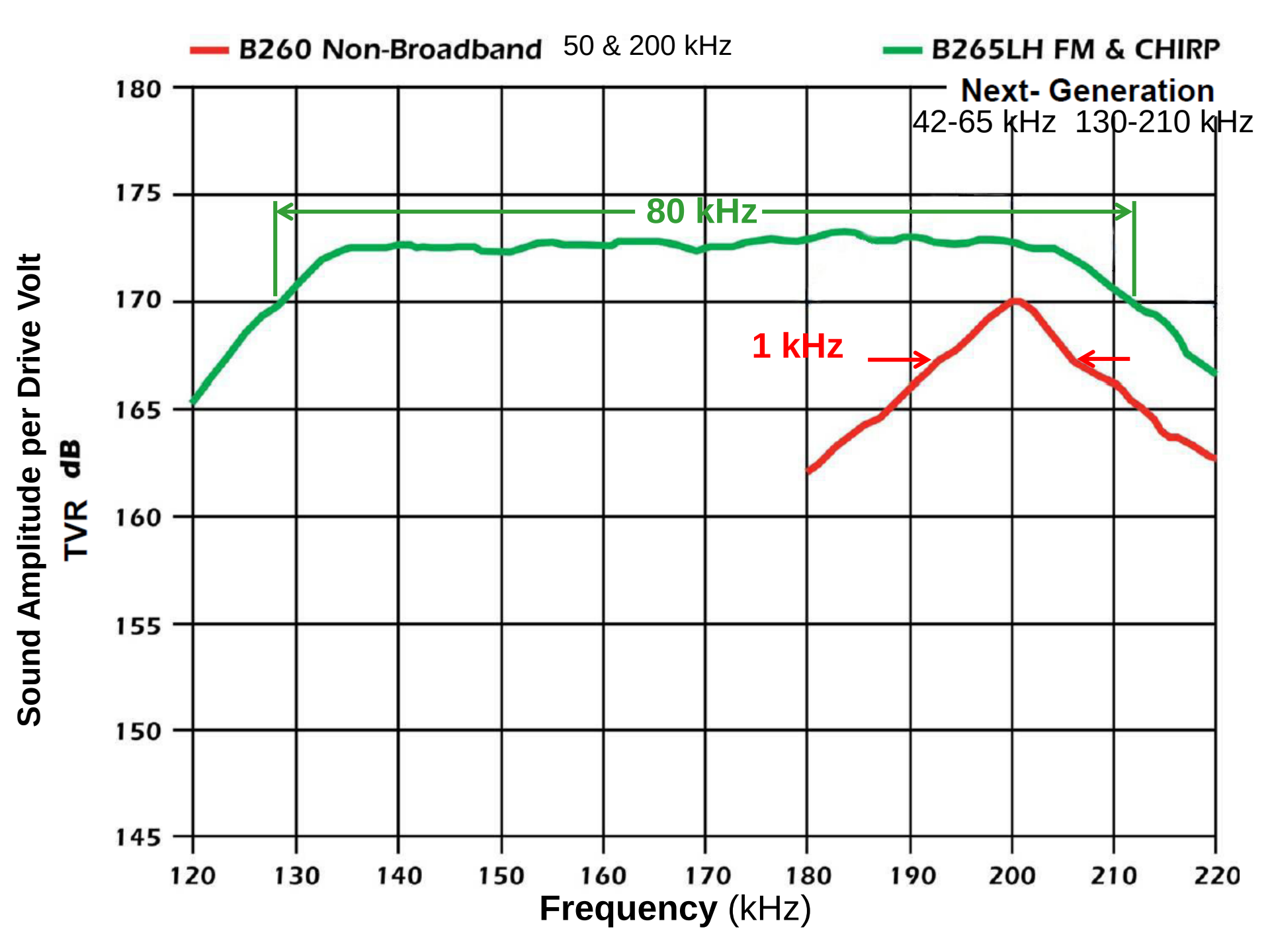
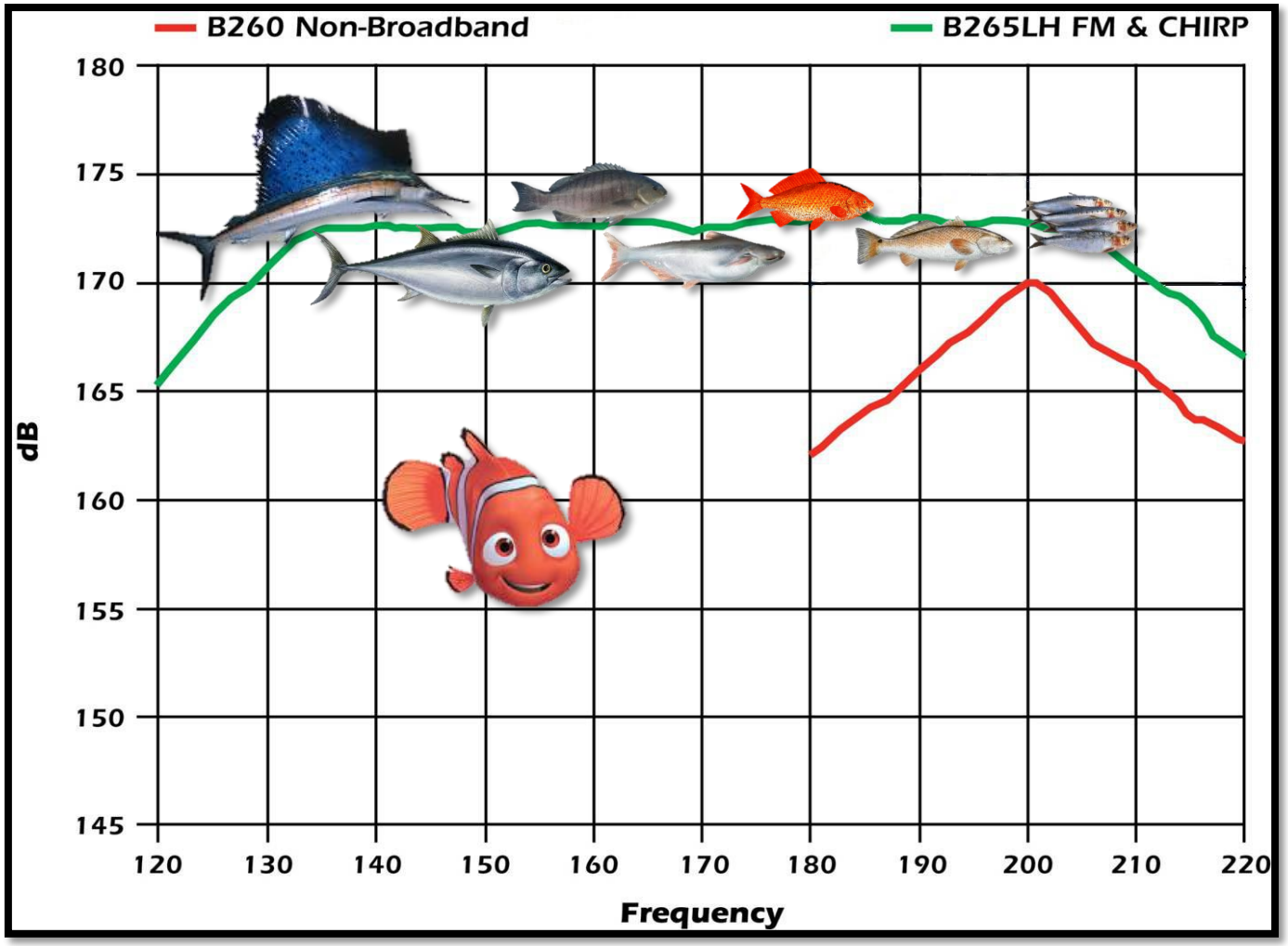
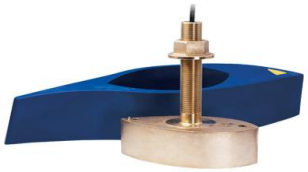

B260 Non-Broadband 50 & 200 kHz
B265LH FM & CHIRP
Next- Generation
42-65 kHz 130-210 kHz
80 kHz
1 kHz
Sound Amplitude per Drive Volt
TVR dB
180
175
170
165
160
155
150
145
120
130
140
150
160
170
180
190
200
210
220
Frequency (kHz)

Target detection



CHIRP is a technique that involves three principle steps

1. Use *broadband* transducer (Airmar)



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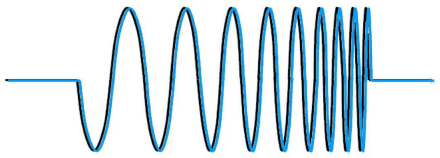

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Tone burst transmit pulse may be HIGH POWER but very SHORT DURATION

Transmit pulse is only at one discrete frequency.
The short pulse limits *the total energy* that is transmitted into the water column

CHIRP sounders use a precise sweep pattern of many frequencies (i.e., 28-60 kHz or 130-210 kHz)

- Requires a long duration transmit pulse in order to sweep through all of the frequencies.
- In order to send a CHIRP pulse, the transducer MUST HAVE BANDWIDTH

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Benefits to YOU…

- Toneburst fishfinders only send out a waveform at one frequency.
- If a long pulse is used at one frequency, you will lose resolution. Multiple fish will get lost in the long pulse and can not be distinguished.

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Benefits to YOU…

- The long transmit CHIRP pulse transmits more energy in the water column
  - Up to 10-1000 times more energy on target!
    - Will get different echo returns from all of the frequencies transmitted – which are then processed and shown on the display.
  - Ability to sound deeper – (more amplitude)

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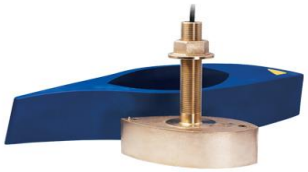
What else is different?

- The CHIRP sound wave that is transmitted is stored in memory
  - Sounder knows the frequency band and pulse length that was transmitted
  - The sounder listens for the return echo, and will match the echo received by the transducer with the reference wave form.
  - AKA: Pattern Matching or Correlation

CHIRP is a technique that involves three principle steps

1. Use *broadband* transducer (Airmar)



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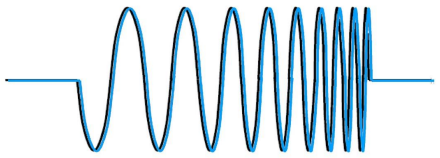

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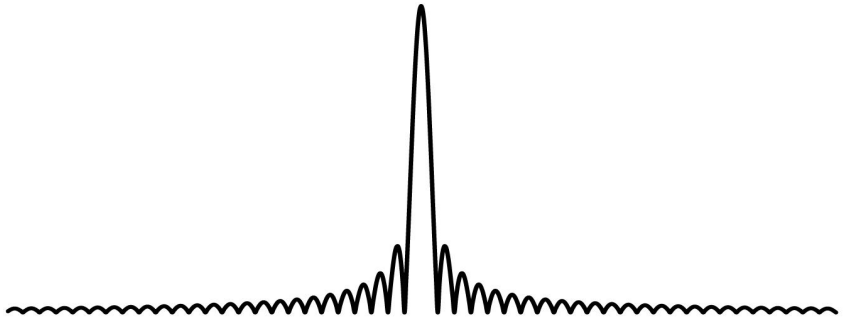

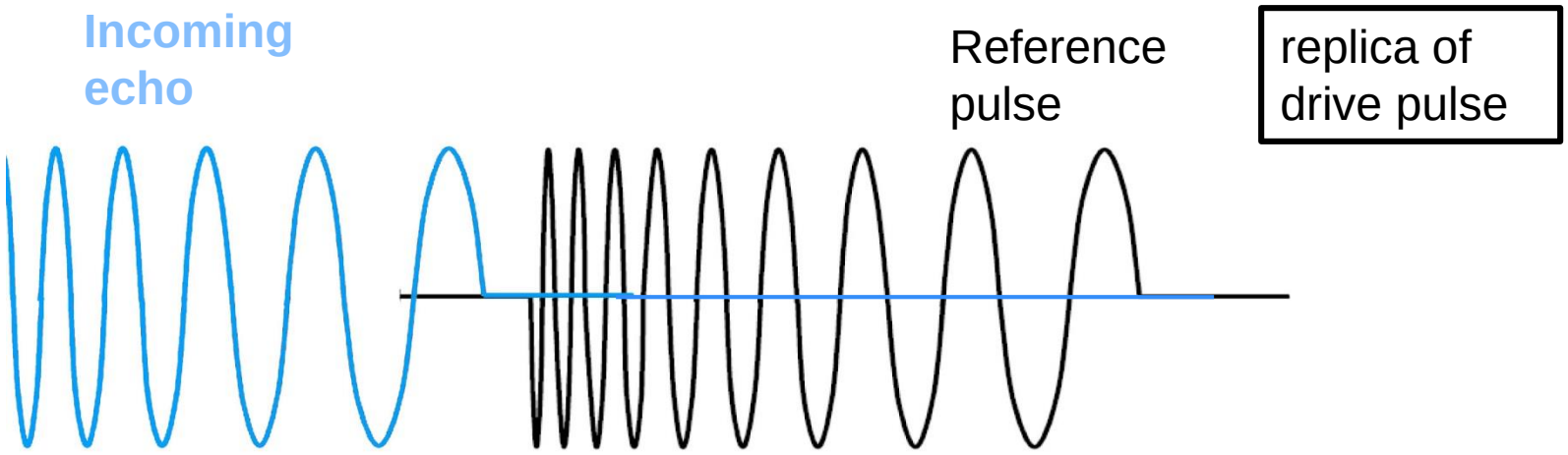

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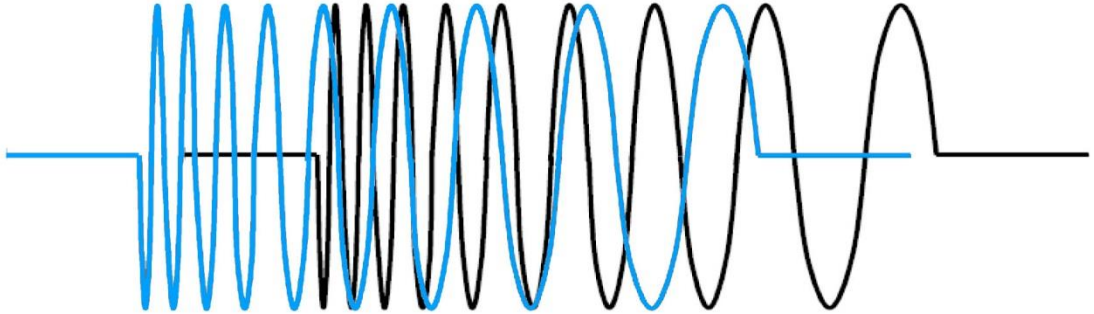
Pattern Matching



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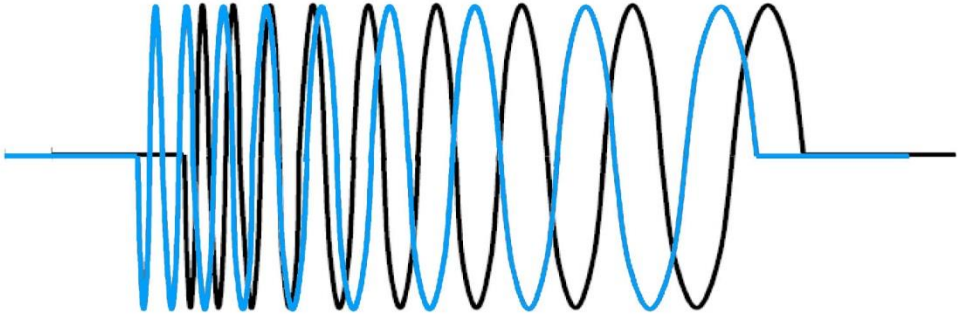
Sensing Technology

Pattern Matching



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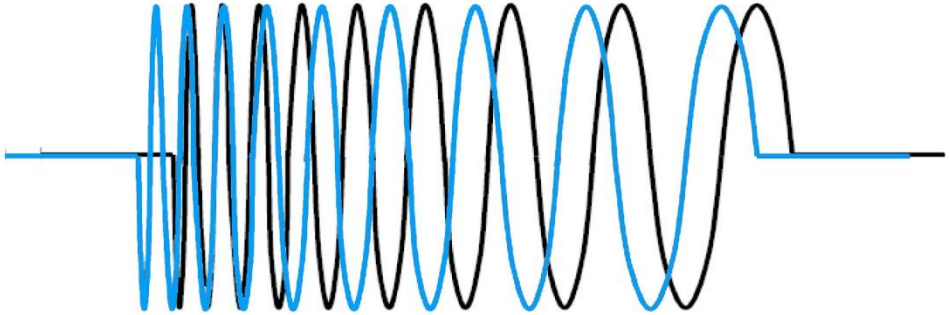

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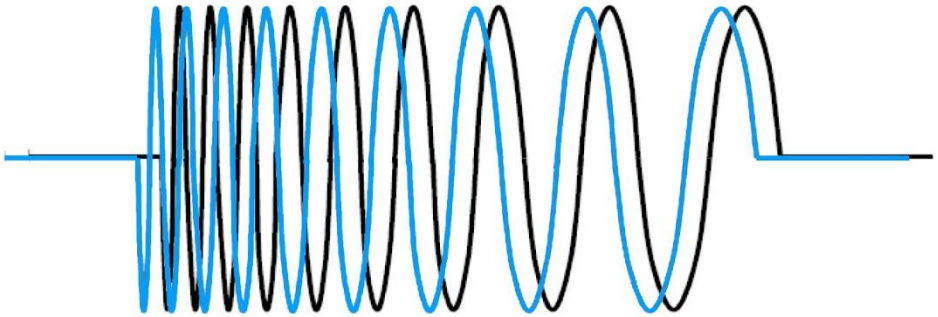

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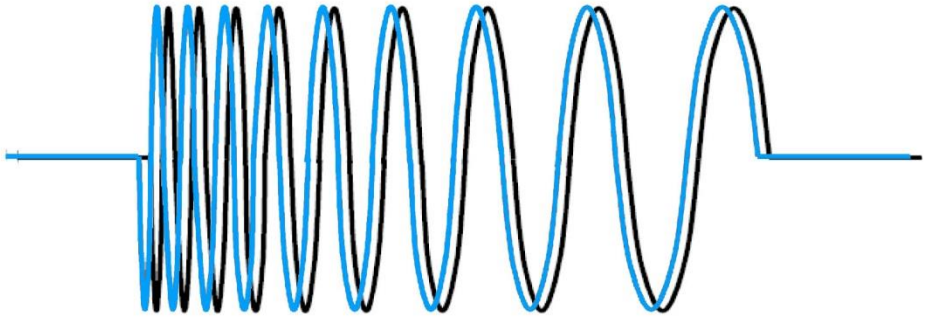

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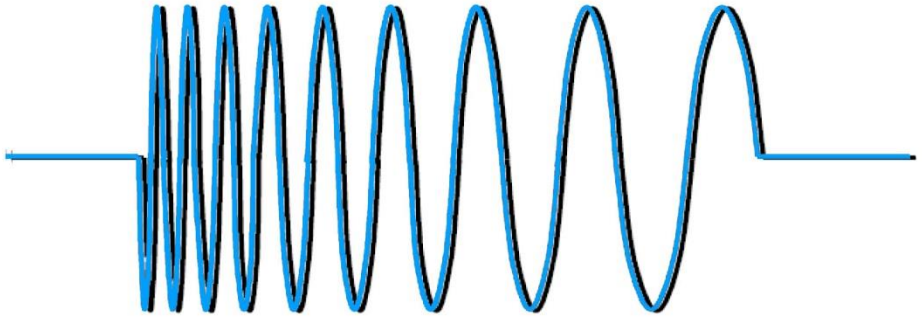

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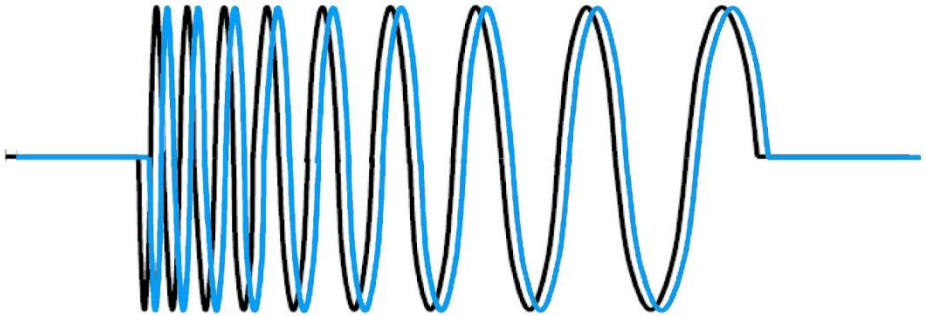

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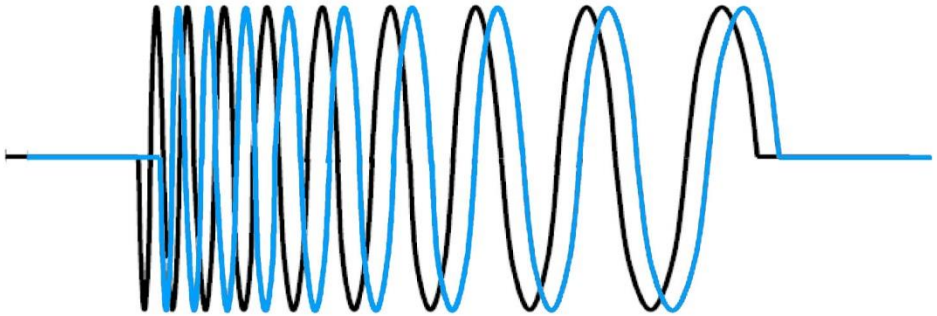
Pattern Matching



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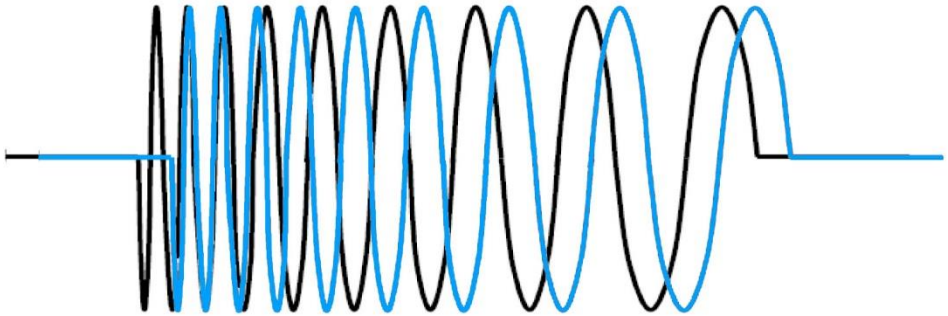

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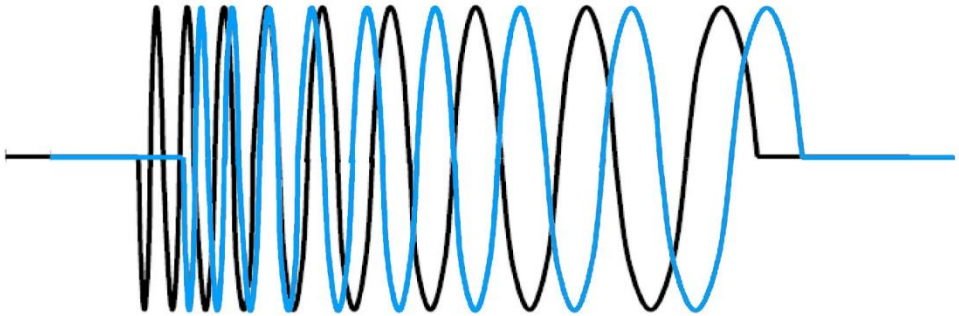
Pattern Matching



. . . etcetera

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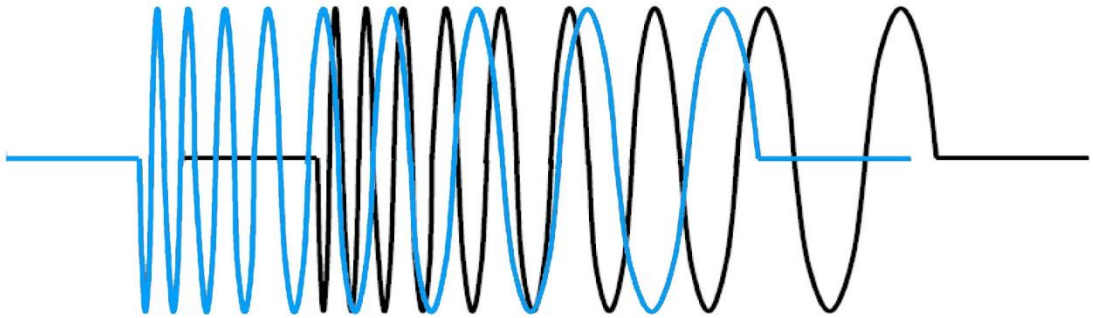
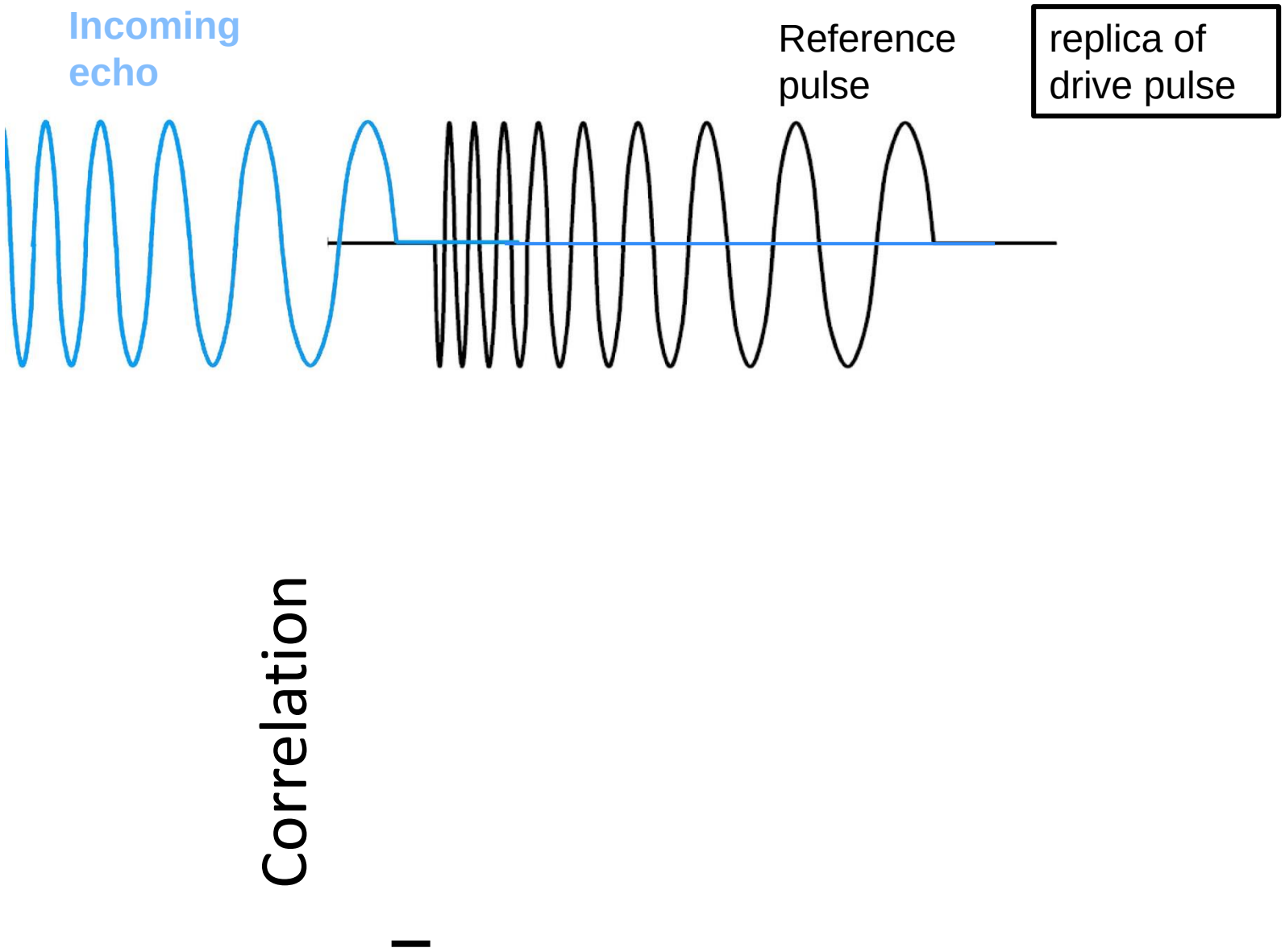
Procedure for Pulse Compression

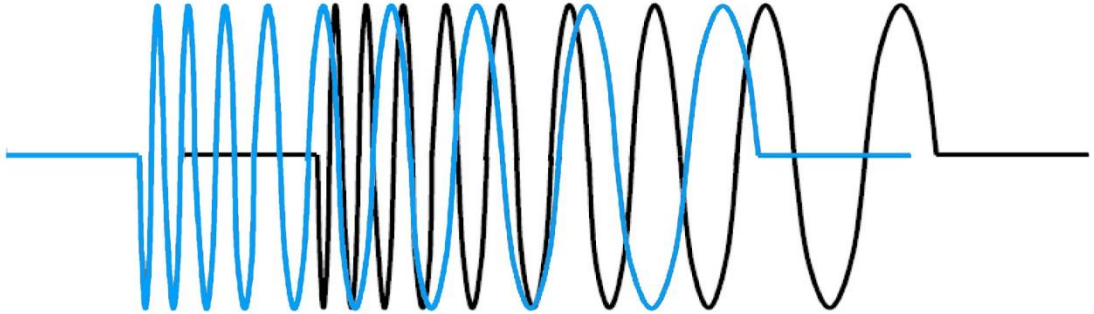
Shift, Multiply and Add

calculation performed by computer



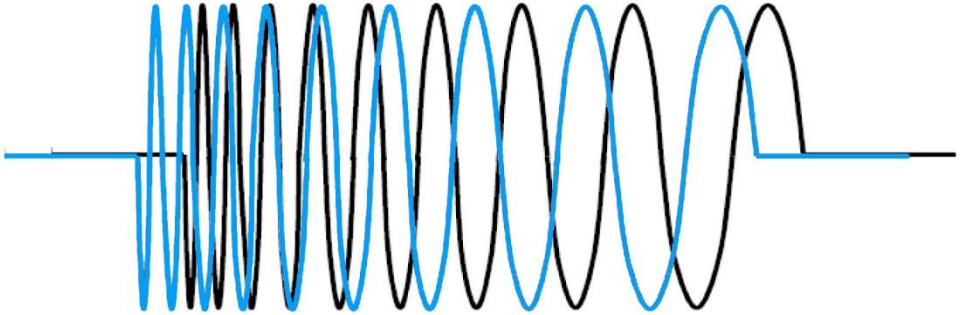

Incoming
echo
Reference
pulse
replica of
drive pulse
Correlation
I

Pulse Compression



Correlation

Pulse Compression



Correlation

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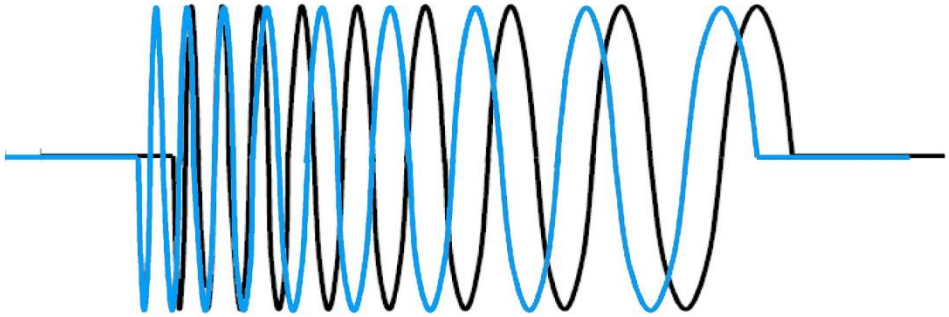

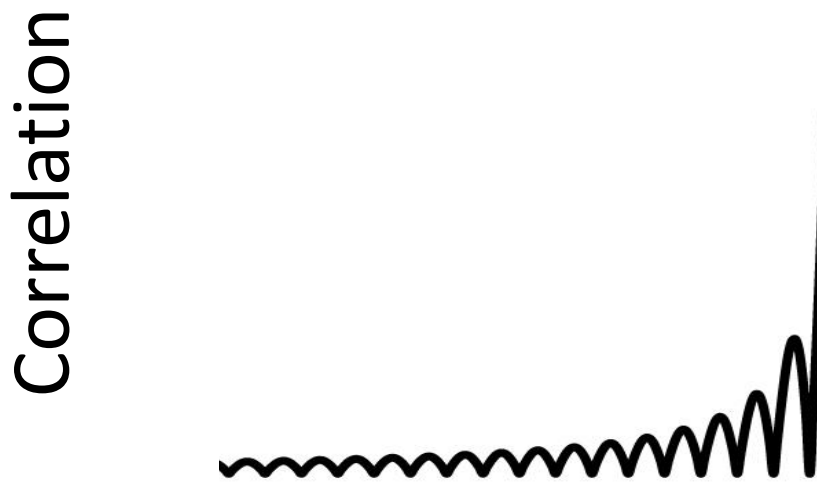

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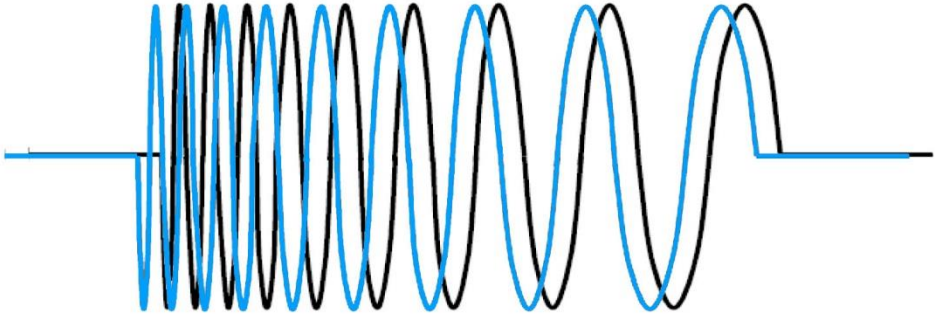

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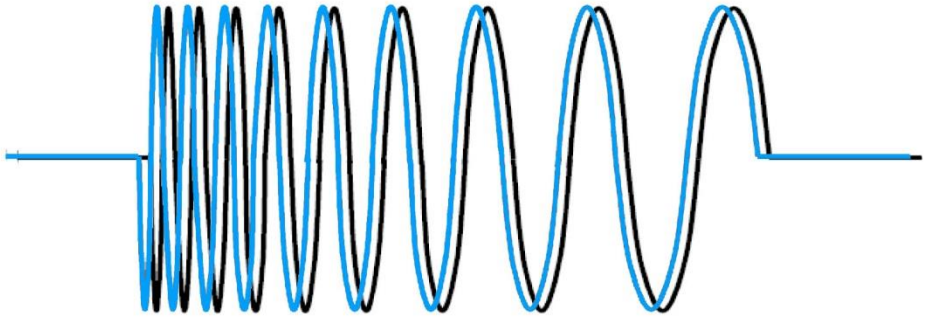
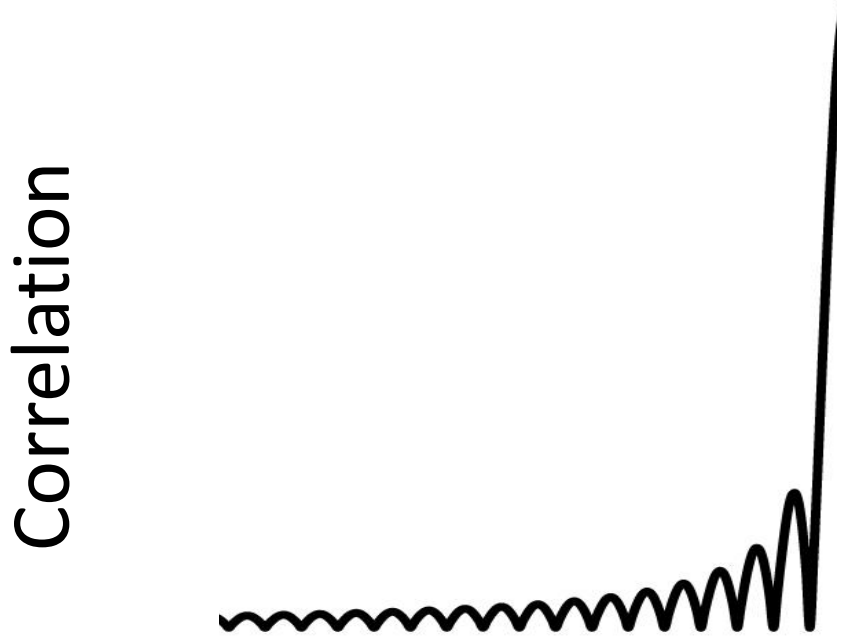
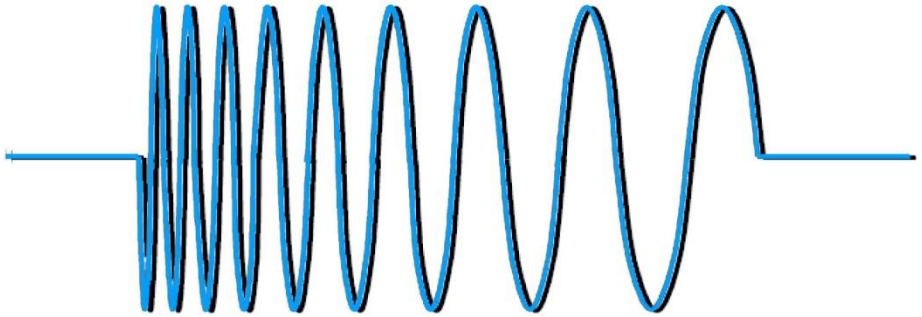




Pulse Compression



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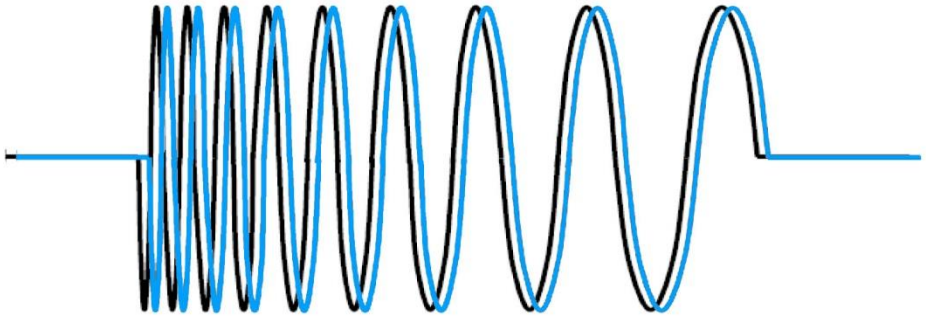

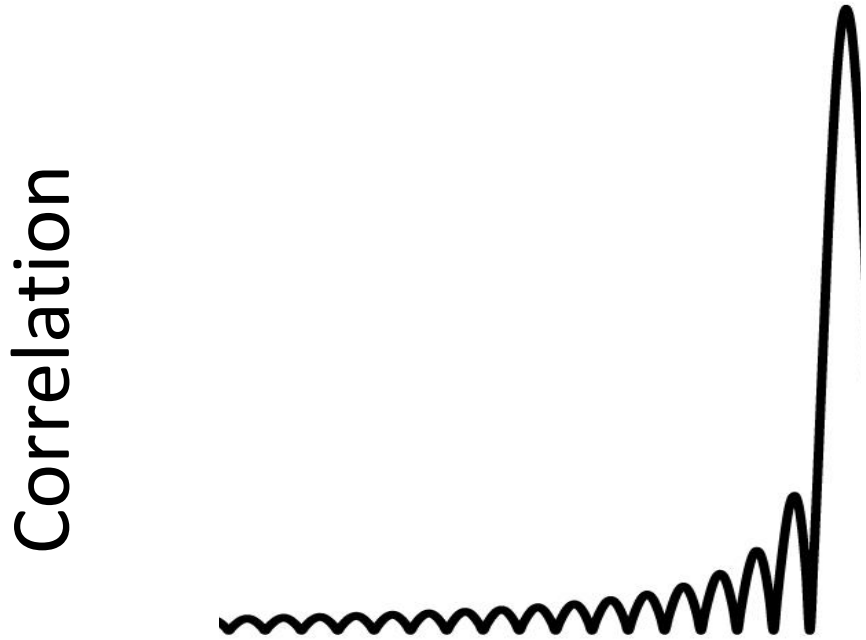

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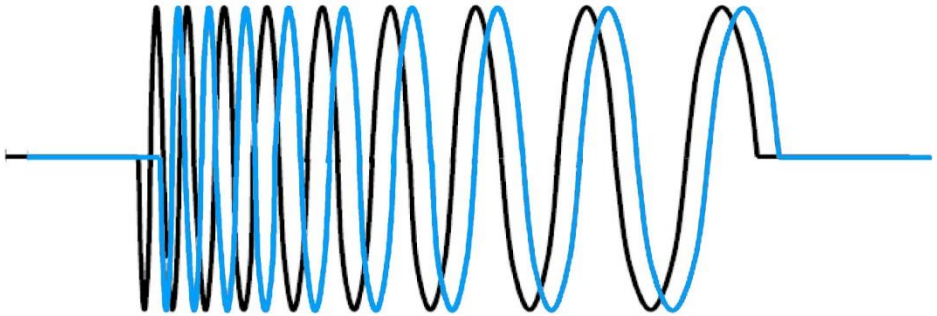
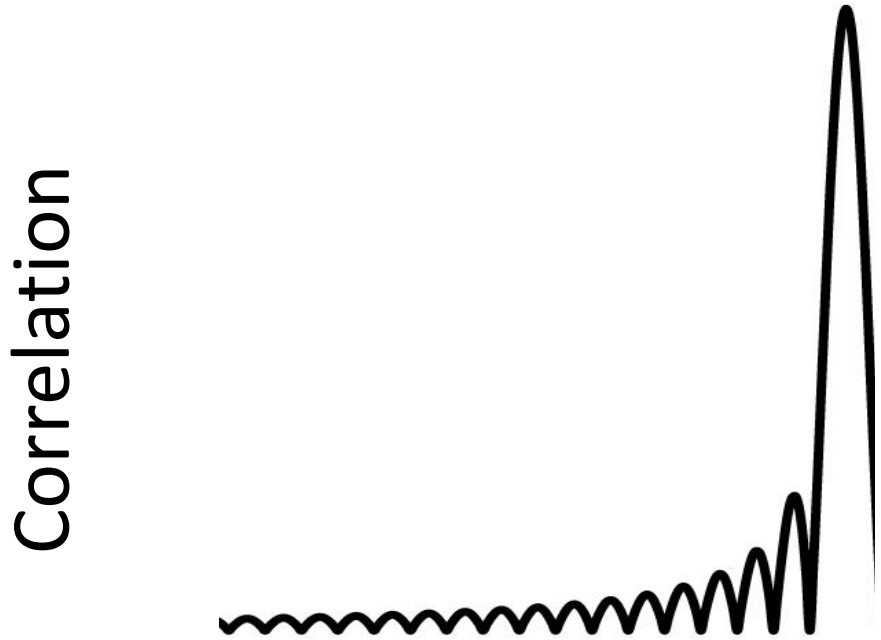
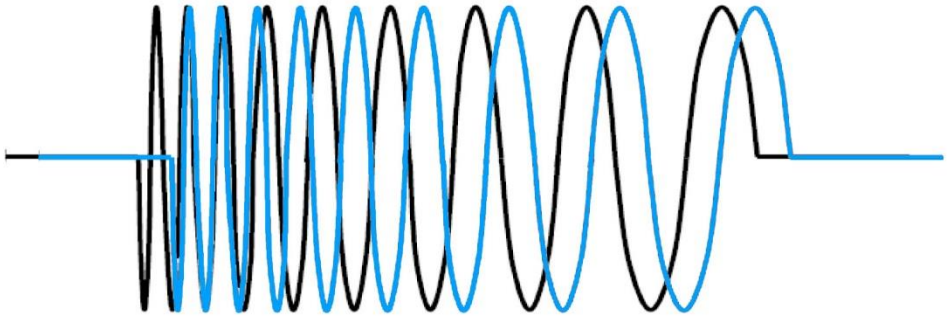
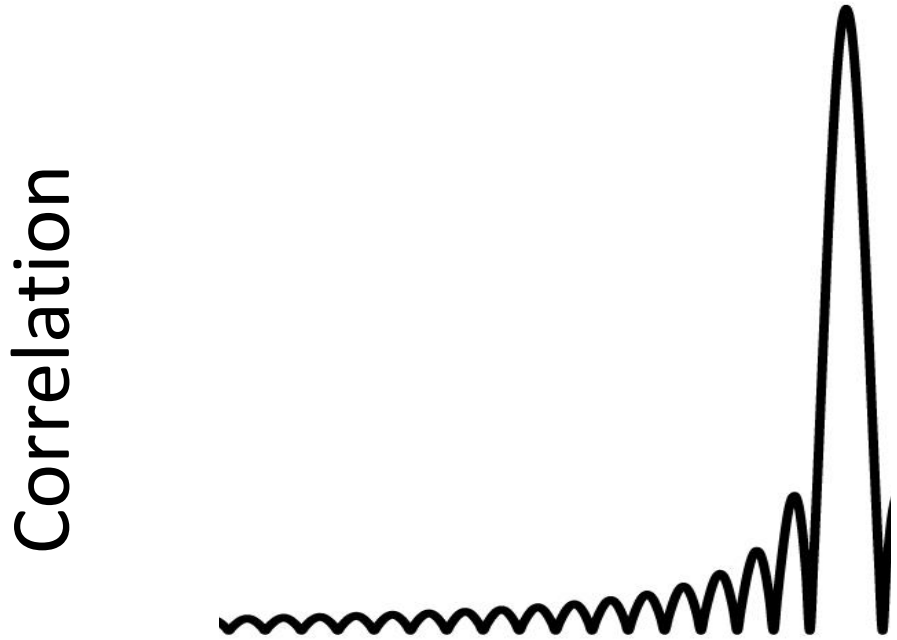




Pulse Compression





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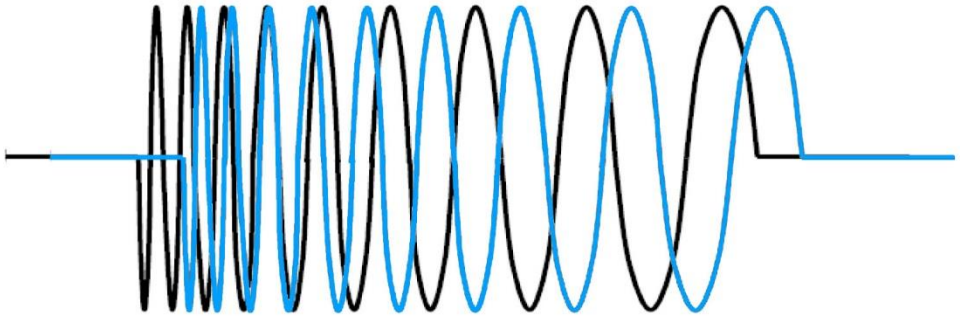

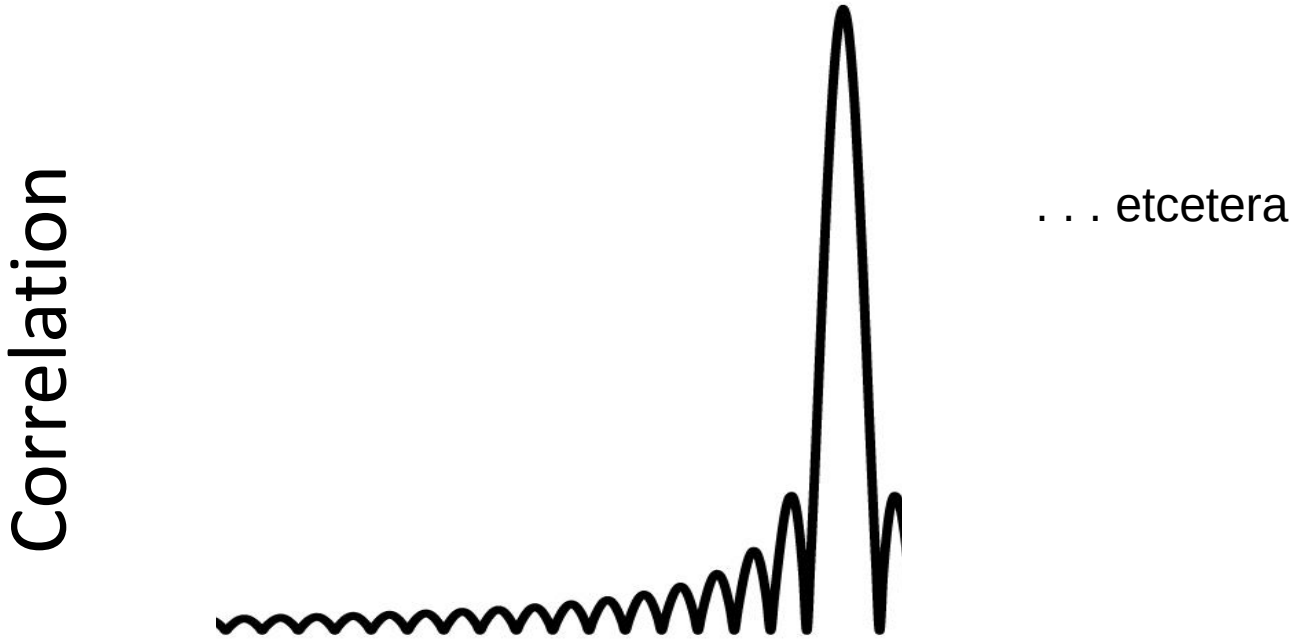

Why is pattern matching (pulse compression) important?

Significantly improved signal to noise ratio

- Noise does not correlate with the stored waveform
- Ability to pull targets from the noise floor
- Bottom tracking at high speed and deep depths

Resolution

- Resolve individual targets – no blobs
- Crisp images

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Is a CHIRP system for YOU?

Advantages versus Disadvantages

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CHIRP: Many advantages when the conditions are challenging

- Operating in a noisy environment

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CHIRP: Many advantages when the conditions are challenging

- Operating in a noisy environment
- When detailed resolution is needed to separate individual fish (range resolution)

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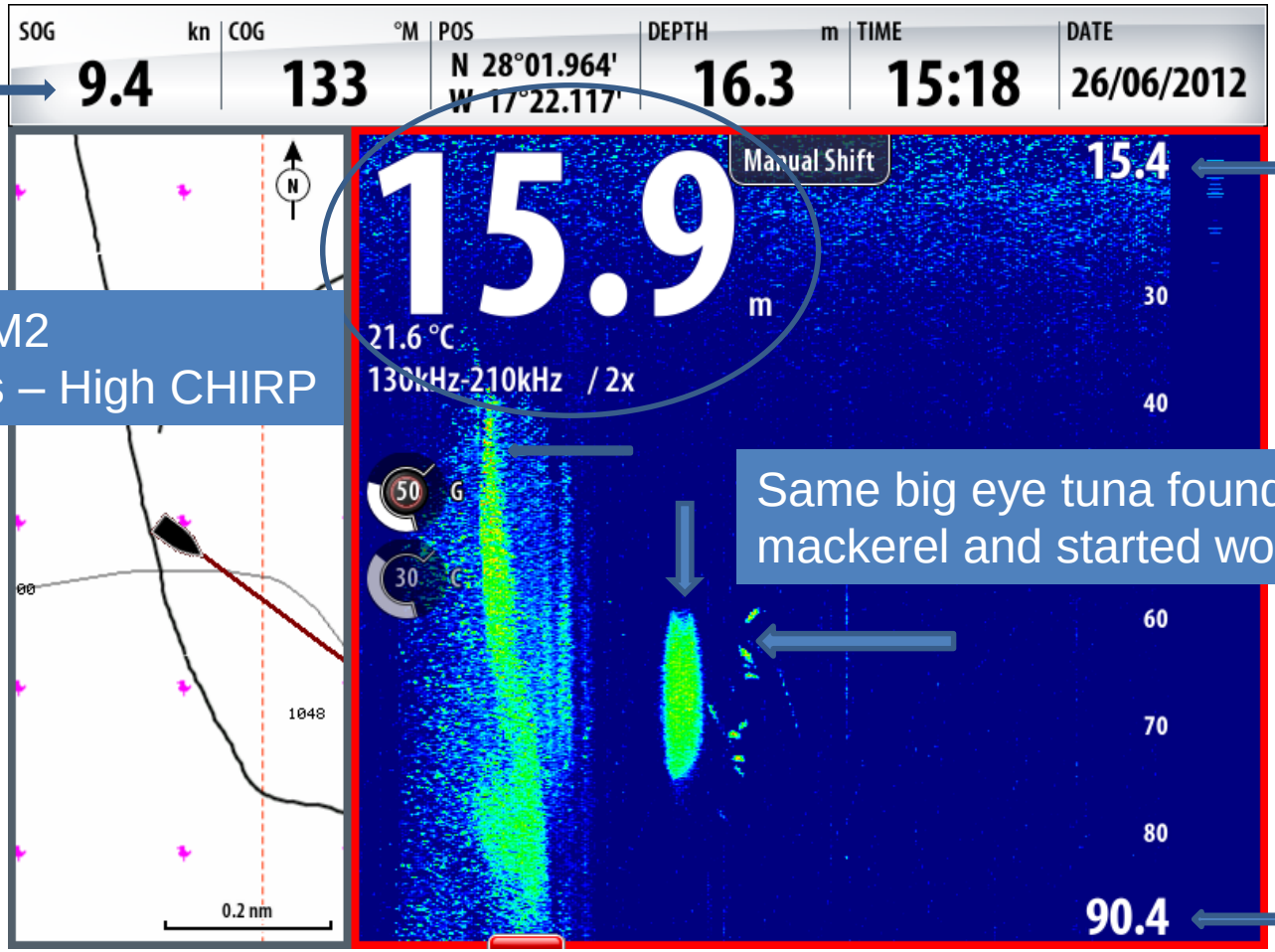
Tuna working on baitfish



R599LH & BSM2
Canary Islands – High CHIRP

Same big eye tuna found the shoal of mackerel and started working on them

Gain has been turned down from left to right

CHIRP: Many advantages when the conditions are challenging

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- Crisp images

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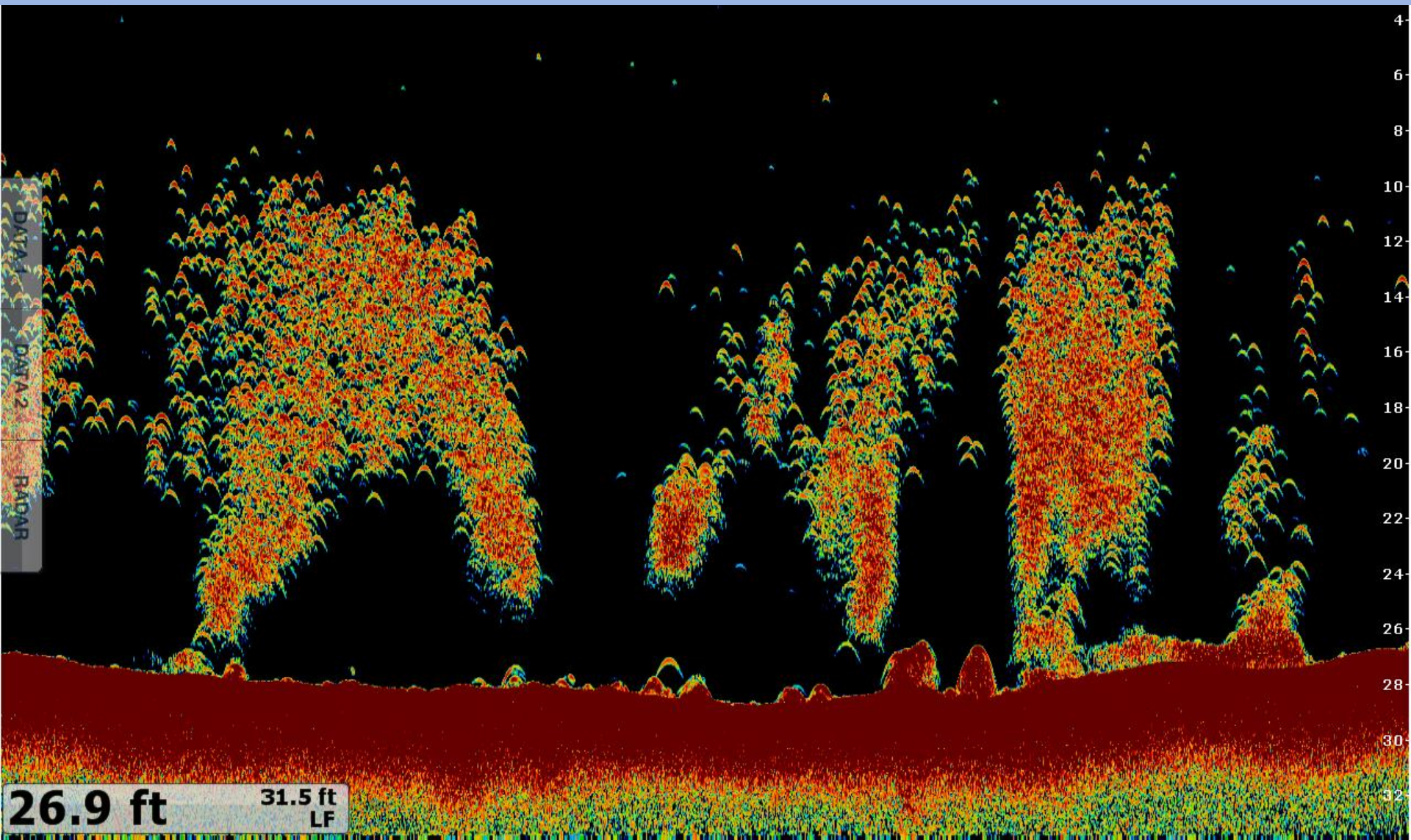
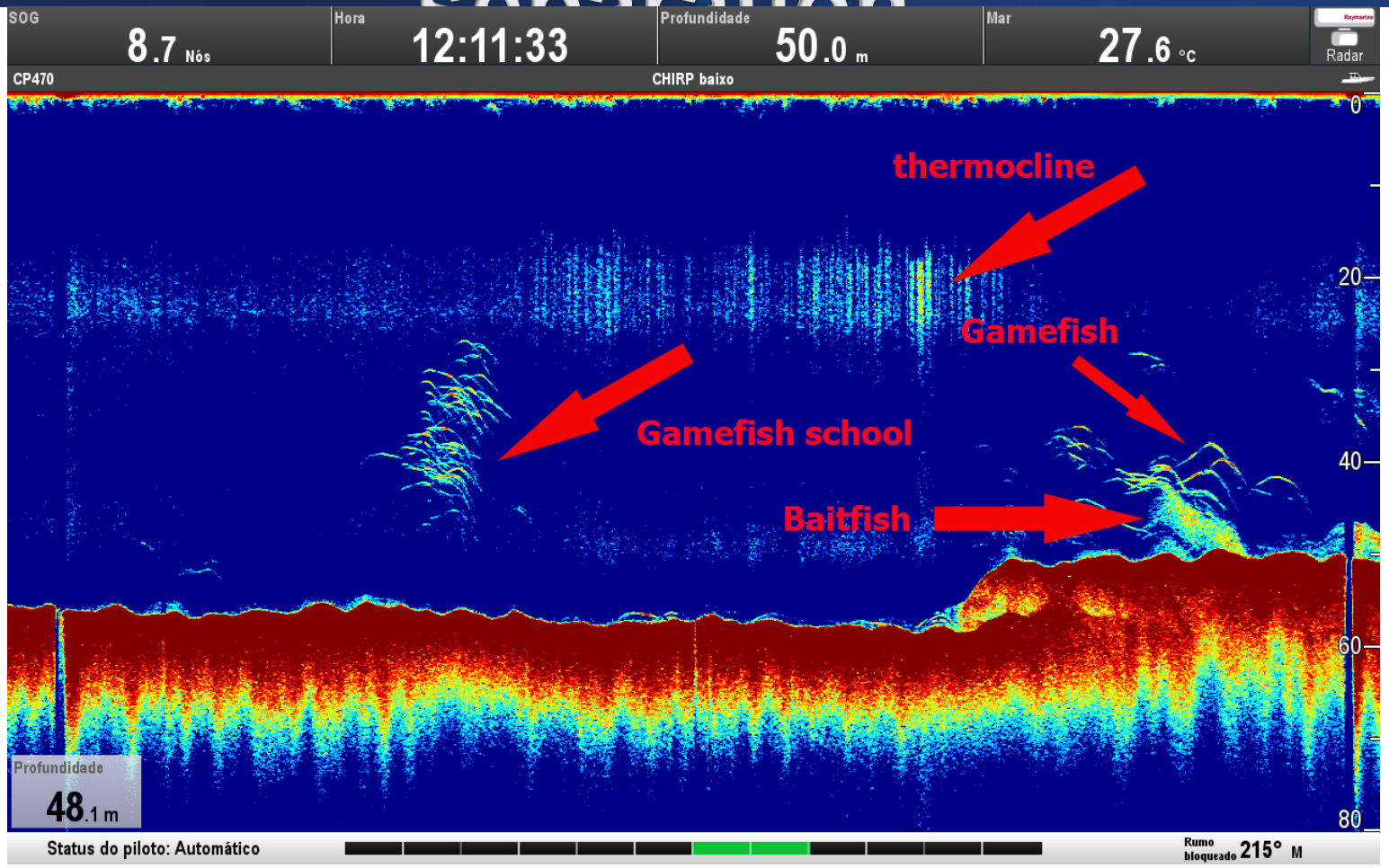
Crisp, detailed images



Accurate detection – Target separation



CHIRP: Many advantages when the conditions are challenging

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- When detailed resolution is needed to separate individual fish (range resolution)
- Crisp images
- Bottom fishing – resolve targets close to the bottom or near structure

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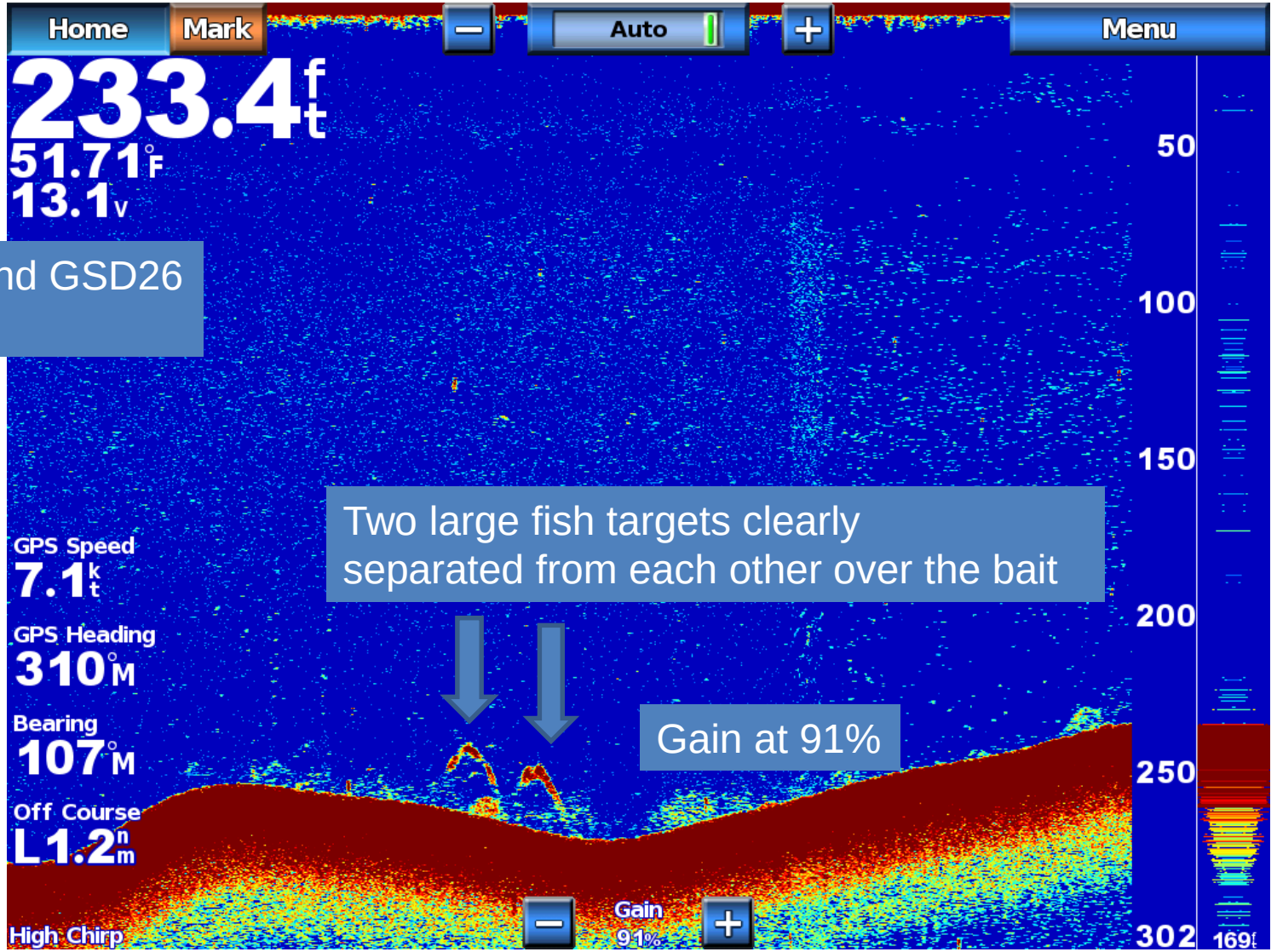
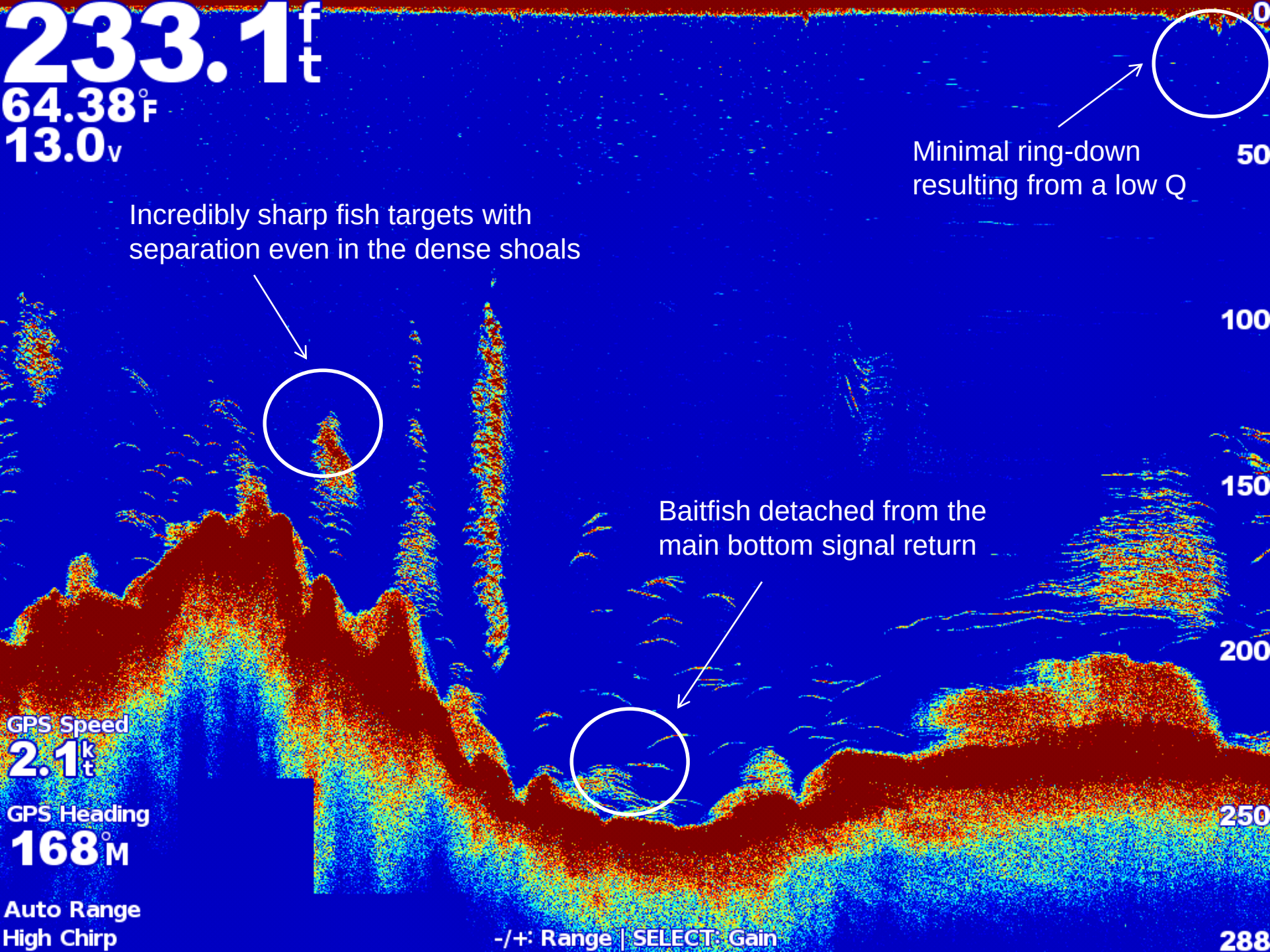
Gain: Large Fish on Medium CHIRP

R109LM and GSD26
Scotland




233.1ft
64.38°F
13.0v
Minimal ring-down
resulting from a low Q
Incredibly sharp fish targets with
separation even in the dense shoals
Baitfish detached from the
main bottom signal return
0
50
100
150
200
250
288
GPS Speed
2.1kt
GPS Heading
168°M
Auto Range
High Chirp
-/+: Range | SELECT: Gain

CHIRP: Many advantages when the conditions are challenging

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- When detailed resolution is needed to separate individual fish (range resolution)
- Crisp images
- Bottom fishing – resolve targets close to the bottom or near structure
- Searching for fish at high boat speeds

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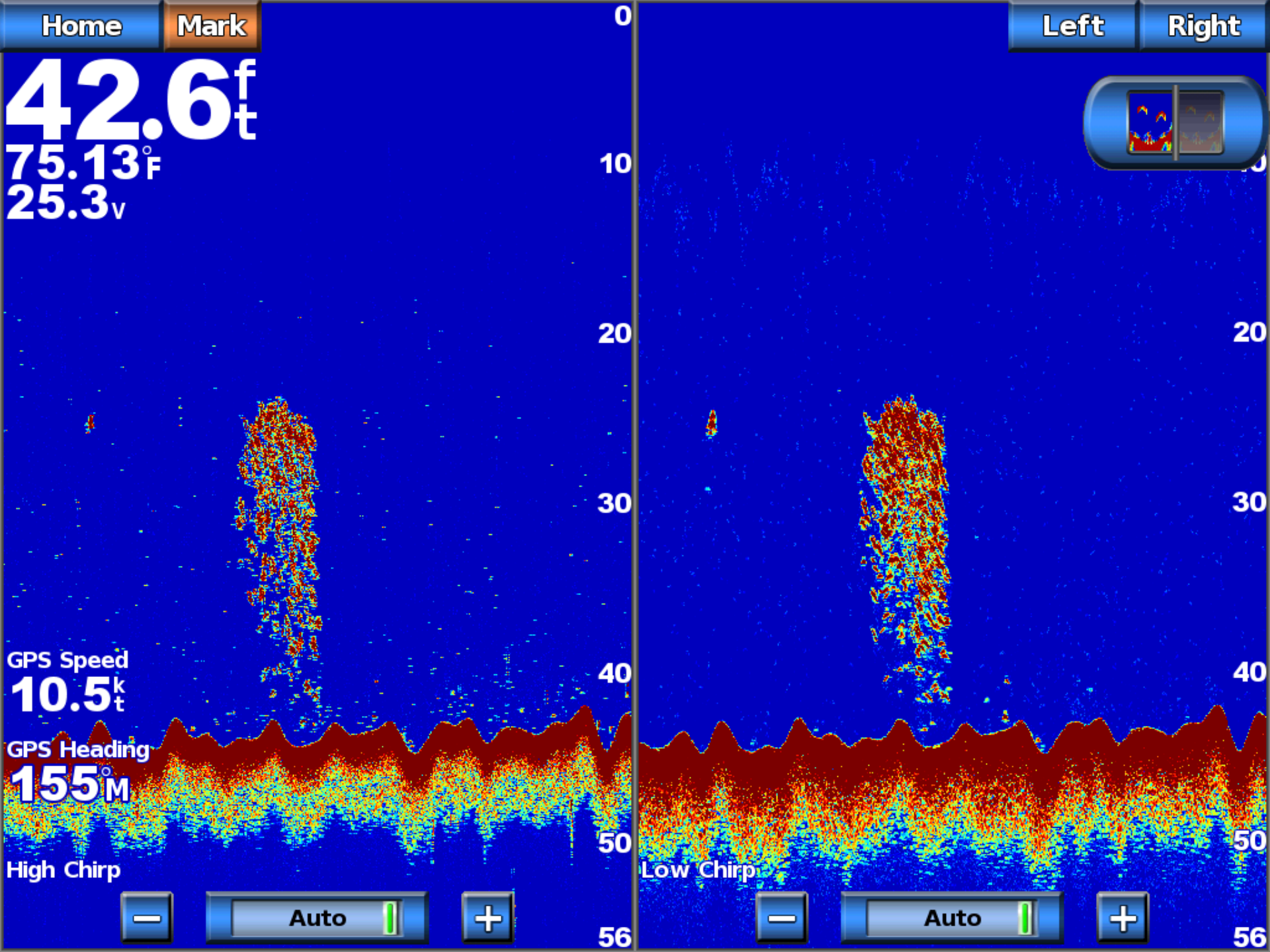
Home
Mark
42.6ft
75.13°F
25.3v
GPS Speed
10.5kt
GPS Heading
155°M
High Chirp
Auto
0
10
20
30
40
50
56
Left
Right
Low Chirp
Auto
20
30
40
50
56

CHIRP: Many advantages when the conditions are challenging

- Operating in a noisy environment
- When detailed resolution is needed to separate individual fish (range resolution)
- Crisp images
- Bottom fishing – resolve targets close to the bottom or near structure
- Searching for fish at high boat speeds
- Tracking bottom at deep depths

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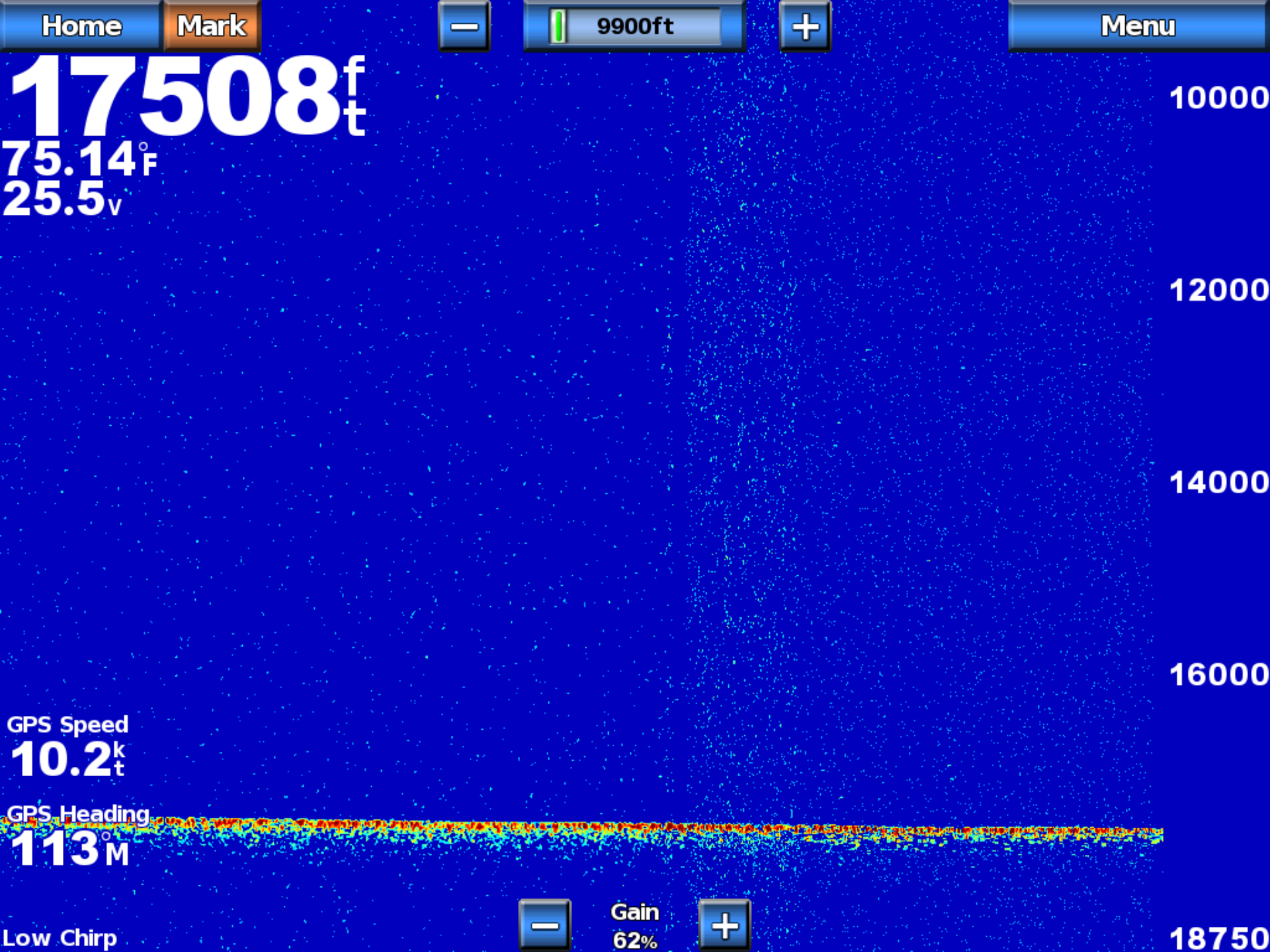
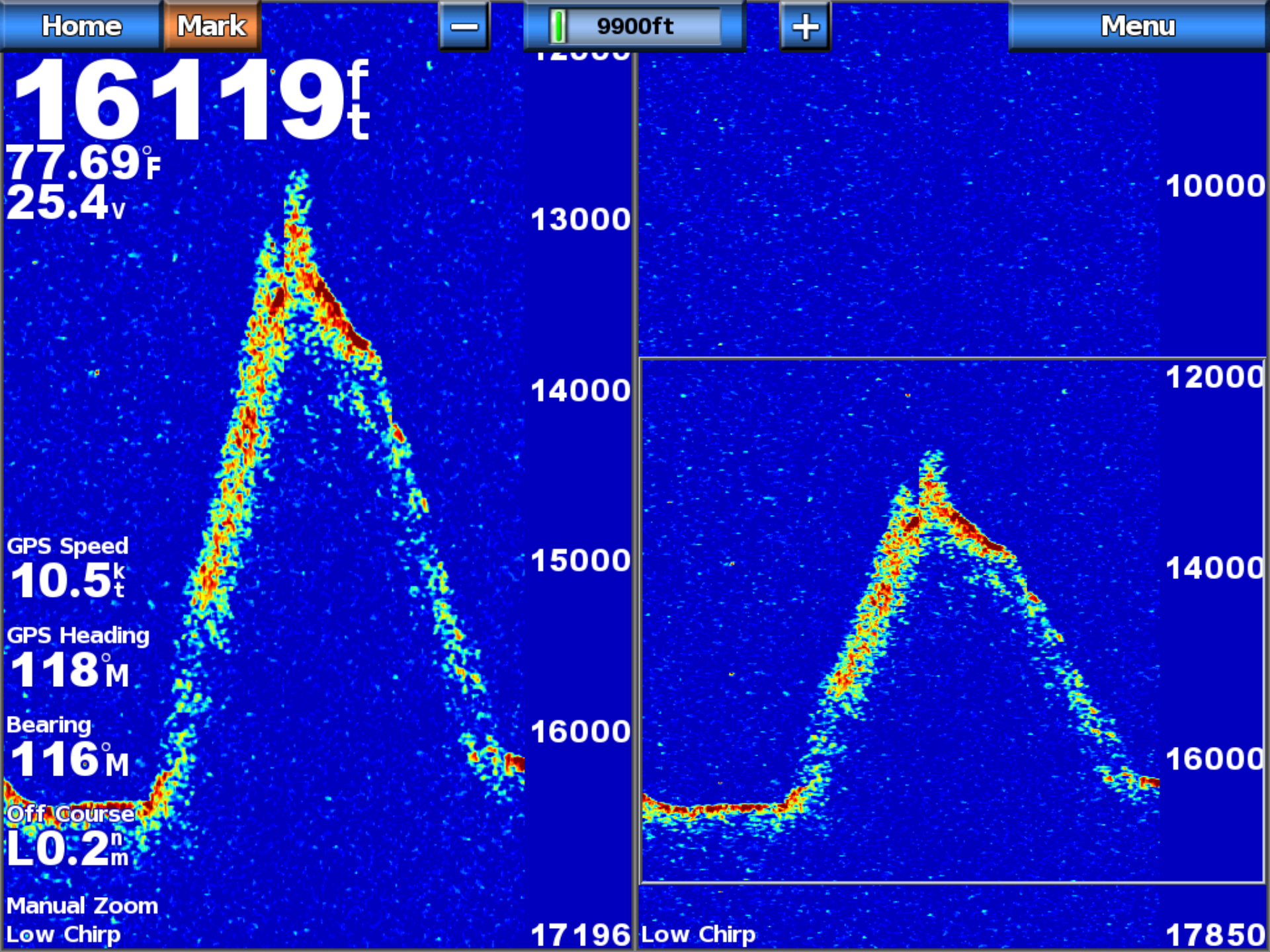

Home
Mark
9900ft
Menu
17508ft
75.14°F
25.5V
10000
12000
14000
16000
GPS Speed
10.2kt
GPS Heading
113°M
Gain
62%
Low Chirp
18750


Home
Mark
9900ft
Menu
16119ft
77.69°F
25.4v
GPS Speed
10.5kt
GPS Heading
118°M
Bearing
116°M
Off Course
L0.2nm
Manual Zoom
Low Chirp
13000
14000
15000
16000
17196
10000
12000
14000
16000
Low Chirp
17850

More advantages

- One transducer can offer offer 117 kHz of selectable frequencies
  - Can I use a CHIRP transducer with a non-CHIRP sounder?
- Significant resolution improvements at low frequency
- More energy on target
- Up to 1,000 times greater sensitivity than traditional fishfinders

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Things to remember - disadvantage

- Keep in mind – the display is limited by the available pixels.
  - The deeper the depth, the less pixels available to show details is in the water column.
  - CHIRP is able to show fine resolution/detail
  - If too much range, the images will be limited by the resolution of the display
    - Get a bigger monitor! (details will be lost)