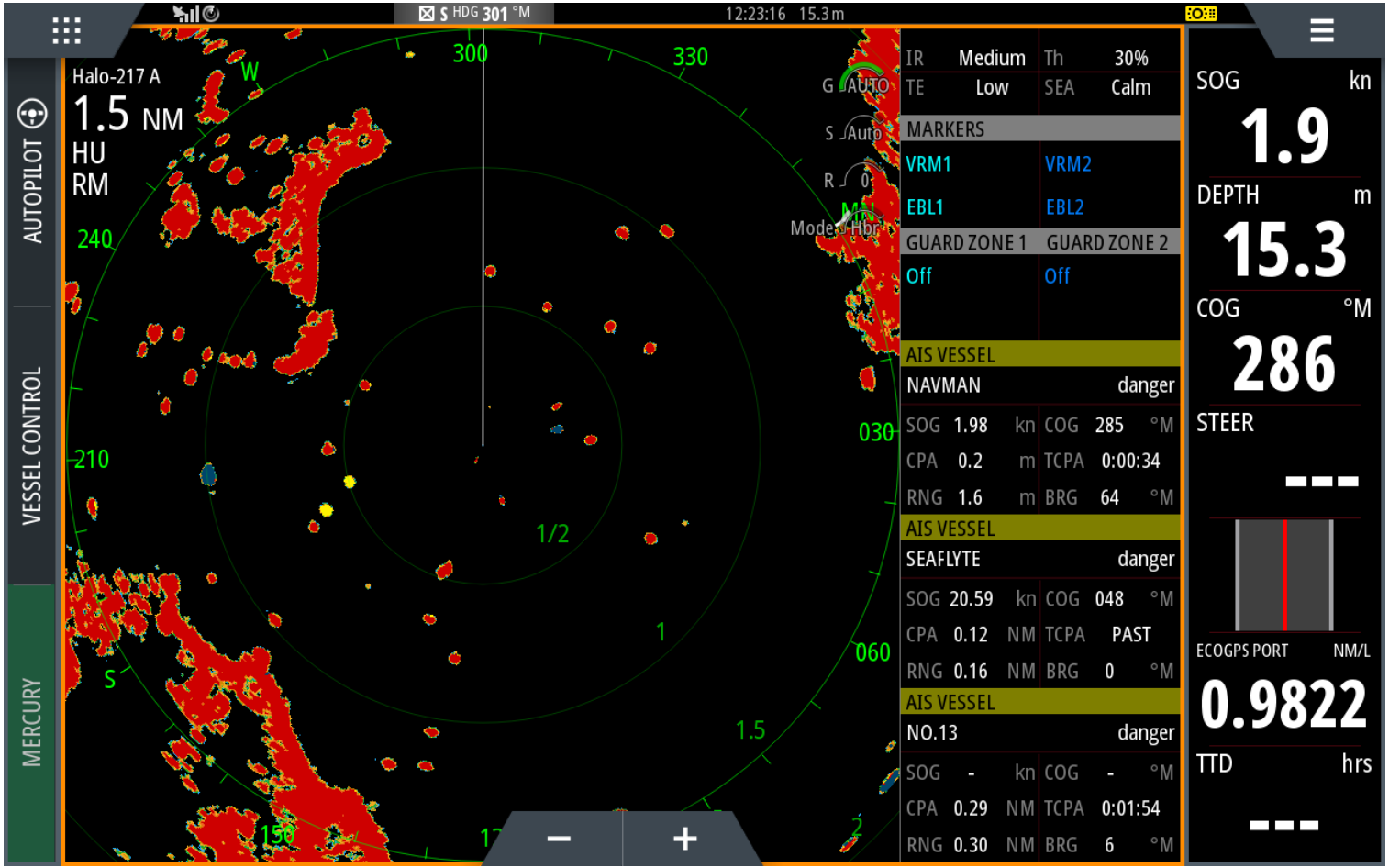
SIMRAD

Go With Confidence

VelocityTrack for Halo

Information Document

August 2017


HDG 301 °M
12:23:16 15.3 m
AUTOPILOT
VESSEL CONTROL
MERCURY
Halo-217 A
1.5 NM
HU
RM
300
330
240
210
030
060
150
W
S
1/2
1
1.5
IR Medium
Th 30%
TE Low
SEA Calm
MARKERS
VRM1
VRM2
EBL1
EBL2
GUARD ZONE 1
GUARD ZONE 2
Off
Off
AIS VESSEL
NAVMAN danger
SOG 1.98 kn COG 285 °M
CPA 0.2 m TCPA 0:00:34
RNG 1.6 m BRG 64 °M
AIS VESSEL
SEAFLYTE danger
SOG 20.59 kn COG 048 °M
CPA 0.12 NM TCPA PAST
RNG 0.16 NM BRG 0 °M
AIS VESSEL
NO.13 danger
SOG - kn COG - °M
CPA 0.29 NM TCPA 0:01:54
RNG 0.30 NM BRG 6 °M
SOG kn
1.9
DEPTH m
15.3
COG °M
286
STEER

ECOGPS PORT NM/L
0.9822
TTD hrs

VelocityTrack

VelocityTrack™ technology provides instant visual feedback on the motion of radar targets in relation to your boat. This powerful add-on offers yet another way for Halo™ radar to improve your situational awareness and reduce your risk of collision. Using the Doppler effect, the VelocityTrack™ feature is able to detect motion on the first radar sweep for a useful view straight from standby. This feature is available for any new or existing Halo™ radar system via the purchase of a one-time unlock code.

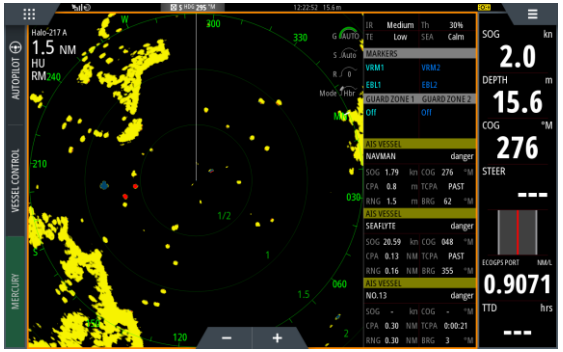
Key Features

Selling Points

SIMRAD

Key Features VelocityTrack

- Greater *situational awareness* to help reduce your risk of collision
- Instantly identify how radar targets are moving in relation to your boat
- Automatic colour coding highlights approaching targets
- Optional colour coding de-emphasises diverging targets
- Detect motion from the first radar sweep
- Compatible with all Halo™ radar models and NSS evo3, NSS evo2, NSO evo2 displays, and R2009/R3016 standalone radar displays
- Available for any Halo™ radar system with the purchase of a one-time unlock code



SIMRAD

Key Features Highlight

Avoid Collision Hazards

The optional VelocityTrack™ feature for Halo™ radar enables easy identification of approaching obstacles, helping you to avoid dangerous and costly on-water collisions. VelocityTrack™ works with any number of targets, perfect for crowded harbours and waterways. Motion is detected on the first radar sweep, giving you an immediate view when you need it.

Doppler Effect Detects Motion on the First Sweep

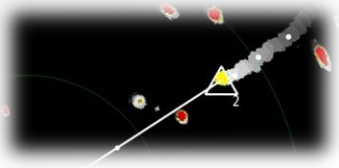
The VelocityTrack™ feature works using the Doppler effect, where radar transmissions are affected by a “phase shift” when bouncing off a moving target. By analysing this shift, Halo™ radar is able to determine whether a target is closing, diverging, or stationary. This means VelocityTrack™ technology is able to deliver information about the motion of targets from the very first radar sweep; combined with Halo™ radar’s InstantOn™ functionality and high-speed operation, the VelocityTrack™ feature provides a clear view of approaching collision hazards in just seconds from standby.

Instantly Identify Relative Motion of Radar Targets

VelocityTrack™ technology provides instant feedback on the motion of every target detected by your Halo™ radar system in relation to your boat. Closing or approaching targets are highlighted, and you also have the option to deemphasise diverging or retreating targets. Targets that are stationary relative to your boat are displayed as normal. This simple colour coding works with all of our radar display palettes, so you can continue to use the colour scheme you prefer with added VelocityTrack™ enhancements.

VelocityTrack™ Technology and MARPA

All Halo™ radar models provide MARPA technology functionality to track up to ten manually selected targets (20 in dual range mode). VelocityTrack™ is the perfect complement to MARPA, offering an immediate view of all relative target motion that enables you to pick out relevant targets to track in greater detail, and ignore diverging targets that don’t prevent a collision risk.

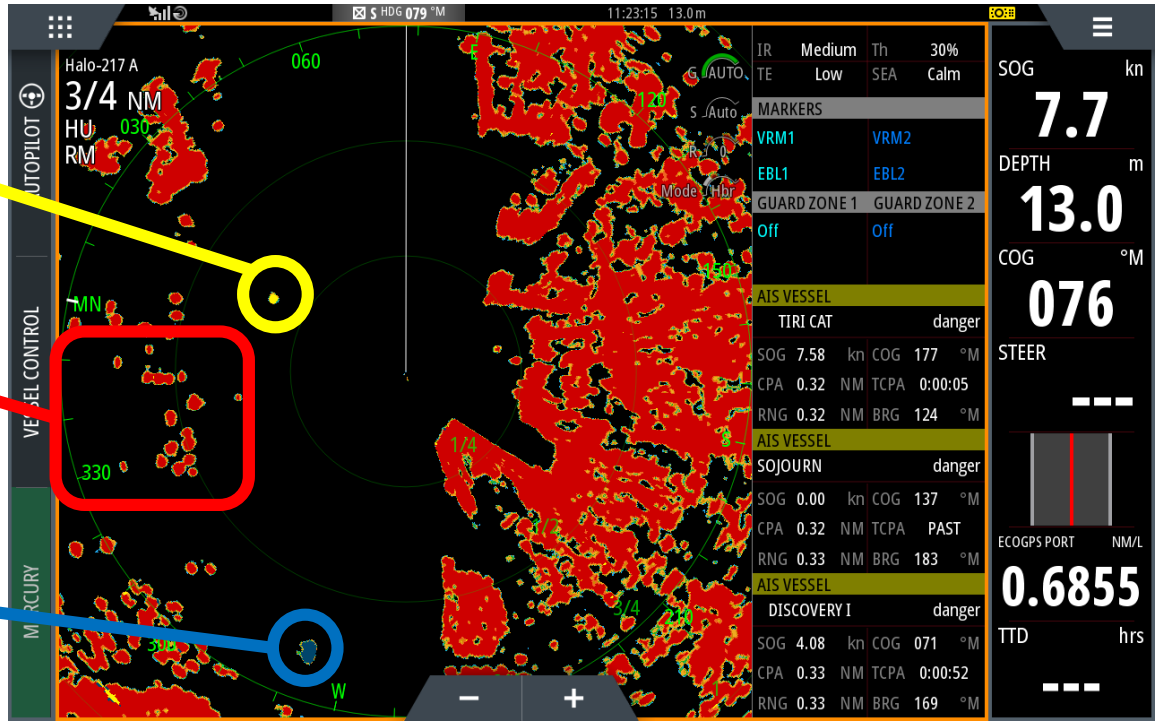


Screen Shot With Callouts

Approaching Target

Stationary Targets, or target under threshold velocity

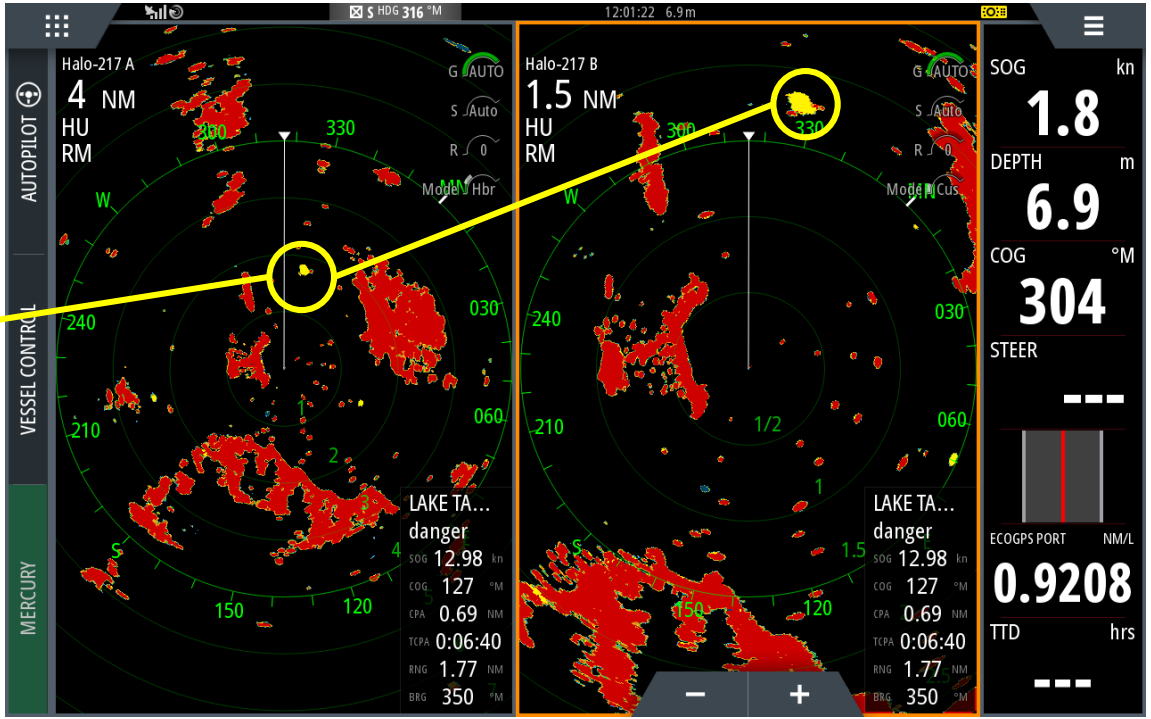
Diverging Target



Screen Shot with Callouts

Dual Range, no compromise.

Note the large approaching Car Carrier bisecting the channel, and stationary channel markers remain visible, while the approaching ship is highlighted yellow

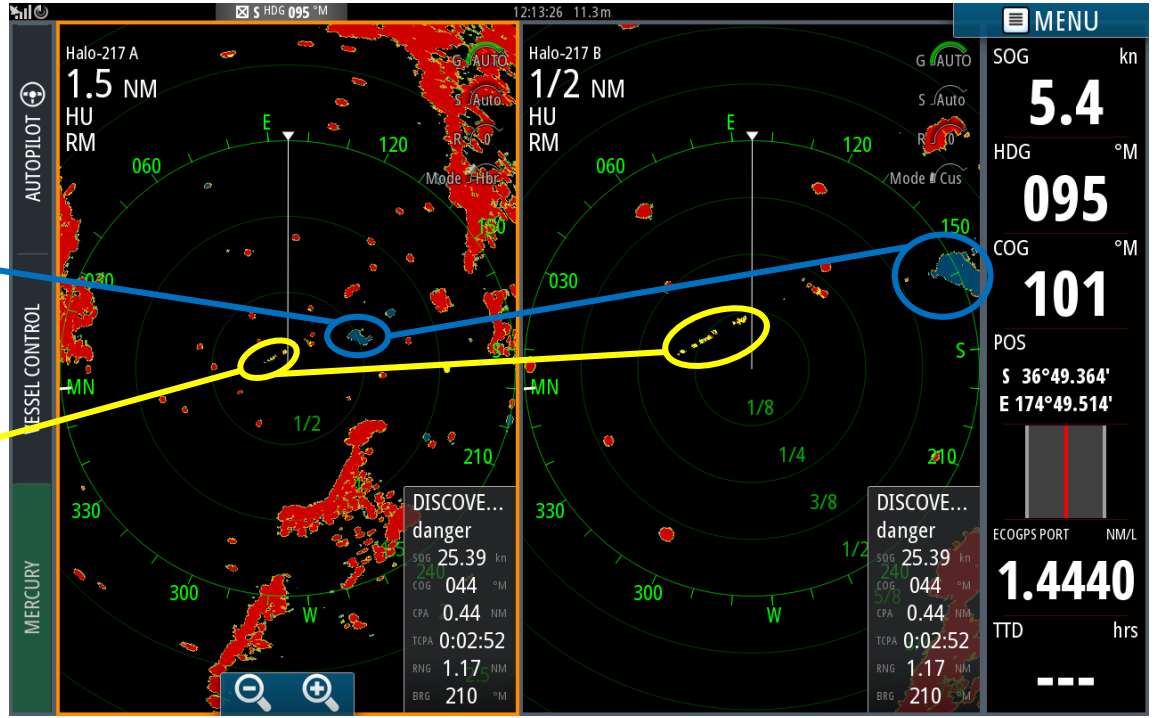


SIMRAD

Screen Shot with Callouts

Dual Range, no compromise.

The large Car Carrier is now diverging, so is coloured as such, note its large **wake** is approaching our vessel now, the radar detects this and it is coloured as approaching

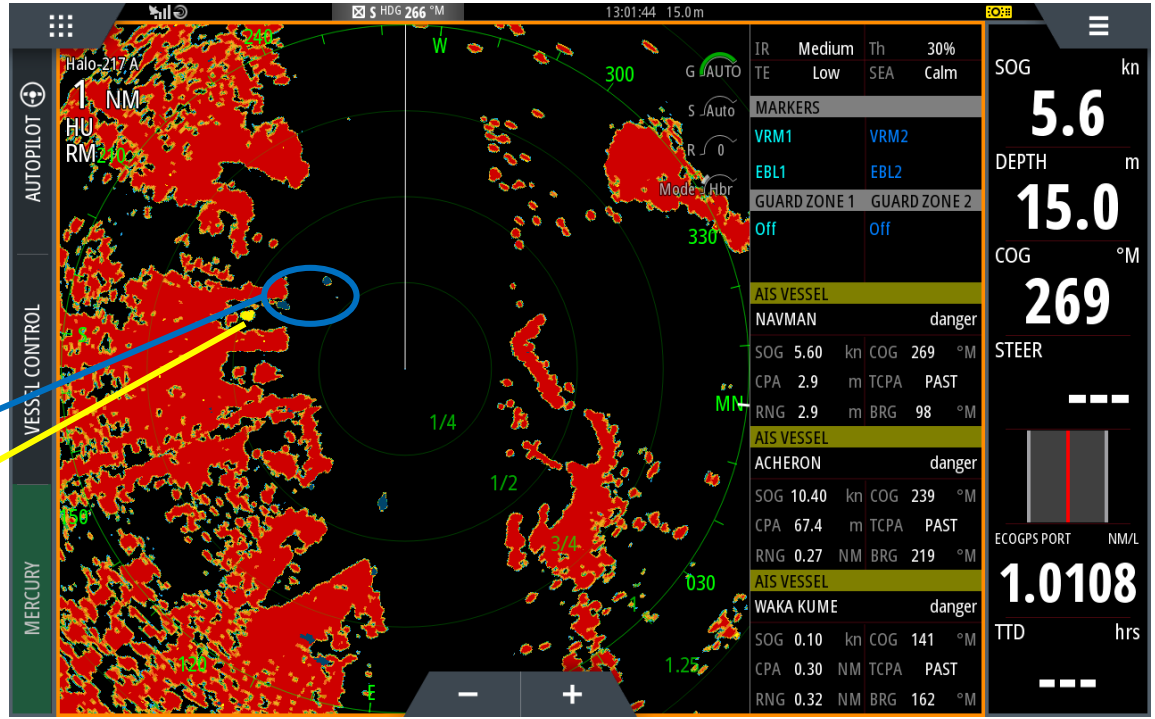


SIMRAD

Screen Shot with Callouts

Combining VelocityTrack with Halo's Superior Azimuth & Range **Resolution**

The vessel is about to pass a busy Ferry terminal, note we can easily identify the Ferry's Arriving (Diverging) and Departing (Approaching) This greatly improves your situational awareness.

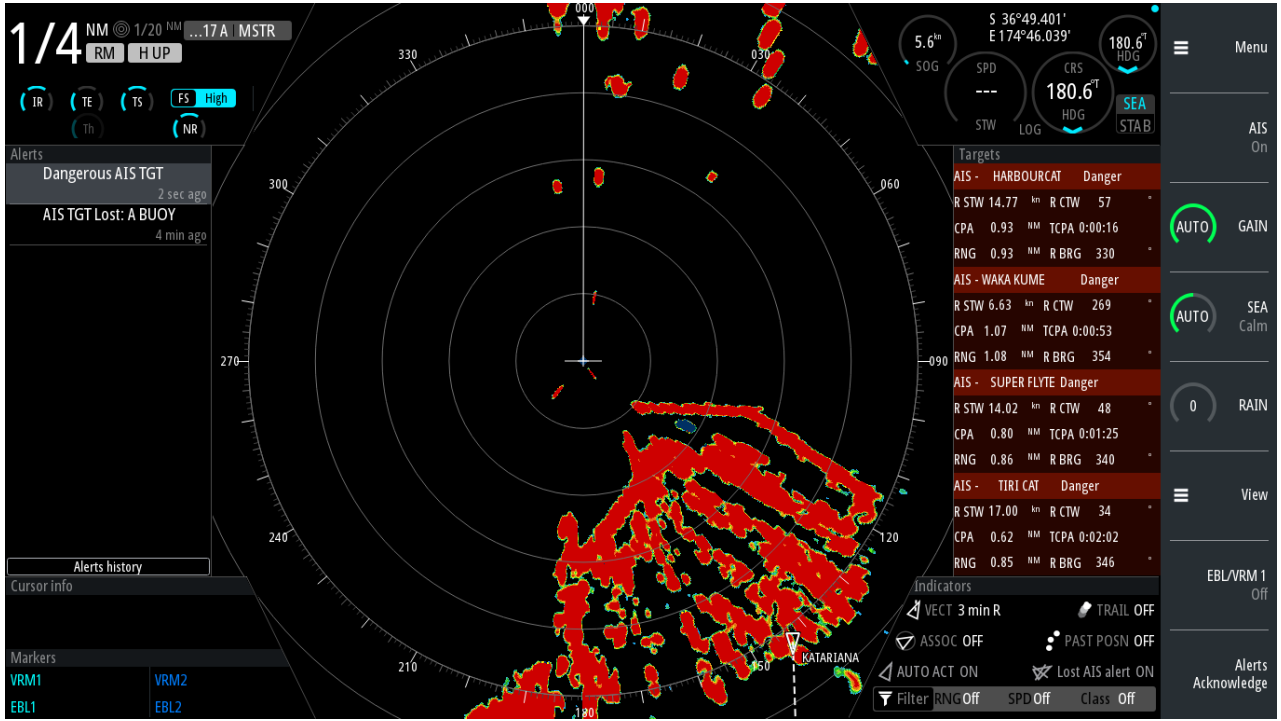


SIMRAD

Screen Shot with Callouts

Tracking a target over time, using R3016

As our vessel departs the dock, we can see the highlighted vessel approaching, then diverging as it makes its way down the channel

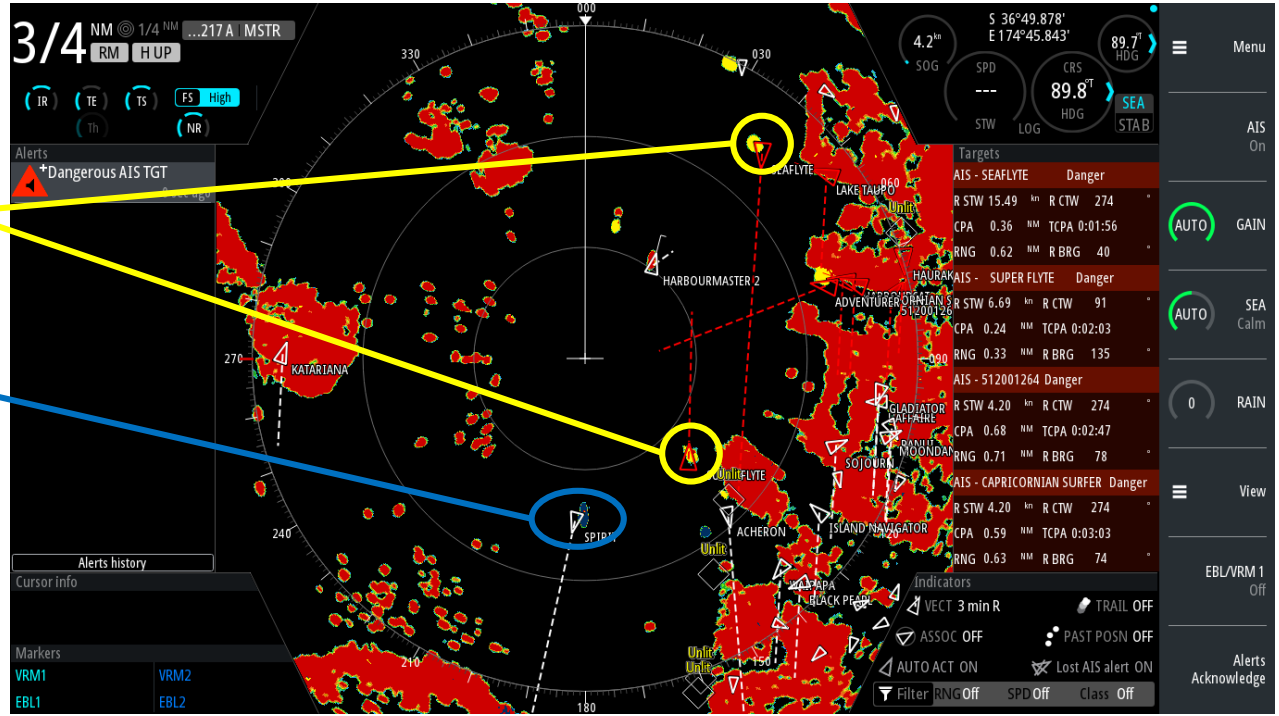


SIMRAD

Screen Shot with Callouts

Using the R3016 with its commercial user interface we can use VelocityTrack colouring to augment our AIS data and symbology, this is another tool to aid in verifying the relevance of a radar target.

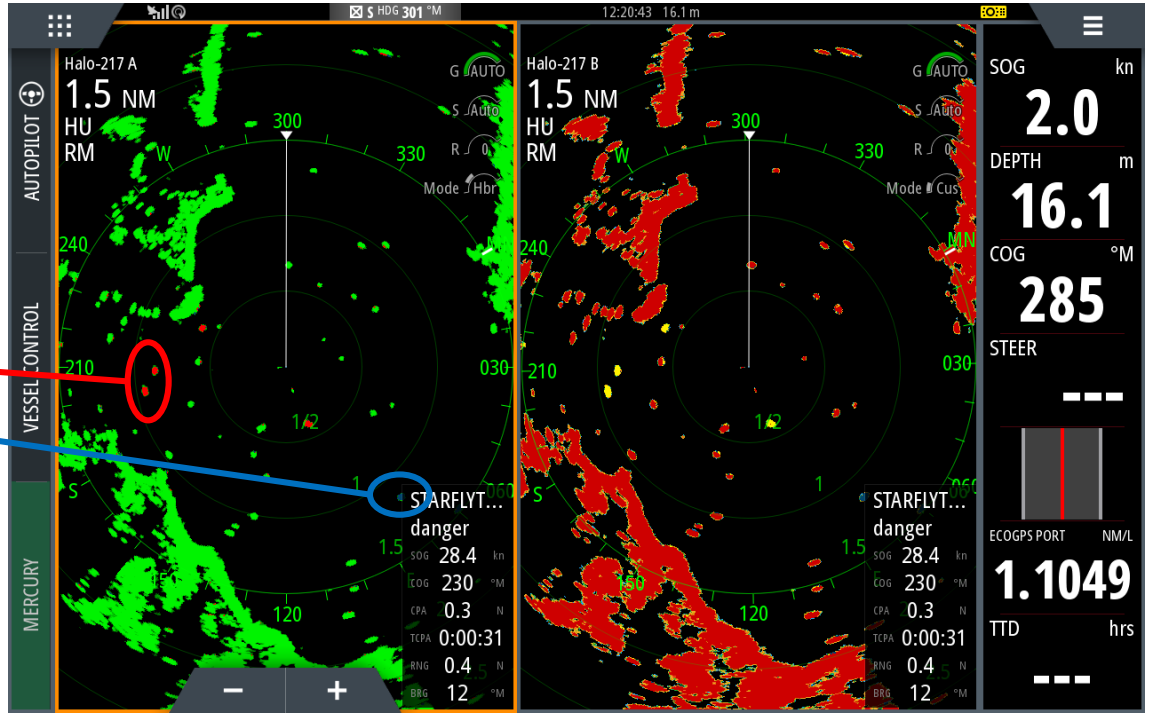
This improves situational awareness and helps mitigate risk of collision.



Screen Shot with Callouts

VelocityTrack is available while using all colour palettes

On the Green on Black palette approaching targets become RED diverging targets are unchanged

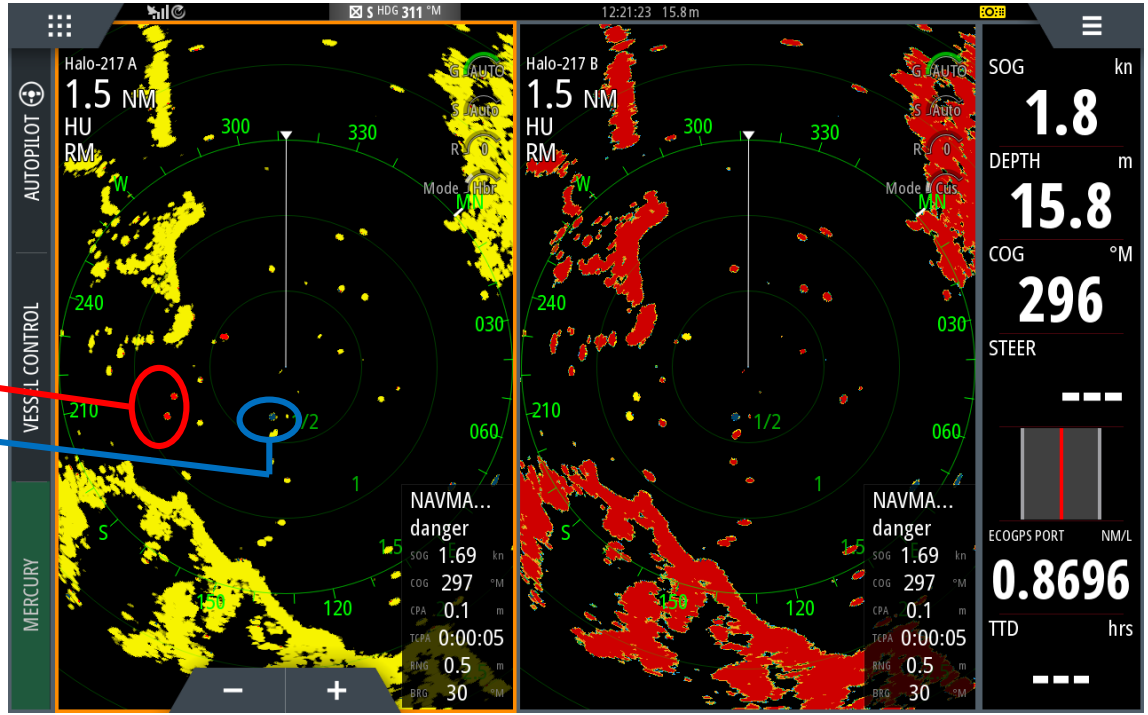


SIMRAD

Screen Shot with Callouts

VelocityTrack is available while using all colour palettes

On the Yellow on Black palettes approaching targets become RED diverging targets are unchanged

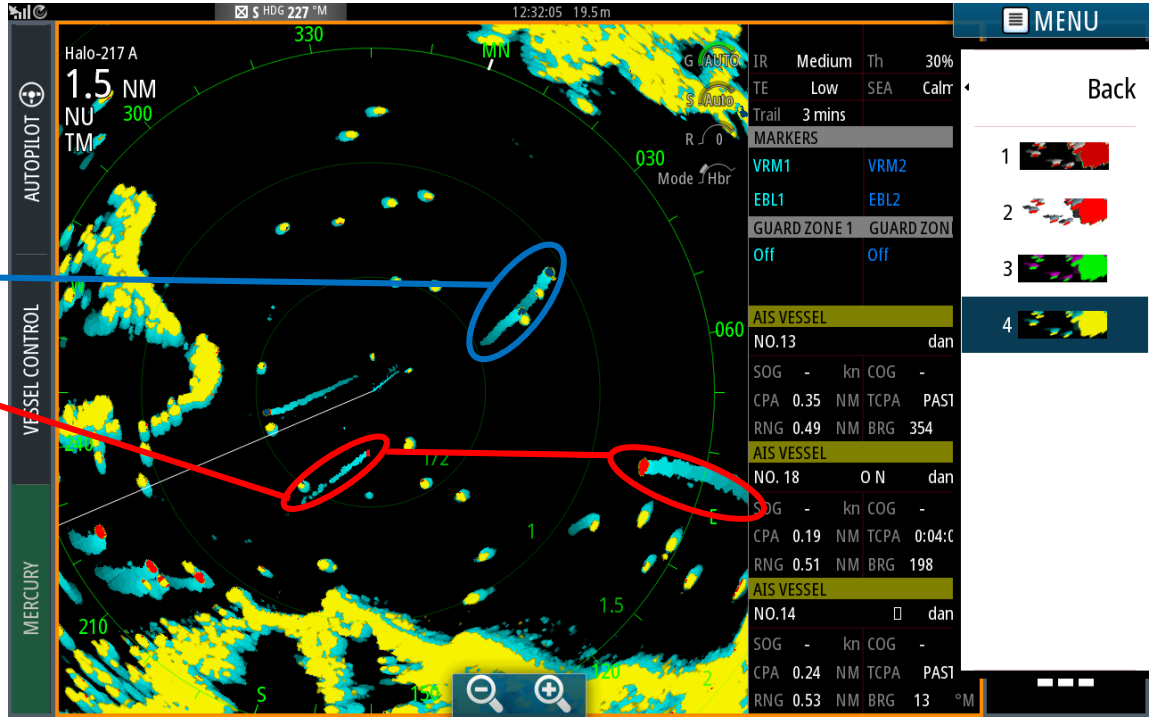


SIMRAD

Screen Shot with Callouts

VelocityTrack is available while Radar Trails are on

The trail and coloured target can be viewed concurrently to help improve situational awareness

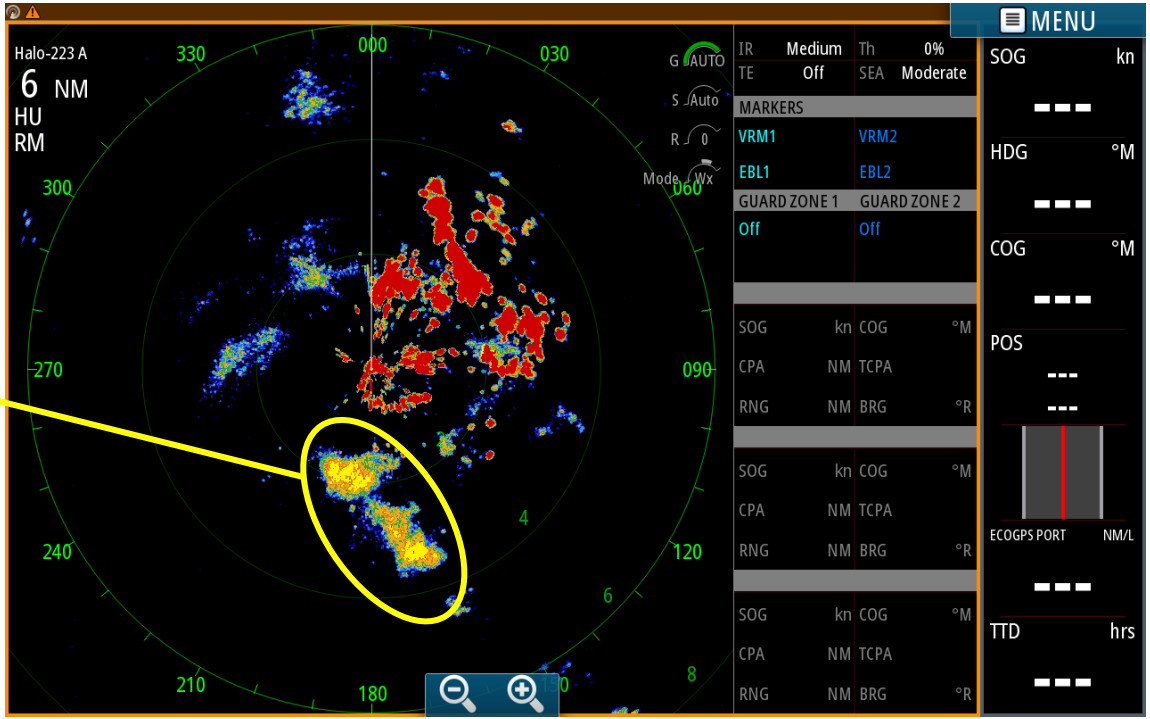


SIMRAD

Screen Shot with Callouts

VelocityTrack can colour a weather cell moving towards or away from the vessel.

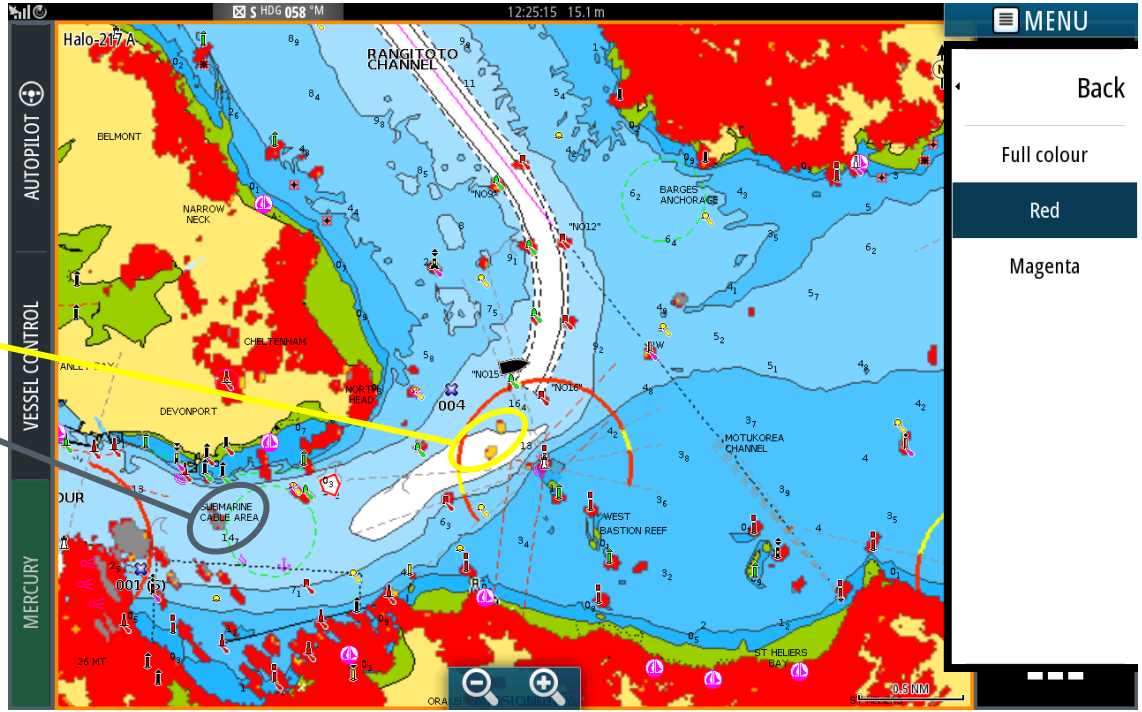
As our speed threshold is adjustable, the user can adjust the threshold in increasing increments until the cell is no longer coloured, this will give an indication as to the closing speed of the cell…..useful information to have.



Screen Shot with Callouts

VelocityTrack works on Chart with Radar Overlay.

Approaching targets are coloured yellow, diverging targets grey



SIMRAD

Compatibility

Compatible Displays and Radar Pedestals

SIMRAD

Compatibility

Both MFD & Radar must be on noted versions (or greater) for the VelocityTrack function to be shown in the Feature Unlock Menu

Simrad/B&G MFD or Standalone Radar with NOS57
Simrad NSS evo2, evo3, B&G Zeus^2 & Zeus^3
Simrad NSO evo2, B&G Zeus^2 Glass Helm
Simrad GO9, B&G Vulcan9
Simrad R3016 (NOS57 release for R3016 TBA)
Simrad R2009 (NOS57 release for R2009 TBA)

Simrad Halo Radar with v5.3.1.X
Halo-3
Halo-4
Halo-6

Heading Sensor outputting at 10Hz or better
Precision-9
HS60/70
RC42
Third party compass outputting 10Hz or better, preferably rate/gyro stabilised

VelocityTrack feature unlock purchases and activated on the MFD

Unlock Procedure Overview

Unlock Options

SIMRAD

Purchasing an Unlock

Dealer/Distributor call Customer Service to obtain an unlock. They must have a MFD Request Code generated by the MFD or their Halo Pedestal Serial Number(s)

OR

Consumer purchases unlock through the GoFree Shop on Web. They must have a GoFree Shop account and need to sign in, and an MFD Request Code generated by the MFD

Generating an MFD Request Code

Instructions on Generating MFD Request Code

Generating an MFD Request Code & entering an unlock code

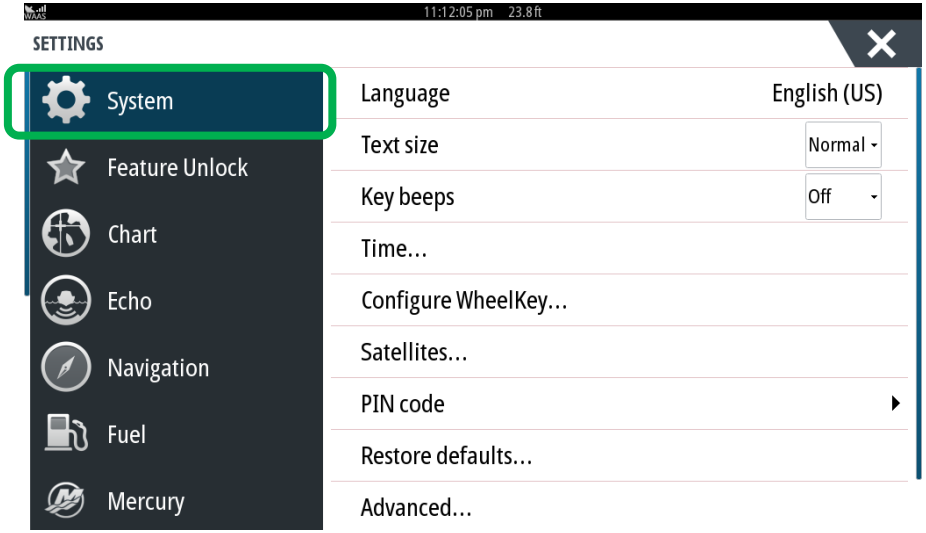
These instructions are for generating a request code for a Feature Unlock on a Navico MFD.

Once the request code is obtained the consumer can use it to generate the associated unlock code from the GoFree shop or by contacting a Navico CSR.

The unlock menu and specific unlocks will only show if the MFD is on a software version that allows it (NOS57+) and the device to unlock supports the function, for example the Halo is updated with software to allow VelocityTrack

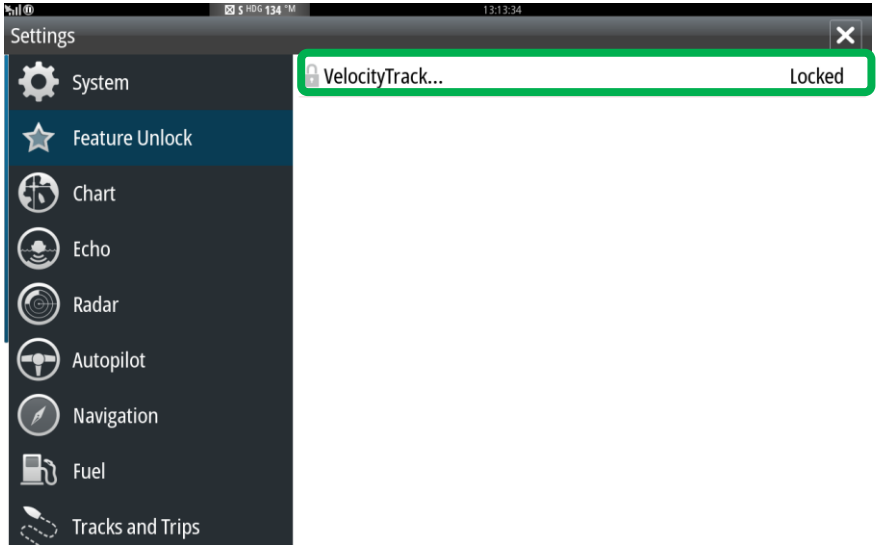
Step 1

Make sure all radars that need unlocking (max 2 per system) are powered on. From the settings menu select “Feature Unlock”;



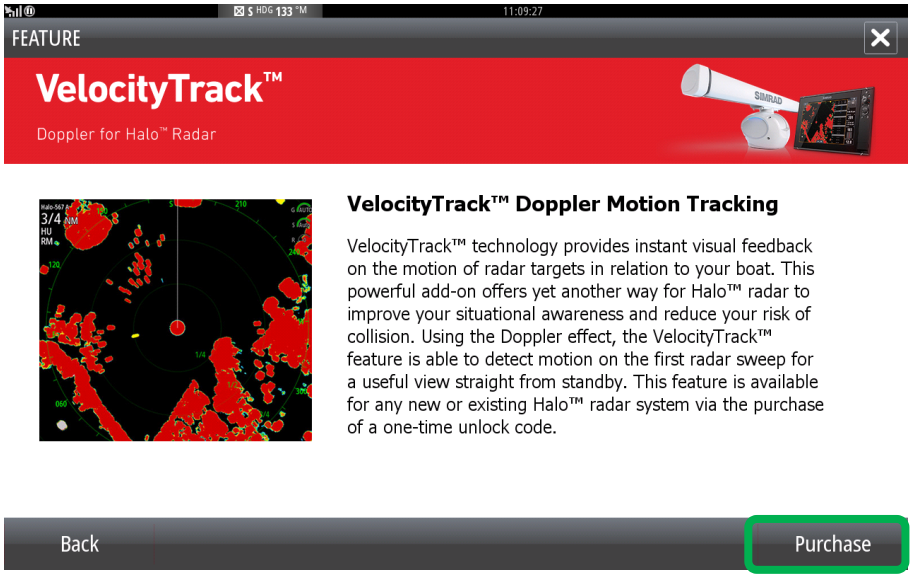
Step 2

From the “Feature Unlock” Menu, select which feature you wish to unlock, previously unlocked features will be indicated;



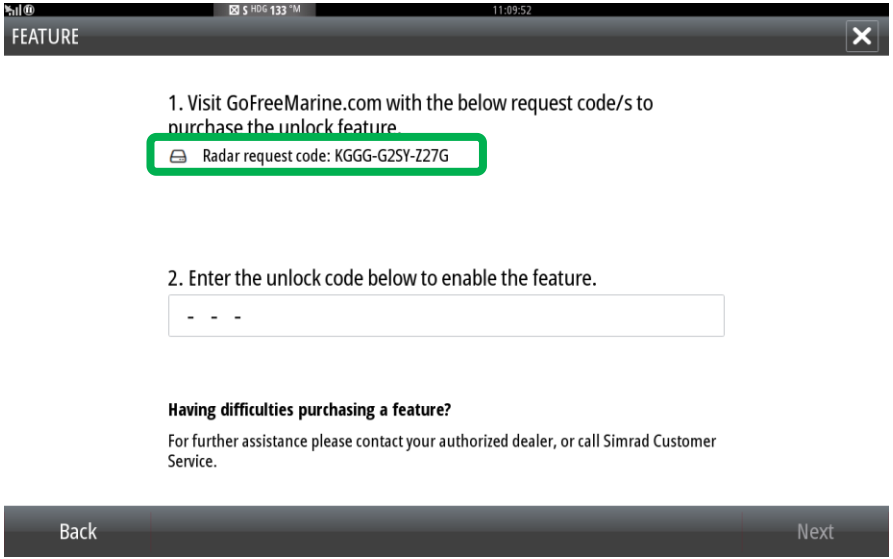
Step 3

You will be shown a feature description, if you wish to continue select “Purchase”;



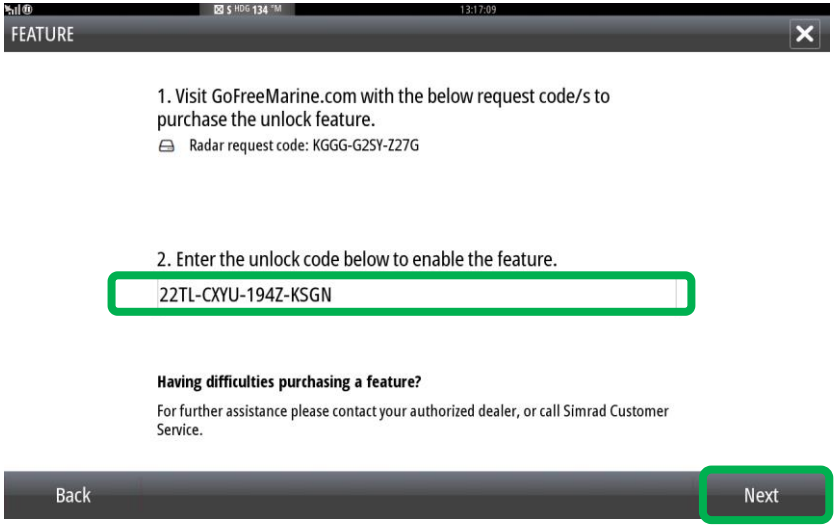
Step 4

You will be shown the “Request Code” that you will need to enter when prompted on the GoFree Store website, or by a Customer Service Rep;



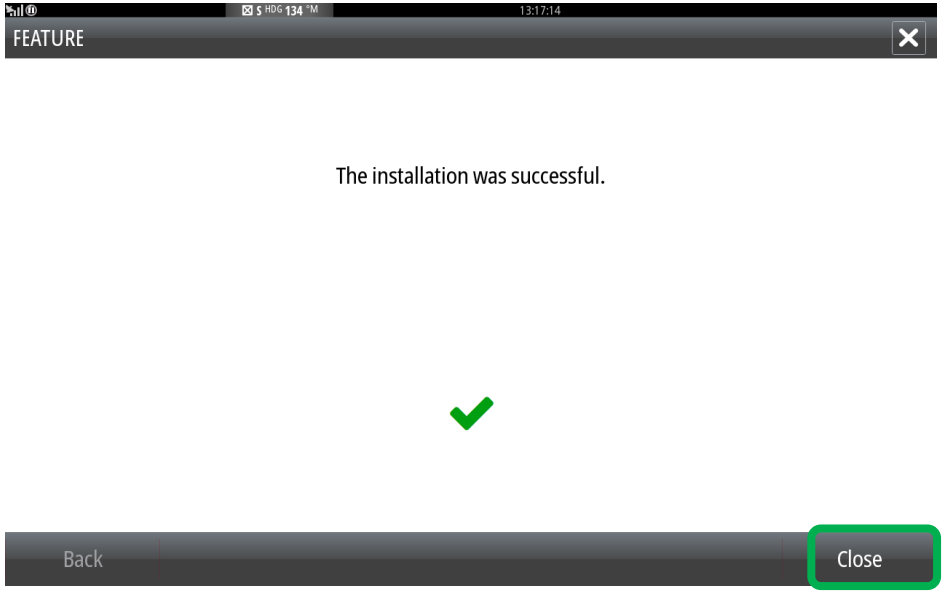
Step 5

Enter the unlock code that was given to you on the GoFree store or by a CSR and select “Next”, you should then see a message indicating “Success”;



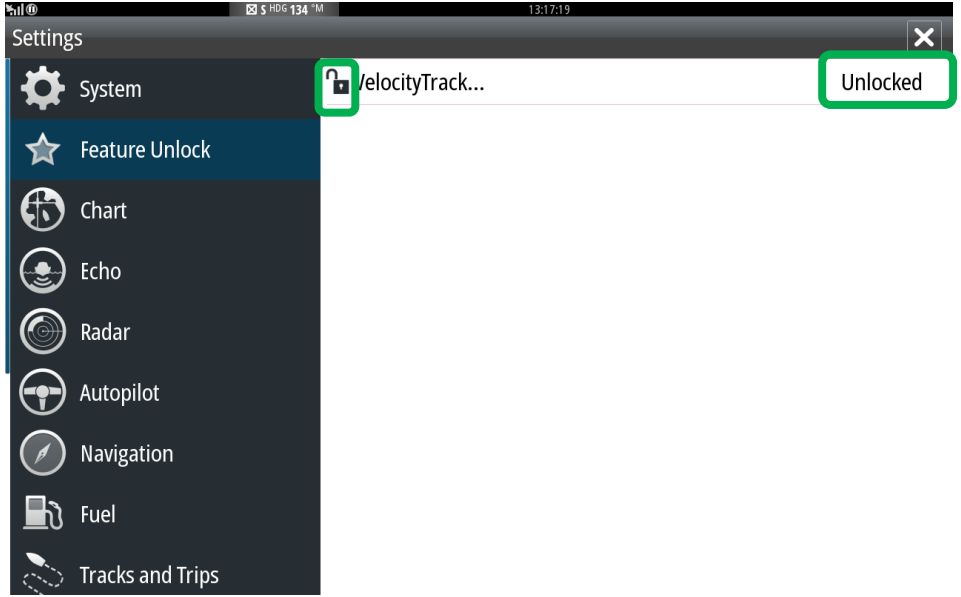
Step 5

You should then see a message indicating “Success”, select close;



Step 6

The feature should now show as “Unlocked” in the Feature Unlock Menu



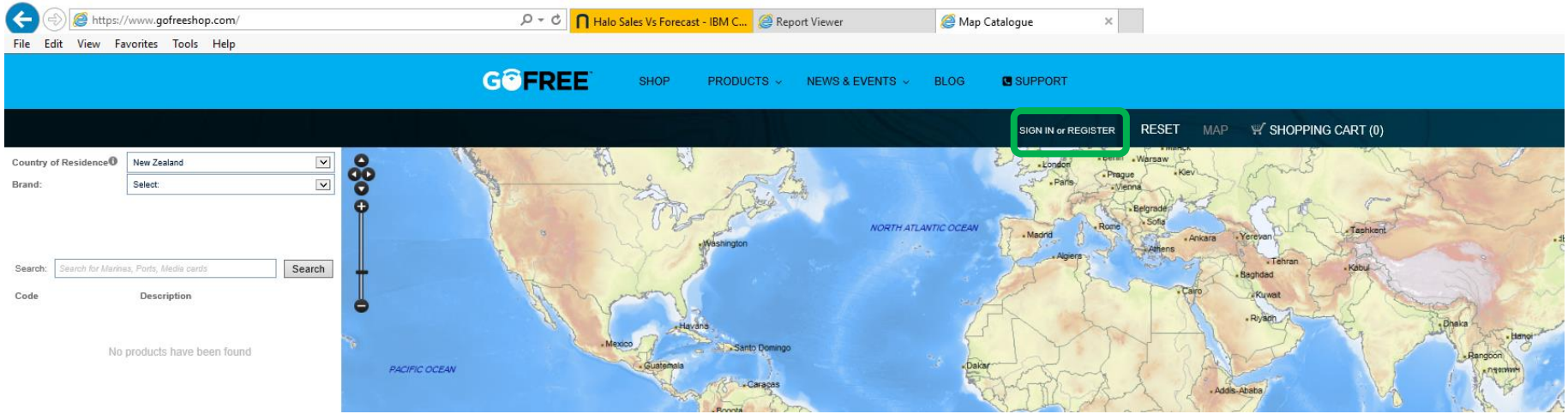
5. GoFree Shop

Helping consumers buy an unlock online

Step 1. Navigating to GoFree Shop

The consumer has to have a GoFree shop account to begin.

Visit www.gofreeshop.com and click “Register” and follow the instructions, if they already have an account, get them to “Sign In”



SIMRAD

Step 2. Browsing the store and selecting a feature unlock

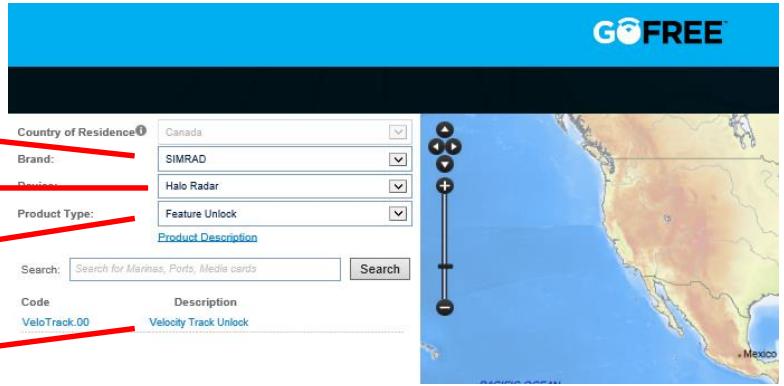
Once the consumer is “Registered” and “Signed In”, they can browse and purchase unlocks. Use the drop down menus on the left hand side. In this example we will try and purchase a “VelocityTrack” unlock for Halo Radar.

Select Simrad

Devices will appear, select Halo Radar

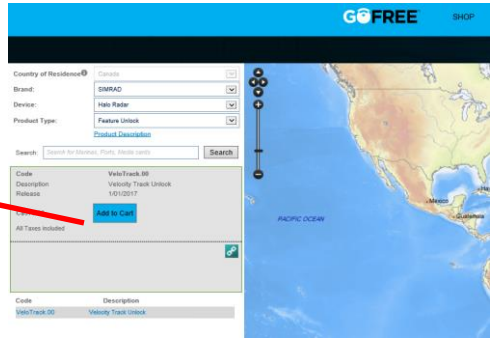
Feature Unlock Appears

VelocityTrack Appears
Click on “VelocityTrack Unlock”

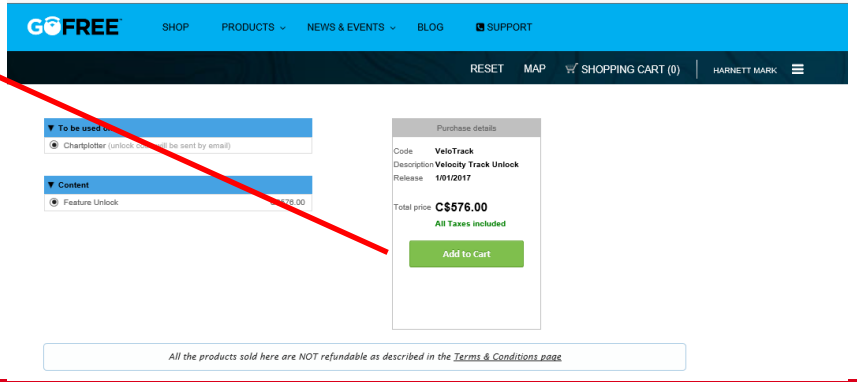


Step 3. Adding to cart

Click add to cart



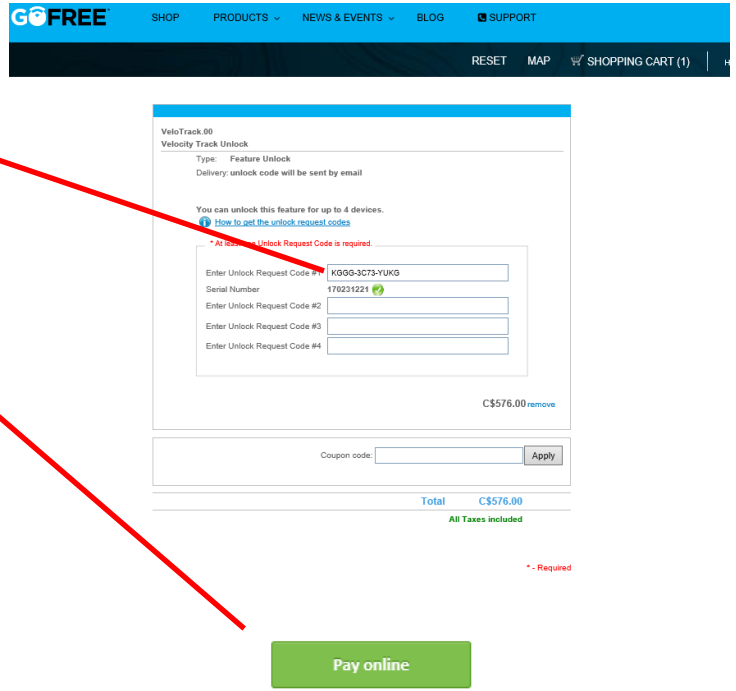
You will be taken through to another page
Click “Add to cart” Again



Step 4. Entering request code

Enter the request code in the first box,
the serial number should appear with a tick.
(Note the X is omitted after the first 4 digits)

Select “Pay Online” at the bottom of the page
Follow the payment instructions.
The unlock code will be shown and emailed to the addressed used with the GoFree store account upon successful payment.



User Interface

Options & Settings

User Interface & Settings-MFD

The following options are available in the "View" Menu:

- Off - turns off Doppler colouring
- Normal - approaching targets and diverging targets are coloured.
- Approaching targets - only approaching targets are coloured

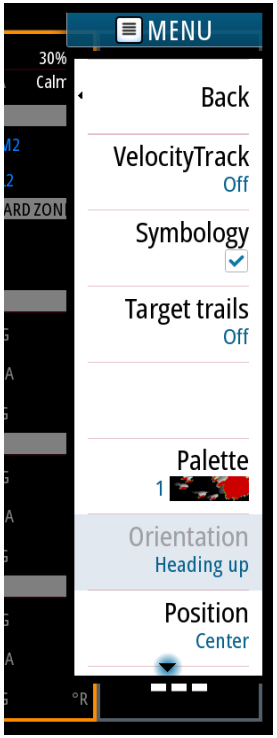
The colour of approaching and diverging targets depends on the palette used:

Radar image palettes

- Diverging targets are blue coloured on all radar image palettes.
- Approaching target colours on radar image palettes:
  - Black/Red palette - Yellow
  - White/Red palette - Yellow
  - Black/Green palette - Red
  - Black/Yellow palette - Red

Radar overlay palettes on charts

- Diverging targets are dark grey.
- Approaching targets are yellow.



SIMRAD

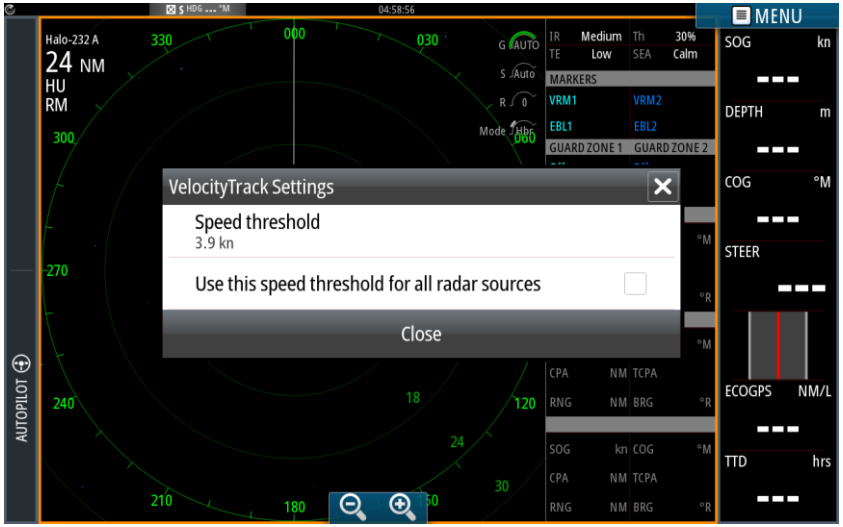
User Interface & Settings-MFD

VelocityTrack settings

Use this dialog to set speed thresholds of targets to be coloured.

The speed threshold can be defined to apply for the radar source of the selected radar panel only, or to all radar sources connected to the system. The setting is only applied to those radars powered and connected at the time the setting is made. If the all radar sources option is selected, newly connected radars will use the specified values automatically.

Threshold is adjustable from 1kt up to 30kts.



SIMRAD

User Interface & Settings-R2009/R3016

The following options are available in the "View" Menu:

- Off - turns off Doppler colouring
- Normal - approaching targets and diverging targets are coloured.
- Approaching targets - only approaching targets are coloured

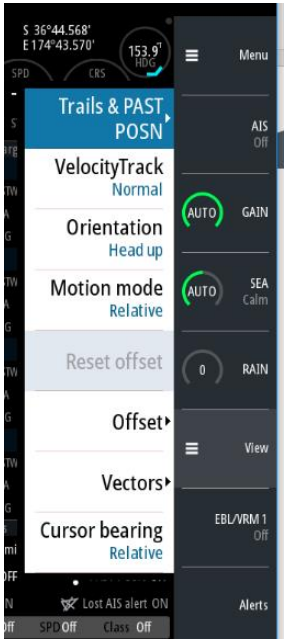
The colour of approaching and diverging targets depends on the palette used:

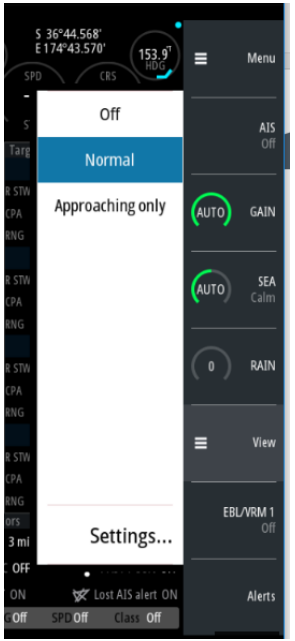
Radar image palettes

- Diverging targets are blue coloured on all radar image palettes.
- Approaching target colours on radar image palettes:
  - Black/Red palette - Yellow
  - White/Red palette - Yellow
  - Black/Green palette - Red
  - Black/Yellow palette - Red

Radar overlay palettes on charts

- Diverging targets are dark grey.
- Approaching targets are yellow.





SIMRAD

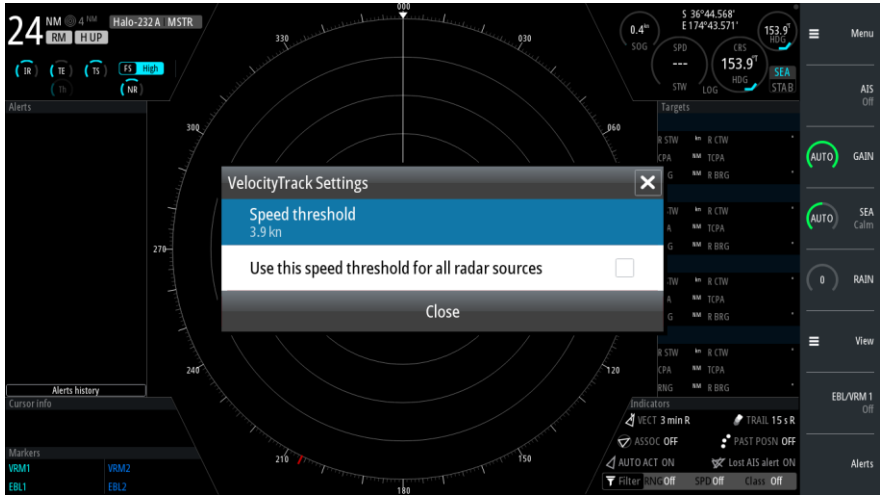
User Interface & Settings-R2009/R3016

VelocityTrack settings

Use this dialog to set speed thresholds of targets to be coloured.

The speed threshold can be defined to apply for the radar source of the selected radar panel only, or to all radar sources connected to the system. The setting is only applied to those radars powered and connected at the time the setting is made. If the all radar sources option is selected, newly connected radars will use the specified values automatically.

Threshold is adjustable from 1kt up to 30kts.

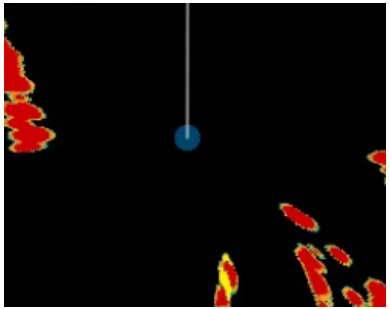


Handy Hint to see if VelocityTrack is enabled

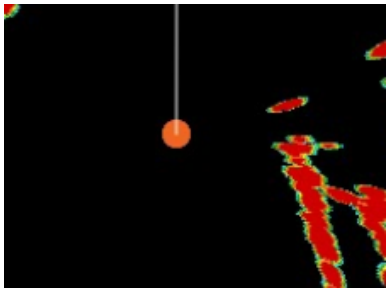
How can I tell at a glance if VelocityTrack is on?

On very short ranges a small dot will appear in the centre of the PPI.

When VelocityTrack is enabled, the dot is blue/grey



When VelocityTrack is disabled, the dot is red



Cautions & FAQ’s

VelocityTrack Cautions

- Users may have a tendency to over rely on the colouring, any radar target poses a risk of collision, not just the ones highlighted as approaching.

- Wagon-Wheeling
  The radar has a limit to the maximum relative speed it can measure.

  For Halo VelocityTrack this is up to 60kts relative speed if own boat is stationary or up to 120kts if own boat speed is 60kts.

  Beyond this the radar is unable to determine the direction of the velocity because of a stroboscopic effect similar to that which makes wagon wheels or propellers appear to rotate backwards beyond a certain speed.

  Echoes from high speed vessels or aircraft may frequently be displayed with an incorrect direction indication for this reason .
  The Approaching/Diverging colours may invert for these types of targets.

FAQ's

Q. **Can my dealer or distributor purchase an VelocityTrack unlock at a discount and in advance of the installation?**

A. Yes. The discount for an unlock is the same as it is for a Halo radar. Please contact your CSR and have the radar pedestal serial number available. If a dealer wishes to purchase the unlock before installation, you only need to have the radar pedestal serial number.

Q. **I have two Halo radar units on my vessel. Do I need to pay twice?**

A. No, the unlock is per vessel, if you have two Halo Radars, which is the maximum supported in a system, you only need to purchase one unlock code. You will be given two Unlock Request codes at generation, and you enter both of these on the GoFree shop. One unlock code will be generated, this will unlock both radars.

Q. **If I have to replace my Halo for a service issue, do I have to acquire another unlock.**

A. Yes, but Navico will provide this Free Of Charge. Please contact Customer Service to obtain a free unlock. You will be required to provide the old and new pedestal serial numbers, plus any RMA/PS numbers if applicable

Q. **Can I view VelocityTrack working in the Simulator file?**

A. Not at this stage, we hope to allow this in future NOS updates

Q. **Is my B&G MFD compatible with VelocityTrack?**

A. Yes, please see earlier "Compatibility Page"

Q. **Will I be able to buy and unlock VelocityTrack directly from my MFD in future?**

A. Yes, we hope to allow purchases of unlocks directly from the MFD in future software updates.

Appendix

How Doppler Works and how to explain it

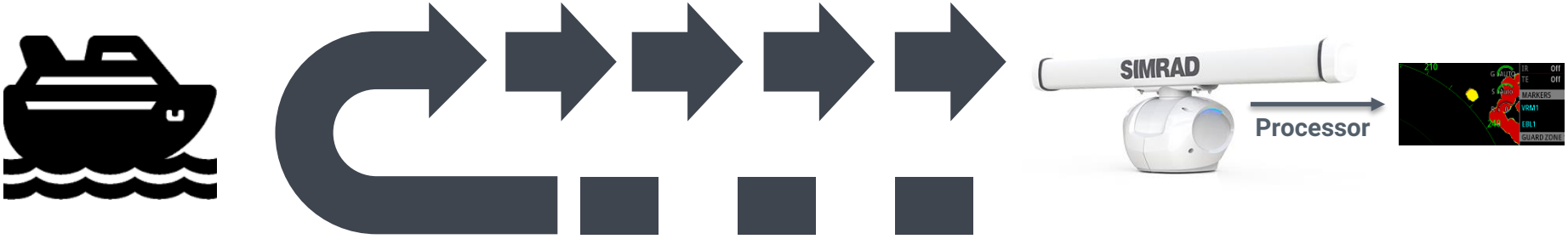
Doppler Explained Simply

- If radar waves reflect off an object moving towards you the frequency gets higher, conversely, if the object is moving away the frequency gets lower
- With velocity track we use the Doppler information from each target to categorise it as:
  A. Moving towards the vessel (emphasise to a yellow or red colour)
  B. moving away from the vessel (deemphasise to a grey/blue colour)
  C. Stationary (no change)

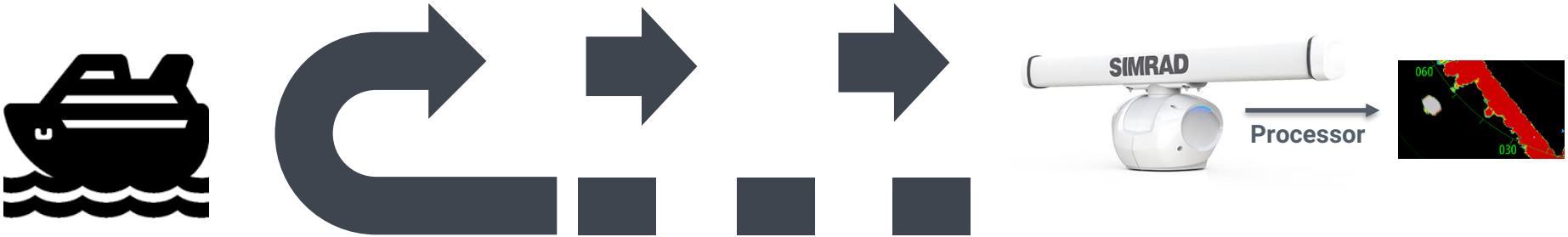
- More info here: https://en.wikipedia.org/wiki/Doppler_effect

Doppler Diagram

Vessel moving towards you the frequency gets higher



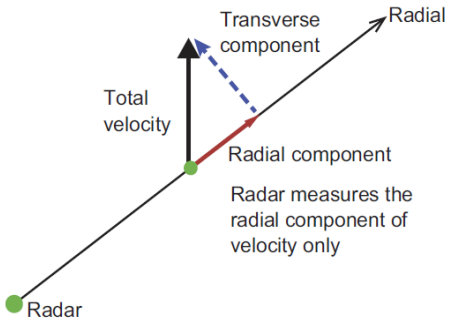
Vessel moving away from you the frequency gets lower



Advanced Doppler Technical

Background

Halo radars' Velocity Track feature utilises the Doppler effect to detect whether a target is moving away or towards the radar. It is only possible for the radar to measure the radial component of the targets speed:



It is not possible for transverse component of the targets speed to be detected by the radar.

Advanced Doppler Technical

Motion indication

A target that meets both the following conditions will be indicated as approaching or receding:

- Is not geo-stationary such as land or marker buoys*
- Has relative radial speed exceeding the VelocityTrack speed threshold setting

*To determine this, the radar removes own-vessel radial speed-over-ground (SOG) component in the direction of the target so that radial speed is then effectively ground referenced.

A target not meeting these conditions is referred to as neutral and coloured in the same way as targets are when VelocityTrack is Off.

Using VelocityTrack in practice

The criteria above causes moving targets or approaching/diverging targets to be indicated as neutral in some circumstances and the navigator should be aware of these situations to safely use the VelocityTrack feature as an aid for collision avoidance.

Advanced Doppler Technical

Navigation examples

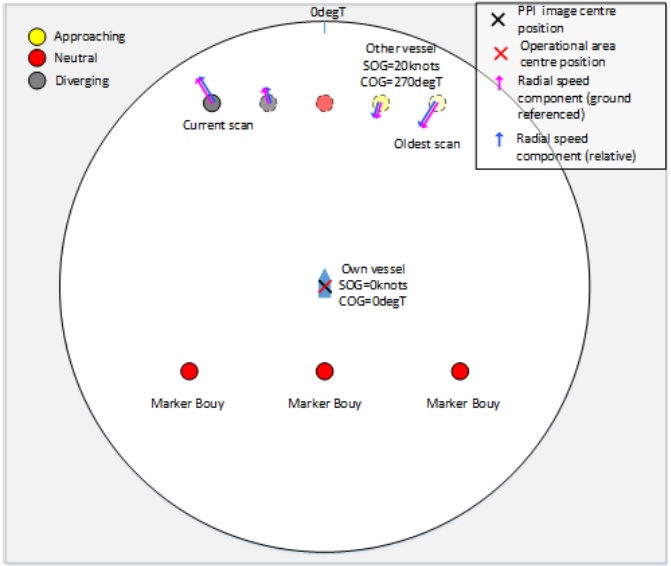
Examples of how VelocityTrack behaves in various navigation scenarios are illustrated on the following slides.
The PPI is shown in relative motion mode and with the position of each target shown over 5 radar scans (rotations).

In general, for a target to be indicated as approaching/receding both the blue (relative) and magenta (ground referenced) radial vectors must be sufficiently large.

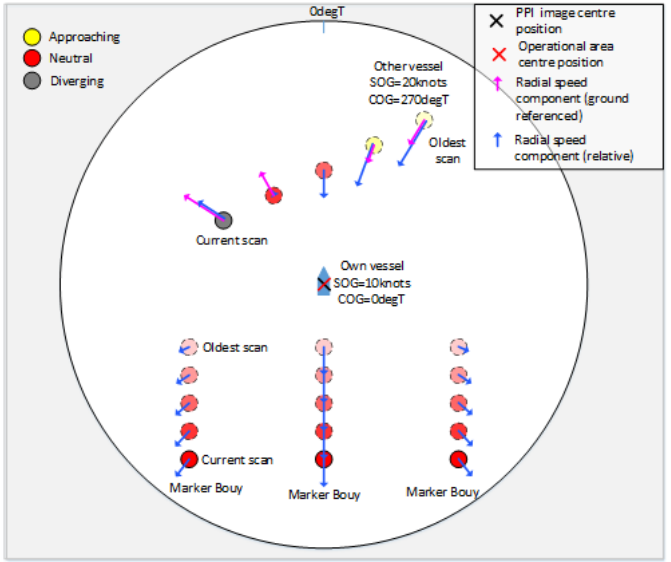
Advanced Doppler Technical-Navigation examples

Vessel crossing our bow

As a vessel crosses our bow, the radial speed component of the target becomes zero momentarily so it is indicated as neutral:



When own vessel is moving towards the target, relative or ground referenced may fall below the threshold as the vessel crosses and so become momentarily indicated as neutral:

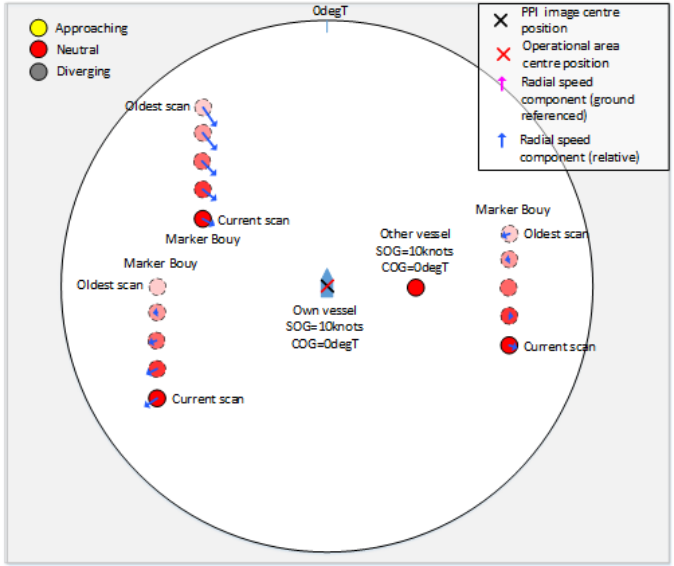


SIMRAD

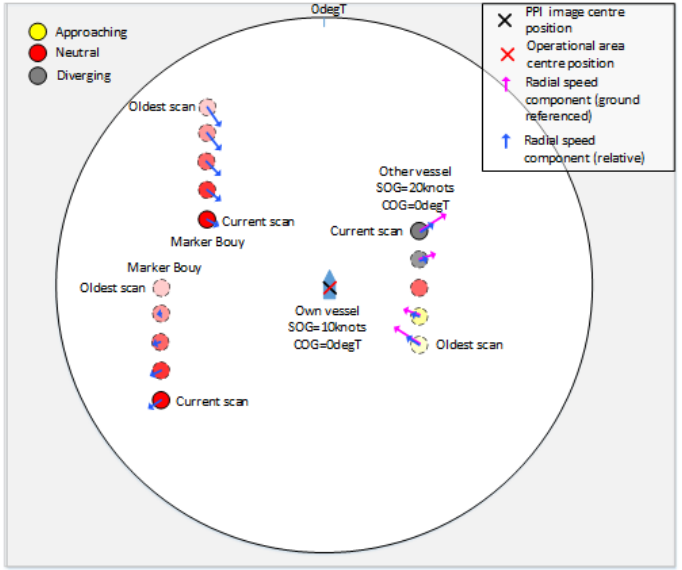
Advanced Doppler Technical-Navigation examples

Vessel travelling abeam to our vessel

When another vessel is travelling Abeam and at the same speed as our own vessel, it will be indicated as neutral because it has zero relative and ground referenced radial speed:



Similarly, a vessel overtaking our own vessel will be indicated as neutral momentarily as it passes:

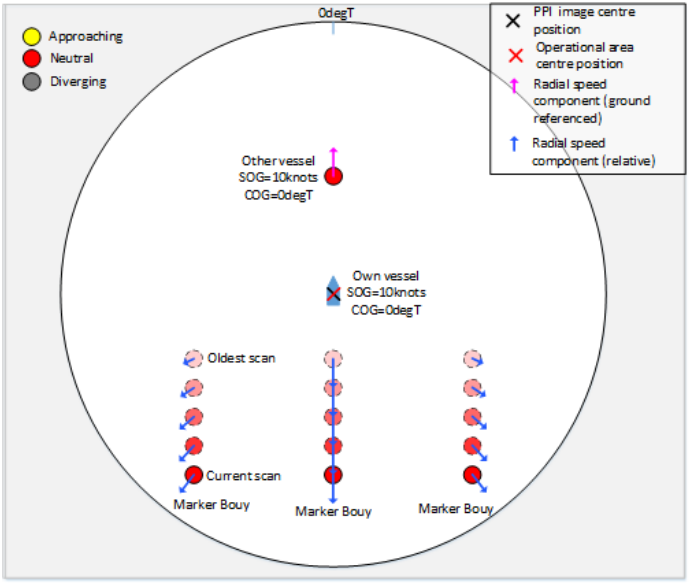


SIMRAD

Advanced Doppler Technical-Navigation examples

Following Vessel

When following a vessel that is travelling at the same speed as our own vessel, the other vessel will be indicated as neutral because its relative radial speed is zero.



SIMRAD

SIMRAD®

Go With Confidence