SHN-VIEW
User Manual

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CHAPTER 1

Overview

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1.0 WARNINGS & CAUTIONS

HIGH VOLTAGE

Radar equipment requires the use of high voltage, which can cause injury, or loss of life. Danger exists only when the units are opened exposing internal circuits, as when servicing the equipment. The radar has been carefully designed to protect personnel from possible injury from high voltages.
Nevertheless, it is recommended that the Line Switch shall always be opened, as an added protection when inspecting or servicing the equipment.
Although every effort has been made to eliminate danger to personnel, no responsibility is accepted for any injury or loss of life suffered in connection with this equipment.

RADIATION HAZARD

Harmful effects (particularly to the eyes) may be caused by exposure of any part of the human body to radio-frequency mean power densities in excess of safety levels set by ICNIRP. Whenever it is necessary to disconnect the waveguide system from a radar transmitter for maintenance purpose, the transmitter output should, when practicable, be terminated in a matched load. If this is not possible, care should be taken to avoid standing in front of an open-ended waveguide from which power is being radiated.
NEVER look down a waveguide from which power is being radiated.

NON-IONIZING RADIATION

The non-ionizing radiation levels from Sea-Hawk SHN-X12 radar in the below table is at 2m distance from the rotating antenna. The radar is inhibited to transmit when the antenna is stationary. The distance 2m from the antenna center is the shortest distance to the rotating antenna a person can be without the antenna touching the person.

Data in table are for dual radar, SHN-X12-OV, for single radar, SHN-X12-V, average power density will be lower than indicated in tables below.

SHN-X12	Power Density W/m²	Electric field strength V/m,	Magnetic field strength A/m	Magnetic field density µT
SHN-X12 2m	$13Wm^{-2}$	$70Vm^{-1}$	0,186 Am^{-1}	$0{,}234\mu T$

Levels at 2m distance from the antenna, when antenna is rotating.
The radar has to be in long pulse length for both transceivers to achieve maximum levels.

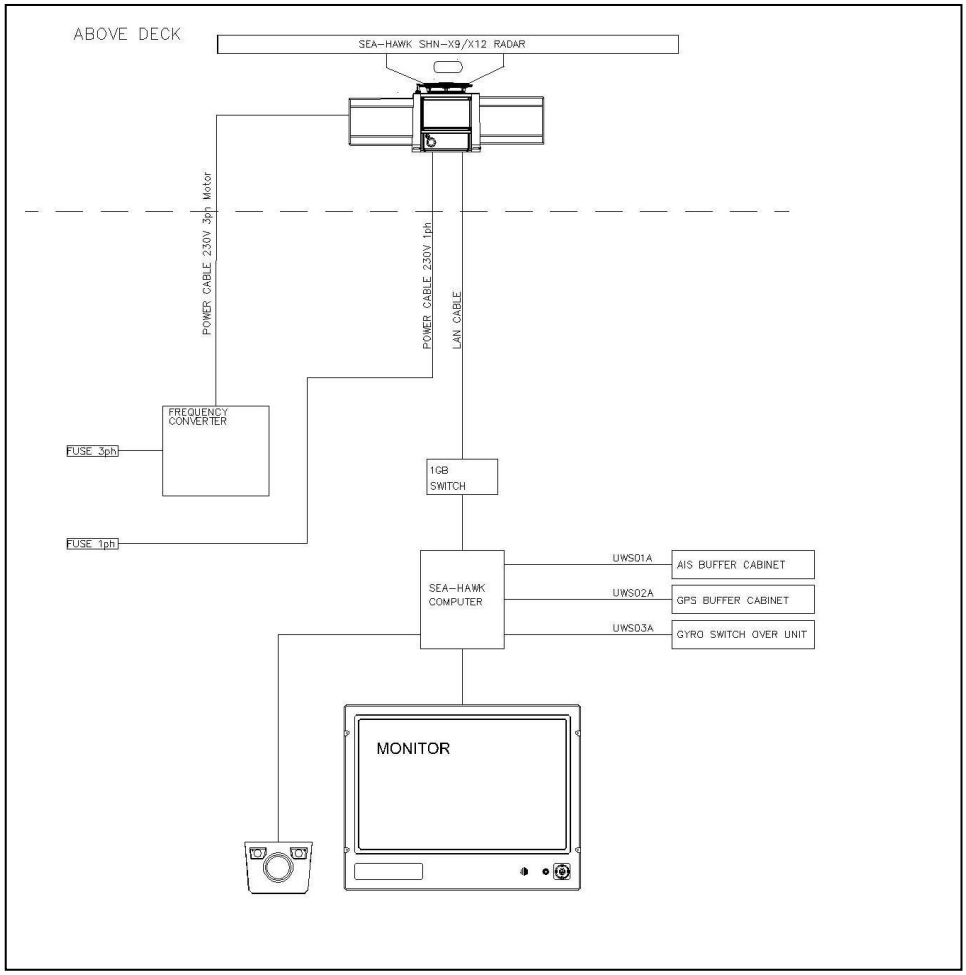
ICNIRP Guidelines for non-ionizing radiation levels for 2-300 GHz

	Power Density 10W/m² Rotating antenna	Peak Power Density 10 000 W/m²
SHN-X12	3m from antenna	7m from antenna
SHN-X9	4m from antenna	9m from antenna

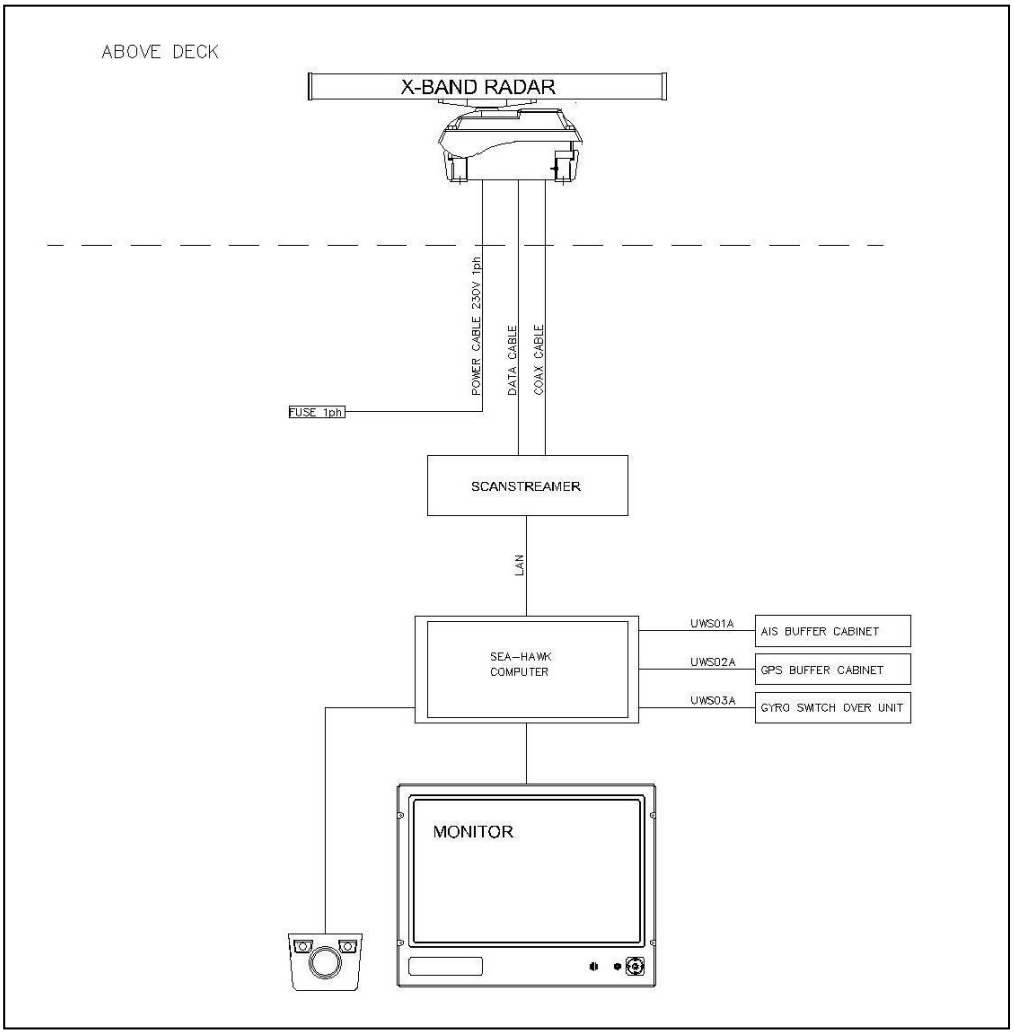
BASIC SYSTEM

SHN-View Radar processor can interface to the most common radars in addition to Sea-Hawk radars.

SHN-View in Sea-Hawk basic radar configuration



SHN-View in Sperry radar configuration



Sea-Hawk View system can be also be configured as slave in an existing radar system.
Monitor size are

1.1 FEATURES

Features:

Parameter	Radar Configuration	
	Master	Slave
Transceiver control	V	-
Video processing controls	V	V
Display controls	V	V
User specified data	V	V
Zoom functions	V	V
Scan to Scan mode	V	V
Red first strike	V	V
Tracking	V	V

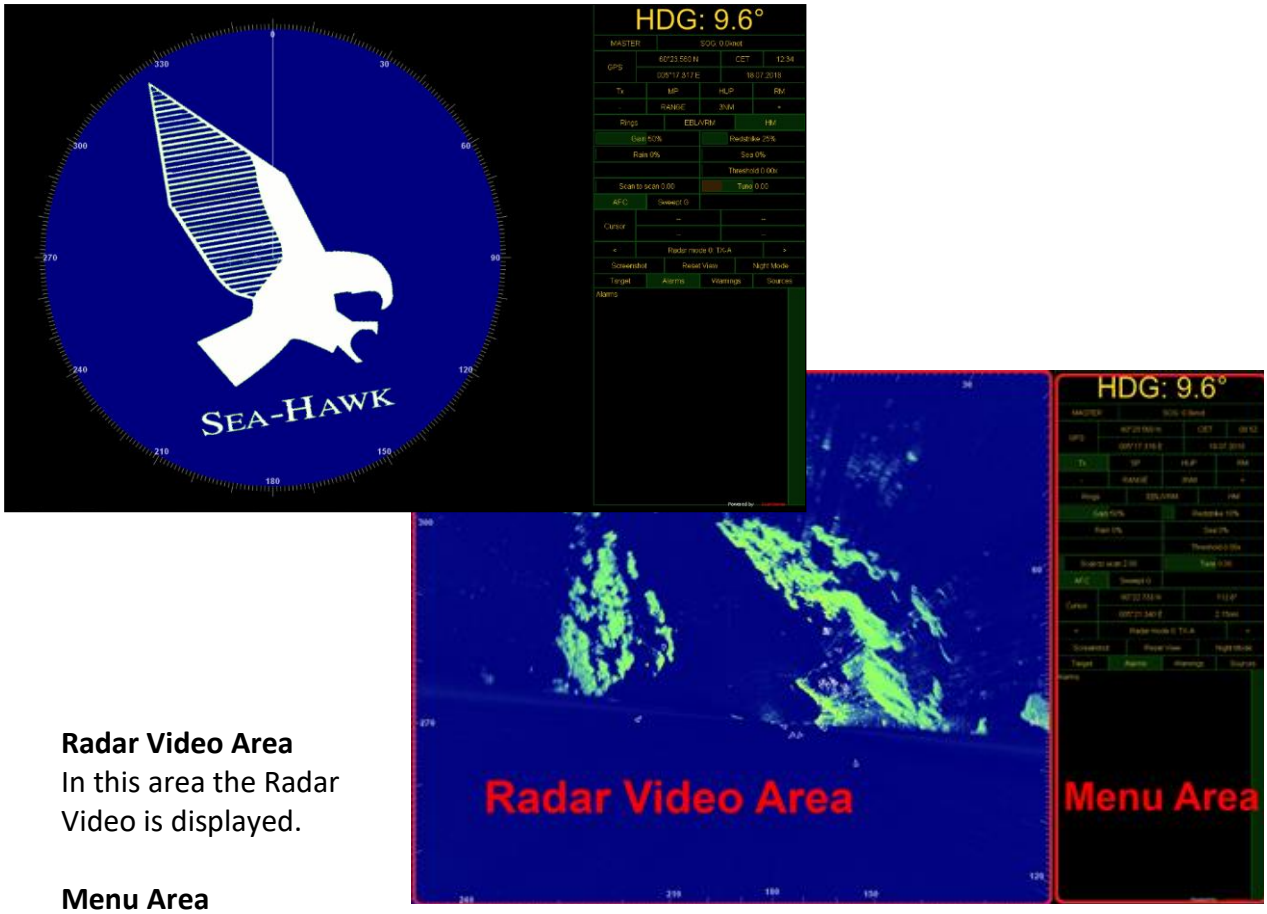
CHAPTER 2

Basic Operation

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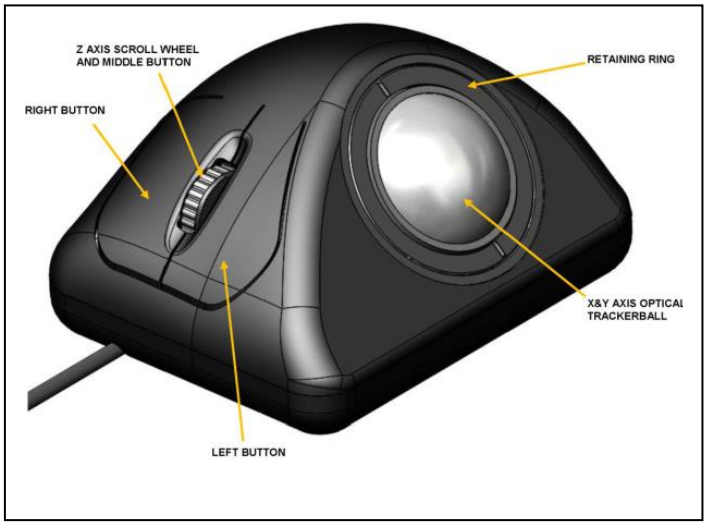
1.0 OVERVIEW



Radar Video Area
In this area the Radar Video is displayed.

Menu Area
Fixed area on the right side
Where fixed menus are displayed.

Track Ball.
Scroll wheel = > Zoom in & out
Left button => selection
Right button => target allocation



Zoom
Scroll Wheel on Tracker Ball can be used for zooming out and in. Pointer has to be in Radar Video Area.

Off-center
Move pointer in Radar Video area. Click and hold left button while operating Tracker Ball to off-center to preferred location.

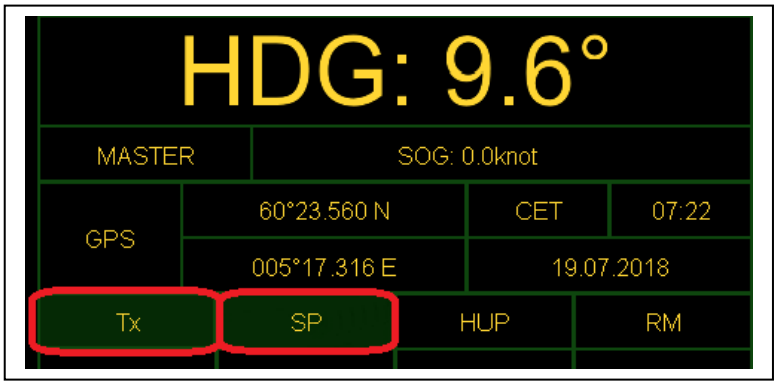
1.1 START UP

Switch on the Radar fuse (site depended).
Press the On/Off switch on the computer and monitor.
Sea-Hawk SHN-View will start up (if autostart is activated) or double click on Sea-Hawk icon on the desktop.

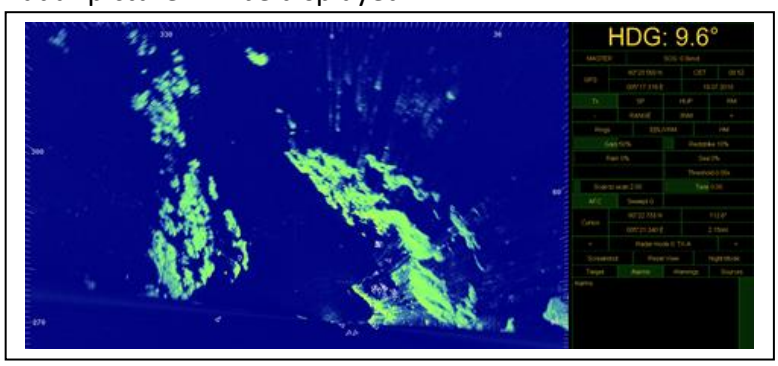
Verify reception of Heading, position and speed input.



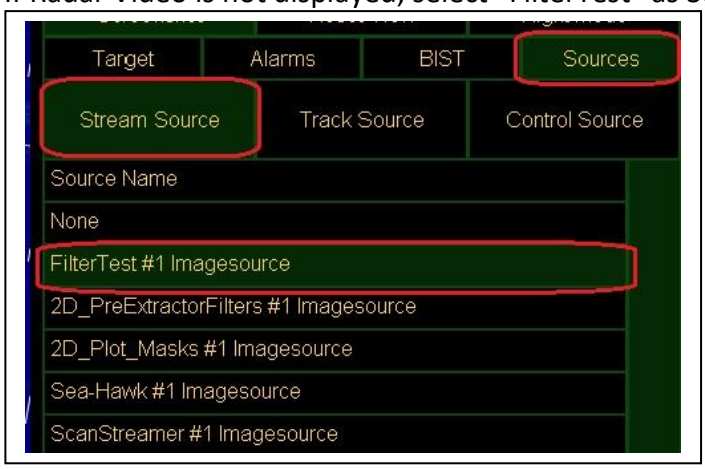
Transmit
Select TX, the menu box shall change to green.
Transceiver warmup time is approx. 3min after power is applied.
Select pulse length, e.g short pulse : SP,the green colour will fade out when the pointer is moved out of the box.



Radar picture will be displayed.



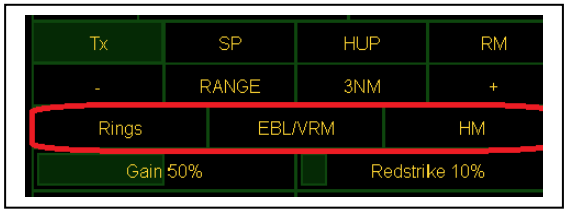
If Radar Video is not displayed, select “FilterTest” as Stream Source.



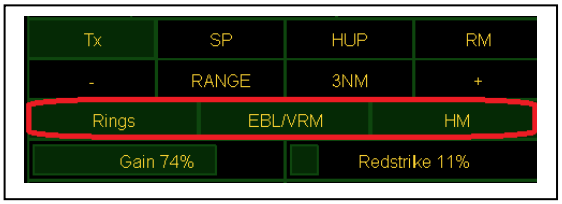


Rain & Sea Clutter, RedStrike and Scan to Scan will only be operational when FilterTest is selected as Stream Source.

2.0 Rings , EBL/VRM & HM



Rings
When selected the box stays green



HM
Heading line is a line centred on own ship.
In Head-up presentation HUP, the line is always at 000°. When selected the box stays green

EBL/VRM

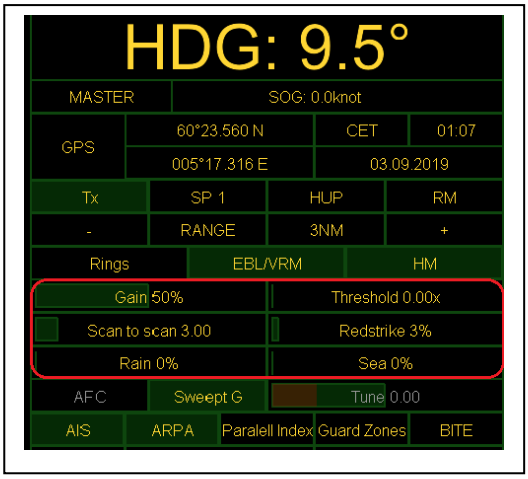
When selected a small pop-up window appears in lower left corner. Click on EBL1/EBL2/VRM1VRM2 to activate.



EBL, adjust EBL by moving the pointer over EBL line, EBL line colour changes, click & hold left tracker ball button, operate tracker ball to adjust EBL.

VRM, move pointer into radar screen click & hold left tracker ball button, operate tracker ball to adjust VRM in/out. To readjust move pointer over VRM, VRM changes colour, click left button and adjust with tracker ball.

2.1 Gain , Threshold, Scan to Scan, Redstrike, Rain & Sea



Gain
Adjust Gain to preferred level. For small target Detection, high gain level is recommended. When Scan to Scan correlation is increased, the Gain may be increased additionally.

Threshold
Threshold, cut the DC offset level of video. Increased Threshold level will remove noise and small targets.

Scan to Scan
The operational function of "Scan to scan" correlation is to distinguish real target echoes from sea clutter and enhance small targets. Scan to scan setting "number" e.g 3 , displays the average echo signals from 3 antenna rotations. Correlation is performed by storing and averaging echo signals over successive antenna scans. Scan to scan signal correlation algorithms is based on the true motion over the ground of each target.

If an echo is solid and stable, it is presented in its normal intensity. Sea clutter is averaged over successive scans resulting in the reduced brilliance, making it easier to discriminate real targets from sea clutter and to some extend rain clutter.

Warning: Fast moving targets will fade and their brilliance presentation will be weaker, with increased of scan to scan setting. Good positions (GPS) updates are essential for scan to scan calculations.

Factors that have impact on scan to scan correlations:
Antenna speed, antenna size, pulse length, target speed, own speed, GPS and Gyro accuracy, target size.

High Speed antenna rpm (40+) is recommended for intensive use of scan to scan correlation.

RedStrike

RedStrike is a red first strike function, moving targets will be presented with red on first hit.
Level of ResdStrike is adjusted with respect to Gain level, Scan to Scan number, Sea State and rain conditions. With increased Scan to Scan correlations RedStrike should also be increased.
Correct adjustment of RedStrike and Gain will essentially eliminate fade out of fast moving targets when scan to scan correlation is increased.

Rain Control Bar

Used to reduce the rain clutter appearance in radar picture. Use the control with care, excessive suppression can cause loss of small targets. The purpose of the Rain control is to reduce the clutter in the radar picture, so that targets masked by the clutter can be seen and distinguished in the Radar picture.

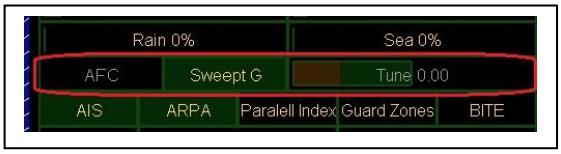
X-band Radars in general are sensitive to rain drops, snowflakes and fog, an aspect of their returning signal is sometimes like an intense large volume clutter sky of video, which can saturate the receiver and mask all targets covered by the humidity. This effect is higher on X-Band than on S-Band Radars.

Rain control bar can be used to optimise suppression of rain clutter and in combination of "scan to scan" integration , i.e. balance the detection of targets within the clutter region (under the rain) with detection of those outside the clutter region.

Sea Control Bar

Used to reduce the Sea Clutter. Always use the control with great care. Avoid setting the control to completely remove all sea clutter, as this will reduce the detection of small targets. The proper setting should permit small targets, often of similar signal strength to the sea clutter returns to be detected. If the control is set too high, both sea clutter and echoes will disappear from the display. When there is no sea clutter visible on the display, adjust the bar to zero (0%).

2.2 AFC, Swept G, Tune



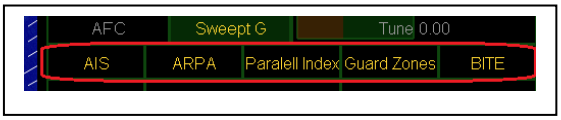
Swept Gain , Sweept G

Operation On / Off.
A Swept Gain function provided by the biased limiter. The time sensitive function will reduce the system sensitivity of the system at short ranges, out to approx. 1,1 nm.
The Swept Gain function is not recommended to use when searching for small target on short range or when the there is very little sea clutter conditions.

AFC
AFC (auto frequency control) when selected, manual tune is not possible. In some application, radar is looked to AFC and operator have no access to tune.
For Sea-Hawk SHN-X9 & SHN-X12 tune is locked to AFC.

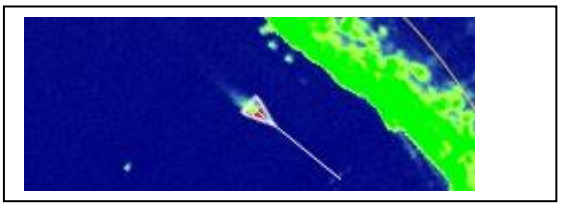
Tune
Tune bar indicating status of tune. When AFC is off, manually tune can be carried out.
For Sea-Hawk SHN-X9 & SHN-X12 tune is locked to AFC and manual tune is disabled.

2.3 AIS – ARPA – Parallel Index – Guard Zones – BITE



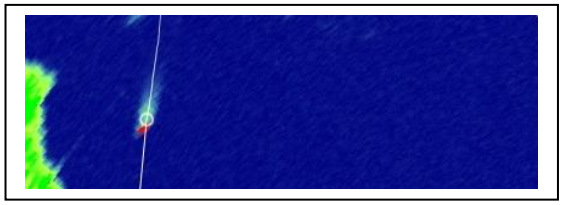
AIS

When selected ; AIS targets are shown in the Radar Video Area.



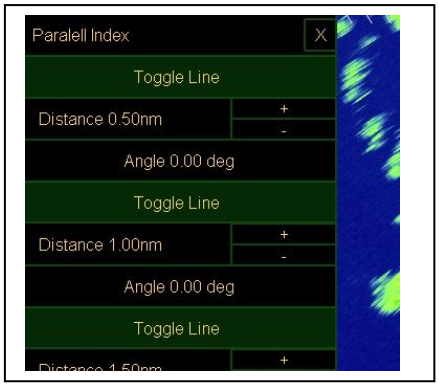
ARPA

When selected; ARPA (tracked) targets, are shown in the Radar Video Area.
To be displayed Targets has to be manually acquired or automatically tracked in selected Guard Zone or track Zone.



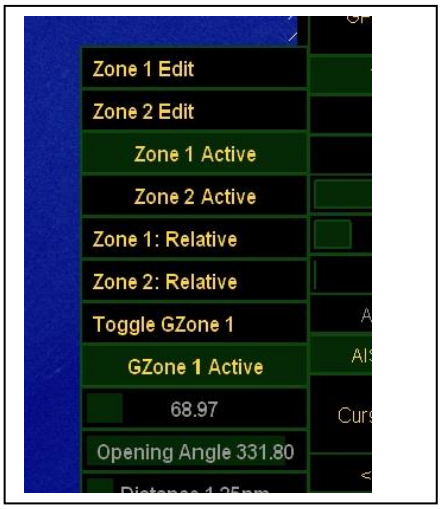
Parallel Index

When selected; the Parallel Menu appears in the left side of the Radar Video Area.
Detailed description for operation of Parallel Index in separate chapter.



Guard Zones

When selected; the Guard Zones and Zones Menu appears on the right side of the Radar Video Area.
Detailed description for setting of zones in separate chapter.



2.4 Cursor

When Cursor are in the menu area,
No position data /bearing /distance data are displayed.



Cursor are in Menu Area

When Cursor are in the menu area,
Position data /bearing /distance data are displayed. Bearing data is relative



Cursor are in Radar Video Area

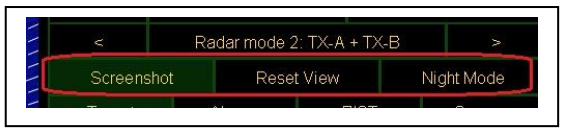
2.5 Radar mode

Radar Mode only applies for Sea-Hawk SHN-X9 & SHN-X12 radar in master mode.
Use right/left arrow to cycle through the modes.



Radar Mode 0: TX-A = Horizontal Polarization HP , recommended for 12/24/48 nm range.
Radar Mode 1: TX-B = Circular Polarization CP, recommended for heavy rain / monsoon.
Radar Mode 2: TX-A+TX-B = HP + CP, Standard mode for normal conditions
Radar Mode 3: TX-A+TX-B = HP + CP, Sweept G Off, Standard mode for calm sea.
Radar Mode 4: TX-A+TX-B = HP + CP, Standard mode for Medium Pulse MP.
Radar Mode 5: TX-A*TX-B = HP * CP, Standard mode for rough sea conditions
Radar Mode 6: TX-A*TX-B = HP * CP, mode for rough sea conditions and MP
Radar Mode 7: TX-A*TX-B = HP * CP, mode for rough sea conditions MP + high gain

2.6 Screenshot - Reset View – Night mode

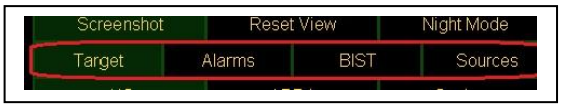


Screenshot
takes a print screen of the Radar Video and Menu Area. Pictures are stored under Filename SHOT-000001.PNG, where the number will increase by one for each new screenshot.

Reset View
Rest of picture to the centre and to selected range.
E.g if the picture is off
centred and zoomed in on a target, the Rest View will centred the picture and reset zoom to the range selected in range menu.

Night Mode
Switches to night colours or other custom pre-set colours.

2.7 Target - Alarms – BIST - Sources

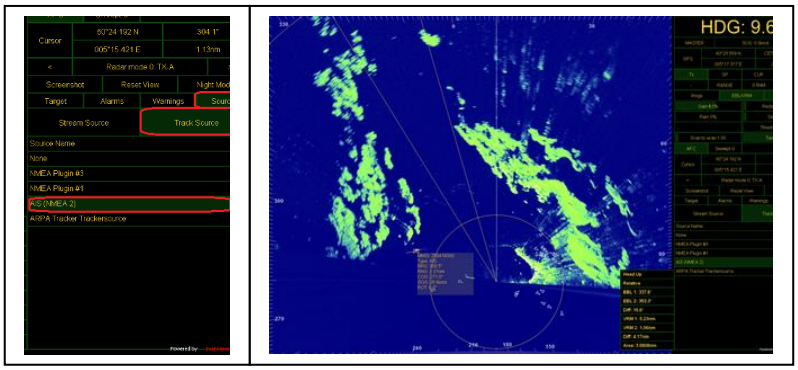


Target

Accessing Target functions.

1 Select “Sources”

2 Select “Track Sources”



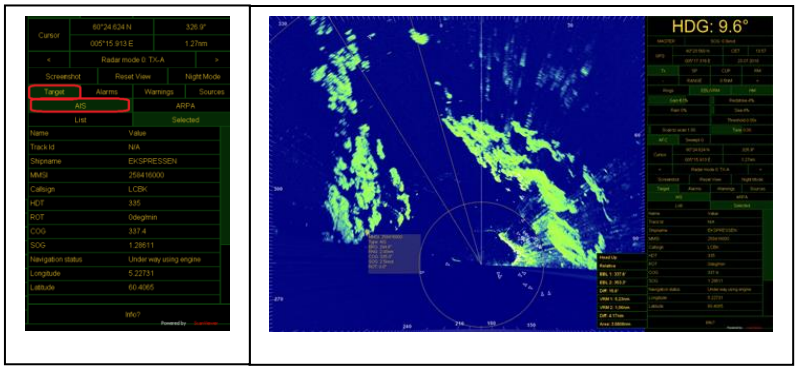
AIS

Select AIS under “Track Sources”

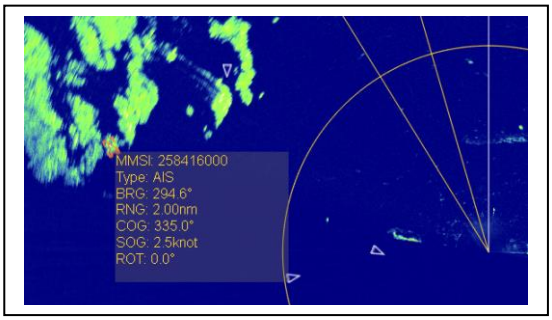
1 Select “Targets”

2 Select “AIS”

Choose between “List” and “Selected”.



Allocate specific AIS target by position the pointer over AIS symbol. AIS symbol change color, right click to allocate



ARPA

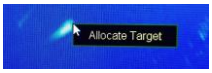
Select ARPA under Target





Choose between “List” and “Selected”.
“List” displays all tracked targets.
“Selected” displays tracked data for selected Target.

Target acquiring : move the pointer over a target and right click. A dialog box pops up, left click in the box.



Right click



Left click

After a few scan the ring change color from orange to white and a vector appears.

To select a tracked target, move the pointer over the target, the ring color changes from white to orange, then left click.



Left click



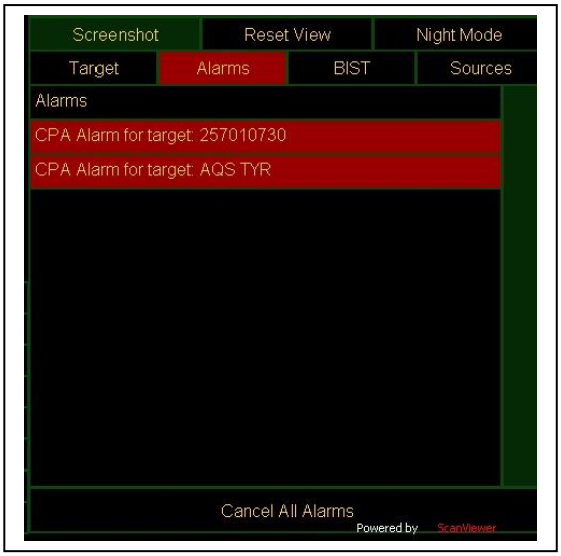
Selected target

Deselect, left click outside the target.

Alarms

When an alarm occurs, the Alarm box will flash red. In the alarm list active or non confirmed alarms will flash red. When confirmed the flashing stops.

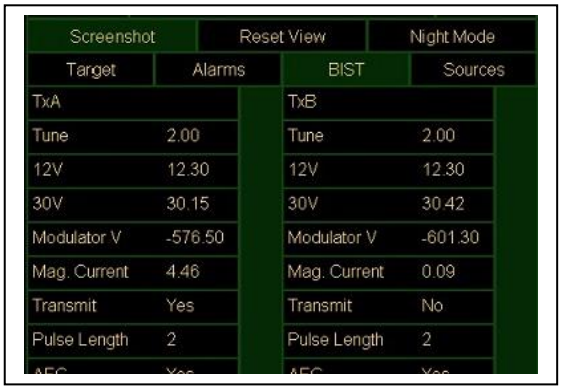
Confirm / cancel individual alarms by clicking on the alarm.



To cancel all alarms, click on “Cancel All Alarms” dialog box in the bottom.

BIST

"Built in system test" – Bist, list out status from the transceivers. Depending on type of radar



Sources

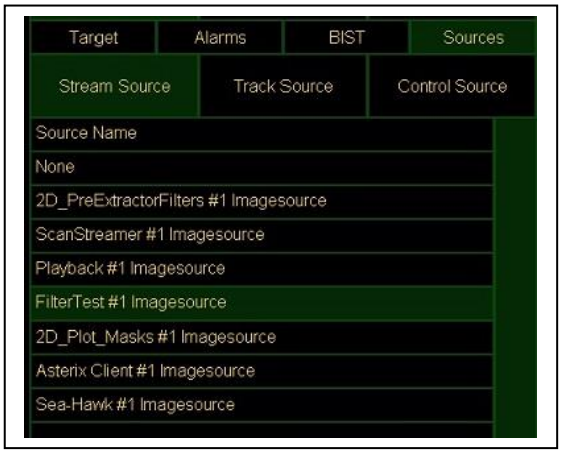
Sources are automatically selected by SHN-view during start-up. Should normally not be changed by the operator.

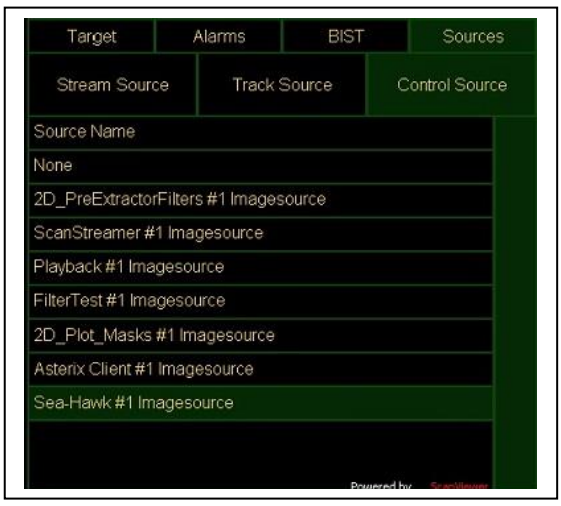
Sources are divided into three sub sections.

Stream Source.
Sub program where SHN-View receive Radar video from. Normally FilterTest.

Track Source
Sub program where SHN-View receive AIS data from.

Control Source
The selected Plug-In source that SHN-View use for control commando of the radar. Normally





CHAPTER 3

Measurement

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4	Parallel Index Lines		
5	Range Rings		

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3.1 RADAR ECHO MEASUREMENT



The position, speed, course, distance and bearing of Radar echoes can be performed in several ways:

- Measurement by means of Range Rings and Bearing Scale.
- Measurement by means of the Cursor.
- Measurement by means of the ERBL 1 or 2.

The following Table visualise the advantages and the disadvantages for each of the above mentioned options.

Measurement Mode	Advantages	Disadvantages
Range Rings and Bearing Scale	Fast measurement	Measurement with Very High Approximation
Cursor	Precise measurement Fast measurement	Changing the scale the cursor remains on the same position on the PPI, changing the information.
ERBL	Precise measurement Changing the scale the cursor remains on the same distance.	The operator doesn't get a fast measurement

3.1.1 Measurement by means of Range Rings and Bearing Scale

The Measurement by Range Rings and Bearing Scale is performed when it is not necessary to get an accurate value but it is sufficient to have an approximate one very quickly.

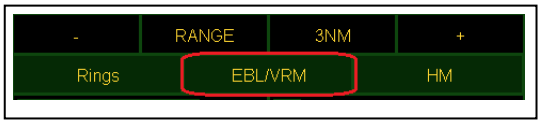
3.1.2 Measurement by means of the Cursor

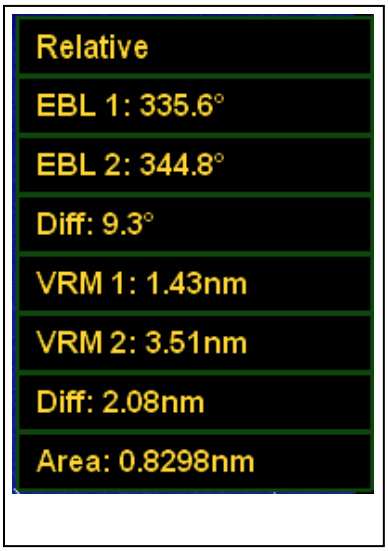
Placing the trackball cursor over the echo, in the Cursor Area the range and bearing of the cursor will coincide with the echo range and bearing.
If the system is connected to a position source (i.e. GPS), with this Measurement Mode is also possible to know the geographic position of the echo, just watching the cursor.

3.1.3 Measurement by means of the EBL & VRM 1 or 2

EBL = Electronic Bearing Line VRM = Variable Range Marker

In order to measure the Bearing or Range of an Radar echo, by means of one of the two available EBL or VRM, the operator has to activate the EBL/VRM menu.





Relative, True, Drop*

EBL 1:, heading Electronic Bearing Line 1

EBL 2:, heading Electronic Bearing Line 2

Diff:, difference between EBL2 and EBL1

VRM 1, Variable Range Maker 1

VRM 2, Variable Range Maker 2

Diff:, difference between VRM2 and VRM1

Area: Areal limited by EBL1, EBL2, VRM1 and VRM2 in nm^2.

*Drop function to be released later.

Adjust EBL

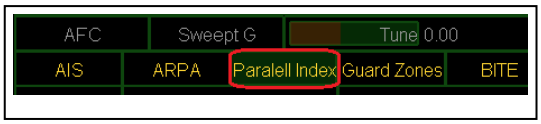
When EBL is activated, it will pop up be in heading 000° as an orange line.
Move the cursor over the line, colour changes to red, left click left bottom and hold, the line can now be move to wanted heading (right or left), release left bottom when EBL is on wanted heading.

Adjust VRM

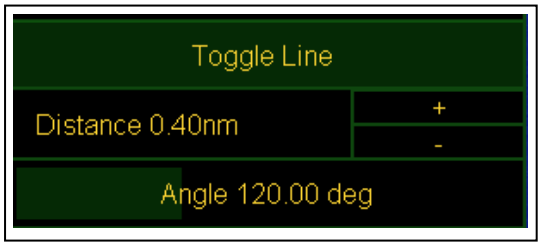
Activate VRM by clicking on VRM 1: or VRM 2:, the dialog box change from “”Off” to “0.00nm”.
Move the courser into the Radar Video Area, click and hold left bottom, a red VRM circle pops up. Adjust the distance by moving the cursor in or out, release left bottom at desired distance, the VRM circle changes from red to orange.

3.1.4 Index Lines

In order to display and adjust the Parallel Index lines, the operator has to activate the Parallel Index menu.

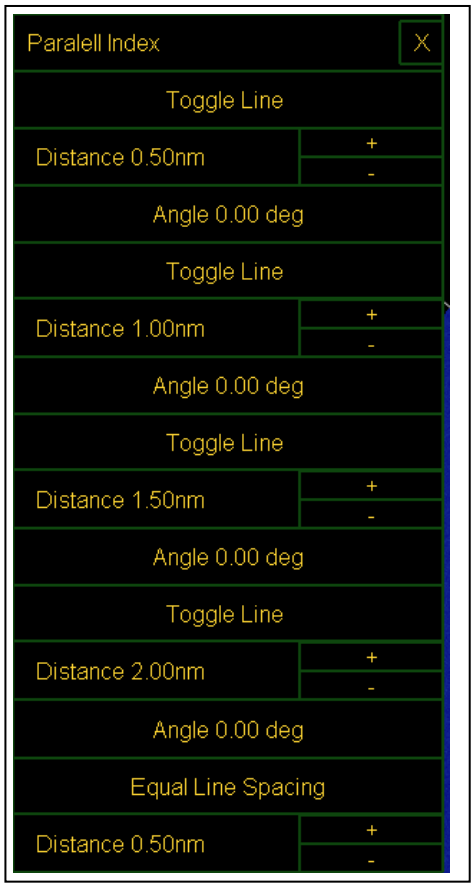


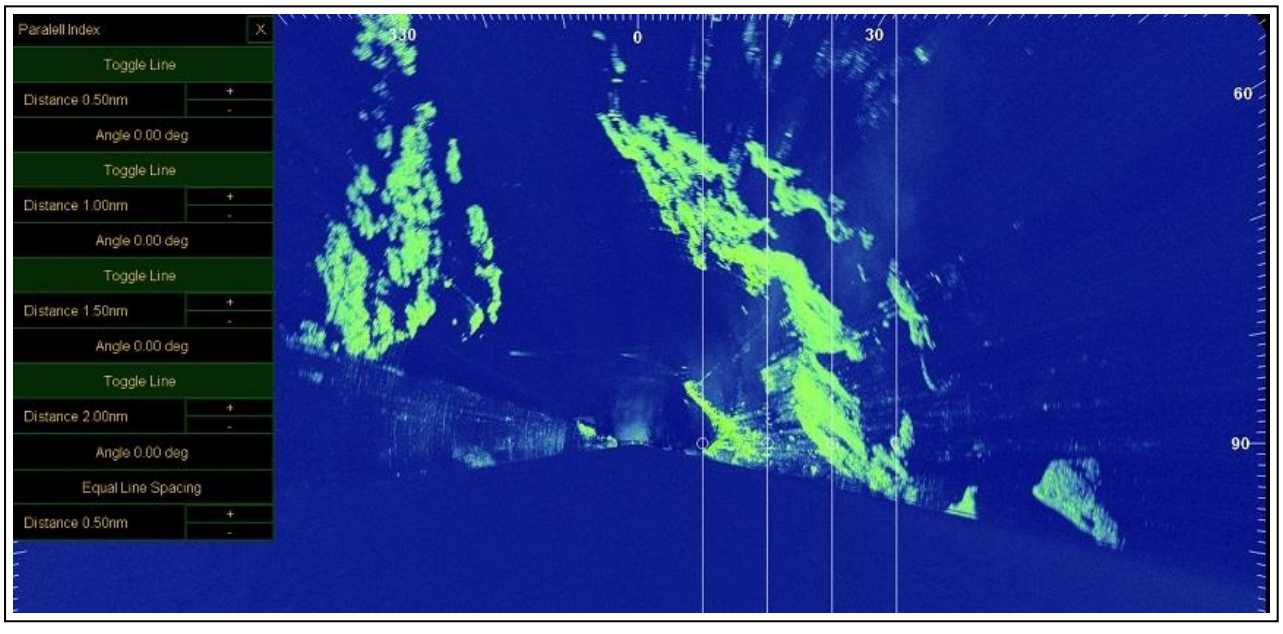
To activate Parallel Index lines click on “Toggle Line”
Adjust distance by “+” or “-“.
Drag the Angel bar to adjust the Index line angel.
Same procedure for all four index lines.



For equal line spacing activate “Equal line spacing” box
Adjust distance by “+” or “-“.
“+” or “-“. Has to be clicked at least one time to activate Equal line space.







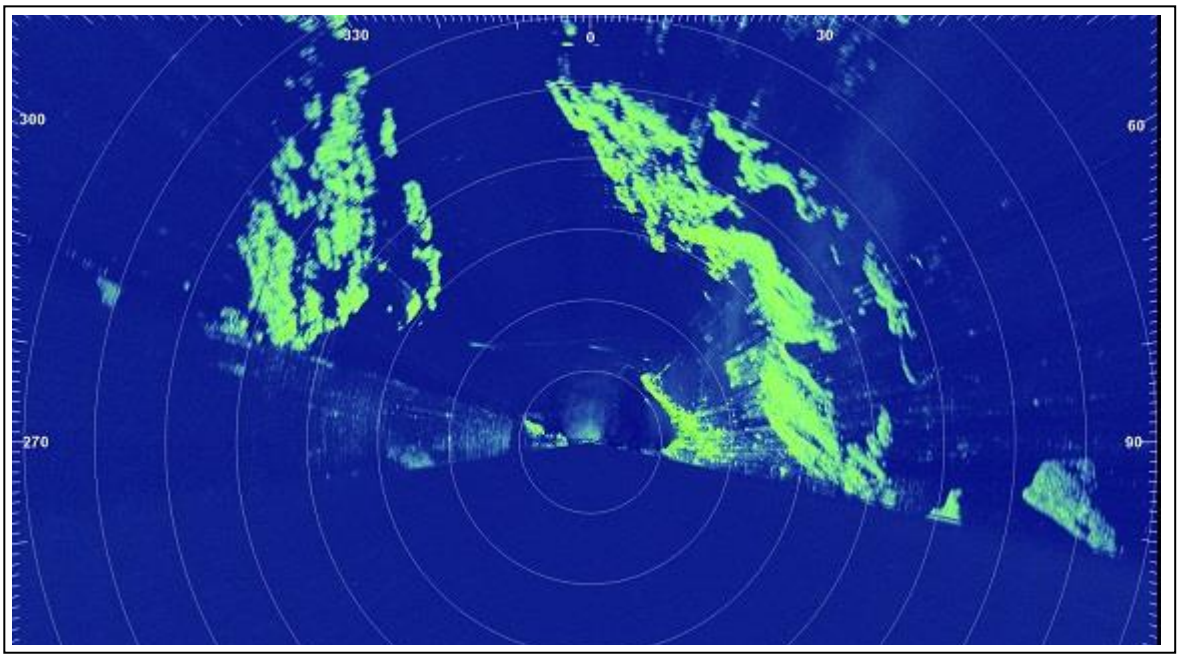
3.1.5 Range Rings

Activate Range Rings by position the cursor over the "Rings" box and left click. The colour changes to green.



Distance between two adjacent rings is automatically adjusted to selected range. Distance between the rings are fixed at selected range.

Range NM	Distance NM	Range NM	Distance NM
0,25	0,4	6,0	1,0
0,5	0,8	12	2,0
0,75	0,125	24	4,0
1,5	0,25	48	8
3,0	0,5	96	16



CHAPTER 4

Tracking & Guard Zones

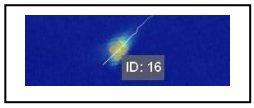
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3	Zone		5
4	Guard Zone		6
5	Conditions Affecting Tracking		7

1 OVERVIEW

The operator can manually acquire individual local targets to be tracked, providing the targets are within the tracking range. Targets can also be tracked automatically when they enter **Polygonal** Acquisition Zones (Zone) or Annular Acquisition Zone (GZone).

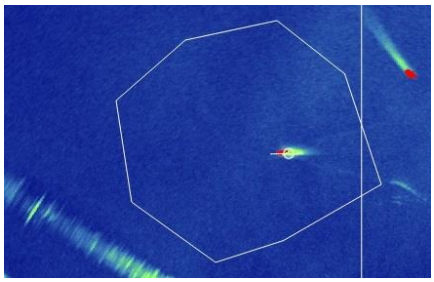
Tracked target 

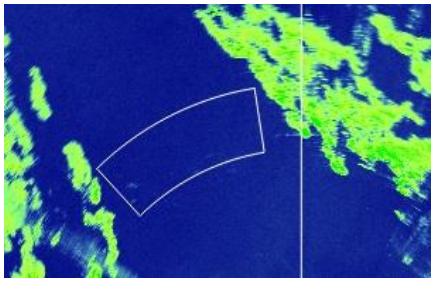
Selected Target 

Lost Target 



Selected Target Menu


Polygonal Zone


Annular Zone

2 MANUALLY TARGET ACQUIRING

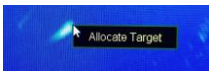
Select ARPA under Target

Choose between “List” and “Selected”.





Target acquiring : move the pointer over a target and right click. A dialog box pops up, left click in the box.



Right click



Left click

After a few scan the ring change color from orange to white and a vector appears.

To select a tracked target, move the pointer over the target, the ring color changes from white to orange, then left click.



Left click



Selected target

Deselect, left click outside the target.

Cancelling Tracked Targets

Tracked targets can be cancelled individually or collectively. When a target is cancelled all to the target are automatically cleared.

When acknowledge of lost target alarm, lost target icon in display will disappear.
Cancelling all lost targets, left click on “Cancel All Alarms” all lost targets will disappear from radar display.

3 ZONE, POLYGONAL ACQUISITION ZONES

Zone 1 and Zone 2 are Polygonal Acquisition Zones. When the radar is in transmit mode, targets that enter the area and fulfils tracking criteria are automatically acquired and tracked.
Zone 1 and 2 are a randomly shaped zones constructed from operator defined zone points, which are entered directly on to the display. In theory there are unlimited zone points that can be drawn. Modes are Static or Relative.

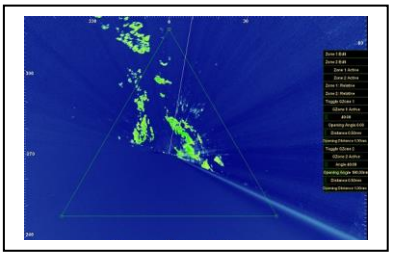
Recommended minimum distance from radar (or land) to the beginning of the zone is 1 nm, this depends on the sea clutter intensity in the area. In heavy sea clutter this distance should be increased.

Select “Guard Zones” from menu, a sub menu pops up.

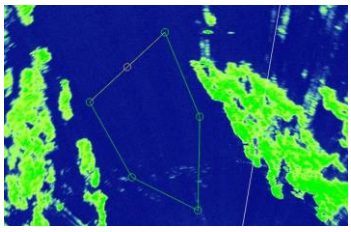


Left click on “Zone 1 Edit” , a green triangle pops up.





Move the cursor over one of the triangle corner circle ,
left click and drag the corner to wanted positon.
Move the cursor to the midpoint for one of the lines,
the line changes colour and a new circle pops up.
Drag the circle to wanted position.

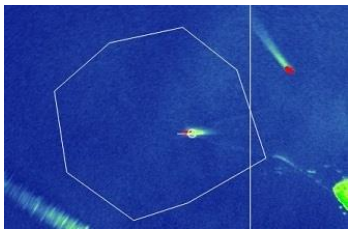


When the wanted shape of the Polygonal Zone is drawn,
activate the zone by left click in dialog box “Zone 1 Active”,
dialog box changes from black to green.
The Polygonal Zone changes from green to white.



Left click on dialog box “Guard Zones” to close the zone menu.
Activated zones will still be active.

Repeat the above procedure to edit and activate Zone 2.


Activated Polygonal Zone

4 GUARD ZONE, ANNULAR ACQUISITION ZONE

GZone 1 and GZone 2 are annular acquisition zones in relative mode, that is defined by the operator for a user set area of the display. When the radar is in transmit mode, targets that enter the area and fulfils tracking criteria are automatically acquired and tracked. Operator can set and adjust; Angel, Opening angel, Distance and opening distance.

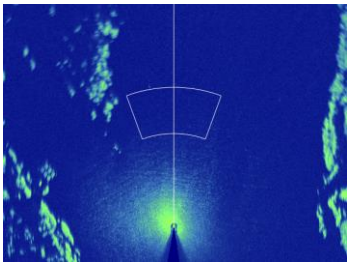
Recommended minimum distance from radar (or land) to the beginning of the zone is 1 nm, this depends on the sea clutter intensity in the area. In heavy sea clutter this distance should be increased.

Select “Guard Zones” from menu, a sub menu pops up.

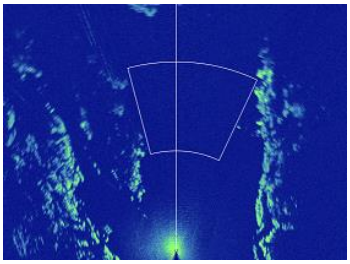


Left click on “Toggle GZone 1”, annular zone (GZone 1) pops up 1 nm from center.





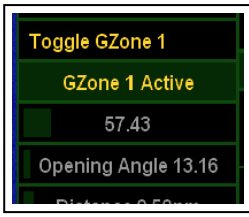
“Toggle GZone 1”



Adjusted GZone 1

Adjust GZone bearing width, by moving Angel bar.
Adjust GZone bearing (center heading), by moving Opening Angel bar.
Adjust GZone start range, by moving Opening Distance bar.
Adjust GZone range, by moving Distance bar.

Left click dialog box “GZone 1 Active” to activate GZone 1, dialog box change to green.



Left click on dialog box “Guard Zones” to close the zone menu.
Activated zones will still be active.

Repeat the above procedure to edit and activate GZone 2.

5 CONDITIONS AFFECTING TRACKING

Tracking Error Sources and Effects

There are some factors that can generate errors and confusion in tracking and/or reduction of target detection capability to the Radar operator. Such factors are:

- Sea, Rain, Snow and Low Clouds Returns
- Radar Interference
- Side lobe Echoes
- Blind Sectors
- Low Signal to Noise Ratio and Signal to Clutter Ratio.
- Radar Mode and Pulse Length

Sea returns are caused by the reflection of the Radar wave by the surface irregularities of the sea and by the water droplet layer existing in the vicinity of the sea surface. They are displayed as a bright circular area (sea clutter) around the centre having a radius that, depending on the sea state and the height of the antenna, can be up to 6-8 NM.

Rain, Snow and low Clouds Returns have two main effects on the Radar electromagnetic wave

- Attenuation
- Masking effect

The first effect reduces both the power of the direct wave hitting a target and the power returning to the antenna after reflection from the target. The second effect is due to the electromagnetic wave reflected by rain drops and ice crystals and appears as a bright area (rain clutter).

Radar echoes falling in sea or rain clutter areas are practically more or less masked by the clutter. Tracking of targets entering in these areas cannot work properly. Generally the effects of such errors appear as continuous big changes of the target course and speed vector. Sometimes the target symbol, having acquired a very high speed, can move away from the real target position causing after a certain time the loss of the target and Lost Track alarm will be generated.

Blind Sectors

Funnels, masts or other objects may cause blind or shadow sectors, where the target visibility may be completely lost or strongly reduced. In these sectors the tracking will be very difficult and targets remaining there for long time, not seen for more than >6* antenna revolutions, will be lost and "Lost Track " alarm will be generated.

*can be adjusted to site specific conditions.

Low Signal to Noise Ratio and Signal to Clutter Ratio

In all other cases where the signal to noise or the signal to clutter ratio of the radar targets are less than a defined limit (small vessels in heavy sea or rain clutter, big vessels close to the Radar horizon), targets detection is very poor and the tracking will not see the target in each antenna revolution; this will cause errors in the tracking.

Radar Mode

The Sea-Hawk radar can be set in different modes, this will affect tracking and unwanted tracking of sea-clutter and rain clutter. Normally the tracker is adjusted for the prominent mode and pulse length, e.g. MP2 and Mode 0. When changing the mode from Mode 0 to Mode 5, will increase the signal to noise ratio, resulting in less false track from rain and sea clutter, however the small targets will probably fall under the threshold and not be track.

Pulse Length

When chaining the radar pulse length, the return signal from targets, sea and rain clutter, nearby objects e.g will also change and the tracker will need some time to adjust. The following recommendations for pulse length and range, can be used as an initial setting for tracking;

SP 1-4 nm , MP 3nm -24nm , LP >12nm.

Other conditions may affect this recommendations and the operator has to adjust.

CHAPTER 5

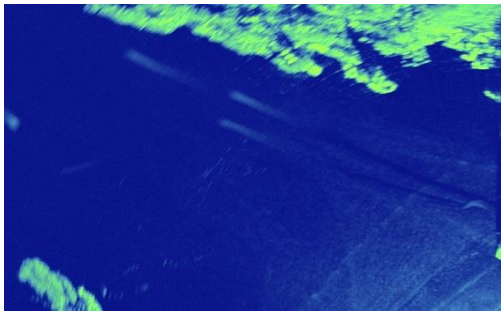
Red Strike & Scan to Scan

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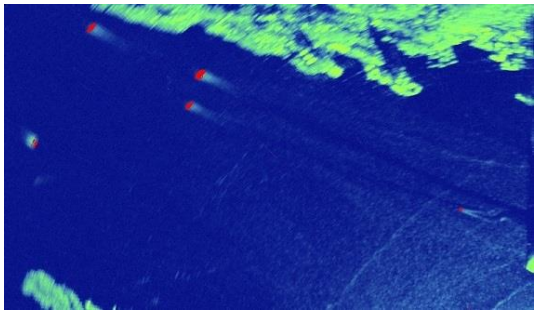
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1 OVERVIEW

Red Strike is a red first strike function, moving targets will be presented with red on first hit.

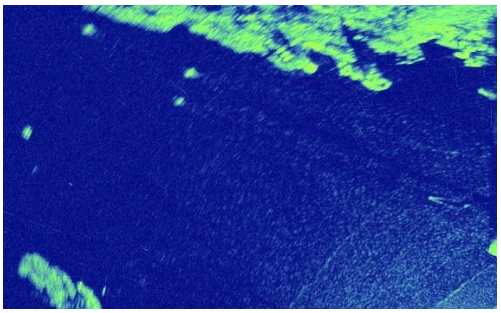


Target without Red Strike.

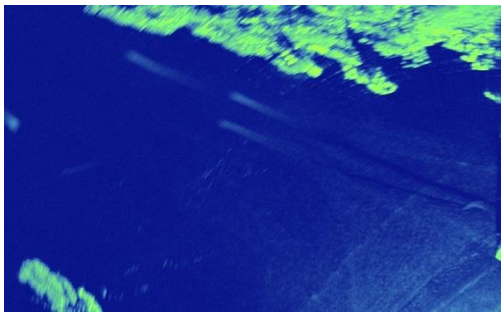


Target with Red Strike.

Scan to scan correlation, is a correlation function for distinguish real target echoes from sea clutter and enhance small targets.



Target without Scan To Scan Correlation.



Target with 10 Scan To Scan Correlation.

2 SCAN TO SCAN

The operational function of “Scan to scan” correlation is to distinguish real target echoes from sea clutter and enhance small targets. Scan to scan setting “number” e.g 3 , displays the average echo signals from 3 antenna rotations. Correlation is performed by storing and averaging echo signals over successive antenna scans. Scan to scan signal correlation algorithms is based on the true motion over the ground of each target.

If an echo is solid and stable, it is presented in its normal intensity. Sea clutter is averaged over successive scans resulting in the reduced brilliance, making it easier to discriminate real targets from sea clutter and to some extend rain clutter.

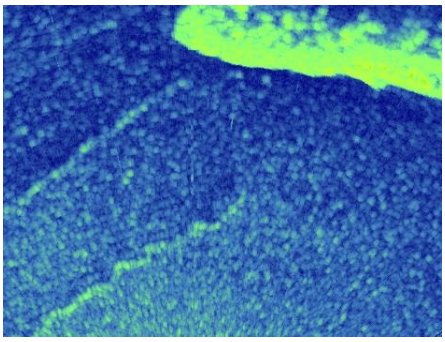
Warning: Fast moving targets will fade and their brilliance presentation will be weaker, this effect increases with increased of scan to scan setting. For radars onboard vessels; accurate and good sensor data from GPS and Gyro are essential for scan to scan correlation.

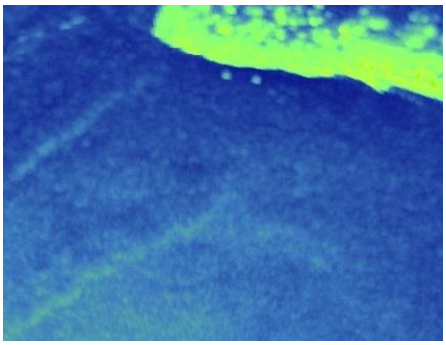
Factors that have impact on scan to scan correlations:

Radar: Antenna speed rpm, antenna size (beamwidth) , pulse length.
Sensors: GPS & Gyro accuracy and update, vessel own speed.
Target: Range, size, speed and course.

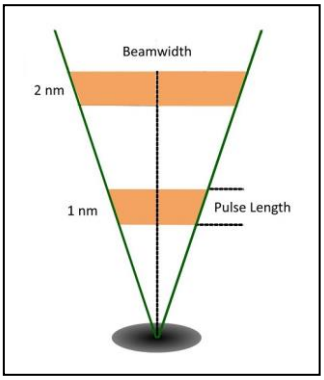
High Speed antenna rpm (40+) is recommended for intensive use of scan to scan correlation and short pulse length. Intensive use of Scan To Scan on short range, <1 nm, antenna with wider beam with is recommended.

For “non moving” small target detection from a radar onboard a vessel with own speed <5 nots, recommended max Scan To Scan correlation is 7-10. Target speed is depending on sea current and wind, higher target speed lower Scan To Scan.


Scan To Scan set to 0


Scan To Scan set to 10

Scan To Scan & cell size.



As stated above there are many factors that affect the ideal settings of Scan To Scan, ideally the settings should be as high as possible without the wanted type of targets starts to fade. The time a target stays in a cell corresponds to the maximum Scan To Scan that can be used without fading. The size of the cell is based on transmitting pulse length and antenna horizontal beam with.
The cell size stay constant in range for the given pulse length.
In bearing (beamwidth) the cell size increase with range.

The time the targets stays in the cell can be dived by the antenna rotation time, result is the theoretical max Scan To Scan without target fading. The result is normally to high, for static site radar it should be reduced with 10% and for radar on a moving platform (vessel) it should be reduced by 25%.

When a target has moved out of the cell before the set number of Scan To Scan is completed, the target will fade.

Example :
Radar SHN-X12
A small target , rcs 2,5m², is drifting with a speed of 1 knot, range 1nm from the radar, course towards the radar.

Target time in one cell in SP =29s
Target time in one cell in MP=147s

Target speed increase to 3 knots
Target time in one cell in SP =10s
Target time in one cell in MP=49s

If the target changes course with 90°, same speed, 3 knots.
Target time in one cell in SP =15s
Target time in one cell in MP=15s

Antenna rotation time
40 rpm = 1,5 s
35 rpm = 1,71s

SHN-X12, Medium Pulse MP & Short Pulse SP
Radar Beam (cell) size at given range

Range nm	Beamwidth size in m	MP Range size in m	SP Range size in m
0,5	11	75	15
1	23	75	15
2	45	75	15
3	68	75	15
4	91	75	15
6	136	75	15
12	272	75	15
24	543	75	15

SHN-X9, Medium Pulse MP & Short Pulse SP
Radar Beam (cell) size at given range

Range nm	Bearing size in m	Range MP size in m	Range SP size in m
0,5	15	75	15
1	29	75	15
2	58	75	15
3	87	75	15
4	116	75	15
6	176	75	15
12	349	75	15
24	698	75	15

Small target movement within one cell

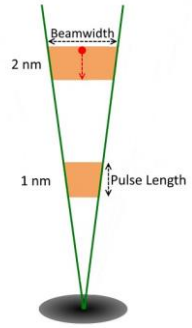


Figure A

Figure A shows a target moving 180° degrees towards the radar, time in cell at 2nm is the same as time in cell at 1 nm.

Figure B shows target moving 225° degrees, time in cell at 2nm is longer than time in cell at 1 nm. In this case Scan To Scan can be higher at 2nm compared to 1nm without target fading.

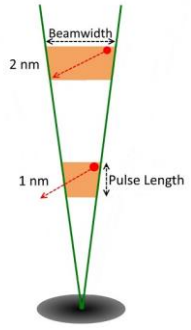


Figure B

Recommended maximum Scan To Scan settings for Static Site Radar

Recommend initial maximum Scan To Scan setting for small target with relative course 180°. For other courses Scan To Scan can be increased. When fast moving targets are compensated with Red Strike , Scan To Scan can be set from 3 and above.

SHN-X12, Short Pulse

Ant. speed	40 rpm
Target Speed	Scan To Scan
0,5 not	<30
1 not	17
2 not	9
3 not	6
5 not	4
10 not	2
15 not	1-2
20 not	1-2

For range above 0,75 nm

SHN-X12, Short Pulse

Ant. speed	35 rpm
Target Speed	Scan To Scan
0,5 not	<30
1 not	15
2 not	8
3 not	5
5 not	3
10 not	1-2
15 not	1-2
20 not	1-2

For range above 0,75 nm

SHN-X12, Medium Pulse

Ant. speed	40 rpm
Target Speed	Scan To Scan
0,5 not	<30
1 not	<30
2 not	<30
3 not	29
5 not	17
10 not	9
15 not	6
20 not	4

For range above 3,3 nm

SHN-X12, Medium Pulse

Ant. speed	35 rpm
Target Speed	Scan To Scan
0,5 not	<30
1 not	<30
2 not	26
3 not	26
5 not	15
10 not	8
15 not	5
20 not	4

For range above 3,3 nm

3 REDSTRIKE

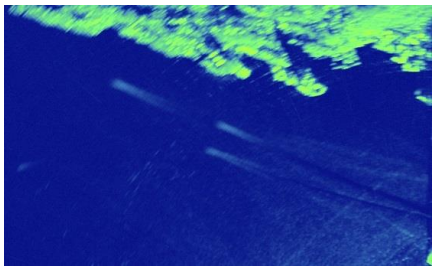
Red Strike, when correct adjusted, will essentially eliminate the “fade out” of fast moving targets when Scan To Scan correlation are in use.

Mode, Gain and Scan to Scan should be set/adjusted before adjusting Red Strike.

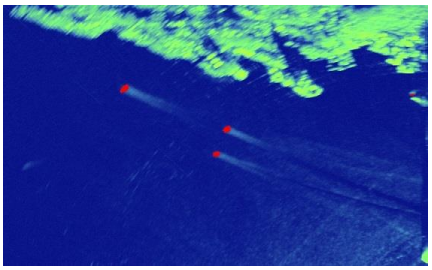
Level of Red Strike is adjusted with respect to Gain level, Scan to Scan number, Sea State and rain conditions. In sea clutter area the Red Strike should be adjusted to a level that only a few Red Strike from the sea clutter are presented.

With increased Scan to Scan correlations RedStrike should also be increased.

.



Red Strike off
Scan To Scan set to 7



Red Strike on
Scan To Scan set to 7

CHAPTER 6

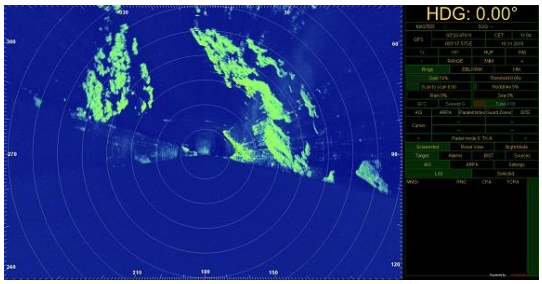
Plugin

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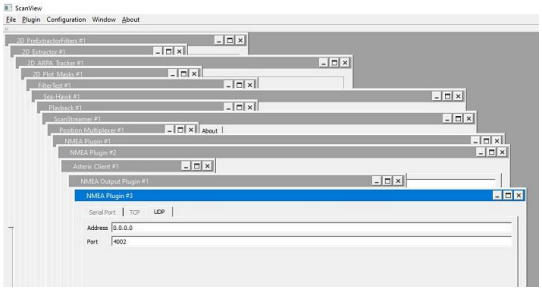
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1 OVERVIEW

SHN–View system consist of several Plugin's, that are described in the following chapters. Sea-Hawk Display plugin normally runs in "fullscreen" mode. All the other Plugin's runs within the ScanView frame.

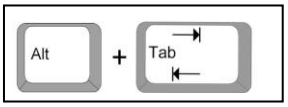


Sea-Hawk Display plugin " fullscreen " mode

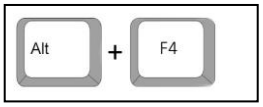


ScanView frame with plugins

Use Alt – Tab to switch between Sea-Hawk plugin in "fullsrceen" mode and ScanView frame.

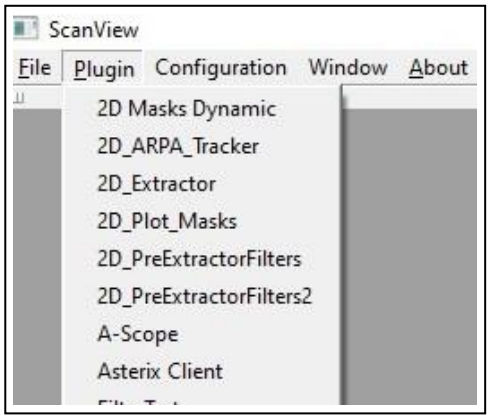


For exit / closing the Sea-Hawk Display plugin use ALT-F4 . Always exit Sea-Hawk Display plugin before exit / closing ScanView frame.



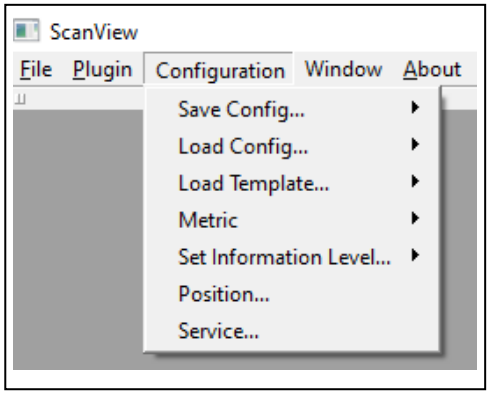
Plugin folder

For individually startup of Plugin's go to folder "Plugin". This action shall normally not be required, can be required upon remote support e.g .
All Plugins are license depended, "Error accessing license" warning will pop up if the Plugin don't have valid license.

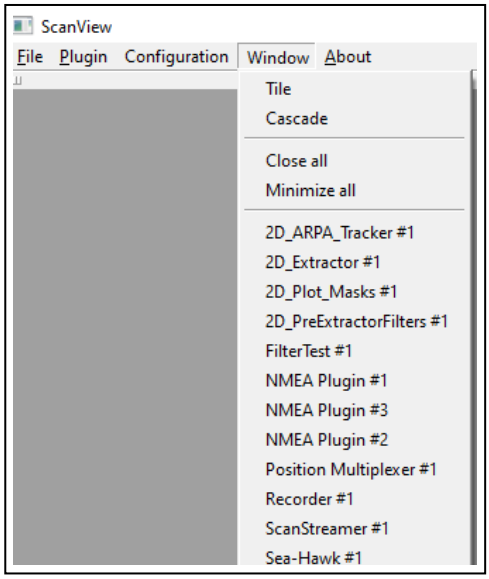


Configuration folder

For loading different configurations click on :
Load Config..
For some systems there can be several selectable Configuration files for different conditions. The other Options are not intended for the operator to use.



Window folder

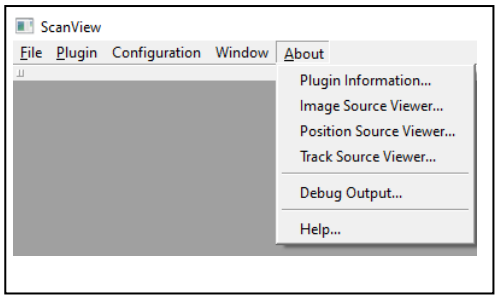


For easy access to one of the running Plugin's, select the wanted Plugin from the list under the Window folder.

Tile, Cascade and Minimize all, are different modes to display the Plugin's.

Warning, "Close all" exits all pulgin's.

About folder



Plugin Information; displays version no of the Plugin's

Image Source Viewer; Viewer for selected source.
Draw mode: -Scan converted
-A scope
-B scope

Position Source Viewer; displays position from selected Plugin that contains position Information.

Track Source viewer; display track ID from selected source.

Debug Output; display tech info for system engineers.

2 SEA-HAWK DISPLAY

Sea-Hawk Display Plugin is the main user interface Plugin for operation of the system.
Detailed description for operations is given in other chapters.

3 SEA-HAWK PLUGIN

This Plugin are in direcet communication with the Sea-Hawk radar. All radar commandos selected in Sea-Hawk Display, like selection of pulse length, transmit / standby e.g are routed though Sea-Hawk Plugin.

The operator shall normally not change any settings in Sea-Hawk Plugin.

4 SCANSTREAMER PLUGIN

Mainly analog video to digital video stream converter for network transfer. In adition to Sea-Hawk radar the ScanStreamer can be connected to other OEM radars for converting of radar video. ScanStreamer can also control some of the OEM radars.

The operator shall normally not change any settings in ScanStreamer Plugin.

5 FILTER TEST PLUGIN

The Filter Test Plugin is handling the Scan To Scan algorithm.

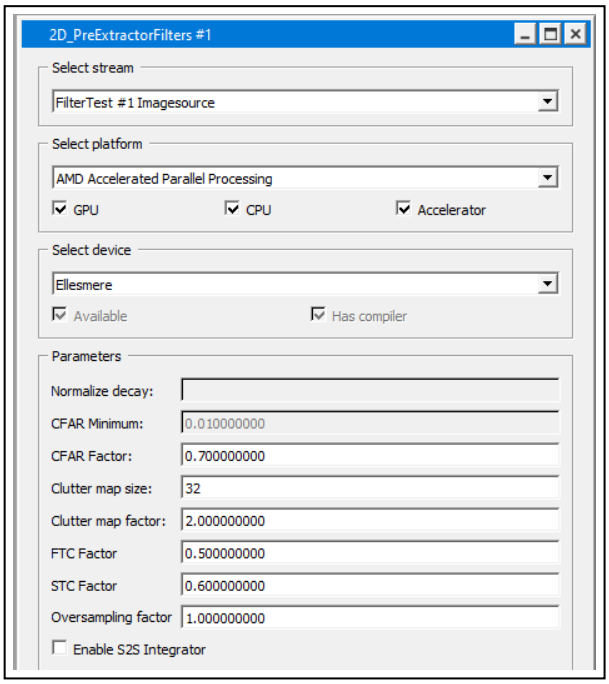
The operator shall normally not change any settings in Filter Test Plugin.

6 TRACKER PLUGIN'S

Tracker Plugin's family consists of four tracker Plugin's.

-2D Pre Extracktor
-2D Extracktor
-2D Plot Masks
-2D ARPA Tracker

2D Pre Extracktor

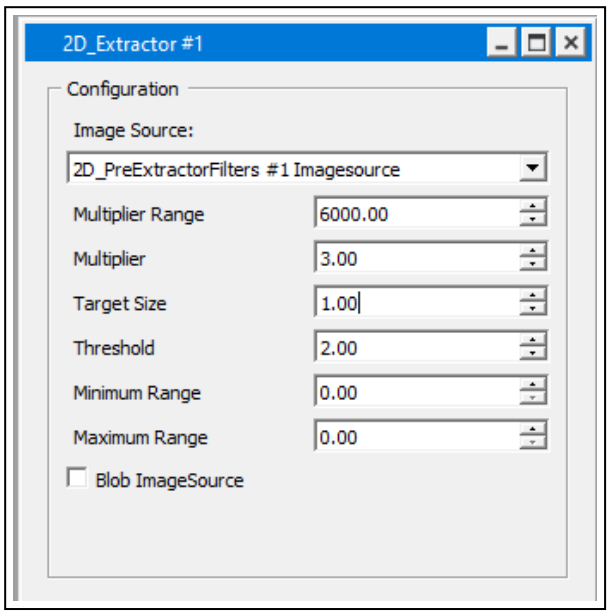


Pre extracts the radar stream before radar stream are sent to 2D Extractor.

In some cases the operator can alter some of the Pre Extractor setting due to change in weather or radar settings e.g. changes will not be saved,
To save changes config.json file needs to be saved. It's recommended to save under a new name.

Clutter Map Factor : 2 – 4
STC Factor : 0.5 – 0.7

2D Extracktor

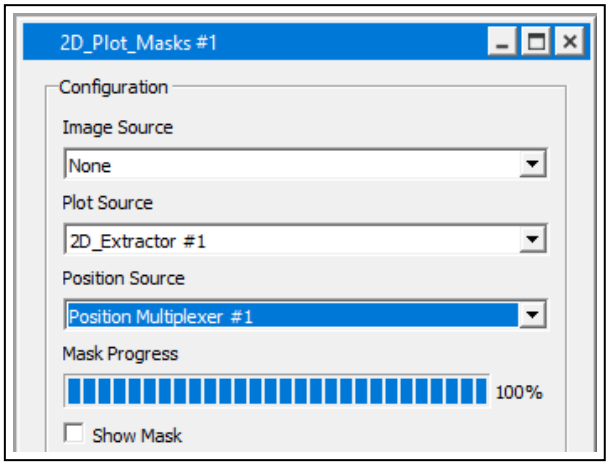


Extracts the radar stream before radar stream are sent to 2D Plot Maks.

In some cases the operator can alter some of the Pre Extractor setting due to change in weather or radar settings e.g. changes will not be saved,
To save changes config.json file needs to be saved. It's recommended to save under a new name.

Target Size : 1 - 5
Threshold : 1 – 3

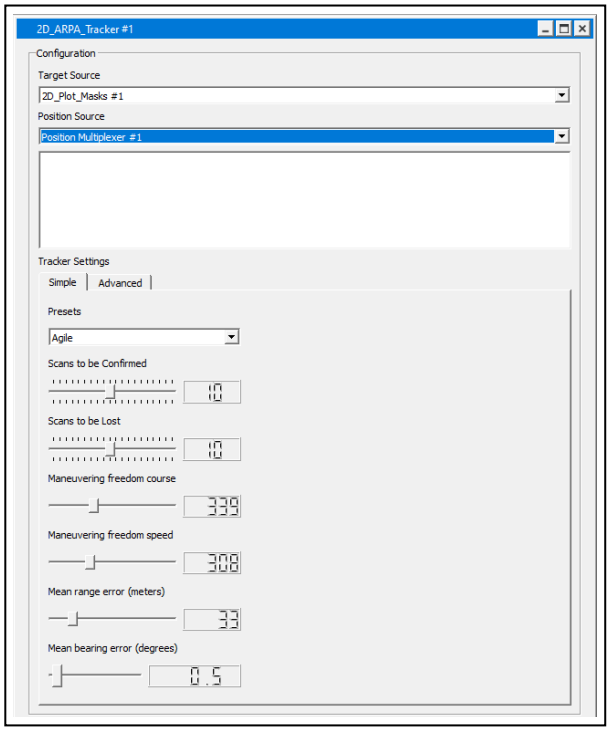
2D Plot Masks



2D Plot Masks sets out the zones that have been drawn in Zone & Guard Zones menu.

Normally no operator settings for 2D Plot Masks.

2D ARPA Tracker



Tracker settings that can be altered by the operator.

Scan to be confirmed:
No of antenna scans to confirm a target as tracked..

Scan to be lost:
No of antenna scans to confirm a target as lost.

Other settings shall normally not be changed.

To save changes, config.json file needs to be saved. It's recommended to save under a new name.

7 NMEA PLUGIN'S

NMEA Plug in receives NMEA sensor data from an external source.
NEMA Output Plugin's sends selected data from positions source and/or tracked targets from tracker sources.

Normally no operator settings for NEMA Plugin and NEMA Output Plugin.

8 POSITION MULTIPLEXER

Positon Multiplexer Plugin is used to adjust the offset positon of the GPS in relation to CCRP (consistent common reference point) onboard a vessel. The plugin can also generate a fixed position source, forward another position source, or combine multiple position sources. Heading can also be generated.

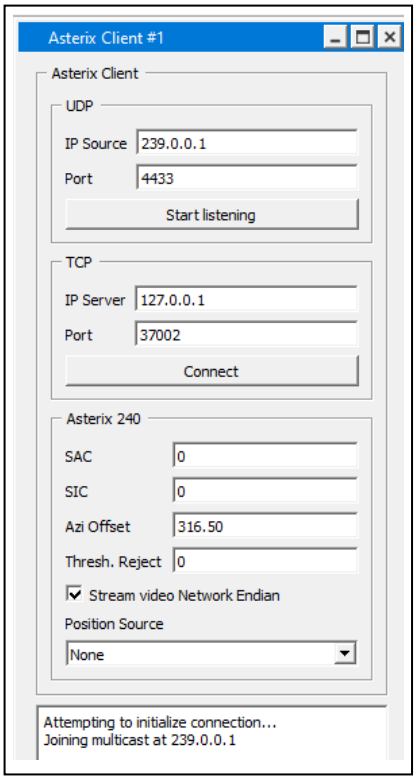
Normally no operator settings for Position Multiplexer Plugin.

9 ASTERIX CLIENT PLUGIN

Transfer protocol for digitized radar video. Used in some sea-Hawk sytems where there are several user nodes (e.g. radar display and oil spill display) connected to one radar.

In some cases after restart of SHN –View
The operators need to click on “Start listening” dialog box.

Normally no other actions or settings is required by the opertator for the Asterix Clinent Plugin.



CHAPTER 7

Troubleshooting

CONTENTS

			Page
1	Overview		3
2	Software faults / problems		3
3	Network faults / problems		4
4	Radar faults / problems		4

1 OVERVIEW

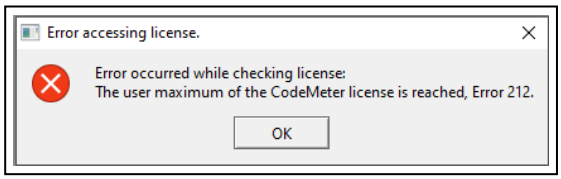
This section will cover troubleshooting that are linked to faults and problems related to :

Faults linked to software.
Faults linked to network.
Faults linked to radar.

Normal navigation alarms will not be covered in this section.
Some faults and system errors will generate alarms, others will be seen as missing radar video.

2 FAULTS & PROBLEMS LINKED TO SOFTWARE

License Error ;



Starting more than one SHN-View program.
Starting a Plugin without valid license.
Defect Dongle.

No Radar video present ;

1 Verify that correct Stream Source are selected.
If correct Stream Source, verify available
Image Source in Scanview Frame, Section 6-1.

2 If Asterix Plugin are in use, verify that the
plugin are listening. See Section 6-9.

3 Verify that radar are rotating and transmitting.
Verify that ScanView has connection with radar.

4 Verify that ScanView radar stream is not stopped
in firewall and other computer security programs.

3 FAULTS & PROBLEMS LINKED TO NETWORK

SHN-View communicates with radar via network. AIS, GPS and Gyro sensor data are received via com ports and/or network.

Verify that ping command receive response from Sea-Hawk radar and ScanStreamer.
Default ip adr for Sea-Hawk radar : 192.168.1.210
Default ip adr for ScanStreamer : 192.168.1.233
For systems with more than one Sea-Hawk radar or ScanStreamer other IP addresses my be in use.

4 FAULTS & PROBLEMS LINKED TO SEA-HAWK RADAR

Verify that For Sea-Hawk radar the Sea-Hawk View has a bist (built in system test)

Access BITE menu, verify PPR shall be 4096 ± 2
Verify Rev Time, should be within 1,40s- 1,90s site dependent.
Verify Rev Speed; normally a slightly small change when rotating.



Access BIST menu, verify radar feedback.

Verify voltages, Mag. Current, Transmit e.g.



Data from BIST menu are only presented when SHN-View are connected to a Sea-Hawk radar. For other radars this data may not be displayed.