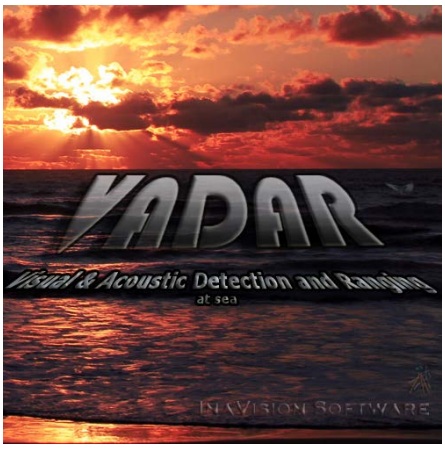
YADAR

Visual & Acoustic Detection and Ranging

at Sea

USER MANUAL

VERSION 1.51.02



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VADAR - Start Survey

Under the ***Survey Menu*** are a number of options to start or continue a VADAR survey:

1. **Start**. This will start a NEW survey. The start hour will be part of the Survey data file name. Real time input.
2. **Continue**. Continue with CURRENT (last survey data file created) survey. Real time input.
3. **Resume**. Continue with any OLD survey file already created. You will be asked to choose a file. Real time input.
4. **Open**. Open an OLD survey file. Use OPEN to edit and inspect old survey data files.
5. **Create**. Create and Start a NEW survey file for another date. Real time input.
6. **Import TOF file**. Import Cyclops TOF (Observation) file. First create a new survey file for the correct date.

VADAR – Definitions

Information Dialog

The Information Window at the top of the screen. Information about the Focal Observation is shown in this dialog box. The amount of information displayed can be changed by pressing the 'Shift' + 'Tab' keys.

Track Line

A line (shown on the graphics display) that joins all positional observations for the same pod or vessel. Each Track Line has a name. Information such as speed and course is calculated and displayed on the second row in the Information Dialog.

Focal Point

The current selected point or observation. Information about this observation is shown in the information dialog shown at the top of screen. The Focal Point is usually the last observation. Select a new Focal Point by clicking with the left mouse button (*LMB*) on any observation, or use the Page Up and Page Down keys to scroll through the list of observations (shown on the map with a hexagon).

Base Point (or Base Track)

An observation or track line that is set as the base. Additional information for the Focal Point is calculated from the Base point. The direction and distance from the Base Point to the Focal Point is shown in the last row of the Information Dialog. The Base Point is usually the observation Station. Select a new Base Point by holding down the 'Ctrl' key and clicking with the *LMB* on any observation. If the Base is set as a Track Line then the Base Point position is calculated on the Track Line at the time of the Focal Observation (shown with a diamond symbol).

Focal Track

A Track Line that has been highlighted. Additional functions and information are available for the Focal Track. Press 'Shift' + *LMB* on any observation for a track to make this the Focal Track.

Focal Layer

The current Layer (or Group) displayed in the Title Bar. New observations will be put into the Focal Layer. Quick edit Behaviour options are also based on the Focal Layer (shown in the menu bar).

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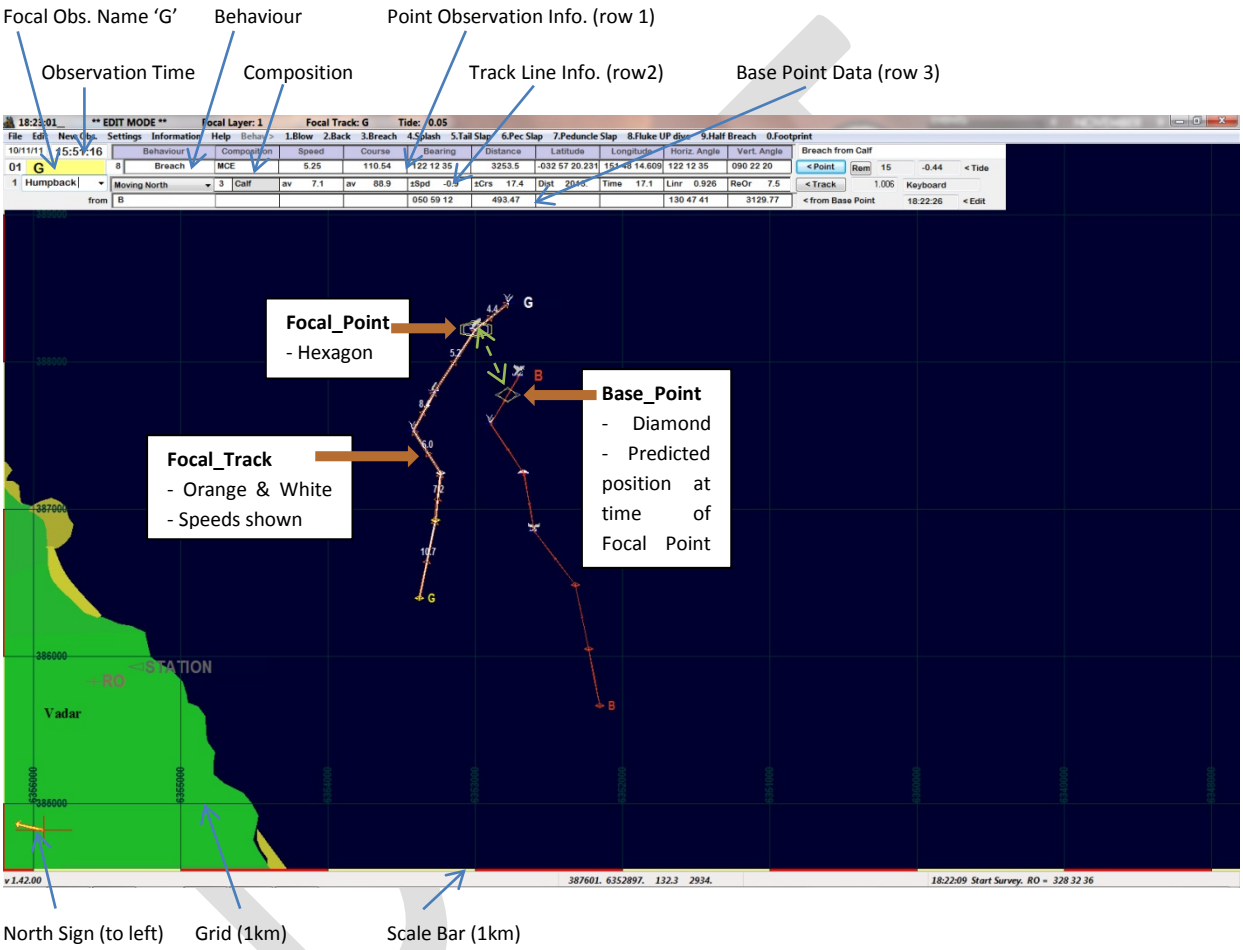
Zone of Interest

Special zones or areas can be defined which may be of interest. For example the boundary outlining a protected area (such as a marine park) can be defined as a zone, and any observations measured within the zone will be highlighted and labelled in the observational database for further analysis. If only 2 points are defined in a zone then the zone will be a square.

VADAR - Graphical User Interface



Information Dialog

Focal Point: **G** Time of Obs.: **15:51:16** Track Layer: **1 Humpback** Comments: **Breach from Calf**
Track #: **1.006** **(track #1, point #6)** Input Device: **Keyboard**

Observation data (row 1): Breach (from Calf); Mum Calf Escort (MCE); track leg is 5.25km/h @ 110.54°; 122°12'35" and 3253.5m from Station; Latitude & Longitude in DMS; Observed Horizontal & Vertical Angles.

Track Line data (row 2): Track Behaviour (Moving North); # in Pod (3), Member of Pod for Behaviour (Calf); Average Track Speed & Course (7.1 km/h @ 88.9°); Change in Speed and Course to next leg (-0.9 km/h {5.2 to 4.4}, +17.4°{right or clockwise turn}); Distance and Time tracked since first obs. (2013m for 17.1minutes); Track Line Linearity (0.926); Track Line Re-Orientation (7.5°/minute).

Base Point data (row 3): Base Point (B ~ location is diamond on map); Bearing and Distance from B at time 15:51:16 (50°59'12" @ 493.47m ~ green arrow on map); Bearing and Distance from Station to Base Point (130°47'41" @ 3129.77m). Other data such Cumulative noise exposure levels may also be shown on this row.

Row 3 can also show the predicated location, bearing and distance to the Focal Track (from the station).

Note: Green and Orange arrows and White Text Box are not normally shown on the map. Also note at top that VADAR is in Edit Mode; no new observations will be displayed until the editing is complete.

BEHAVIOURS SYMBOLS

Some behaviours have their own symbols shown on the screen but there are also several behaviours which can be used to display varying size symbols on the screen. The size of these symbols is determined by the pod composition; the radius or length of the symbol will depend on the composition size.

Behaviour	Symbol	Size	Comments
'Pod' or 'Group'	Concentric Circles	Radius(m) = composition x 5	Composition of 10 will have radius of 50m.
'Circle'	Concentric Circles	Radius(m) = composition	Composition of 1200 will have radius of 1200m.
'Blast' or 'Ring'	Concentric Circles	Radius(m) = composition	Only last observation for track will have large circle.
'Shot'	Concentric Circles	Radius(m) = composition	Only shot within 10 seconds of current time will have large circle
'Square'	Square	Length(m) = composition	Composition of 800 will have side length of 800m.

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VADAR - Menus

File Menu

Ctrl + S	**Stop Survey**	Return to VADAR start-up screen.
	Extract Focal Track	Copy Focal track to another Survey File (named 'f1').
	Create Multi-Survey File	Creates a new Survey File ('MS') for multi-survey input.
	Add Survey	Adds another survey file to the MS file.

Only Observation records are added to Multi-Survey files; remarks, weather etc. are not included.

Edit Menu

Ctrl + E	**Edit Obs** .	Puts VADAR into ***Edit Mode***. Cursor is placed into *NAME* field.
Ctrl + D	**Delete Point**	Deletes the Focal Point. Another delete will un-delete.
Ctrl + F	**Find Track**	Find first record for Track.
Alt + C	**Edit Comments**	Puts VADAR into ***Edit Mode***. Cursor is placed into *COMMENT* field.
Alt + R	**Edit Range**	Cursor placed in *Distance* field. Additional Observations only.
Alt + D	**Edit Direction**	Cursor placed in *Direction* field. Additional Observations only.
Alt + T	**Track Colour**	Change Focal Point Track colour.
Alt + W	**Edit Weather**	Edit the last Weather record.
	Clear Temp. Obs.	Clear temporary observations (used with Acoustic input).
	Refresh All	Re-compute and Refresh the graphics screen.

New Obs. Menu

Ctrl + A	**Additional Obs.**	Opens input dialog for Additional Observation.
Ctrl + B	**Behavioural Obs.**	Starts Behavioural Observations input.
Ctrl + R	**Remarks Obs.**	Opens input dialog for Remarks.
Ctrl + W	**Weather Obs**.	Opens input dialog for Weather observations.
Ctrl + K	**Keyboard Input**	Opens Keyboard Input dialog for binocular or theodolite obs.
Ctrl + L	**Location Fix**	Opens dialog for Location Fix (known point co-ordinates).
Ctrl + G	**GPS Obs.**	Gets a new location fix for the survey vessel from the GPS.
Ctrl + T	**Theo Obs.**	Obtain a new observation using data from the theodolite.
Ctrl + I	**Slope + Angle**	Opens input for Slope Angle and Direction (Inclinometer).
Ctrl + C	**Elec. Compass**	Gets a new observation using Electronic compass data.
Ctrl + O	**Photo. Obs.**	Opens Input Dialog for first Photo Observation (image file name).
Ctrl + V	**Aerial Photo. Obs.**	Opens Input Dialog for first Aerial Photo Observation (file name).
Ctrl + X	**Text File record**	Read in the next record from the Text file (CSV file).
Ctrl + P	**Prediction***	Predicts location and other data for Focal Observation Track.
	Station Height*	Opens Dialog Input for calculating Station Height.
	Define Zone	Special input mode to define a Zone of Interest.

* These do not create a new record (data is not saved).

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SETTINGS MENU

Alt + D	**Display & Info. Settings**	Change Display and Information Settings.
	Display Time	Display and Change Time (OPEN survey only).
Alt + A	**Air Gun**	Change Air Gun status (On/Off or Ramp Up stage).
Alt + G	**GPS**	Turn GPS On/Off.
	AIS	Turn AIS On/Off.
Alt + B	**Base Point**	Set Focal Point as BASE Point.
Alt + F	**Focal Track**	Set Focal Point as FOCAL Track.
Alt + S	**Set Station as Base**	Set Station as BASE Point.
Alt + V	**Set SV as Base**	Set Survey Vessel as Base Point (Track).
Alt + Z	**Set TA as Base**	Set the Towed Array as Base Point (Track).
Alt + PgUp	**Next Remark**	Display Next Remark.
Alt + PgDn	**Previous Remark**	Display Previous Remark.
	East + North	Show positions as East and North.
	Lat+Long (DMS)	Show positions as Latitude & Longitude (Degrees, Minutes, seconds)
	Lat+Long (DM.m)	Show positions as Latitude & Longitude (Degrees, decimal Minutes)
	Lat+Long (D.dddd)	Show positions as Latitude & Longitude (decimal Degrees)

INFORMATION MENU (DATABASES)

Tracks	Database Information Dialog of all Tracks observed.
Track Line Summary	Database Information Dialog of all Tracks (summary).
Observation Info	Information on each Observation for every (or focal) Track.
Raw Observations	Information on the raw data measured for each observation.
Focal Follow	Database Info for the Focal Track.
Relational Follow	Relational Database Info for the Focal Track and Base Track
Auxiliary Data	Information on extra data collected such as Weather Info. etc.

KEY MENU

	Short Cut Keys	List of available short cut keys.
Ctrl + F1-F12	**(Angle & Range)**	User defined fixed observations (Turn Angle and Range).
Alt + F1-F12	**(Angle & Range)**	User defined fixed observations (Turn Angle and Range).

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VADAR – Observation Input

Each observation input into VADAR becomes a record stored in one of two database files. Each record can be classified as type:

1. High accuracy position (theodolite, camera, GPS observations, etc.)
2. Low accuracy positions (compass binoculars, etc.)
3. Non-position (behaviour, remarks, weather, etc.)

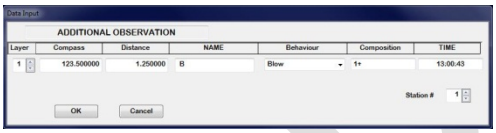
Only record type #1 is used to calculate track line speed and course, etc. Record type #2 positions can be plotted on the map as individual marks (not on track line), but are still a valid observation for that track number. The derived position of behavioural observation records (based on the record time) can also be plotted on the map.

Keyboard Input

Many of the new observations are input via the keyboard. Fill in the appropriate fields and press the ***Accept*** button (or press **Enter**). Use the **Tab** key to move from one field to the next; the use on the mouse is not required making it easier for field work. Any keyboard input is time stamped when the input dialog is open; if data is being added post field work then make sure the time is also correct (HH:MM:SS).

Additional Observation 'Ctrl + A'

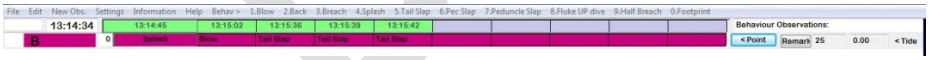
Additional observations are visual observations taken with compass binoculars or eye. Additional Observations will be assigned to a track line but are not used in determining track line speed, course etc. (insufficient accuracy); non-position record.



Type the compass bearing in decimal degrees under 'Compass'. The 'Distance' field can either be either metres (using a range finder or guessing the distance) or compass reticule distance (from horizon to target). Pod name, behaviour and composition can also be set.

Behavioural Observation 'Ctrl + B'

Behavioural observations are visual observations of behaviours for the Focal Track or last track line observed. Up to 10 behaviours can be stored on one record; only the time and behaviour is recorded for each.

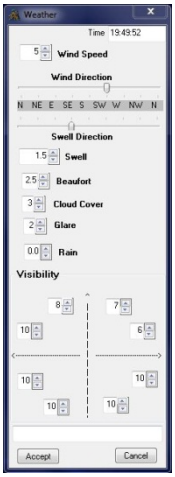


When the behavioural observation is first executed only the pod name and time is displayed, all 10 behavioural observation fields are blank. Each new behaviour is added by pressing the appropriate key assigned to that behaviour (e.g. 5 = Tail Slap; that is just press the '5' key every time a tail slap is observed); the time and behaviour is added to the next field. Press the 'Enter' key to save and quit out of behavioural observations. Press the function keys (F1, F2, etc.) to display behaviours from those groups. Press the 'Backspace' key to delete the last behaviour and re-enter (the time is retained).

Remarks Observation 'Ctrl + R' OR *Remark*

Any additional remarks or comments can be saved by using the remarks observation. Type in remarks into the 2 fields available and press 'Enter'. Remarks can be linked to other observations by opening the Remarks input dialog by pressing on the '*Remark*' button for that observation (do not use 'Ctrl+R').

WEATHER OBSERVATION 'CTRL + W'



Use the 'Tab' key to scroll down to each field and then use the arrow keys to set the correct value. Press 'Enter' or the '*Accept*' button to save the observation. Cloud cover is in eights and glare is on a scale of 0 to 3. Visibility is expressed as the maximum viewing distance (km) in any one of 8 directions. Any remarks can be added at the bottom of the dialog box. The last weather observation can be edited or inspected by pressing the 'Alt' + 'W' keys. Weather observations are stored in the auxiliary file.

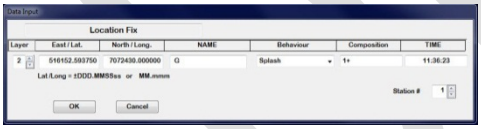
KEYBOARD INPUT 'CTRL + K'

Keyboard input can be used to either manually type in theodolite observations, or compass binocular observations if they are to be used as the primary measurement device (record type #1).

If you wish to simulate a theodolite observation put a '#' in the name field; in this case VADAR will add all the corrections used for a theodolite shot; angles must be in the format 'DDD.MMSS'. Binocular observations should be in decimal degrees for the horizontal angle (compass reading) and the vertical angle is the reticule reading.

LOCATION FIX 'CTRL + L'

A location fix can be used to type in a point's location if the Latitude and Longitude or Easting and Northing are known (from a GPS fix, etc.).



Location can be input as East and North (in metres) or Latitude and Longitude as '±DDD.MMSSss' (ss = decimal seconds).

SLOPE + ANGLE OBSERVATION 'CTRL + I'

An inclinometer and protractor device can be used to take observations during a vessel or aerial survey. The slope angle is the angle read by the inclinometer (angle from horizontal down to target in decimal degrees) and the angle is the turn angle from the vessels course to the target (horizontal bearing = vessel course + turn angle). Distances measure with a range finder can also be used and placed into the slope angle field (any slope angle greater than 40.0 will assumed to be a distance). These will be record type #1 as they will be the primary means of measurement, despite the fact that they are low accuracy.

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GPS OBSERVATION **'CTRL + G'**

Force a GPS reading to be taken.

ELEC. COMPASS OBSERVATION **'CTRL + C'**

Force an EC reading to be taken.

THEO OBSERVATION **'CTRL + T'**

You can force VADAR to take GPS, EC or theodolite observation at any time using these options. Normally these types of observations are recorded using other means.

TEXT FILE RECORD **'CTRL + X'**

This option will read in the next record from a CSV file. The test record field types are set in the 'CSV Import' section in Graphics and Information Settings.

FIXED OBSERVATION **'CTRL + F1** TO **F12'** AND **'ALT + F1** TO **F12'**

These are user defined 'Additional' fixed observations; the direction and range to the target are pre-defined in the file called '*NAME*_FKEYS.dat' (*NAME* is the project name). This type of observation will only be useful for vessel and aerial surveys where lower accuracy directions and ranges are acceptable over short distances. The directions can be measured with a protractor or even estimated from the direction of the vessel (turn angle). Often the direction is estimated based on the hour hands of a clock (1 to 12; 3 o'clock is 90 degrees) which may correspond with the F1 to F12 keys (two distance zones will then be possible, one using Ctrl and the other using the Alt key).

The function keys can also be used in two stages, the first to set the direction and the second to set the distance (in 100m increments; 100m to 1200m). For example the first key stroke may be 'Ctrl+F9' (9 O'clock = 270 degrees) and second may be 'Ctrl+F6' (600m). The distance in the '*NAME*_FKEYS.dat' will have to be set to -1 for this type of option. Use the 'Esc' key to quit out if a mistake is made.

The direction and range can also be edited after the observation is made to correct or increase the precision of the measurements (use 'Alt+R' and 'Alt+D').

INSTRUMENT INPUT

THEODOLITE

The electronic theodolite should be connected to the computer by a serial cable. Use either the 'Record' button on the theodolite or ***Ctrl + T*** keys to take a theodolite observation. The first theodolite shot should be to the Reference Target to make sure that the instrument has been setup correctly (make sure the instrument is in Face Left or Face I ~ vertical angle will be about 90 degrees); VADAR will show a message that the Reference Target has been done. The second theodolite shot should also be done to the Reference Target but this time in Face Right or Face II; this will perform a Vertical Circle Index Correction (VCIC) check and then VADAR will make corrections for the Vertical angles. Vertical Circle Errors will cause large errors in determined distances unless this check is performed. Return the instrument to Face Left once this is done. Theodolite shots should be taken to the Reference Target several times a day or after the instrument has been disturbed or gone out of level.

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GPS, AIS, Electronic Compass & Rotary Encoders

These devices also need to be connected to the computer using a serial cable. Once VADAR has started a survey it will read these instruments at certain time intervals, from every 0.5 seconds for EC and RE to every few minutes for GPS and AIS. Specific time intervals can be set in the Project file.

Cameras

There is a large variety of options available with cameras. Camera observations can be done a number of ways; from almost fully automatic input to post processing. Refer to the 'VADAR Camera' manual.

Observations

Once an observation is taken, VADAR will calculate the position of the target and 'best guesses' which Track Line was observed (if unknown). This measurement will usually become the Focal Point and displayed on the screen. Often some editing of the observation is required. If VADAR cannot match the observation to an existing track line a new track line will be created for that observation.

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VADAR – Edit Data

VADAR is designed so that most of the important editing can be done quickly and simply. But there is always the option to edit all data in the information dialog box, by simply re-typing the data in the field.

Edit Mode

Once any editing has started VADAR will go into ***Edit Mode*** and the words '** EDIT MODE **' will appear in the title bar. While in ***Edit Mode,*** VADAR will not update any information or graphics until the edit has been complete (but VADAR will still be running in the background looking for new observations, etc.). Pressing 'Ctrl + E' or pressing the mouse cursor in any field in the information dialog will put VADAR into ***Edit Mode***.

➢ Enter	or	'***Point***' button	to accept edit for Focal Point only.
➢ Esc			to Quit edit.
➢		'***Track***' button	to Accept edit for all observations for that Track.

Quick Edit Options

There a number of quick edit options for the observation fields that need the most editing. Pressing the following keys will place the corresponding character in the appropriate field with the information dialog box, and put VADAR into ***Edit Mode***:

➢	A to Z	*	Track Name (letters A to Z)
➢ Shift +	1 to 0	*	Track Name (numbers 1 to 9 and 0)
➢ Ctrl +	`		Change Name prefix level (e.g. from '1A' to '2A')
➢	1 to 0	#	Behaviour (list is on Menu bar)
➢ Shift +	A to Z	*#	Behaviour
➢ Ctrl +	1 to 0		Composition
➢ Ctrl +	- or =	*	Composition (MC, MCE, etc.)
➢	=	*	Count up the number of behaviours (e.g. 'Blow * 3')
➢	-	*	Count down the number of behaviours
➢	\		Change Track Name to Focal Track Name
➢ Shift +	F1 to F9		Change Layer
➢	F1 to F9		Select Focal Layer (or Group)
➢	Enter		Accept Observation Edit
➢	Esc		Cancel Edit
➢ Alt +	C		Edit Comment (cursor jumps to comment field)

* Repeatable Key strokes. Each key stroke in quick concession will change the field.

\# User defined

ATTENTION: Remember to Accept or Cancel when editing is complete, otherwise VADAR will appear to be locked up. Press the ESC key if VADAR seems to be not responding.

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YADAR – Control

There are also other quick key strokes available:
LMB = Left Mouse Button
RMB = Right Mouse Button
MSW = Mouse Scroll Wheel

General

Shift + Tab	Change size of Information Dialog
LMB	Select Focal Point
Shift + *LMB*	Select Focal Track
Ctrl + *LMB*	Select Base Point / Track

Focal Point

Page Up	Make previous observation the Focal Point
Page Down	Make the next observation the Focal Point
Home	Go to first Observation
End	Go to last Observation
[	Go to previous Observation on the Track Line
]	Go to next Observation on the Track Line
Shift + [	Go to first Observation on the Track Line
Shift +]	Go to last Observation on the Track Line
Alt + Page Up	Display Next Remark.
Alt + Page Down	Display Previous Remark.

Graphics

Ctrl + Home	Pan and Zoom to default viewport
Ctrl + End	Pan to Last Observation
Ctrl + Insert	Pan to Focal Point
Ctrl + Page Up	Zoom In
Ctrl + Page Down	Zoom Out
Arrow	Pan viewport (left, right, up, down)
Shift + Arrow	Shift viewport (left, right, up, down)
RMB	Pan to mouse position
MSW	Zoom In / Out

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TIME (OPEN SURVEY ONLY)

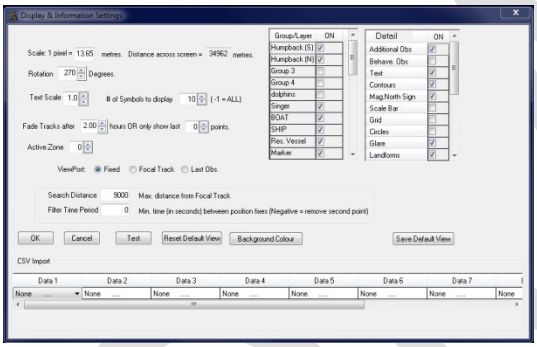
A number of extra commands are available in OPEN mode:

- , (comma) Decrease time by 6 minutes
- . (dot) Increase time by 6 minutes
- Shift + , (<) Decrease time by 15 minutes
- Shift + . (>) Increase time by 15 minutes

VADAR – SETTINGS

GRAPHICS & INFORMATION SETTINGS

- Alt + D or **Display & Info. Settings Menu**



GRAPHICS SETTINGS:

- **Scale** Sets the scale but the scale will constantly change when zooming.
- **Rotation** Change the direction of North on the screen (0, 90, 180 or 270°).
- **Text Scale** Change the size of the text on the graphics screen.
- **# of Symbols** Number of behaviour symbols to display at the end of each Track Line.
- **Fade Track after** # of hours of observations to display to the current time (0.0 = display all).
- **Show Last** # of points to display at the end of each Track Line (only if **Fade** = 0.0 hrs).
- **Active Zone** Set which zone is active (0 = none).
- **ViewPort** Fixed, Centre on Focal Track or Centre on Last Observation.

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Layers (or Groups) can be turned On/Off (this also includes external network inputs). Many of the graphics elements can also be turned On/Off.

Background Colour Change the background colour (water).

Reset Default View Change graphics display to the default view (same as Ctrl + Home).

Save Default View Save the current graphics display as the default viewport.

INFORMATION SETTINGS:

- **Search Distance** The maximum distance to search for the Focal Follow and Relational databases.
- **Filter Time Period** A filter can be applied to each Track Line so that a minimum time period (seconds) is used between observations. That is, if two observations to the same Track were done close together then only one will be used of calculating track speed and course, etc. Care must be taken when using this function as it may appear to give strange results if not used properly. Set 0 to turn this feature off.

CSV IMPORT SETTINGS:

Data types contained within the CSV file which will be imported into VADAR. A time data field must be one of the data types as well as some type of position data (horizontal and vertical angles or positions).

GROUP/LAYER SETTINGS:

Each group or layer can be hidden by un-ticking (turning OFF) that group. In the example above layers named Group 3, Group 4, Dolphins and Singers will become hidden (removed from the screen).

DETAIL SETTINGS:

Other detail can also be shown or hidden on the screen. For example the position of Additional records (type #2) and Behaviour records (type #3) can be displayed or not. An alternative information dialog window is also available for non-wide screen computers.

- Display Additional Observations
- Display Behavioural Observations (location calculated from position observations)
- Display Text on map
- Display Contours
- Display Magnetic North and True North sign (bottom left corner)
- Display Scale Bar (bottom and left of screen) 1 Km interval
- Display Grid (1 Km or 10 km interval)
- Display radiating distance Circles from Base Point (1Km intervals)
- Display area effected by sun Glare (hatched area)
- Display Land Forms
- Display Track Info at last location of track line
- Display Active Zone (hatched area)
- Display Alternative Information Dialog if normal dialog does not fit on screen.

Other graphics and information data can be adjusted in the **Settings Menu.**

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VADAR – Information (Database Information)

There are a number of options to inspect and export a table of data collected by VADAR and other information. The information is exported as a CSV file (comma separated variables) which can be read by Excel and other database programs.

Tracks

Information about each Track line observed.

Track Line Summary

Summary Information about each Track line observed.

Observation Information

Information about observations taken during the survey. If a focal track is selected then only observation information for that track will be displayed. If a base point or track is selected then the bearing and distance from the base point are displayed, otherwise the bearing and distance is from the observation station. The table will only contain observations from Groups (Layers) that are turned on.

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