

SEARCH AND RESCUE (SAR)

TRAINING AUSTRALIA 

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# ***SAR Calculator***



***USER MANUAL***

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Version 3.0

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## Contents

	PAGE
1. Application Overview _____	2
2. Maritime Drift (WS1) _____	5
3. Land Plot (WS4) _____	8
4. Aviation Search (WS2/3) _____	12
5. Maritime Search (WS8) _____	15
6. Coords Module _____	18
7. Allocation Editor _____	20
8. Solution Wizard _____	24
9. Calculator Suite _____	26
ATVS Calculator _____	27
Track Space Calculator (Air Search) _____	29
Track Space Calculators (Maritime Search) _____	30
Intercept & Escort _____	31
Grid Convertor _____	32
Cumulative POD Calculator _____	33
Fuel Calculator (Area Allocation) _____	34
10. Tools Suite _____	36
Zone Clocks _____	37
SARC_Map _____	38
Bearing\Distance _____	40
First-Last Light _____	40
Time Difference Calculator _____	41
Computations Calculator _____	42
11. Resources _____	43
12. Preferences _____	43
13. Disclaimer _____	45

## 1. SAR CALCULATOR APPLICATION OVERVIEW

The SAR Calculator has been designed to assist SAR practitioners with search planning calculations, in accordance with accepted Search and Rescue procedures and practices.

The application should be used in conjunction with standard operating procedures and should not be considered the primary source for the SMC decision making process.

The SAR Calculator has been developed using the methodologies adopted in the Australian National Search and Rescue Manual.

The SAR Calculator is designed to run on the Microsoft Windows environment. The software has been tested on Operating Systems (OS) using version 4 of the .Net Framework or later.

The software may have problems running on earlier versions of the .Net framework.

The SAR Calculator and SARC\_Map applications are designed for 96 DPI display settings (100% font size). Display issues may result for DPI settings greater than 96. To adjust or check the DPI configurations consult the OS display settings.

For installation simply Drag & Drop the SAR Calculator folder from the USB drive to the desired location on your PC (i.e. My Documents Folder, Operational Network Drive etc.). Alternatively the application can be run from the USB drive itself. To start the application double click on the "SAR Calculator.exe" file.

The design concept of the SAR Calculator is to provide a portable, uncomplicated application that operates in a stand-alone environment with no reliance on external databases that allows for quick and precise calculations in place of manual SAR worksheets.



On start-up the application loads a Floating Window that presents the user with a quick access menu to the different modules and functionalities of the program. The Floating Menu is designed to be relatively unobtrusive and can be positioned anywhere on the users screen, where it will by design stay on top of all other active windows.

To access the different modules simply click on the desired menu item. Depending on the element either a new window will be opened to allow access to the module or a list will be presented with various calculators and tools that can be double-clicked on to activate.

## TIPS & TECHNIQUES

### COORDINATES

A number of the modules require input of Latitude and Longitude for positional reference.

The application requires the following formatting for this coordinate system;

#### Latitude

- Degrees Minutes & Decimals of minutes (6 digit)
- Ranging from 0 degrees at the equator to 90 degrees at the poles
- Hemisphere Reference (N = north, S= south)
- i.e. 25 15.30 S

#### Longitude

- Degrees Minutes & Decimals of minutes (7 digit)
- Ranging from 0 degrees at the prime meridian to 180 degrees at anti meridian
- Direction Reference Greenwich (E=east, W=West)
- i.e. 135 54.24 E

### DATE TIME

A number of the modules require input of a Date-Time group (DTG). The application requires the DTG to be entered as per the computer system settings format;

Formatting: d=day, M=month, y= year, h=hour, m=minutes

Example: 16<sup>th</sup> Feb 2016 @ 09:17UTC

AUS/UK: "dd/MM/yyyy hh:mm" = "16/02/2016 09:17"

USA: "MM/dd/yyyy hh:mm" = "02/16/2016 09:17"

### ICONS



Opens an interactive calculator tool



Performs a calculation and returns the applicable results



Resets the module ready for a new calculation



Opens Target Selector



Solution Wizard



Opens Interactive SAR Light Calculator



Opens Interactive Time Calculator



Toggle to set floating window status (right click form to access context menu)

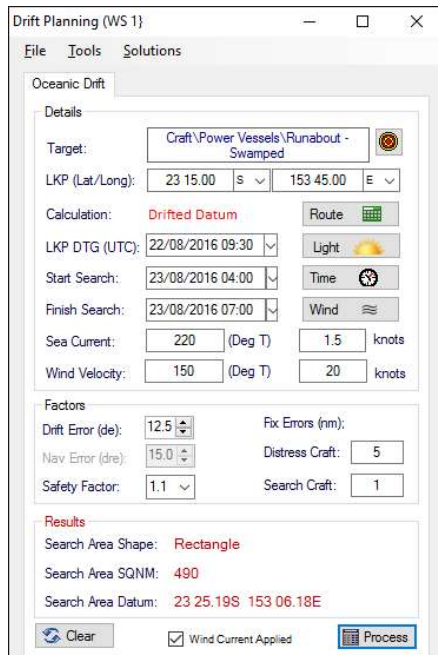
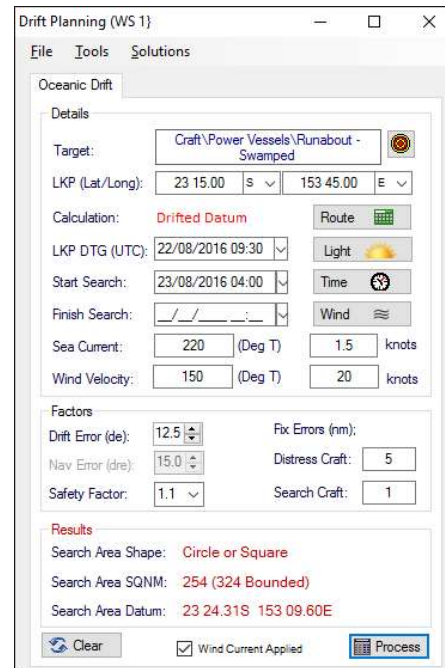
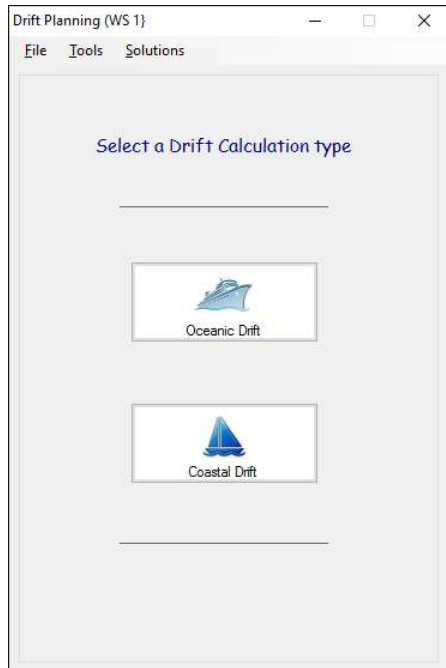
## MENU ITEMS

In each of the main modules is a Menu strip which provides access to certain functions and tools. The Menu is a consistent throughout the application and is comprised of the following;

- **File** menu
  - **New** - starts a new calculation
  - **Open** - opens an existing calculation
  - **Save** - saves the current working calculation
  - **Save As** - saves a copy of the current working calculation
  - **Close** - exits the module
  
- **Tools** menu
  - Provides access to a range of tools or functions to assist in the calculation type
  
- **Solutions** menu
  - **PDF / Text File / Print** – Exports the results of the calculation to the document type selected;
  - **Send to**
    - **Coords** - sends the calculation result to the Coords module (generate search legs and waypoints)
    - **SARC\_Map File** – sends the calculation result to a mapping file that can be opened and viewed in the SARC\_Map application
  - **Solution Wizard** – guides through the creation of a comprehensive SAR solution

## 2. MARITIME DRIFT MODULE

The Maritime Drift module is designed to perform the complex calculations associated with Worksheet 1 in the National Search and Rescue Manual, providing the user with a drifted maritime search area based on the parameters for a particular target, time and environmental conditions. *For a comprehensive understanding of drift planning please consult the National Search & Rescue Manual (NATSARMAN).*



Access to the Maritime Drift Module is achieved by clicking on the 'Maritime Drift' menu item on the SAR Calculator floating window.

Select from the two Drift Calculation options available;

- **Oceanic Drift** (refer to section 4.7 of the National SAR Manual)
- **Coastal Drift** (refer to section 4.8 of the National SAR Manual)

## User Guide

- To start a new Drift Calculation select 'New' from the File menu and select a drift calculation type (oceanic or coastal);
- Click on the Target icon to select the applicable target (note: target leeway & current factors are imported on selection);



- Enter the last known position (LKP) of the target : Latitude and Longitude
- Enter the LKP date time group
- Enter the time UTC that the search will commence
- Optional: Enter the time that the search is planned to conclude (leave blank for basic radius area / sector search)
- Complete the average Sea Current Direction and Speed fields
- Complete the average Wind Direction and Speed fields
- Set the Error Factors in accordance with NATSARMAN Appendix J
- Optional: Check / Uncheck the Wind Current Applied (by default this is not applied)
- Click on the Process button to perform the Drift Calculation

## Results

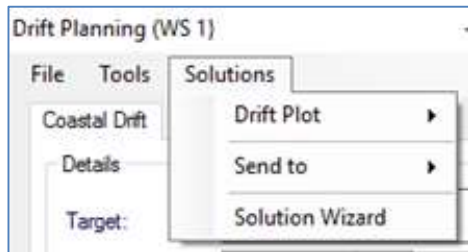
The Maritime Drift module will provide the following results;

- Search Area Radius (in nautical Miles based on the Calculated Datum);or
- Search Area Shape (based on the Calculated type)
- Search Area Square Nautical Miles
- The Calculated Search Area Datum for the target that the above results are based

Note:

To drift Route instead of a Datum open the route editor, complete the applicable fields and check the 'Drift as Route' checkbox. Apply navigation errors (dre) in accordance with the recommendations in NATSARMAN Appendix J

## Solution Menu Options

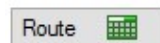


- **Drift Plot:** Creates a comprehensive Drift Plot calculation report that can be printed or saved as a PDF or text document
- **Send to:** The calculation can be sent to the Coords module, where the Search area can be developed. The plot can also be sent to a SARC-Map file to be viewed in the SAR Calculator mapping application (SARC\_Map).
- **Solution Wizard:** Guides the SAR practitioner through a number of the SAR Calculator modules to complete a comprehensive SAR plan solution.

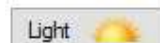
Worksheet 1		SAR Calculator
<b>OCEANIC DRIFT PLOT {Drifted Datum}</b>		
Drifted Target Type:	Craft\Power Vessels\Runabout - Swamped	
Data Valid for:	23/08/2016 04:00UTC	
1. Target (LKP):	23 15.00S 153 45.00E	
2. Sea Current Position:	23 36.23S 153 25.50E (BD:220/27.8)	
3. Wind Current Position:	23 29.57S 153 12.90E (BD:244/32.8)	
4. Leeway Drift Left Position:	23 25.12S 153 08.10E (BD:253/35.4)	
5. Leeway Drift Right Position:	23 23.49S 153 11.16E (BD:255/32.2)	
6. Search Area Datum Position:	23 24.31S 153 09.60E (BD:254/33.8)	
7. Search Radius:	9	
8. Search Area:	254 sqnm	
Note: All Bearings & Distances (BD) are referenced from the LKP coordinates (1)		

### *Oceanic Drift Plot Solution Example (print Version)*

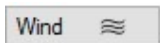
## Tools



The Drift Module provides the option to either drift a Datum or a Rout which is accessed by the Route Editor tool.



The Last Light and Time Difference calculators interact with the module to assist in determining hours of drift to be applied to the search plan.



An average Wind Calculator is available to determine the mean wind effect over the drifted time period, should the winds over the duration be known to have had variances in magnitude.



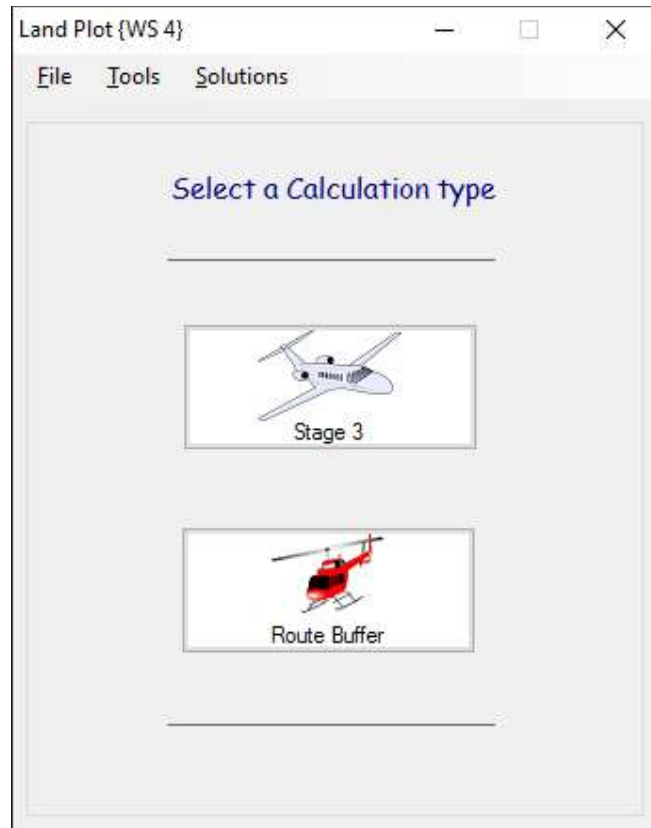
### 3. LAND PLOT

The Land Plot module is designed to perform the functions of the Worksheet 4 calculations, as contained in the National Search and Rescue Manual. This module allows for the development of a single point datum based plot or for a two point datum plot to construct a route trapezoid search area. Additionally a stage 2 Route Buffer area can be created in this module. *For a comprehensive understanding of search planning please consult the National Search & Rescue Manual (NATSARMAN).*

Access to the Land Plot module is achieved by clicking on the 'Land Plot' menu item on the SAR Calculator floating window.

Two calculation options are available to choose from;

- **Stage 3:**  
(Circle of Probability around a datum and Route Trapezoid)
- **Route Buffer:** (Stage 2 Area)



#### User Guide - Single Point Datum

1. Select New from the File Menu and select the Stage 3 option;
2. Enter the LKP Latitude / Longitude (Deg Min Dec)
3. Enter the LKP DTG;
4. Enter the applicable Fix Errors in accordance with Appendix J (NATSARMAN);
5. Select an appropriate Safety Factor (default 1.1)
6. Click on the Process button to generate results.

## Results - Single Point Datum

The Land Plot module will provide the following results;

- Search Area Radius (in nautical Miles based on the Calculated Datum)
- Search Area Square Nautical Miles based on the search radius (a boxed up calculation is also provided)
- The Calculated Datum for the target that the above results are based on.

## User Guide - Multi Point Datum

(Route Trapezoid)

1. Select New from the File Menu and select the Stage 3 option;
2. Enter the LKP Latitude / Longitude;
3. Enter the LKP DTG;
4. Click on the Route button to open the Route Editor. Enter the route details either as Lat/Long coordinates or Bearing/Distance and click apply;
5. Enter the applicable Fix Errors in accordance with NATSARMAN Appendix J;
6. Select an appropriate Safety Factor (default 1.1) and Navigation (dre) error (default 10%);
7. Click on the Process button to generate results.

Datum	Latitude	Longitude	DTG	Speed (kts)	Track (T)	Distance (nm)
1	34 30.00S	117 57.00E	17/09/2016 22:00	100	090	120
2	34 28.56S	120 22.56E	17/09/2016 23:12			

Route Editor

Note: Checking / unchecking the "Calculate as a Route" checkbox determines whether calculating a Route or a single point Datum (based on the LKP).

### Results - Multi Point Datum (Route Trapezoid)

The Land Plot module will provide the following results;

- Search Area dimensions (average of sides of the trapezoid)
- Search Area Square Nautical Miles based on the multiple datum's associated with a route trapezoid
- Search Radius for the start datum and final point datum

### User Guide - Route Buffer

1. Select New from the File Menu and select the Route Buffer option;
2. Enter the Waypoint coordinates (Latitude / Longitude) for the start and end locations of the route;
3. Enter the LKP DTG;
4. Enter the buffer parameters to be applied around the route (standard 10nm either side, 5nm before and after)
5. Click on the Process button to generate results.

The screenshot shows the 'Land Plot {WS 4}' window with the 'Route Buffer' tab selected. It contains a table for waypoints, input fields for LKP DTG and buffer distances, and a results section.

WPT	LATITUDE	LONGITUDE
1	17 00.00S	135 15.00E
2	17 30.00S	135 45.00E

LKP DTG (UTC): 10/02/2016 00:00

Distance Either Side: 10 nm

Distance Before: 5 nm

Distance After: 5 nm

**Results**

Search Area Dimensions: 51.5nm x 20nm

Search Area SQNM: 1,030

Centre of Search Area: 17 15.02S 135 29.94E

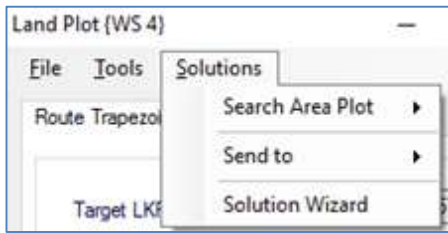
Buttons: Clear, Process

### Results - Route Buffer (Stage 2 area)

The Land Plot module will provide the following results;

- Search Area dimensions (based on the route distance and buffer parameters)
- Search Area Square Nautical Miles
- The centre coordinated of the route with before and after buffers applied.

### Solution Menu Options



- **Search Area Plot:** Creates a Plot calculation report that can be printed or saved as a PDF or text document
- **Send to:** The calculation can be sent to the Coords module, where the Search area can be developed. The plot can also be sent to a SARC-Map file to be viewed in the SAR Calculator mapping application (SARC\_Map).
- **Solution Wizard:** Guides the SAR practitioner through a number of the SAR Calculator modules to complete a comprehensive SAR plan solution.

Worksheet 4		SAR Calculator
<b>ROUTE TRAPEZOID</b>		
LKP Position:	34 30.00S 117 57.00E	
DTG at LKP (UTC):	06/02/2016 22:00	
Number of Datum Plots:	2	
Route Track Miles:	60nm	
<u>Factors</u>		
Combined Fixed Errors:	16.1nm	
Search Safety Factor applied:	1.1	
<u>Search Radius Plot</u>		
Datum 1:	34 30.00S 117 57.00E	
Search Radius:	12nm	
Datum 2:	33 37.95S 117 20.94E	
Search Radius:	18nm	
<u>Route Trapezoid:</u>	Area (sqnm): 2,786	
	Coordinates:	
	34 45.70S,117 52.80E	
	33 32.39S,116 49.32E	
	33 12.41S,117 30.90E	
	34 34.88S,118 15.54E	

Route Trapezoid Plot (print version)

## 4. AVIATION SEARCH

The Aviation Search module is designed to perform the Worksheet 2 (maritime targets) and Worksheet 3 (Aviation / Land targets) calculations, as contained in the National Search and Rescue Manual. The Aviation Search module works in conjunction with the Track Space Calculator (covered in detail later) and returns the optimal Search Area Coverage and Probability of Detection results, and presents a number of compromise options that can be considered by the user. *For a comprehensive understanding of search planning please consult the National Search & Rescue Manual (NATSARMAN).*

Access to the Aviation Search module is achieved by clicking on the 'Aviation Search' menu item on the SAR Calculator floating window.

Air Search Calculator (WS 2/3)

File Edit

Search Criteria

Corrected Sweep Width: 1.05 Coverage Factor: 1.05

Practical Track Spacing: 1 Probability of Detection: 81%

Selected Search Height (ft): 1000 Search Hours at 120kts: 13.3

Search Parameters

Search Area (SQ NM): 1600 Available Search Hours @ 120kts: 10

Search Compromise

Whole Area at Practical Track Spacing - (not achievable with available search hours)

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,600	1	1.05	81%	100%

Modified Area at Practical Track Spacing in Available Hours

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,200	1	1.05	81%	75%

Whole Area at Modified Track Spacing in Available Hours

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,600	1.33	0.79	68%	100%

Compromise Area and Modified Practical Track Spacing in Available Hours (Increment: .1nm)

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,320	1.1	0.95	77%	83%
1,440	1.2	0.87	73%	90%
1,560	1.3	0.81	69%	98%
1,680	1.4	0.75	65%	105%

### User Guide

1. Select New from the File Menu;
2. Enter appropriate details in the Track Space Calculator;
3. Select desired search height / track spacing and click apply;
4. Enter the Search Area details (SQNM) and Available Search Hours;
5. Click on the Search Compromise calculator icon to generate results.

Section Description


Search Criteria:


Results imported from the Track Space Calculator based on the target, search platform and environmental parameters entered.

**Search Criteria**

Corrected Sweep Width:  Coverage Factor:

Practical Track Spacing:  Probability of Detection:

Selected Search Height (ft):  Search Hours at 120kts:  

 Clicking the Calculator Icon will open the Track Space calculator for editing.

Track Space Calculator (Visual Air Search)

Land Targets | Maritime Targets

Selected Target: Aircraft <5700kg

Visibility:  Vegetation:

Fatigue:

Enter / Select Practical Track Spacing


Height (FT)	Sweep Width	Track Space	Coverage Factor	POD
500 FT	0.98	0.98	1.0	79%
1000 FT	1.05	1	1.05	81%
1500 FT	1.05	1.05	1.0	79%
2000 FT	1.12	1.12	1.0	79%


Selected Track Spacing:  Apply Close

Search Parameters:



The size of the search and available search hours allow the module to calculate the Search Compromise results.

**Search Parameters**

Search Area (SQ NM):  Available Search Hours @ 120kts:  

 Clicking the Calculator Icon will open a Search Hour Conversion Calculator to help determine search hours at an equivalent speed of 120 knots.

Convert Hours to 120 Knot Equivalent

Total Hours:  @ Search Speed:  = Hours @ 120kts:   

**Search Compromise:**

Provides the results based on details entered above. If there is not enough search hours available to complete the area then a number of compromise options are generated for the user to consider.

Search Compromise				
<b>Whole Area at Practical Track Spacing - (not achievable with available search hours)</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,600	1	1.05	81%	100%
<b>Modified Area at Practical Track Spacing in Available Hours</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,200	1	1.05	81%	75%
<b>Whole Area at Modified Track Spacing in Available Hours</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,600	1.33	0.79	68%	100%
<b>Compromise Area and Modified Practical Track Spacing in Available Hours (Increment: .25nm)</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
1,500	1.25	0.84	71%	94%
1,800	1.5	0.7	62%	113%

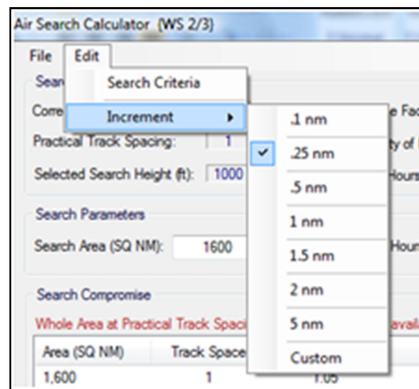


Clicking the Calculator Icon will return the search parameter and compromise results.

**Solutions:** The completed Worksheet can be printed or saved as a PDF document.

**Edit Menu Options**

- Search Criteria: opens the track space calculator with the current data for editing
- Increment: sets the track space increment to be calculated for the compromise options. The Default increment is set at 0.25nm



## 5. MARITIME SEARCH

The Maritime Search module is designed to perform the Worksheet 8 calculations, as contained in the National Search and Rescue Manual. The Maritime Search module works in conjunction with the Track Space Calculator (covered in detail later) and returns the optimal Search Area Coverage and Probability of Detection results, and presents a number of compromise options that can be considered by the user. *For a comprehensive understanding of search planning please consult the National Search & Rescue Manual (NATSARMAN).*

Access to the Maritime Search module is achieved by clicking on the 'Maritime Search' menu item on the SAR Calculator floating window.

Maritime Search Calculator (WS 8)

File Edit

Search Criteria

Corrected Sweep Width: 1.55 Coverage Factor: 0.78

Practical Track Spacing: 2 Probability of Detection: 67%

Selected Search Platform: Vessel (14 FT) Search Hours at 10 kts: 12.5

Search Parameters

Search Area (SQ NM): 250 Available Search Hours @ 10 kts: 10

Search Compromise

Whole Area at Practical Track Spacing - (not achievable with available search hours)

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
250	2	0.78	67%	100%

Modified Area at Practical Track Spacing in Available Hours

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
200	2	0.78	67%	80%

Whole Area at Modified Track Spacing in Available Hours

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
250	2.5	0.62	56%	100%

Compromise Area and Modified Practical Track Spacing in Available Hours (Increment .25nm)

Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
225	2.25	0.69	61%	90%
250	2.5	0.62	56%	100%
275	2.75	0.56	52%	110%

### User Guide

1. Select New from the File Menu;
2. Enter appropriate details in the Track Space Calculator;
3. Select desired search height / track spacing and click apply;
4. Enter the Search Area details (SQNM) and Available Search Hours;
5. Click on the Search Compromise calculator icon to generate results.



## Section Description

### Search Criteria:


Results imported from the Track Space Calculator based on the target, search platform and environmental parameters entered.

**Search Criteria**

Corrected Sweep Width:  Coverage Factor:

Practical Track Spacing:  Probability of Detection:

Selected Search Platform:  Search Hours at 10 kts:  

 Clicking the Calculator Icon will open the Track Space calculator for editing.

Track Space Calculator (Visual Maritime Search)

Vessels: Merchant Ships

Search Object: Person In Water

Raft 1 Person

Raft 4 Person

Raft 6 Person

Raft 8 Person

Raft 10 Person

Raft 15 Person

Selected Track Spacing:

Details

Visibility:  Weather:

Fatigue:  Search Platform: Vessel / Small Boat  
Selected Target: Raft 4 Person

Enter / Select Practical Track Spacing


Eye Height (FT)	Sweep Width	Track Space	Coverage Factor	POD
8 FT	1.15	1.15	1.0	79%
14 FT	1.55	2	0.78	67%


Apply Close

### Search Parameters:



The size of the search and available search hours allow the module to calculate the Search Compromise results.

**Search Parameters**

Search Area (SQ NM):  Available Search Hours @ 10 kts:  

 Clicking the Calculator Icon will open a Search Hour Conversion Calculator to help determine search hours at an equivalent speed of 10 knots.

Convert Hours to 10 Knot Equivalent

Total Hours:  @ Search Speed:  = Hours @ 10 kts:   

### Search Compromise:

Provides the results based on details entered above. If there is not enough search hours available to complete the area then a number of compromise options are generated for the user to consider.

Search Compromise				
<b>Whole Area at Practical Track Spacing - (not achievable with available search hours)</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
250	2	0.78	67%	100%
<b>Modified Area at Practical Track Spacing in Available Hours</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
200	2	0.78	67%	80%
<b>Whole Area at Modified Track Spacing in Available Hours</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
250	2.5	0.62	56%	100%
<b>Compromise Area and Modified Practical Track Spacing in Available Hours (Increment .25nm)</b>				
Area (SQ NM)	Track Space	Coverage Factor	POD	Area %
225	2.25	0.69	61%	90%
250	2.5	0.62	56%	100%
275	2.75	0.56	52%	110%

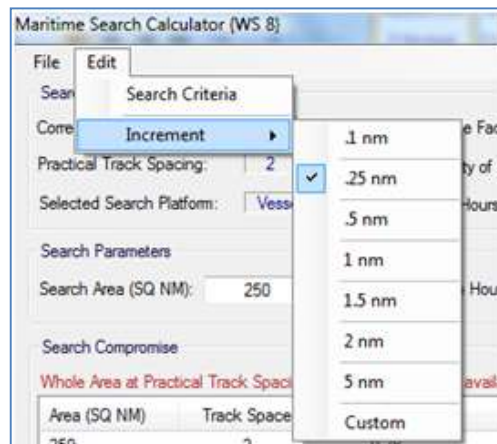


Clicking the Calculator Icon will return the search parameter and compromise results.

Solutions: The completed Worksheet can be printed or saved as a PDF document.

### Edit Menu Options

- Search Criteria: opens the track space calculator with the current data for editing
- Increment: sets the track space increment to be calculated for the compromise options. The Default increment is set at 0.25nm



## 6. COORDS

The Coords module is used to create and edit search areas, apply search legs and to generate the waypoint coordinates for the search pattern.

Search areas can be created or imported into the Coords module.

The following options are available when creating search areas;

- Radius and Search Datum (square or round areas);
- Manual (square, rectangle or trapezoid areas);
- Route Buffer (square or rectangle areas);
- Trackline Search (expanding leg or offset leg)

The following search patterns can be applied to the search areas;

- Parallel Leg;
- Bounded Area;
- Sector Search (Radius and Datum search area only).

Search areas can be imported from the Maritime Drift and Land Plot modules by using the “Send to” solution method.

### Components

- **Calculated / Estimated Driftline:**  
Assists in determining the search leg alignment  
Note: calculated target drift is imported with Maritime Drift module search areas
- **Search Area Orientation:**  
Stipulates the orientation of the search area in degrees true as measured from coordinate 1 to 2;  
The orientation can be amended for square and radius based search areas;  
Orientation is imported with Maritime Drift module search areas and is automatically aligned with the target drift
- **Track Spacing**  
Track spacing for search legs can be entered for parallel and sector search patterns  
For sector searches the track space refers to a Mean Track Spacing
- **Search Leg Alignment**  
The alignment of the search legs can be amended to best suit the search plan
- **Direction of Turns**  
Nominates the direction of turn between search legs for the sector search pattern

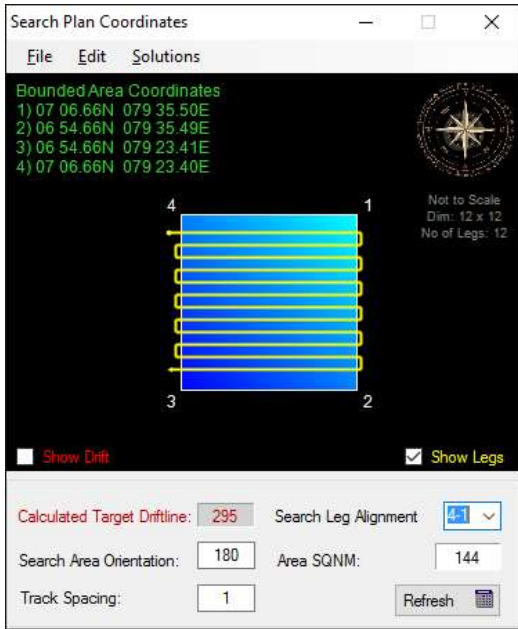
### Search Area Graphical Display

- Show Drift / Show Legs checkboxes control whether the Driftline and Search Legs are displayed
- The number of parallel search legs displayed are indicative only and are primarily for the purpose of determining the search leg alignment
- Rectangular and Trapezoid search area shapes **may not be to scale and/or displayed proportionally**, however *the output solutions (waypoints, SAR solution and SARC\_Map file) will all be accurate.*

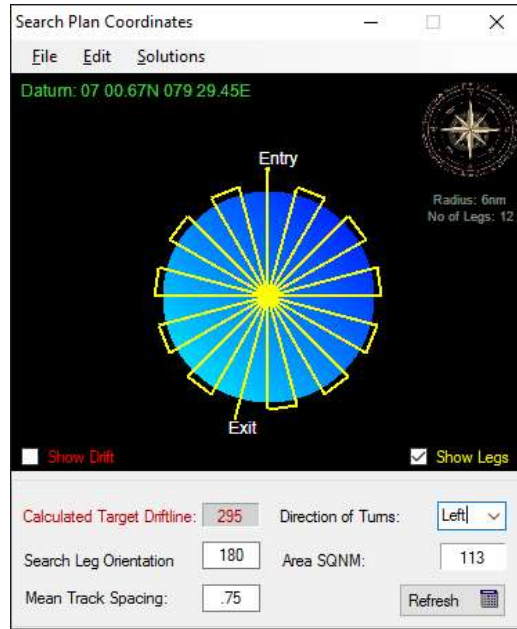
Solutions

A list of coordinates and search leg waypoints can be generated from the Solutions menu. The coordinates can be printed or saved to a PDF or text file document or sent to a GPX file.

The search area coordinates and search leg waypoints can be sent to a SARC\_Map file for viewing in the SAR Calculator mapping application (SARC\_Map).



Parallel Search Pattern



Sector Search Pattern

WAYPOINTS		Total Search Track Miles: 95 nm			
<b>Sector Search</b>					
WPT	Coordinates	Leg	Segment	Track (T)	Dist (NM)
1	09 55.00S 100 00.00E	1	1-2	180	10
2	10 05.00S 100 00.00E		2-3	282	2.1
3	10 04.57S 099 57.93E	2	3-4	024	10
4	09 55.43S 100 02.04E		4-5	126	2.1
5	09 56.65S 100 03.72E	3	5-6	228	10
6	10 03.34S 099 56.23E		6-7	330	2.1
7	10 01.54S 099 55.17E	4	7-8	072	10
8	09 58.45S 100 04.80E		8-9	173	2.1
9	10 00.52S 100 05.04E	5	9-10	276	10
10	09 59.48S 099 54.95E		10-11	018	2.1
11	09 57.50S 099 55.60E	6	11-12	120	10
12	10 02.50S 100 04.38E		12-13	223	2.1
13	10 04.04S 100 02.94E	7	13-14	324	10
14	09 55.95S 099 57.01E		14-15	066	2.1
15	09 55.11S 099 58.94E	8	15-16	168	10
16	10 04.89S 100 01.02E				

Sector Search Waypoint List

## 7. ALLOCATION EDITOR

The Allocation Editor is used to assign search legs or bounded search areas to SAR units. Allocations can be generated for either Maritime or Aviation search platforms.

Callsign	Type	Search Speed	On Search Endurance	Search Height	Area Designator	Task	Search Legs / Datum	ETD	Time on Task	Flip Entry Point	Task Notes	Published
RSCU21	BK17	80	130	500	A1	Parallel Leg	1:5	24/08/2016 21:30	81	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
VH-ABC	R44	75	100	800	B1	Parallel Leg	6:10	24/08/2016 21:30	87	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VH-MNB	C206	100	120	1200	C1	Parallel Leg	11:15	24/08/2016 21:30	65	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VH-GFD	C182	90	140	800	D1	Parallel Leg	16:20	24/08/2016 21:30	72	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VH-LKJ	P68	120	120	1200	E1	Parallel Leg	21:25	24/08/2016 21:30	54	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VH-ASD	PA31	120	170	800	F1	Parallel Leg	26:30	24/08/2016 21:30	54	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RSCU23	B12	90	120	500	G1	Parallel Leg	31:35	24/08/2016 21:30	72	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VH-YGC	H500	100	80	800	H1	Parallel Leg	36:39	24/08/2016 21:30	52	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RSCU431	D328	140	240	5000	COMMS	Comms Relay	32 50.22S 148 35.82E	24/08/2016 21:30	87	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>















Search Miles Required: 820      Search Miles Available: 1602      Total Search Legs: 39      Unallocated Legs: 0      Total Resources: 9

### AVIATION ALLOCATION

**Note:** The Allocation Editor is only accessible from the Coords Module via the Solutions Menu and only after the search area has been saved.

#### Allocation Editor Toolbar

The toolbar provides an orderly process for creating an allocation and generating briefings.

-  Saves the Allocation details to the associated Coords file
-  Reloads the last saved Allocation
-  Adds a row for a new SAR Unit (aviation or maritime as appropriate)
-  Task Editor Tool - performs system automation functions
-  Sets the Search Commencement time
-  Access to the SAR Light Calculator
-  Access to the Fuel Calculator (Aviation Allocation only)
-  Creates a Mapping file (to view in the SARC\_Map tool)
-  To access / edit the search summary notes
-  Generates a PDF SAR Unit briefing
-  Generates a GPX file containing the assigned search waypoints
-  Deletes the selected - the SAR Unit
-  Deletes all SAR Units in the allocation
-  Exit the Allocation Editor

### User Guide to creating an allocation

- Open / create a search area in the Coords Module and select Allocation from the Solutions Menu
- Select the desired search platform for the allocation (aviation or maritime)
- Enter the time that the search is planned to commence
- From the Toolbar add a new SAR Unit
- Complete the data Fields as appropriate (i.e. callsign, search speed endurance etc.)
- Select a Task type from the dropdown list
- Double-click in the Search Legs / Datum cell to allocate search legs to the SAR unit
- Click in the Task Notes cell to add specific task notes for the selected SAR unit
- Repeat above for all other SAR unit tasks
- From the Toolbar click on the Search Summary icon to enter details about the search that will be included in all SAR unit briefings
- From the Toolbar click the Map icon to create and view the SAR unit task in the Mapping application
- From the Toolbar click on the PDF icon to generate a comprehensive briefing the selected SAR unit
- From the Toolbar click on the GPX icon to create a waypoint file for the selected SAR unit

### Task Types

The Task Types is dependent on the type of search area that was sent to the Allocation Editor from the Coords Module. The task types available are;

- **Parallel Leg** - for search areas that have search legs applied  
- search legs can be shared amongst SAR units
- **Bounded Area** - for search areas that do not have search legs applied  
- the bounded area can be sub-divided to assign to multiple SAR units
- **Sector Search** - for search areas created as Sector search  
- search legs can only be assigned to one SAR unit
- **Trackline Search** - for search areas created as Trackline search  
- search legs can only be assigned to one SAR unit
- **Comms Relay** - additional activity available for Aviation allocations only  
- can only be assigned to one SAR unit
- **OSC** - additional activity available for Maritime allocations only  
- can only be assigned to one SAR unit

### Task Editor Tool

The Task Editor Tool provides functions to assist in the creation an allocation.

The Task Editor Tool is search type dependent, providing features appropriate to the task.

The two main features are;

- Automation of search leg allocation
- Splitting a bounded search area into multiple sub-areas

Following is a brief explanation of the Task Editor Tool for Parallel Leg and Bounded Area search types.

### Parallel Leg ~ System Allocate

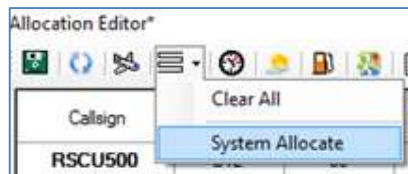
To utilise this function first add all SAR units to the allocation, set their parameters (search speed and endurance) and set the appropriate task from the dropdown list.

From the Toolbar select the Task Editor Tool icon and click on the System Allocate item. Search legs will be assigned to all SAR units that have been set with a Parallel task.

The following rules apply if the allocation is based on a Parallel Leg search area;

- Search legs will be allocated in the order that was designated in the Coords Module (starting at the search leg alignment location);
- Where possible an equivalent number of search legs will be allocated to each SAR unit;
- The number of search legs will be limited to the on-scene endurance of the SAR unit.

To clear the allocated select Clear All from the menu.



Parallel Leg

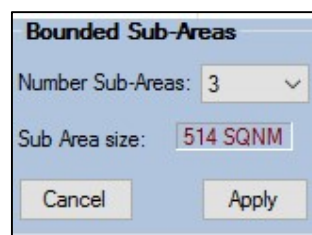
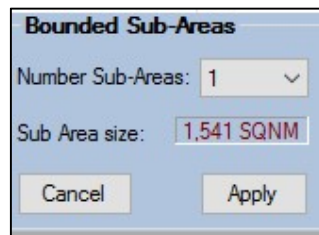


Bounded Area

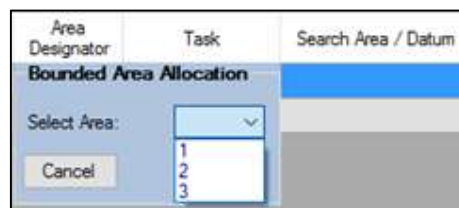
### Bounded Area ~ Sub-Areas

This function allows the bounded search area to be sub-divided into multiple areas, which can then be shared / allocated to multiple SAR units.

From the Toolbar select the Task Editor Tool icon and click on the Set Sub-Area item. The following editing window will be displayed. Select the appropriate number of areas to split the search area into and select apply.



Double click in the Search Area/Datum cell of the desired SAR unit to allocate with bounded area. The following window will be displayed to select the preferred area from.



### Comms Relay / OSC

SAR units assigned with Comms Relay or OSC tasks will be automatically located adjacent to the search area for the endurance of the search (limited to the units on-scene endurance). The datum for the task can manually be overwritten if preferred.

Allocation Editor\*

**Search Summary**

A MAYDAY distress call was received from commercial fishing vessel 'Big Catch' in position 35 30S 109 45E. The skipper advised that they were taking water and that the crew members were abandoning to a life raft. Subsequent attempts to establish communications with the crew have failed. The operator has advised that there are four crew on board the vessel and that the life raft has an orange canopy and is fitted with a drogue. All crew have a life jacket. A distress beacon is on board the FV but has not yet been detected. This search involves 9 aircraft. Merchant Vessel 'Sea Going' will remain in the search area as a rescue platform and will be monitoring Channel 16.

**Comms Plan** Frequency: 123.1

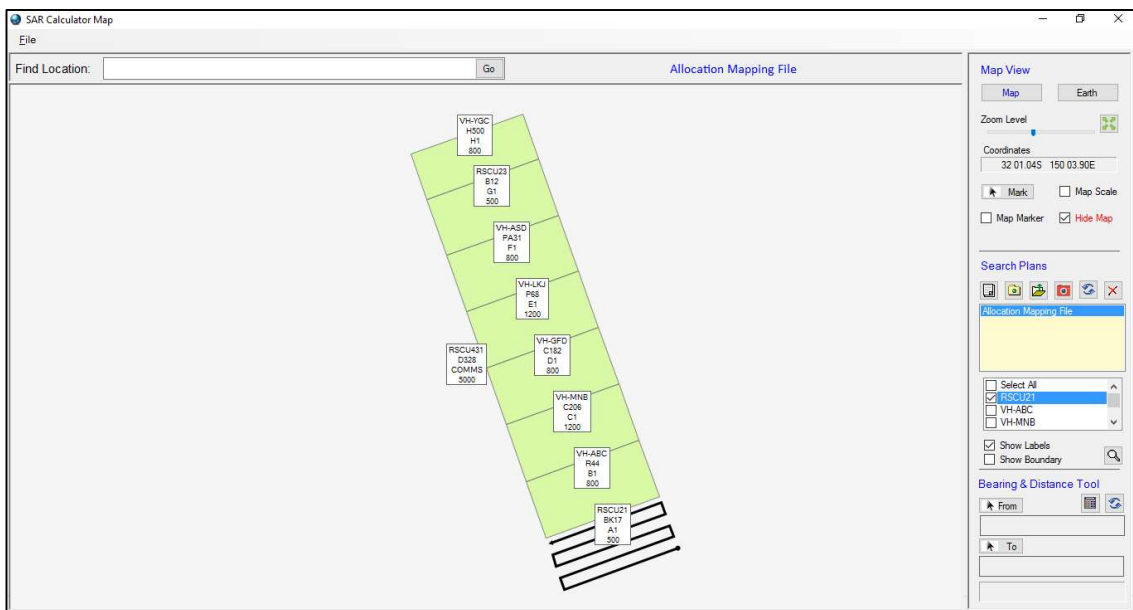
RSCU461 has been tasked as the communications relay platform for this search. All search units are to establish comms with RSCU461 approaching their search areas and arrange for Ops Normal reporting SKEDS. Report any sightings to RSCU461 for on passing to the RCC.

**Search Objects**

Broken Vegetation    Debris    Fire    Ground Scars    Life Jackets    Marker Dye    Movements    Person in Water    Wreckage  
 Burnt Vegetation    Distress Beacon    Flares    Ground Signs    Liferaft/Dinghy    Mirror Signals    Oil Slick    Smoke

Search Miles Required: 820   Search Miles Available: 1602   Total Search Legs: 39   Unallocated Legs: 0   Total Resources: 9

Search Summary Editor



Allocation Mapping View

### SAR Unit PDF Briefing Document

The briefing document that is generated from the Allocation Editor contains the following information;

- The search summary and communications plan;
- A list of appropriate search objects;
- Search Area First and Last Light (UTC);
- Task Details, including type of search, designator, search height and entry/exit points;
- Task Notes specific to the SAR Unit being briefed;
- Waypoints List;
- Search Plan Snapshot;
- SAR Task Debrief Form.



## 8. SOLUTION WIZARD

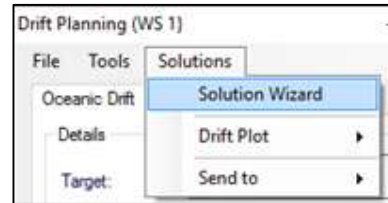
The Solution Wizard guides and integrates a number of the SAR Calculator modules to produce a comprehensive SAR Solution.

### Starting the Wizard





The Solution Wizard can be accessed from the Maritime Drift and the Land Plot modules through the Solutions menu.



*Click on the Wizard Wand to Progress Stages*



The five stages of the Solution Wizard are;

-  **Create the Search Area:** Maritime Drift / Land Plot Module
-  **Search Parameters:** Air/Maritime Search Module
-  **Search Pattern Coords:** Coords Module
-  **Search Plan Solution:** PDF SAR Solution



### Wizard Icons



After processing the necessary data at each stage the Wizard Wand will appear to allow access to the next stage



Clicking on the Wizard Ball will provide tips for progressing at each stage of the solution



Press the return arrow to go back to the previous stage of the solution



Click on the Door at any stage to exit the wizard



## SAR Solution

The SAR Solution is generated in a PDF document and contains the following information;

- **Target Details and Description**  
User defined input
- **Search Area Modelling Data**  
Imported from the Maritime Drift/ Land Plot modules
- **Search Parameters**  
Imported from the Track Space Calculator & Aviation / Maritime Search modules
- **Search Area Details**  
Imported from the Coords module
- **Search Area First & Last Light**  
Calculated for the centre of the search area for the day the solution is created
- **Search Area Snapshot**  
Captured through integration with the SARC\_Map application (if available)
- **Search Leg Waypoint List**  
Generated by the Coords module (option to also generate a GPX file)
- **Allocation**  
Option to save the Coords data to allow an Allocation to be created

### Handling of Search Compromise - reduction in Area

Search area compromise is achieved by reducing the radius of a Square or Sector search area by the factor of the total area selected. In doing this the search datum always remains the centre of the search area and only the extremities are trimmed.

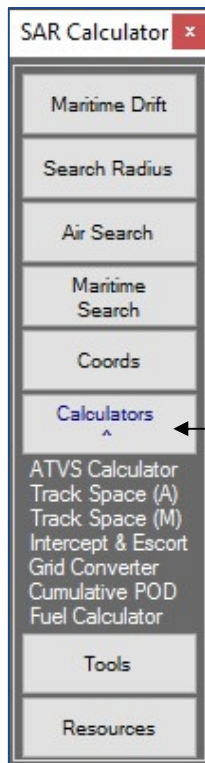
For Route Trapezoid searches each of the calculated circles of probability are reduced by a factor that results in achieving the approximate compromise sqnm selected. In doing this the datum's are retained in the search area while the bounds of the area are trimmed.

For the Route Buffer search the compromise is applied to the buffer either side of track element, resulting in the bounds of the area being trimmed whilst always retaining the route within the search area.

## 9. CALCULATORS

This module provides access to a variety of calculators to assist the SAR practitioner. Included are;

- ATVS Calculator
- Track Space Calculator (Aviation and Maritime)
- Intercept & Escort
- Grid Converter
- Cumulative POD Calculator
- Fuel Endurance Calculator



Access to the Calculator module is achieved by clicking on the 'Calculator' menu item on the SAR Calculator floating window. A list of calculators will be presented. Double clicking on a desired calculator will open it in a separate window.

## ATVS CALCULATOR

SAR Formula:  $A=T.V.S$

A= Area (SQNM)

T= Time (search hours)

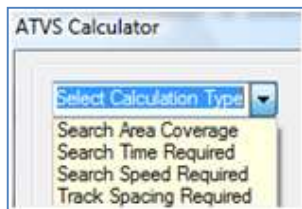
V = Velocity (knots)

S = Track Spacing (nautical miles)

Given any three of the above values the ATVS calculator can be used to find the 4<sup>th</sup> value.

### User Guide

- Select the unknown value to calculate from the drop-down menu



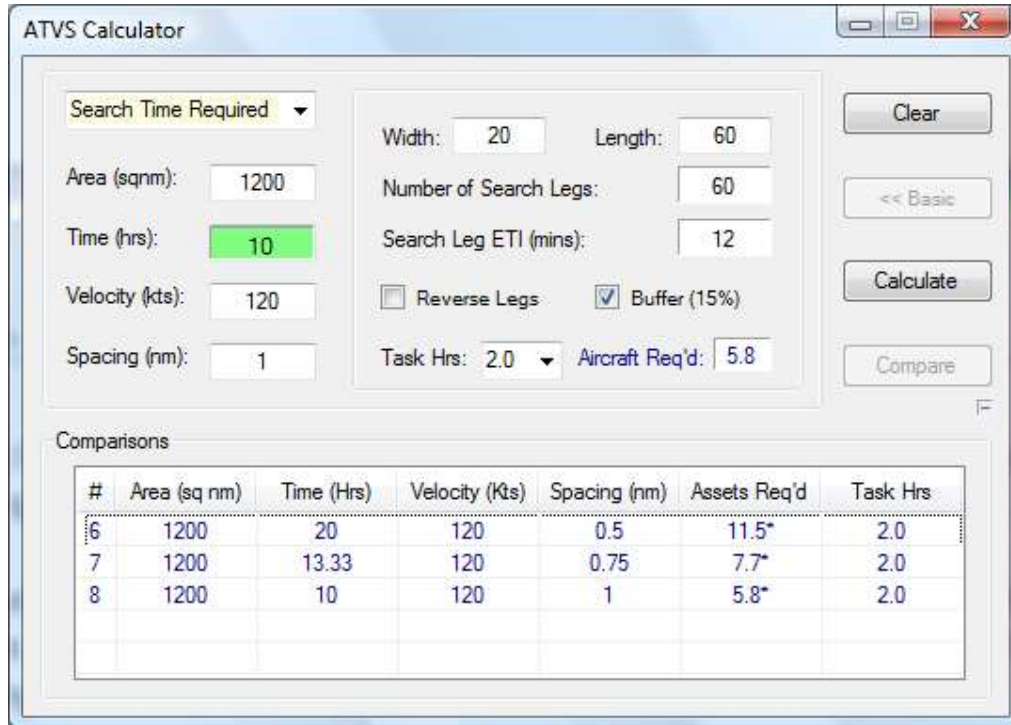
- Enter the know values in the remaining fields

- Click on the Calculate button to return the result

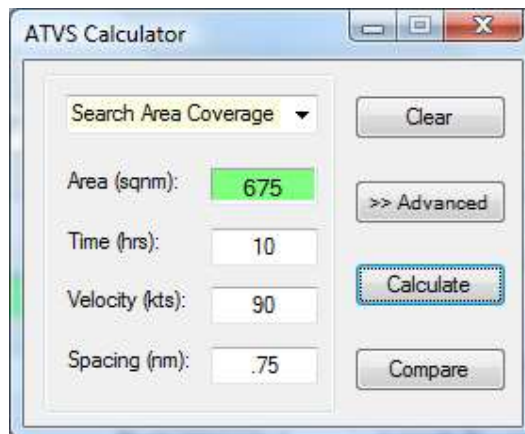
Note: If one of the dimensions of the search area is known and entered (width or length) the calculator will then populate the number of search legs and search leg ETI.

The Aircraft Req'd result is based on the Time required / available divided by the Task Hours. The task hours can be changed by selecting from a drop-down list.

It is possible to store results from a calculation for comparison with further calculations using modified search parameters by clicking the Compare button (i.e. if there are insufficient aircraft to search the area at the optimum track spacing then conducting a review of the track space or search speed or area coverage). In this case do not use the clear button but adjust the parameters and re-calculate the results.



Advanced Calculator with Comparisons



Basic Calculator

## TRACK SPACE CALCULATOR (AIR SEARCH)

The Track Space Calculator returns the corrected sweep width, coverage factor and probability of detection results for visual searches over water and land in accordance with Tables I-5 and Tables I-6 in the NATSARMAN. Correction factors for search speed, weather and vegetation factors are also applied.

Track Space Calculator {Visual Air Search}

Land Targets | Maritime Targets

Selected Target: Raft 4 Person

Visibility: 10 Kms | Weather: WINDS < 15KTS

Fatigue: UNFATIGUED | Platform: FIXED WING | Speed: <= 150kts

Enter / Select Practical Track Spacing

Height (FT)	Sweep Width	Track Space	Coverage Factor	POD
500 FT	1.43	1.43	1.0	79%
1000 FT	1.43	1.5	0.95	77%
1500 FT	1.43	1.43	1.0	79%
2000 FT	1.43	1.43	1.0	79%

Selected Track Spacing: 1.5

Apply | Close

### User Guide

- Select the Land Target / Maritime Target tab as appropriate
- Select the search object from the list
- Select the appropriate criteria from the drop-down options (Visibility, Weather etc.)
- If desired, enter a Practical Track Spacing in the Track Space field (white background)
- Read off the Search Parameters in the table
- When using in conjunction with the Aviation Search module (WS2/3) select the row for desired search Height and click the Apply button to export to the Aviation Search module.

## TRACK SPACE CALCULATOR (MARITIME SEARCH)

The Track Space Calculator returns the corrected sweep width, coverage factor and probability of detection results for visual searches using maritime assets in accordance with Tables I-3 and Tables I-4 in the NATSARMAN. Correction factors for weather and observer fatigue are also applied.

Track Space Calculator (Visual Maritime Search)

Vessels Merchant Ships

Search Object

Person In Water

Raft 1 Person

Raft 4 Person

Raft 6 Person

Raft 8 Person

Raft 10 Person

Raft 15 Person

Details

Visibility: 15 Kms Weather: WINDS 15-25 KTS

Fatigue: UNFATIGUED

Search Platform: Vessel / Small Boat  
Selected Target: Raft 4 Person

Enter / Select Practical Track Spacing

Eye Height (FT)	Sweep Width	Track Space	Coverage Factor	POD
8 FT	1.45	1.45	1.0	79%
14 FT	1.9	2	0.95	77%

Selected Track Spacing: 2

Apply Close

### User Guide

- Select the Search Asset type tab as appropriate (vessel or merchant ship)
- Select the search object from the list
- Select the appropriate criteria from the drop-down options (Visibility, Weather etc.)
- If desired, enter a Practical Track Spacing in the appropriate eye height track (white cell)
- Read off the Search Parameters
- *When using in conjunction with the Maritime Search module (WS8) select the row with the desired Eye Height and click the Apply button to export to the Maritime Search module.*

## INTERCEPT & ESCORT TOOLBAR

The Intercept and Escort module is used to determine a point of intercept between two moving crafts.

The Intercept and Escort calculator returns the Ground Position of Interception (GPI) latitude / longitude, time of intercept and bearing / distance to the GPI for the escort craft.

### User Guide

- Click the New button to start a new calculation
- Enter the Target details;
  - Position (Latitude / Longitude)
  - Date / Time that the target was at that position
  - The Track and Speed of the target craft
- Enter the details of the Escort (intercepting) craft;
  - Position (Latitude / Longitude)
  - Date / Time that the target was at that position
  - Wind direction and speed
  - Speed of the Escort craft
- Select / de-select the Apply Wind to Target box as appropriate (do not apply to surface targets i.e. vessels / vehicles)
- Click the Calculate Button to return the Intercept & Escort Results

### Tools



Included in the Intercept & Escort module is quick access to the First-Last Light and Time Difference calculators to assist the SAR practitioner in planning.

### Solutions

The intercept and Escort calculation can be send to a SARC\_Map file to be viewed the SAR Calculator Mapping application (SARC\_Map).

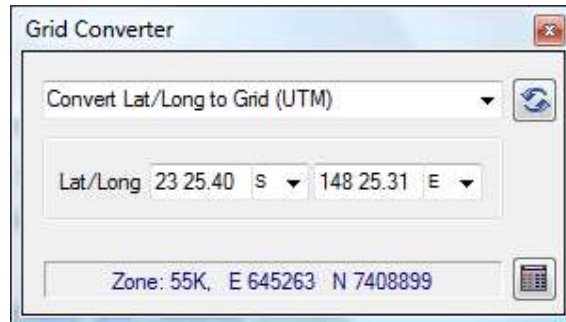


## GRID CONVERTER

The Grid Converter provides functionality to convert between the Universal Transverse Mercator (UTM) Coordinate System and the Latitude Longitude Coordinate System.

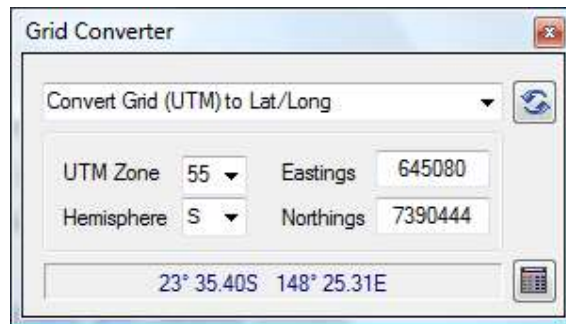
UTM results return the Longitude Zone and Latitude Band and the Easting / Northing coordinates to placement of 1m<sup>2</sup>.

Latitude/Longitude results are returned as Degrees Minutes and Decimal Minutes.



The screenshot shows the 'Grid Converter' window with the dropdown menu set to 'Convert Lat/Long to Grid (UTM)'. The input fields are 'Lat/Long' with values '23 25.40 S' and '148 25.31 E'. The output field displays 'Zone: 55K, E 645263 N 7408899'. A calculator icon is visible in the bottom right corner.

Lat/Long to UTM



The screenshot shows the 'Grid Converter' window with the dropdown menu set to 'Convert Grid (UTM) to Lat/Long'. The input fields are 'UTM Zone' (55), 'Eastings' (645080), 'Hemisphere' (S), and 'Northings' (7390444). The output field displays '23° 35.40S 148° 25.31E'. A calculator icon is visible in the bottom right corner.

UTM to Lat/Long

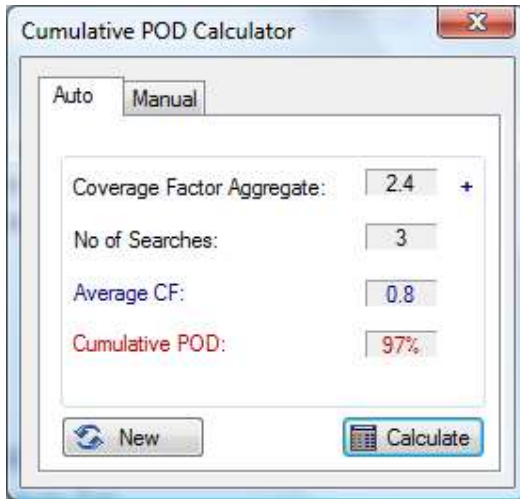
### User Guide

- Click the Reset icon to commence a new conversion
- From the drop down list select the desired conversion type;
  - Convert Lat/Long to Grid (UTM); or
  - Convert Grid (UTM) to Lat/Long
- Enter the known coordinates and associated details;
- Click the Calculator icon to convert the coordinates
- Read off the results in the answer field

## CUMULATIVE POD CALCULATOR

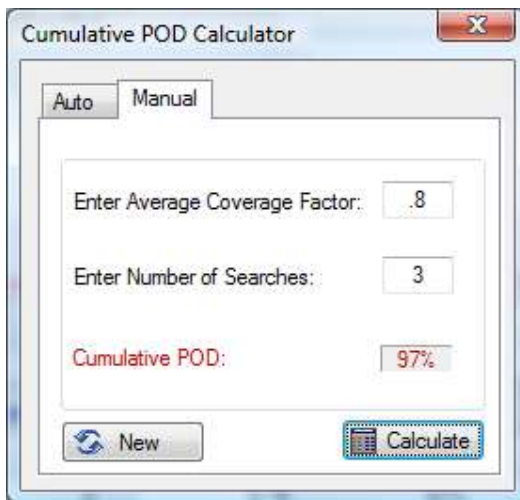
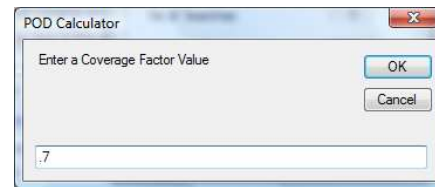
The Cumulative POD calculator returns the percentage value of the probability of detection following one or more search efforts of a particular area. The cumulative POD provides a measure of search integrity. *For more information refer to the NATSARMAN Appendix I POD Graph.*

The calculator offers two methods: Auto and Manual.



### User Guide - Auto Method

- Select the Auto Tab
- Click on the + symbol and enter the individual Coverage Factor value
- Repeat + for each search effort of the area
- Click on the Calculate button to return the results for Average Coverage Factor (CF) and Cumulative POD.



### User Guide - Manual Method

- Select the Manual Tab
- Enter the average Coverage Factor (CF) value (i.e. add up all CF values and divide by the number of searches)
- Enter the number of searches
- Click on the Calculate button to return the Cumulative POD.

## FUEL ENDURANCE CALCULATOR

The Fuel Endurance Calculator is designed to assist in determining the available time that an aviation asset can provide on search, i.e. search endurance. The calculator also provides the option to automate the CASA CAAP fuel reserve recommendations into the calculation.

Note: Fuel Endurance figures should always be confirmed with the operator / pilot.

### User Guide

- Click the Clear Button to start a new calculation
- Enter the Total (on-board) Endurance of the asset in minutes
- Enter the Transit Out and Transit Back times in minutes (to/from the search area)
- Enter the Variable and Fixed Reserve times in minutes \*
- Enter any Holding and/or Alternate transit times in minutes
- Click the Calculate button to generate the Search Endurance result (in minutes)

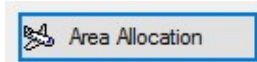
\* If the applicable Resource details are chosen and the Auto Complete checkbox is selected then the reserve values will auto populate based on CAAP recommendations.

### Tools

Distance, Time, Speed Toolbar (DTS)

The DTS Toolbar is available from the DTS button to assist in calculating transit times (two of the values must be entered to calculate the 3<sup>rd</sup> value)

### Area Allocation Function



The Area Allocation operation performs the function of worksheet 6, providing the following results:

- Actual Search Hours available @ 120 knots (required for worksheets 2, 3 & 8)
- Maximum Area / Track miles that can be searched
- Allocated Search Legs and Area SQNM

**Aircraft Area Allocation** ✕

---

**Search Asset Info**

Search Endurance (min):	82
Actual Search Hours (-15%):	1.2
Search TAS:	150
Search Hours @ 120kts:	1.5

---

**Search Capability**

Track Spacing (nm):	1.5
Search Leg Length (nm):	20
Total Search Track Miles:	180
Maximum Area SQNM:	270
Search Legs @ 2 Hours:	15
Maximum Search Legs:	9
Allocated Search Legs:	6
Allocated Area SQNM:	180

Close
Calculate

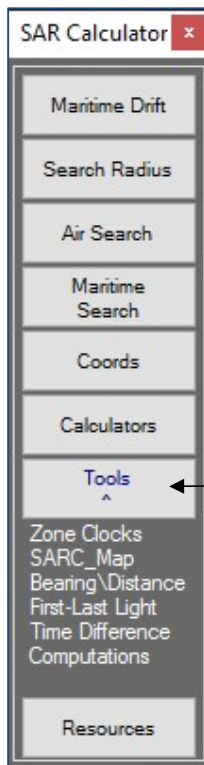
### User Guide

- After performing a Fuel Endurance calculation click the Area Allocation Button
- The Search Endurance value will be imported and a calculation performed on the Actual Search Hours, less 15% (for turns and investigation)
- Enter the Search TAS, Track Spacing and Search Leg distance
- Click the Calculate button to determine the maximum number of search legs that the aircraft can accomplish
- Enter the number of search legs to be allocated to the aircraft (equal or less than calculated Maximum Search Leg value)
- Click the Calculate button to determine the Allocated Area SQNM

## 10. TOOLS

This module provides access to a variety of tools to assist the SAR practitioner. Included are;

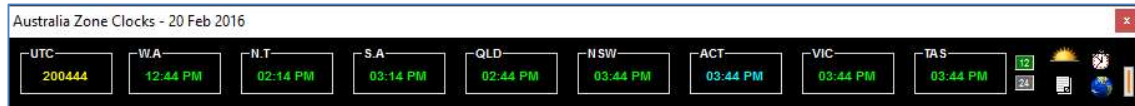
- Zone Clocks
- SARC\_Map
- Bearing\Distance tool
- First-Last Light tool
- Time Difference calculator
- Computations



Access to the Tools module is achieved by clicking on the 'Tools' menu item on the SAR Calculator floating window. A list of available tools will be presented. Double clicking on a desired tool will open it in a separate window.

## ZONE CLOCKS

The Zone Clocks is a floating toolbar that provides access to a number of regional time zone clocks and other time related tools.



### Features



Sets display to 12 hr or 24 hr clock format



Displays a table detailing the first-last light times associated with the capital centres of the zone clocks being displayed



Displays a comparable time grid based on the zone clocks being displayed



Opens a Timer / Stopwatch toolbar



Scrolls through the available sets of Regional Zone Clocks: (Australia; SRR; Pacific Islands 1; Pacific Islands 2, Indian Ocean)



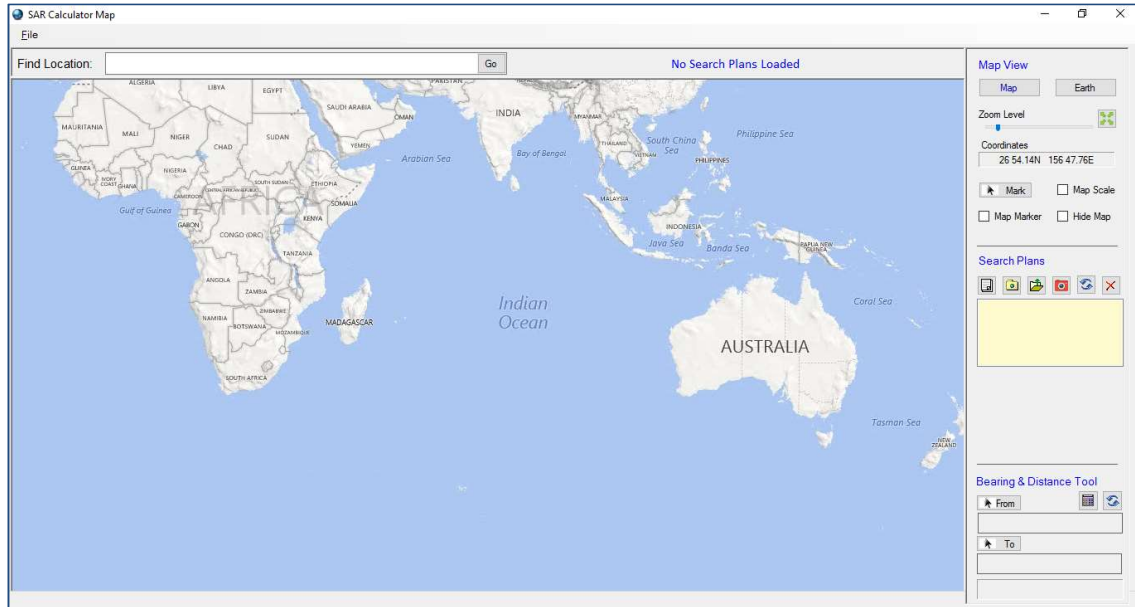
Changes the orientation of Zone Clock Toolbar between Portrait and Landscape

### Tips

- Single clicking on a clock will highlight the time for ease of reference
- Double clicking on a clock will allow the user to enter a specific time for that zone to compare to the associated time values for the other regions being displayed

## SARC\_Map

SARC\_Map is an extension of the SAR Calculator designed to provide the SAR practitioner with a visual presentation of developed Search Areas and Drift Plots. To take full advantage of the SARC\_Map features an internet connection is required.



## Location Bar

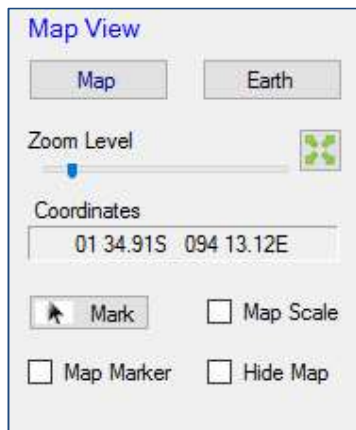
Enter an address in the location bar to zoom the map display to zoom to that location.

The title of an active search plan will be displayed to the right of the Location Bar.



## Tools

### Map View



The Map View tools provide the user with control over the map display.

Three map views are available:

- Map (default)
- Earth (satellite)
- Nil (hide map checkbox)

Zoom Level: zooming can be controlled by the Zoom slide bar or the mouse-wheel.

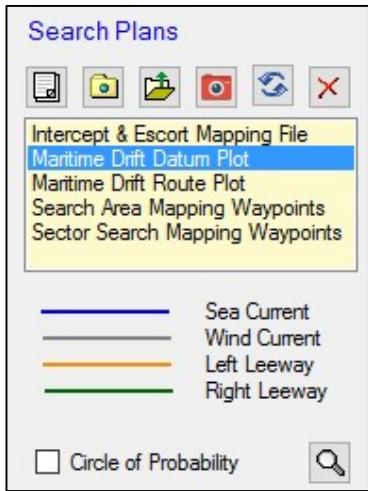


Map Panning: The Left mouse button (default) allows the map to be panned (moved). Click on the Pan symbol to change to the right mouse button. Note: during some operations the pan is atomically changed to the right mouse button.

Selecting the Mark command button allows interaction with the map display to mark a location. The Map Marker checkbox will hide / unhide the map marker display.

The current mouse position coordinates will be displayed in the Coordinate field.

### Search Plan Tools

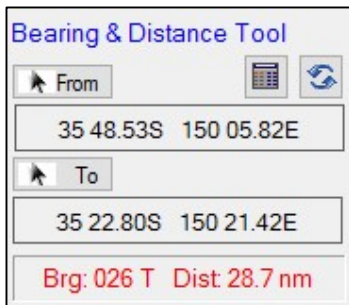


The Search Plan Tools control the files that have been created from the SAR Calculator application.

- Opens a Search Plan file from file explorer
- Loads all Directory mapping files into the Map pick list
- Opens the selected file in the Map pick list
- Captures a screen shot of the current mapping display
- Clears the Map pick list
- Closes any active Search plans and resets the display
- Zoom/pans to the active Search plan

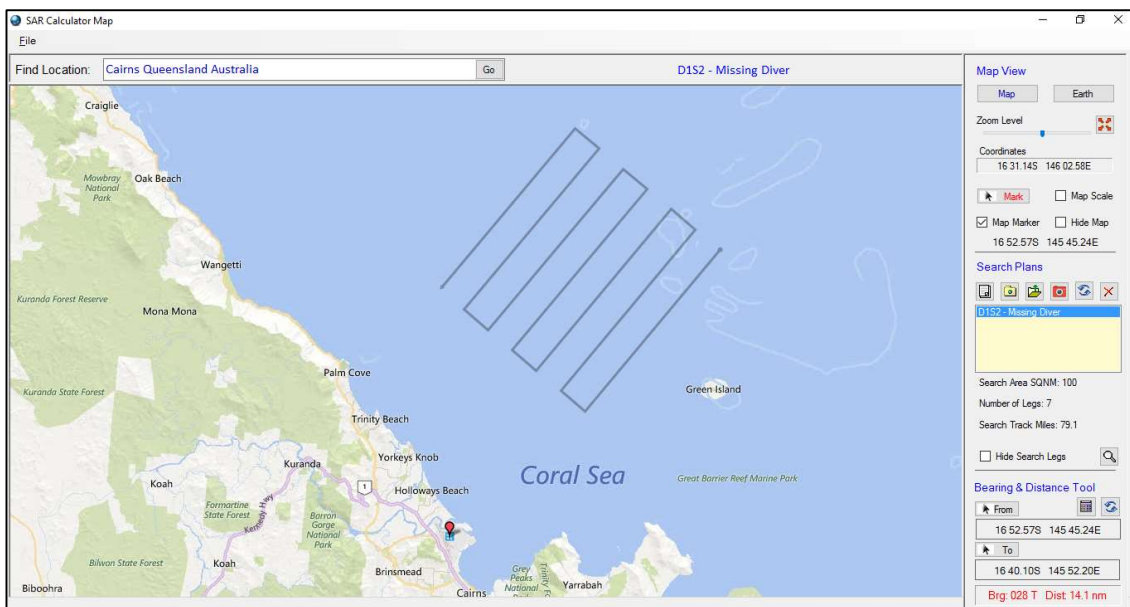
*Legend displayed as appropriate to loaded Search Plan file*

### Bearing and Distance Tool



The Bearing & Distance Toolbar provides interaction with the mapping display to measure the distance and bearing between two points.

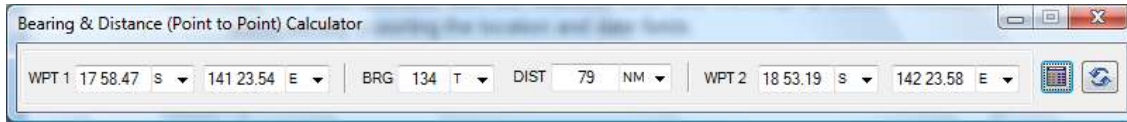
- Selection of the From/To buttons will allow mapping interaction. The position selected on the map display will be captured.
- Calculates the Bearing and Distance
- Clears the previous calculation result





## BEARING & DISTANCE TOOLBAR

The Bearing\Distance Toolbar calculates the bearing and distance between two sets of waypoints or a waypoint based on a bearing & distance value. The calculator requires two of the three fields to be completed in order to calculate the remaining value.

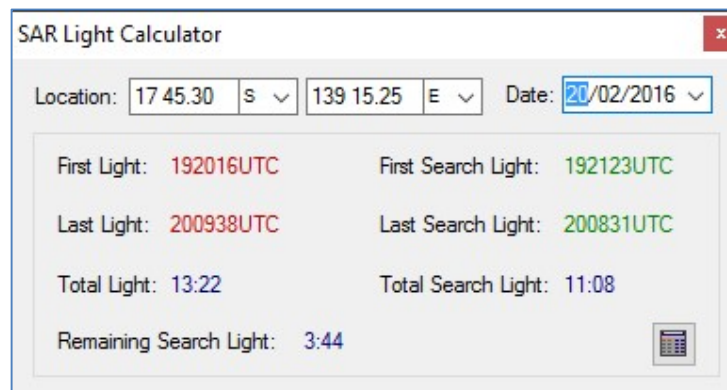


### User Guide

- To calculate WPT 2 coordinates;
  - Enter a Lat/Long in WPT 1 fields;
  - Enter a Bearing & Distance
  - Click the Calculator icon to return the WPT 2 Lat/Long result
  
- To calculate WPT 1 coordinates;
  - Enter a Lat/Long in WPT 2 fields;
  - Enter a Bearing & Distance
  - Click the Calculator icon to return the WPT 1 Lat/Long result
  
- To calculate the BRG/DIST between WPT 1 and WPT 2;
  - Enter a Lat/Long in WPT 1 fields;
  - Enter a Lat/Long in WPT 2 fields;
  - Click the Calculator icon to return the BRG and DIST result

## FIRST-LAST LIGHT CALCULATOR

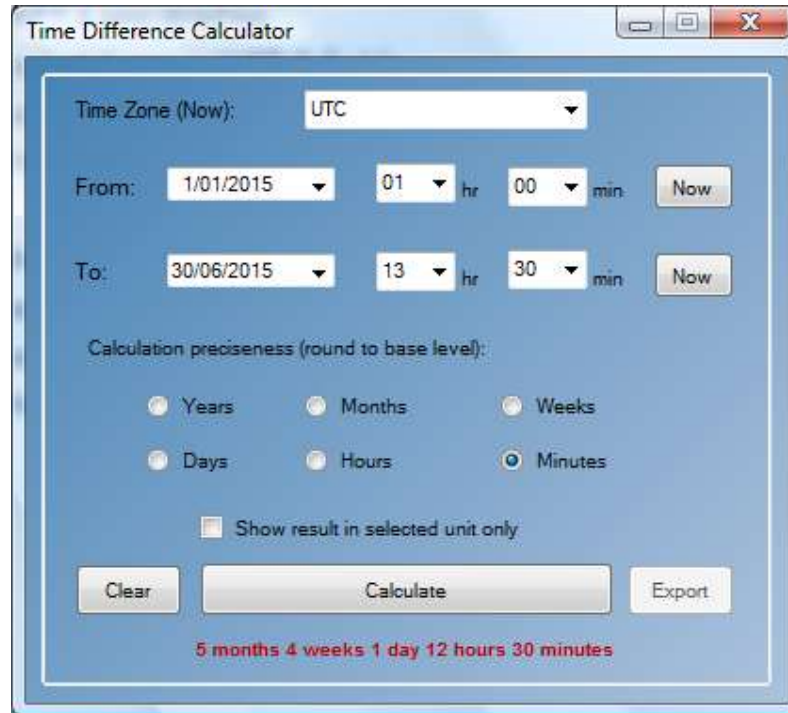
The First-Last Light Calculator displays the applicable daylight times for the location and date entered. If it is the current date then the remaining light will also be displayed.



Note: This tool also interacts with the Maritime Drift and Intercept & Escort modules by automatically importing the location and date fields.

## TIME DIFFERENCE CALCULATOR

The Time Difference Calculator will compute the time difference between two date/time groups. The results can be displayed as a specific unit only or to a preciseness of units ranging from years to minutes.



The screenshot shows a window titled "Time Difference Calculator". It features a "Time Zone (Now):" dropdown menu set to "UTC". Below this are two rows for date and time input. The "From:" row has a date dropdown set to "1/01/2015", hour and minute dropdowns set to "01" and "00", and a "Now" button. The "To:" row has a date dropdown set to "30/06/2015", hour and minute dropdowns set to "13" and "30", and a "Now" button. Underneath is a section for "Calculation preciseness (round to base level):" with radio buttons for "Years", "Months", "Weeks", "Days", "Hours", and "Minutes". The "Minutes" option is selected. There is also a checkbox labeled "Show result in selected unit only" which is unchecked. At the bottom are three buttons: "Clear", "Calculate", and "Export". Below the buttons, the result is displayed in red text: "5 months 4 weeks 1 day 12 hours 30 minutes".

### User Guide

- Click the *Clear* button to reset the calculator
- Complete a start date, hour and minute
- Complete an end date, hour and minute
- Click the *calculate* button to return the result
- To change the preciseness of the result, select the desired base level (i.e. Days or Minutes etc)

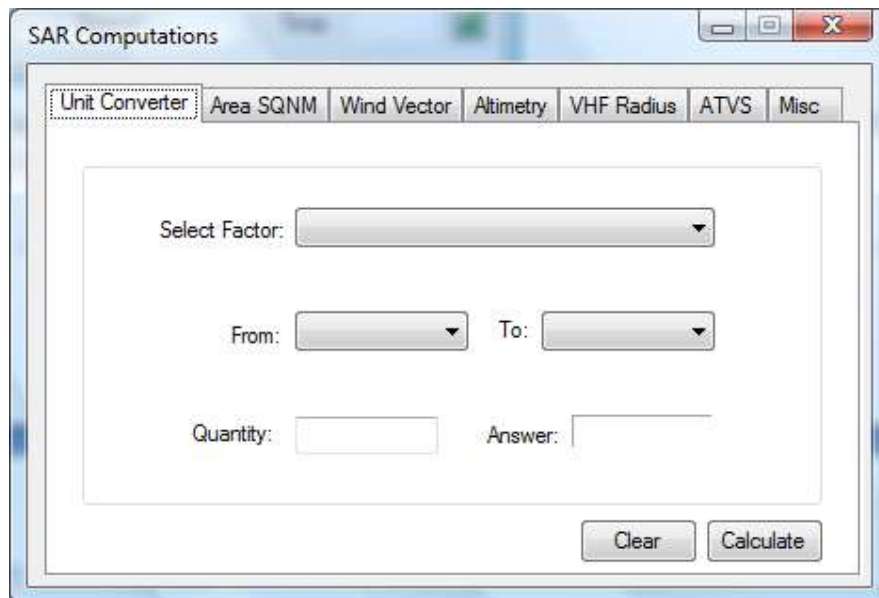
Tip: if the calculation is to include a current time select the time format (UTC or Local) from the Time Zone Now drop-down list and click the *Now* button to automatically populate the From or To fields.

Note: When used in conjunction with the Maritime Drift module the LKP DTG will be imported into the Time Difference Calculator 'From' DTG fields. After performing the calculation the result can be exported into the Maritime Drift 'Hours of Drift' field by clicking on the *Export* button.

## SAR COMPUTATIONS

The SAR Computations module provides access to a variety of functions, including;

- Unit Converter
- Area (square nm) calculator
- Wind Vector calculator
- Pressure Height calculator
- Descent Point / Profile calculator
- VHF Signal Range calculator
- ATVS Calculator (basic)
- Rate of Search Leg Creep calculator
- Radius of Turn Calculator
- Coordinated Creeping Line calculator
- Distance to Horizon calculator



The screenshot shows a window titled "SAR Computations" with a tabbed interface. The "Unit Converter" tab is selected. The interface includes a "Select Factor:" dropdown menu, "From:" and "To:" dropdown menus, a "Quantity:" input field, and an "Answer:" output field. At the bottom right, there are "Clear" and "Calculate" buttons.

The SAR Computations module is designed to be intuitive. In most cases it just requires entering or selecting the required field values and pressing the calculate button to return a result.

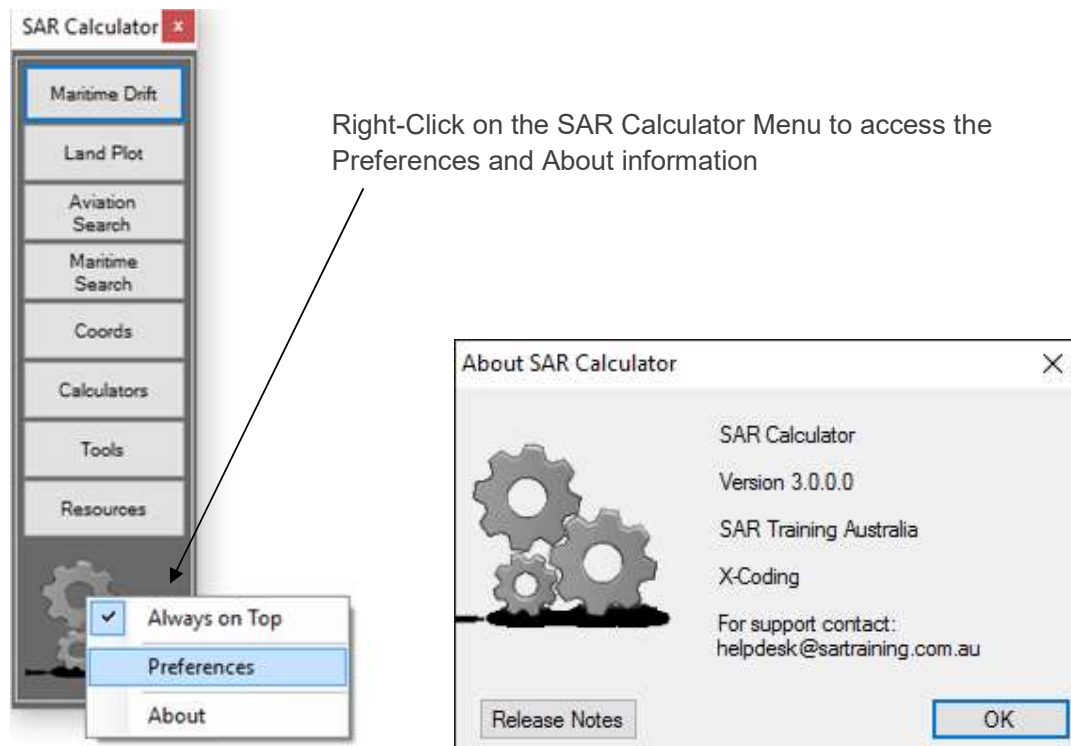
## 11. RESOURCES

Selecting the Resources button from the main floating menu will allow double-click access to a number of supporting resources. These include;

User Guide:	A quick reference to the features included in the SAR Calculator
NATSARMAN:	Internet link to the National Search and Rescue Council website*
SAR Training:	Web link to the SAR Training Australia website*
SAR Weather:	Web link to WINDYTY weather information website*
SAR Contacts:	Web link to the Search and Rescue Contacts search webpage*
User Manual:	Opens the SAR Calculator User Manual

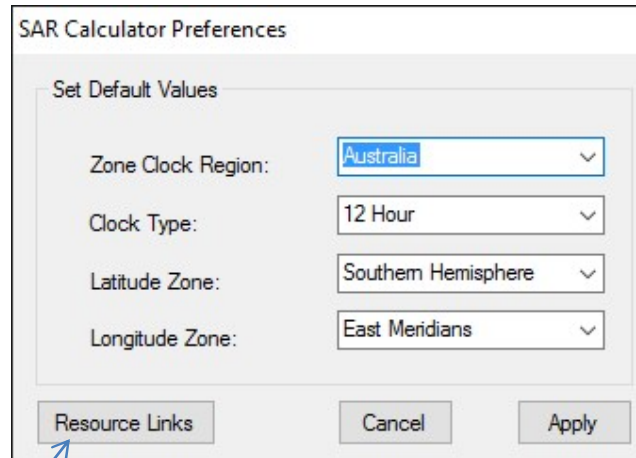
\* Requires an active internet connection.

## 12. PREFERENCES



Preferences allow the user to customise the SAR Calculator application. The following values can be set as the settings;

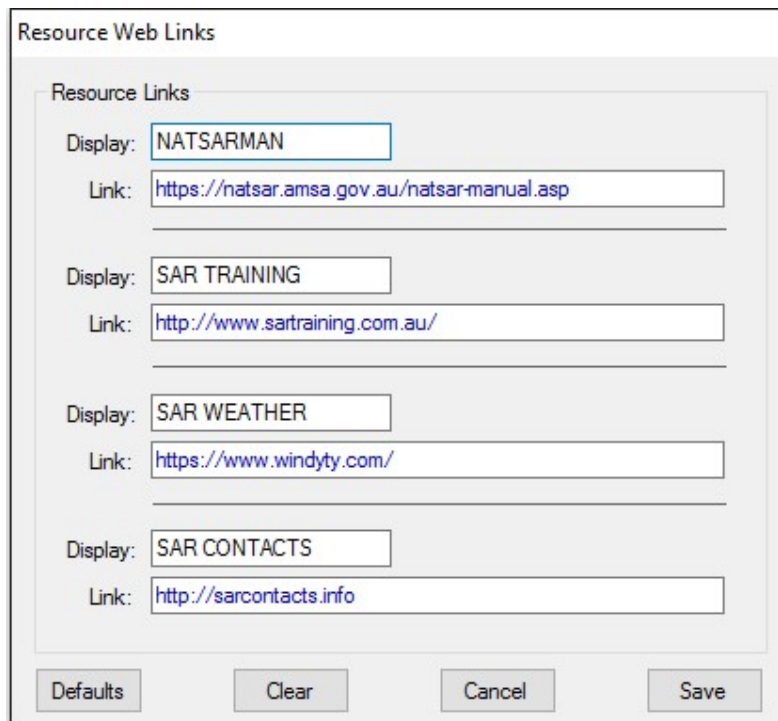
- Zone Clock Region
- Clock Type (12 or 24 hour)
- Latitude Zone
- Longitude Zone



The screenshot shows the 'SAR Calculator Preferences' dialog box. It has a title bar 'SAR Calculator Preferences' and a section titled 'Set Default Values'. This section contains four dropdown menus: 'Zone Clock Region' (set to 'Australia'), 'Clock Type' (set to '12 Hour'), 'Latitude Zone' (set to 'Southern Hemisphere'), and 'Longitude Zone' (set to 'East Meridians'). At the bottom of the dialog are three buttons: 'Resource Links', 'Cancel', and 'Apply'. A blue arrow points from the 'Resource Links' button to the text 'Preferences' below the dialog.

Preferences

The "Resource Links" button allows the user to customise the shortcuts to Websites.



The screenshot shows the 'Resource Web Links' dialog box. It has a title bar 'Resource Web Links' and a section titled 'Resource Links'. This section contains four pairs of text input fields, each with a 'Display:' label and a 'Link:' label. The first pair has 'Display: NATSARMAN' and 'Link: https://natsar.amsa.gov.au/natsar-manual.asp'. The second pair has 'Display: SAR TRAINING' and 'Link: http://www.sartraining.com.au/'. The third pair has 'Display: SAR WEATHER' and 'Link: https://www.windyty.com/'. The fourth pair has 'Display: SAR CONTACTS' and 'Link: http://sarcontacts.info'. At the bottom of the dialog are four buttons: 'Defaults', 'Clear', 'Cancel', and 'Save'.

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# SAR Calculator



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## 13. SAR Calculator Disclaimer

The SAR Calculator application has been designed as an aid which may assist SAR practitioners with search planning calculations consistent with accepted Search and Rescue procedures and practices, and the methodologies adopted in the Australian National Search and Rescue Manual.

This training aid does not replace the skill, formal training and knowledge of a qualified Search Mission Coordinator (SMC), and should not be relied upon as a primary SMC decision making tool.

The user indemnifies and releases SAR Training Australia, its officers, employees and agents and the developer of the SAR Calculator in respect of all claims of liability for loss, damage or injury which may be suffered by any party or person, direct or consequential arising from the use or of the SAR Calculator.

The software is provided on an 'as is' basis with no ongoing support. SAR Training Australia does not warrant or guarantee the serviceability, accuracy, completeness, currency or suitability of the SAR Calculator for any purpose or use, including complying with any applicable statutory obligations arising in any jurisdiction.

Search planning calculations that are derived from this software should always verified as correct with approved Search and Rescue manuals and procedures.

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