Debrief Cheat Sheets

Welcome to the Debrief Cheat Sheets. This is a set of self-teach tutorials that you will use to learn about Debrief. In working through the tutorials you'll encounter the breadth of the Debrief applicaftion, ready for using the tool for your own analysis.

Name: _____ Date: _____

Please forward feedback on this cheat-sheet to support@debrief.info

Getting started with Debrief NG

This series of cheatsheets will guide you through creating your Debrief working environment, customising it according to your preferred file locations, and loading some analysis data.

Defining your workspace

In comparison with prior versions of Debrief, Debrief NG introduces the concept of a Workspace - a central repository for your assorted analysis-related documents. Within this workspace your work is grouped into individual projects: thus you can quickly switch between concurrent analysis tasks. Debrief's provision of projects allows you to quickly drag and drop Debrief data-files and plots into the editor.

Generating a project for your data

Debrief NG stores it's data in a local folder called a Project. It's into this folder that you place analysis files and links to existing data folders elsewhere on your machine/network. This tutorial will lead you through creating a new, blank project.

1. **Check Navigator is open** ☐
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu.
2. **Learn about the Show View menu** ☐ (optional)
   Was the navigator view already open? If it was then you've missed out on the Show View menu. To open a view, just open the Window menu from the top of Debrief, and select **Show view**. A list of Debrief-specific views will open. So, in the future, if you're directed to a view but you can't find it, just remember you can open any view from this menu,
3. **Learn about the Quick Access panel** ☐
   Alternatively, whereever you are in Debrief, you can popup the quick access panel. Just hold down the **[ctrl]** key, press **3** and a yellow post-it like menu will appear. As you start typing 'Navigator' the list of available commands will shrink down until your required view is open. Obviously, this is of greater relevance to those who favour keyboard over mouse.
4. **Learn about Views in Debrief** ☐
   As you'll have read, the Navigator panel is an example of a View in Debrief. Views are supplemental panels that provide additional information (or control) to the conventional 2D Debrief plot. They can be closed by clicking on the **X** icon on their name tab. They can also be dragged around, both within Debrief (to put them, for example on the opposite side of the application), or out of Debrief into a separate window. When you close Debrief, it remembers the views that were previously open.

5. **Check you need a project**
   If the navigator window is empty, then you need to create a project. If the window already contains a folder-icon (possibly containing sample data) then hey, you're ready to go, well done! You can now move on to the next cheat sheet. But, if you have to create a project please move on to the next step.

6. **Create a 'General' project**
   Right-click in the Navigator view, and select **Project...** from the **New** sub-menu. The New Project wizard will open. From the **General** folder, select **Project**, and then press **Next**. Now just enter a name for your project (this could be the name of the current exercise). If you're in a workplace where users are unable to create folders in their home directory, clear the **Use default location** checkbox, and **Browse** to a folder in your personal working directories. (Note: you can ignore 'Working Sets' for now). Then just press the 'Finish' button, and you will see the new project in your workspace.

You've now created a project into which you can store your Debrief data

Generating links to your existing data

Debrief NG stores it's data in a local folder called a Project. While these are frequently created afresh to store new analysis data, it's also possible to denote your existing data directories as sub-folders (via links). This tutorial leads you through generating links to your existing data folders. But, if the "Create Project" form opened at application startup, you provided a project name, and indicated that you would like sample data to be imported, then you can skip the following steps and move on to the next cheat sheet.

1. **Check Navigator is open**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select **Navigator** from Debrief's Window/Show View menu.


(optional)

2. **Check you have a workspace**
   Before you can link in existing data, you need to define a project for your work. This is a parent folder within which your links are stored. If your Navigator window is empty, you must follow the **Generating a project** cheat-sheet Earlier in this document.


(optional)

3. **Add a new Folder**
   Right-click on your current project in the Navigator view, then select **Folder** from the **New** sub-menu. The New Folder wizard will open. Instead of creating a fresh child folder to store our data, we're going to link to an existing folder. So, whilst still in the New Folder Wizard, click the 'Advanced' button to display the Advanced options. Next, click on the 'Link to alternate location (Linked folder)', and click on 'Browse...' to navigate to an existing data folder on your machine or the network, clicking on **Finish** to, erm, Finish.
   If you don't have your own data, please use the **sample_data** folder that's installed in your Debrief installation folder (for a deployed Debrief) or org.mwc.cmap.combined.feature/root_installs (if you are running a development version of Debrief).


(optional)

4. **Done**
   Well done, there you are. Just repeat this process to add any other data directories you want to load data from. You've probably just created a link to the sample data, but you may also wish to create a link to a shared working folder.


(optional)

You can now repeat this process to create links to your other Debrief data directories.

Configuring legacy data

In addition to plotting your recorded vehicle data, Debrief is able to show a number of datasets in backdrop form. These range from Vectored datasets such as VPF through to gridded datasets such as ETOPO-2

1. **Locating the coastline file**
   In your Debrief installation directory is a file named **world.dat**. This is a fairly coarse global coastline. For Debrief to plot coastlines we need to tell Debrief where the file is.
   So, go into **Window/Preferences**, then open up **Maritime Analysis**, then **Coastline file location**. Lastly, click on **Browse** to navigate to the **World.dat** file in your Debrief installation folder.

2. **How to configure VPF library datasets**
   The steps to configure VPF and Etopo are covered in Debrief's user manual. Here's a clue though, you go into the **Maritime Analysis** section of the Preferences.
   VPF is distributed as 4 CD-ROMS. If you don't hold the CDs you can skip this step.

(optional)

3. **How to configure ETOPO library data**
   Please read the relevant section of the Debrief user manual for how to specify use the Debrief/Preferences dialog the location of the ETOPO dataset.
   ETOPO is distributed as a ~200Mb data-file. If you don't hold the data-file you can skip this step.

(optional)

Viewing some data

This series of steps will guide you through creating then populating a new Debrief plot.

Creating a new plot in Debrief

This tutorial will lead you through creating a new, blank plot in Debrief.

1. **Check you have a Project**
   Before you can create a Plot, you must have a Project into which the Plot is created. If you haven't created a project, go to the "Generating a project" cheatsheet, then return here.

2. **Choose location for plot file**
   Debrief will store the new plot in one of your existing folders. If your navigator contains links to both shared training data and personal data folders, it's probably best to create this plot in your personal data folder.

3. **Create new plot**
   In the Navigator view, right-click on the parent folder for your new plot and select **New/Debrief Plot** and the Wizard will open. Once the wizard opens, the first step is to confirm where you would like the plot to be stored (it's **Container**). If you're not happy with the specified location click on **Browse** button and select the top-level folder of your data directories. Also provide a filename. Using the wizard, follow the series of tabs to indicate what information you'd like shown in the background of the plot, clicking Finish to complete. Some of the steps will not advance until all of the necessary fields have been filled.

4. **Finished**
   Once the Wizard has closed, the plot you've created can be found in the folder you specified.

Note that we didn't have to use the wizard steps, we could have inserted chart features into our Plot by hand using the Chart Features menu.

Adding data to a plot

Debrief's New Plot Wizard is quite effective at providing you with a ready-formatted backdrop to your analysis, but it doesn't load your data for you. Here we're going to load some existing tracks to assist your getting started.

1. **Check Navigator is open**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. In the navigator, you should have a linked directory to sample data, either from a previous Debrief installation, or from within this fresh one.

2. **View sample data**
   In the Navigator, expand the folder that contains your existing Debrief files (either REP or XML). Valid Debrief files are flagged with a Debrief icon. See the help link for this step (the Question mark icon) to read about the two file types.

3. **Drag in a simple track**
   If you've already got a plot open (maybe one from earlier steps in the tutorial), close it now by clicking on the cross in the small tab-shaped icon above it. Don't worry about saving the tutorial files. Drag a REP track from your Navigator onto the blank plot area. The **boat1.rep** file is a simple starting point. The plot and any associated views will promptly update. When REP files are dragged in, you may be asked whether you wish to import the data in Over The Ground (OTG) or Dead Reckoning (DR) mode. For this tutorial, select OTG, but see help link (?) for this step for more detail - particularly if you expect to be using DR data.

4. **Drag in a complex plot**
   If you have multiple tracks to analyse you can drag them onto the track plot you've just created. But, for now, close the plot you have open (by clicking on the cross icon in it's tab. You'll be asked if you want to save it, press **don't save** . Now drag across **sample.dpf**. You'll see that this plot contains more complex graphical features.

5. **Debrief file types**
   Note, you've just encountered two file types, the Replay file type (**.rep**) and the Debrief file type (**.dpf**). The Replay file format is a very simple, column oriented text format that's ideal for passing around track data. But, it isn't suited to storing formatting data or user preferences. This is where the Debrief DPF file type comes in. Whilst it's still a textual file format, it' XML structure that allows it to store a wide range of data types and subjects. Thus a typical flow for data is that it enters Debrief in REP format, the analyst creates a custom plot based on this data, and then stores the plot in XML format as a DPF file.

6. **Done**
   There you are, your track data is now on the plot. Note, tracks can't only be dragged from the Navigator. If you arrange your windows correctly you can drag tracks in directly from Windows Explorer. See the Maintainers Guide section of the Debrief User Guide to learn how to support right-click track opening on MS Windows.

Editing your data

So, you've found your data, loaded it into Debrief, and now you want to make some changes to it. This cheat-sheet will give you some pointers.

1. **Check you have some data**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. Also check you have our sample data-files - it they're not there, find how to load them from the "Loading sample data" cheat-sheet.

2. **Open the sample plot-file**
   If it's not already open, double-click on 'sample.dpf' in the Navigator window, and the sample plot will open.

3. **Fit to window**
   You can also experiment with zooming in and out. Click the zoom out button once to zoom out, or put plot into **Zoom In** mode by clicking on the Zoom In button. Now, when you drag an area, the map will zoom in on that viewport. Lastly, to make sure all of the data is visible, click on the "Fit-to-Window" toolbar button. Read more about the toolbar buttons in the **Moving around the view** section of the Debrief User Guide.

4. **View the data in tree form**
   In addition to viewing your data on the 2D plot, the **Outline View** displays it in tree form. Switch to the **Outline View** view to see the data. If the Outline View isn't open already, you can open it via the **Window/Show View** menu. You'll see the two tracks there, together with other layers that contain **Chart Features** (such as the **Grid** and **Scale**), and the **Misc** layer that contains graphical annotations.

5. **Make sure the properties window is open**
   The properties window is normally at the bottom left of Debrief. If it's there but not at the top of the 'stack', click on its title to reveal it. If you can't find it, select "Properties" from the 'Window/Show View" drop-down list.

6. **Select an item**
   Now double-click on one of the corners of the green rectangle near the centre of the track plot. You'll now see its editable attributes appear on the properties window. Cool. You'll see that the attributes are grouped for ease of use, and some must be expanded (those for location & time).

7. **Make a change**
   Now have a go at changing the rectangle's label color. Click once on the green rectangle next to 'LabelColor'. A button containing three dots will appear. Click on this to open the color editor. Click on the red rectangle and then the 'OK' button. The dialog will close, the label color property will be updated, and the plot will redraw. Well done.

8. **Undo the change**
   Oops, it appears we shouldn't have changed the label color, it doesn't meet NATO MilStd 12332 Sub-para 14g (2002 version). To undo a change, first click on the tab at the top of the **sample.dpf** plot (to tell Debrief which plot we're undoing). Now click on the Edit menu, and select Undo (it's the first item). The color of the label will now change back. Look on the Edit menu again, and you'll see there's now a "Redo" command available - just in case you're undecided about your adherence to sub-para 14g. Note, it's not just edits that are undo-able, lots of operations can be undone, just have a look on the Edit menu whenever you feel the need to step-back. If you think something isn't on there but it should be, just ask... **But it did not undo!**. The Undo button applies to whichever is the active Debrief view. So, to undo a change to the plot, first need to select the plot (or the tab containing hte plot name), then press undo.

9. **Edit a position**
   To select a position within a track, just double-click on that position - its editable attributes will appear in the properties window. You can now change the symbol or label (**LabelShowing** or **SymbolShowing**, visibility, or the color (**Color**) that position will be plotted in. Note: you may have to scroll up & down the **Properties Window** to see all of the properties.

10. **Edit a whole track**
    Aaah, but how do you edit a track? Easy, just use the Outline View to select it rather than clicking on the plot. Open the Outline View (or select Outline View from the Window/Show View drop-down menu). In the Outline View click once on the name of a track, and the whole track's properties will be editable in the Properties View. The Outline View is also useful for selecting non-geographic entities (such as a grid, scale, or background data-set) to be edited.

11. **Re-arrange the views**
    Now, are you finding it a bit of pain switching between the Outline View and Properties views? Using your mouse, just click and drag the Properties panel upwards - so it's on top of the view vertically above it. You can now see the Outline View and Properties windows at once.

12. **Edit directly from the plot itself**
    For some attributes, you don't even need to use the Properties View. Just right-click on an item on your plot. The popup menu shows a series of options and commands. A drop-down menu is shown next to the current item's name. From this drop-down menu you'll be able to edit all of the item's true/false or 'select one from many' attributes. Note, if you click on a vehicle position, a drop-down is shown for the parent track as well as the position itself. Also note, that the right-click menu is shown if you click on an item from the Outline View.

13. **Don't forget to save**
    Now that you've invested all that effort in your plot, don't forget to save it. Just click on the floppy-disk icon on the main toolbar. If the data you're looking is actually an REP file, you will be invited to save the file in Debrief's XML plot-file format - since REPs can't store formatting data.

View the UI overview in the Help

That's the end of the guided tour, you can now learn more from the online user guide.

View the help guide
In addition to these cheat sheets, Debrief has an extensive user guide. Now's a good time to go and read about the other features you can see in the user interface.

Analysing Sensor Data

With ever-increasing data rates from multiple recording systems it is easy for an analysis plot to become swamped. Debrief NG provides tools to reduce the volume and type of data displayed. This tutorial will lead you through the management of large volumes of data.

1. **Check you have some data**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. Also check you have our sample data-files - it they're not there, find how to load them from the "Loading sample data" cheat-sheet.

2. **Open the sample sensor tracks**
   Double-click on the "sen_tracks.rep" file and you will see the red and blue vessel tracks (select 'Over The Ground' for both tracks if the import dialog pops open).

3. **Fit to window**
   To make sure all of the data is visible, click on the "Fit-to-Window" toolbar button. To these tracks you're going to add the sensor data

4. **Drag in the SSK track**
   From the Navigator window, drag the SSK sensor data file (sen_ssk_sensor.dsf) onto the plot. You can accept the default options in the import wizard.

5. **And now the FF track**
   Next, drag the SSK sensor data file (sen_frig_sensor.dsf) onto the plot. No, there hasn't been a visible change to the plot, but be assured, the data is there.

6. **View the sensor data**
   From the Outline View, expand the 'tree' for each track (they're called 'Frigate' and 'New_SSK'). Within each track you will see named blocks of sensor data. Make each block of sensor data visible by selecting it, then clicking on the 'make visible' toolbar button. As you make each set of data visible you should see its bearing fan appear. Overall there are six blocks of sensor data across the two tracks.

7. **Sensor formatting options**
   Sensor lines can be formatted to change their colour, their label, and the location of their label. The formatting can be applied to a single sensor line or a series of sensor lines. Now, the dense fans of sensor data present in the sample files you have don't lend themselves to being individually annotated. So we won't.

   (optional)

8. **Format the sensor data**
   What we're going to do now is simulate formatting a series of bearing lines to represent a particular sensor state. So, from the Outline View open up the "NEW_SSK_BB" sensor for the "New_SSK" track. Select the first five sensor bearings. Now switch to the properties view. This view should show the editable properties for those bearings. Change the color from red to yellow. You will see the sensor lines on the plot update.

9. **Conduct a plot-lock**
   What we're going to do now is to simulate the process of dragging tracks so that their bearing fans match. In UK this is called a plot-lock, and in the US its called a tie-point. First we must indicate which tracks we want to view the relationship between - so make the Frigate the primary track, and the New_SSK the secondary track - you should now see them both on the Track Tote.

10. **Commence plot-lock**
    Next we tell Debrief that we want to use the mouse to drag the tracks, so click on the "Drag Track Segment" button - it's a white arrow with a diagonal line at its top-right.

11. **Start dragging**
    The 'Stacked Dots' view should have opened, and the cursor should now have changed to a brown hand. The Stacked Dots view shows the bearing error for visible sensor bearing lines against the point on the target track nearest to that DTG. When the cursor is over the end of a track, it will turn green. So move the cursor over the north-west end of the blue track until the cursor turns green, hold down the mouse button, and start dragging. You will see track and it's sensor data start hover as you drag it, and the bearing errors in the Stacked Dots view will update proportionally - in plot-locking the tracks you're trying to minimise the errors displayed on the graph. If you weight some sensor data more than others, experiment with hiding those blocks of sensor data (by making them not visible) - this will declutter the plot and the stacked dots, making plot-locking easier.

12. **Done**
    Well done, that's the loading, management, and formatting of sensor data - supported by a healthy dose of plot-locking.

You've now mastered the initial steps of using Debrief.
Ok, you've finished your first cheat sheet, why not try the "Using Debrief in analysis" on next.

Signed: _____ Date: _____

Name: _____ Date: _____

Please forward feedback on this cheat-sheet to support@debrief.info

Controlling what you view

This tutorial is going to get you started with some of the analysis functionality within Debrief.

Filtering your view

With ever-increasing data rates from multiple recording systems it is easy for an analysis plot to become swamped. Debrief NG provides tools to reduce the volume and type of data displayed. This tutorial will lead you through the management of large volumes of data.

1. **Check you have some data**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. We're going to be working with the Sample.dpf data-file from Debrief's sample data distribution. If you can't see the sample data, refer to the online help covering how to find/load it. ☐
2. **Open a sample file**
   Now double-click on **Sample.dpf** in the navigator window. Our sample Debrief plot should now open ☐
3. **Check you can view the data**
   To be sure you can see all of the data, perform a fit-to-window operation, either via the Fit-to-Window button on the toolbar, or by the Fit-to-window button on the Chart Overview panel. ☐
4. **Open the Outline View**
   Next, make sure the Outline View is visible. Remember if any screen component isn't visible you just load it by selecting it from the 'Window/Show View' menu. ☐
5. **Hide shape**
   In the Outline View, expand the layer titled "Misc (xx items)". At the top of the Outline View, is a toolbar of operations that can be applied to plot items. After selecting an annotation from within that layer, click on the empty rectangle icon in the Outline View toolbar (next to the tick-in-rectangle). You should see the green tick disappear, together with the shape on the plot. Show the shape again - but this time use the Outline View drop-down menu (at the right of the Outline View's toolbar). (Note that you can hide/reveal more than one item at a time by holding down the control key to perform a multiple selection.) ☐

6. **Hide whole layer**
   Next, experiment with hiding whole layers: select one of the tracks in the Outline View and try hiding and revealing it. Note, that you can expand each track to see the series of positions inside it. Once expanded, you can select a series of point (representing a time-period) to be hidden/revealed. But hey, there are quicker ways than that - just keep reading.

7. **Show Time Controller**
   Now we're going to filter the plot to a particular period of time. Start off by revealing the Time Controller view (or opening it if it isn't already visible). The lower section of the time controller is a pair of sliders used to mark the start and end time of a variety of tasks.

8. **Select Filter to Period**
   Instruct Debrief that we want the plot to be filtered according to the selected time period by selecting "Filter to period" from the Time Controller's drop-down menu (the downward facing triangle at the right-hand end of the tools at the top of the Time Controller view).

9. **Trim visible time period**
   Now, as you drag the start and stop markers, the amount of data visible on the plot will be trimmed. Nice. The shaded portion between the time-sliders represents the currently visible time period. You can drag this shaded section to move your 'windows' forwards and backwards. Hold down the shift key to lock the period to the line markers

Now you're a master of manipulating data, a skill essential both to data analysis and the collation of information for transfer to further presentation via Word or PowerPoint

Assigning primary and secondary tracks

With ever-increasing data rates from multiple recording systems it is easy for an analysis plot to become swamped. Debrief NG provides tools to reduce the volume and type of data displayed. This tutorial will lead you through the management of large volumes of data.

1. **Check you have some data**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. Also check you have our sample data-files - if they're not there, find how to load them from the "Loading sample data" cheat-sheet.

2. **Open the sample plot-file**
   Double-click on 'sample.dpf' in the Navigator window, and the sample plot will open.

3. **Fit to window**
   To make sure all of the data is visible, click on the "Fit-to-Window" toolbar button.

4. **View the tote**
   In the centre section of the left hand column in Debrief is the Track Tote. If it's obscured by other view panels, click on it's tab to highlight it. If it's not visible at all, open it by selecting "Track Tote" from the "Window/Show View" drop-down menu.

5. **What can I see?**
   Once open, you should see a table consisting of two or more columns. The left-hand column lists the calculated data fields, and an optional right-hand column shows the units used for that field. The centre columns show the actual calculated data fields, one for each track on the tote. The left-hand data column (Nelson in our test data) is the primary track - that is, all calculations are shown relative to this track. The calculations themselves are explained in greater detail in the Help manual .

6. **Move track through time**
   Ok, now open the Time Controller (in the top-section of the left hand column once again, open it from the Window menu if you can't see it). If you drag the time-slider in the time-controller you will see the calculated data fields update.

7. **Removing a track**
   As an experiement with managing the tracks on the tote, right-click on the right-hand tote's columns (but not the header) and select "Remove this track". Yes, the secondary track will be removed, and with only one track remaining.

8. **Adding a track to the tote**
   Open the Outline View (you must know where to find that by now...). Observe the '1' and '2' buttons on the view's toolbar, they're probably currently disabled. They become enabled depending upon whether the currently selected item is suitable for inclusion on the tote. Click once on the track you just removed from the tote, and both buttons will be enabled - allowing you to make the current track primary or secondary. Go on, have a go at assigning it... It's more than just tracks that can be put on the tote, any data-item that has time and location attributes can be placed on the tote: items such as circles and labels are particularly suited.

9. **Done**
   Well done, you are now a master of the tote.

So, you now understand Primary and Secondary tracks. You're practically an analyst!

Viewing time-related vessel tracks

Debrief offers more than just a static overview of vessel tracks - it allows you to control the time period of data shown.

1. **Check you have some data**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. Also check you have our sample data-files - it they're not there, find how to load them from the "Loading sample data" cheat-sheet.


(optional)

2. **Open the sample plot-file**
   Double-click on 'sample.dpf' in the Navigator window, and the sample plot will open.

3. **Fit to window**
   To make sure all of the data is visible, click on the "Fit-to-Window" toolbar button.

4. **View the time controller**
   In the top section of the left hand column in Debrief is the Time Controller. If it's not at the top, click on it's tab to highlight it. If it's not visible at all, open it by selecting "Time Controller" from the "Window/Show View" drop-down menu.

5. **What am I looking at?**
   The Time Controller is quite a busy part of the application, used for a range of time-related tasks. Have a read of the **Controlling Time** section of the Debrief User Guide

(optional)

6. **Check we're in normal stepping mode**
   Before we start moving through the data, just check that we're in 'normal' time stepping mode. There are two stepping modes: normal and snail - make sure we're not in the snail mode, but that the button on the Time Controller toolbar with the red track and black background is pressed.

7. **Move slowly through the data**
   Above the current time indicator are a series of buttons, similar to the pause/ play/rewind you'd find on a music-player. Click on the buttons and you'll see the time value move forwards/backwards appropriately - any the white rectangular highlight move along the vessel tracks.

8. **Move quickly through the time period**
   Now drag the time-slider, and notice the white highlight rectangle move along the vessel tracks, with the current time shown in green-on-black text. If you also have the Track Tote view open, notice how it's updating to reflect the current time.

9. **Experiment with the time format options**
   The Time Controller toolbar has a drop-down list. Within this are further drop-down lists to select the format in which the current DTG is displayed, and the increment used for moving through the plot. Have a go at changing the time format so that you can see the full Year/Month/Day for the current DTG (yes, the Debrief test-plots are that old...). Also have a go at changing the time increment to 15 minutes, so that you can move through the plot in large handfuls.

10. **Change plotting modes**
    Start off by selecting **Primary Centred/North Oriented** and see how the viewport changes as you move forwards and backwards whilst in Snail mode. Note that relative mode is selected independent of the mutually exclusive normal and snail modes.

11. **Work with time periods**
    There's one part of the Time Controller we haven't covered yet - that's the time period selector. As its name suggests, this is used to select a period of time. It doesn't work in quite the same way as the time-slider however, because typically nothing happens when you adjust it. It is typically used to select a time-period to be used in a subsequent operation. Here's an example: select a time period of 120700 to 121000. Now select "Export calculated data to clipboard" from the Time Controller's drop-down menu. Three hour's worth of calculated data have just been copied onto your system clipboard, ready to be pasted into Excel.

12. **Control the visible time period**
    Right, let's move on to another role of the Time Period selector. The time-period selector is also used to select a time period when viewing time-variable graphs - but hey, let's not leap ahead of ourselves. One last use for the time-period selector is more related to the current view. If you select the 120600 to 120700 period, then depress the "Filter to period" icon on the Time Controller toolbar, when you move the time-sliders the plot is trimmed to that one hour period. Holding down the shift-key makes the slider move in larger increments. Dragging the selected period whilst holding down the shift-key whilst in this mode effectively gives you the ability to jump through the exercise in one-hour blocks. **But**, so we don't lose our sample data, make sure you now extend the sliders out to their full range to reveal all of our training data.

13. **Super accurate time selection**
    Note, for some time export operations you may find it difficult to select the **exact** time period you require. If this is the case, double-click on the start/finish time marker triangle, and the value will become editable in the Properties View. Or if you're just trying to move the time value a couple of minutes either way, hold down the **[Control]** key whilst double-clicking, and a sweet little mini dialog will open to let you move it just a small amount.

14. **Time Controller's editable properties**
    The Time Controller's drop down menu contains a series of child menus. In some of these you'll see an 'Edit properties' element. These let you control various aspects of temporal data analysis. Once you've selected an item from the properties drop-down its attributes will become editable on the properties view (so open it, if it's not visible). Note - the item only appears on the properties window if the Time Controller is the active view, that is it's the most recently selected view as indicated by it's blue highlight.

15. **Bookmarking the current time**
    So, just one part of the time controller left to cover now, bookmarking a particular time or event. Debrief NG lets you insert a bookmark attached to a particular DTG in the current plot. Let's say you're analysing a particular exercise and want to record a couple of interactions. In Normal view mode, move the time-slider to 121011 hrs - the point when RED first react to BLUE. Now select "Add DTG as bookmark" from the Time-Controller's drop-down menu. A dialog box will open inviting you to add a remark for that DTG. Enter "First contact", then press "OK". Now move to 121131 and enter a bookmark title "Plotlock start". Hmm, where are those bookmarks? Open the Bookmarks view from the "Window/Show view" menu - and you'll see your two bookmarks. Double-click on either of them to move to that time. Now save and close your plot. Note that the bookmarks remain effective, and you can store as many bookmarks as you like, across as many analysis plots as you like.

16. **Done**
    Well done, you've now mastered one of the most complex parts of Debrief - all downhill from now on...

The **Time Controller** is a very capable panel that provides a wide range of functionality. You've now got an idea how to control it.

Analysing time-related calculated data

Debrief is capable of producing analysis products beyond the traditional graphical track plots. After all, it's got the data hasn't it? The most obvious derived products are the analysis plots - graphs showing time versus either a recorded data value or a calculation based on a specific set of data-values. Why not learn more...

1. **The big-picture**
    Right, here's the process we're going to follow. We need to tell Debrief the time-period we want plotted, which participants to plot data for, what type of data to plot, and (for relative calculations) which is the primary track. Let's go.

2. **Check you have some data**
    In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select "Navigator" from Debrief's Window/Show View menu. Also check you have our sample data-files - it they're not there, find how to load them from the "Loading sample data" cheat-sheet.

3. **Open the sample plot-file**
    Double-click on 'sample.dpf' in the Navigator window, and the sample plot will open.

4. **Fit to window**
   To make sure all of the data is visible, click on the "Fit-to-Window" toolbar button.

5. **Open the Time Controller**
   In the top left hand corner of Debrief you should find the Time Controller. If is isn't there, select "Time Controller" from Debrief's Window/Show View menu.

(optional)

6. **Select the time period of interest**
   Right, select the period 120800 to 121100 using the time-period selector at the bottom of the Time Controller (See the **Controlling Time** part of the Debrief User Guide for more detail on the Time Controller). Remember that holding down the shift-key makes the sliders move in one-hour jumps.

7. **Open the Outline View**
   Next we need to indicate what tracks we want to see information for. In the bottom left hand corner of Debrief you should find the Outline View window. If it isn't there, select "Outline View" from Debrief's Window/Show View menu.

(optional)

8. **Select the tracks of interest**
   Click on the two tracks (holding down the CTRL key to select multiple items).

9. **Open xy-plot**
   Then right-click on the selected items and click on "View XY Plot". Next select "Range" from the drop-down list of calculations, then "OK". Finally indicate which track is the primary (for plotting data that's based on the relationship between multiple tracks Debrief needs to know which track is the "subject" of the calculation).

10. **Navigate around the plot**
    Well done, there you are. Zoom in on the graph by dragging with the mouse, and view the whole dataset again by clicking on the graph's Fit to Window button. Feel free to experiment with the other commands as well, or even configure the graph to use your preferred font & titles. Note that you can use the **tab** key to cycle through the 5 drag modes, or use **ctrl> key and mouse wheel to zoom in and out of the plot.**

11. **Done**
    That's almost it for plotting graphs. The only additional thing to add is to point out that it's not just tracks that can be the plotted. If you need to track proximity of multiple vehicles to a fixed point (such as a sensor), just insert a label annotation at that point and select the label in addition to the tracks - making sure you indicate that the label/sensor is the primary.

And that's all for using Debrief for analysis. If you're from an organisation that conducts TMA analysis based on sensor data (or you've a general yearning to learn) why not try the **Single Sided Reconstruction in Debrief** tutorial.

Signed: _____ Date: _____

Name: _____ Date: _____

Please forward feedback on this cheat-sheet to support@debrief.info

Single Sided Reconstruction in Debrief

Before running through this cheat-sheet, you should really have completed the **A Debrief walkthrough** cheat-sheet, so you know how to configure Debrief and how to load your data. If you haven't completed the Debrief walkthrough, now is the perfect time to do it.

Working with target tracks

Now it's time to start building the target track

Groom sensor data

This cheat sheet is going to work through creating preparing the ownship sensor data ready for production of TMA tracks.

1. **Load datafiles**
   We're using new datafiles for this step, so double-click on **nonsuch.rep** in the Navigator to load ownship track (and select **DR** mode when asked). Perform a Fit to Window once loaded to have a look at the track. Next, drag in **sensor.dsf**. The Sensor Import Wizard will offer you some customisations, but you can ignore them. Now, **don't worry** if the sensor data doesn't appear on the plot - this is by intention. ☐
2. **Make sensor data visible**
   To keep the plot tidy, sensor data is not shown by default when loaded. Expand **Track:NONSUCH** in the **Outline View** , then open **Sensors** , then select **Sensor:Sensor_A (52 items)** . Once the Sensor A sensor data is selected, click on the tick icon in the toolbar at top of the Outline View view, to make the sensor data visible - and it will appear on the plot. ☐
3. **Resolve ambiguity**
   In our data you can see one bearing fan heading off to the WNW, and the other off towards NNE. Intelligence tells us (well, Ian H tells us) that the actual contact is off to the NW. If we open the Time Controller view and drag the time slider back and forth we'll see the current position highlight moving from top-right to bottom left. Thus, the NW block of sensor data is to the Starboard of the track. . ☐
4. **Drop ambiguous data**
   Now, using the Outline View, expand the **SENSOR_A** dataset and select all of the child items (select the top one, scroll to the bottom of the list, then select the bottom one whilst holding down the shift-key). Now, right click on one of the entries and select **Keep starboard bearings** . The port bearings will dissappear. ☐

5. **Open grid editor**

   In this tutoral we're going to be editing the raw sensor data using the Grid Editor. So, select **Grid Editor** from the **Window/Show view menu** (or click on the link below).

6. **Indicate data to edit**

   The grid editor listens out for the current selection on the Outline View. So, if the item on the Outline View is suitable for being edited in grid format it will be shown in the grid editor (though this behaviour can be cancelled by clicking on the lock icon in the grid editor toolbar). If you open the **Track:NONSUCH** item and select the positions you'll see them appear in the grid editor. Now click on the sensor data for Track:NONSUCH (**Sensor:SENSOR_A(52 items)** .

7. **Get this user interface tidied up**

   We've now got quite a few panels open, so we're going to tidy them a little. If you're on a multi-monitor setup the we're going to put the grid editor onto the other screen. To do this, pick up the grid editor by clicking and dragging its tab-bar title, and drag it over to the other screen. Once it's on the other screen resize it to view all the columns (resize the panel using the drag-handles at the bottom right).

8. **View the data**

   The scrollbar on the right hand side lets you move forwards and backwards through the data (with newest items shown at the top). Most cells in the grid are editable, including the date, and green/red buttons are provided in the toolbar to **add** / **remove** rows. You don't need to do it in this tutorial, but when you click on **Add** , it will insert a duplicate of the currently selected row immediately beneath it - hopefully reducing the amount of manual entry required.

9. **Work on an attribute**

   Beyond straight-forward text-editing of data, selecting an attribute offers greater editing capabilities. So, start off by clicking on the header cell at the top of the frequency column (so, just click on the word **Frequency**). As you do, you'll see a graph appear in the bottom half of the view. The graph is a waterfall display of frequency, with the most recent value at the top. Zoom in on data by dragging a region on the graph using a top-left to bottom-right motion. Zoom out again by dragging bottom-right to top-left. Go on, have a go.

10. **Fix dodgy frequency observation**

    If you zoom out to look at all the frequency data you'll see that whilst the frequency data seems fairly constant near the top of the dataset (49.99), there are occasional instances where the data value seems too low (when viewed in the context of a steady ownship track). We're going to fix an errant data point by dragging it. Firstly, zoom in on the data around the time 05:20. You'll see that the data-point at 05:19:11 is quite a lot lower than its neighbours. Move it by clicking inside the square data point and dragging the symbol so that it's in line with it's neighbours. Note that if the neighbours were in a steady drift you could align by eye where you drop the data point to align with the more tidily.

11. **Smooth period of data**

    We'll now switch to bearing data. Click on the **Bearing** column to view a graph of bearing data. Fairly near the top of the bearing data you will see three steps in the data, around the period 05:10 to 05:20. Zoom in on these three steps. It appears that the last smooth data point before the steps is at 05:10:44, and the first after the steps is at 05:21:30. We're going to interpolate the data points between these two values, so first we must tell Debrief which are the points we intend keeping. So, in the grid (in the top half of the editor), click on the empty space at the left of row 05:10:44 then hold down the **Control** key and click on row 05:21:30. As you do this, the Interpolate (calculator) button in the grid editor toolbar should become enabled. Click on the interpolate button and the bearings for the selected data points will be smoothed along a curve. You may select **Undo** from the edit menu to undo an interpolation operation.

12. **Getting clever with interpolation**

    Note that we only selected a single point at each end of the poor data. There are two other, more advanced ways of doing the interpolation. If we had selected multiple points at the ends of the dodgy data then Debrief would have made the interpolated values fit through a cubic spline that passed through the selected points. Similarly, if we had selected one or more points in the middle of the dodgy data (in addition to point(s) at the ends) then Debrief would have fitted a curve through the end and mid points of the dataset.

(optional)

13. **Set array offset**

    We can move on now that we've tidied the sensor data. As you'll see, the sensor data is ambiguous, as produced by a towed array. Currently Debrief is plotting the sensor cuts against the attack datum of the platform, but we need to apply an offset for this sensor (-451m in this case). So, select **Sensor:SENSOR_A** in the **Outline View** , then open the **Properties Window** (the click to perform button below will also open it). In the Properties Window you'll see the **SensorOffset** attribute. This allows you to enter a custom offset or to choose from a set of lengths from a shared datafile (see the Help entry for this item for further details). Anyway, ignore the shared values and enter -451 in this field, click on the Plot, and you'll see the bearings jump to reflect the change. To see where the current array centre is, switch on **Plot Array Centre** from the properties for the parent track - you'll see a cross appear astern of the current submarine location.

14. **Reduce data density**

    Whilst it isn't necessary for this exercise, Debrief does allow you to reduce the density of the sensor data. If you right-click on **Sensor:SENSOR_A** , then navigate down into the **SENSOR_A** sub-menu you will see a **Visible Frequency** option. Using one of these options will pass through sensor data and hide sensor observations between the specified frequency. The sensor cuts remain available, and can be made visible again by selecting a smaller visible frequency. Note, instead of this you could have resampled the ownship positions and sensor cuts by right-clicking on the parent track and selecting **Resample data at** .

(optional)

We've now got a track with lovely smooth sensor data. Hmm.

Generate a target track

This cheat sheet is going to work through creating a segment of target track from bearing data. The target track is going to represent a period of straight-line motion, and can be interpreted as a Manual TMA Solution. You should have open a tidy track and sensor data as produced in the previous cheat-sheet. Feel free to close the Grid Editor window now that we're concentrating on the plot.

1. **Decide on contact period**

   The capable analyst will be able to recognise a couple of periods of steady bearing rate that lend themselves to being the basis of TMA solutions. The first one we're going to use is the first dozen or so sensor cuts. We can see that after a period of about 10 unsteady cuts there's another steady period - we'll use that for a solution a little later.

2. **Highlight contacts**

   We're going to change the color of the contacts to use for our first solution. Double-click somewhere along the bearing line for the last data point in first period of steady bearing data - it will be highlighted in the Outline View. By my (unqualified eye), the last data point is the one at **090722 044127**. Click on that to select it. Next scroll back up to the start of the sensor data, hold down the <shift> key and click on the first entry. This period of sensor data is now selected. Before creating a TMA segment based on it we're going to highlight it in a unique color. So, right-click anywhere on it, and select **Multiple items/ Color/Orange** .

3. **Generate the TMA segment**

   Next, with the set of data still selected (or reselect it if you've lost the selection) we're going to create a solution based upon it. When we generate a TMA segment based on sensor data, Debrief creates a track segment of steady course/speed data points, with one data-point at the time of each sensor cut used to generate the segment. Let's get on with it.

4. **Follow the generate TMA wizard**

   Now, right click on the selected sensor data and select **Generate TMA solution from selected cuts**. Once the TMA wizard opens, it will invite you to enter an initial range and bearing to the contact. Enter 1 nautical mile (nm) for the solution, and leave the bearing unaltered (since it's using the bearing from our first sensor cut). Then click **Next** . The wizard will then invite you to enter an initial solution. Based on our understanding of the sensor fan and a complete guess, enter 220 for the course and 6 knots for the speed, then press **Finish** . You will see a red track appear, labelled with **TMA**_ and the time of the first cut used. The solutions have times in their name to make it easier for you to manage them.

5. **Recognise track data**

   If you expand the new track in the **Outline View** you'll see the **Positions** child item. Notice that the icon for this item shows a straight-line section of data with an associated (but tiny) compass rose). The equivalent object for **Track:NONSUCH** shows a non straight-line set of positions. Also, note that on the plot, the name of the TMA segment is shown in italics, to denote that it's not based on actual position recordings.

   (optional)

6. **Put the tracks on the tote**

   To view residuals, we must indicate to Debrief which is the ownship and which is the target. Debrief can hold many more than two tracks, so we must inform it which two tracks we want to compare with each other. So, in the Outline View, first select the **Track:NONSUCH** item, then click on the **1** (primary) in the Outline View toolbar. Next, click on the **Track_xxxx** item and select **2** (secondary) button in the Outline View toolbar. If you switch to the **Track Tote** view (shortcut provided below) you'll now see it contains our primary and secondary tracks - and we've successfully indicated who we want to view in the residuals plot.

7. **Drag the track segment**
   You may now manipulate the track segment to minimise the bearing and frequency residuals. Start by clicking on **Drag Track Segment** on the Debrief toolbar. As you do, the **Bearing Residuals** view will be brought to the front. You can expand this view by dragging it's sides, or to make it much larger you can pick it up by clicking and dragging the **Bearing Residuals** tab above it, and dragging it to another monitor. In this view are the 4 drag operation buttons, that control how you drag the track. The cursor hand will go green when over a valid hot-spot: either end of the track. In the **Shear** drag mode you can **translate** a track by clicking on the hotspot at its mid-point. Have a go at selecting **Shear** mode and dragging the ends of the track - to optimise the bearing errors.

8. **Generate second TMA segment**
   Once you're happy with the first solution it's time to move on. It would appear from the sensor data that the turn is represented by about 13 cuts before a further straight line section of data. As you look at the fan of sensor data, you can see there's an early block of bearing lines that a roughly parallel. Then towards the end of the track the bearing lines appear to converge steadily around a single point. In between these two periods of steady data, the lines jump around a little, representing the period where the subject vessel is changing course and/or speed.
   Now, let's work with the plot again. Click on the first sensor cut of the second steady set of bearings - that cut will be highlighted in the **Outline View**. Now scroll down to the end of the data and shift-click the last sensor cut. We've now selected the cuts to be used for the second track segment. Right click on one of the selected items and select **Multiple items/Color/Green** . The cuts will turn green. Now right-click again on the cuts and click on **Generate TMA solution from selected cuts** , and complete the wizard once again.

9. **Refine second solution**
   Now, find the new solution in the Outline View and set it as the secondary track (it will be easy to spot since it' the track with the "later" value in the name). As you mark it as secondary, you will see it get listed in the Track Tote. Once the new solution is marked as secondary you are able to start dragging/refining this solution. Give it a go.

We now have a pair of target track sections.

Merging one or more tracks

This cheat sheet covers the process for merging two or more tracks. These tracks may be conventional platform tracks produced from positional sensor data, or they may be TMA tracks produced from the analysis of bearing data.
Please see the associated help page for a discussion of the track merge operation.

1. **Select tracks**
   In this tutorial you have generated two track sections and you now wish to combine them into one track. In the Outline View, select the two tracks **TMA_xxxx** and **TMA_yyyy** (use the [control] key to multi-select).

2. **Right click on tracks**
   Next, right click on one of the selected tracks and select **Group tracks into TMA_xxxx**. You'll see the second track dissappear, and inside the **TMA_xxxx** track you'll see two track segments,

3. **Provide infill positions**

   Debrief is now able to provide a track section between the two existing track segments. To do this, open the **Track:TMA_xxxx** track, and then the **Track segments (2 items)** item. Inside you'll see the two new segments. Select both of them, and right-click on one of them - you'll be able to select **Generate infill segment**. You'll see a new segment appear both in the Outline View and the plot. Notice that the infill segment is shown as a dotted line - to indicate that this track segment is not based on any evidence, it's just been calculated to join the tracks either side.

4. **Merge tracks**

   You can continue to keep your target track represented as 3 or more track segments for as long as you like. But, when you need to export the data for presentation or subsequent analysis then you need to merge them. To do this, select the parent item for the track segments (**Track segments (3 items)**), right-click on it and select **Merge all track segments** . The tracks will merge. Note, alternatively you could have selected different track segments to merge by selecting them individually at the next level down.

That's all the skills you need for single sided reconstruction using Debrief. Clearly there's probably now another step to be performed in how you exploit your shiny new track, but that would depend on your analysis objective.

Signed: _____ Date: _____

Name: _____ Date: _____

Please forward feedback on this cheat-sheet to support@debrief.info

Walkthrough

Introduction
This collection of cheat sheets will teach you how to use Debrief's Semi Automated Track Construction (SATC) capabilities.

Single Leg Solution

Introduction Let's start off with an easy scenario. We're going to work on an engagement where there is just a single leg of target data.

Finding the sample data

There are two ways to load the sample data. We're probably going to end up modifying the sample data, so you shouldn't do that if you're working on a set of sample data that's shared with other users (since you would be modifying the **master** copy of the data). Start off by considering if your Debrief installation folder is on your local machine, or on a Network Shared Folder.

Generating links to your existing data

Debrief NG stores it's data in a local folder called a Project. While these are frequently created afresh to store new analysis data, it's also possible to denote your existing data directories as sub-folders (via links). This tutorial leads you through generating links to your existing data folders. But, if the "Create Project" form opened at application startup, you provided a project name, and indicated that you would like sample data to be imported, then you can skip the following steps and move on to the next cheat sheet.

1. **Check Navigator is open**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select **Navigator** from Debrief's Window/Show View menu.

   ☐ (optional)

2. **Check you have a workspace**
   Before you can link in existing data, you need to define a project for your work. This is a parent folder within which your links are stored. If your Navigator window is empty, you must follow the **Generating a project** cheat-sheet Earlier in this document.

   ☐ (optional)

3. **Add a new Folder**
   Right-click on your current project in the Navigator view, then select **Folder** from the **New** sub-menu. The New Folder wizard will open. Instead of creating a fresh child folder to store our data, we're going to link to an existing folder. So, whilst still in the New Folder Wizard, click the 'Advanced' button to display the Advanced options. Next, click on the 'Link to alternate location (Linked folder)', and click on 'Browse...' to navigate to an existing data folder on your machine or the network, clicking on **Finish** to, erm, Finish.
   If you don't have your own data, please use the **sample_data** folder that's installed in your Debrief installation folder (for a deployed Debrief) or org.mwc.cmap.combined.feature/root_installs (if you are running a development version of Debrief).


(optional)

4. **Done**
   Well done, there you are. Just repeat this process to add any other data directories you want to load data from. You've probably just created a link to the sample data, but you may also wish to create a link to a shared working folder.


(optional)

Ok, you've found the Debrief **Sample Data**. You're ready for the tutorial now.

Generating links to your existing data

Here we are going to copy in an existing set of sample data. We aren't going to link to the original set, since we don't want to modify it, or we don't have modify access.
The steps presume that the Debrief **Sample data** is in the **Debrief\DebriefNG** folder that is probably in a **Programs** network share.

1. **Check Navigator is open**
   In the top left hand corner of Debrief you should find the Navigator window. If it isn't there, select **Navigator** from Debrief's Window/Show View menu.

2. **Check you have a workspace**
   Before you can import the existing data, you need to define a project for your work. This is a parent folder within which your data (or links to your data) is stored. If your Navigator window is empty, you must follow the **Generating a project** cheat-sheet accessed from the Help/Cheat Sheets menu.

3. **Prepare to drag in data**
   The sample data is going to be dragged in. In order to do this, the relevant windows both need to be visible at the same time.
   So, open Windows Explorer and then arrange your on-screen Windows so that Debrief is also visible. Then, navigate in Windows Explorer so that you can see the **sample_data** folder. It's in the **Debrief/DebriefNG** folder.

4. **Drag in sample data**
   Now that you are ready to import, pick up the **sample_data** folder using your mouse, and drop it into a project in the **Navigator** window of Debrief. A dialog will open asking you if you wish to **Copy files and folders** or **Link to files and folders**. Select the **Copy** option.

Ok, you've found the Debrief **Sample Data**. You're ready for the tutorial now.

Multi Leg Solution

Now for something a little more advanced. In this tutorial we're going to work with a scenario with several targets zigs, where a number of contributions are required to get a good quality solution.

Loading the data

We've got a Debrief plot file pre-prepared to let you avoid some of the steps in the single-leg tutorial, called **L2_Scenario.dpf**.

1. **Find the data file**
   The data-file for this tutorial is contained in the SATC sub-folder, as were the files used in the previous tutorial.

2. **Drag in the file**
   Before you load the data-file, close any existing Debrief plots, then drag in the **L2_Scenario.dpf** data-file from the SATC folder we used in the previous tutorial.
   You will see a Blue Ownship track, with a bearing fan in nice pretty shades of green, purple and red.

Grooming the data

Let's understand the data we've got, before we start playing with it

1. **View the ownship track**
   When you view the tutoral plot you will see an ownship track. Use the Debrief **Time Controller** and **Track Tote** to familiarise yourself with the general motion of the **OWNSHIP** track. You'll see that the vessel starts in the North-East of the area, then travels quite slowly at 2.5 knots, with two straight legs.

2. **View the sensor data**
   The identification of straight legs is pivotal to the SATC process, since they greatly constrain the possible solution combinations.
   Just as when conducting Manual TMA generation using Debrief, the best practice for this process is to color the sensor cuts according to the leg they're contained in. If you examine the Ownship sensor data, you'll see that the first and second legs have been coloured in green and purple, respectively. Between each leg, a few cuts have been left red, to provide time for the target to make alterations.

3. **Mark the final target leg**
   Whilst the first two target legs have been coloured, the last one hasn't. Let's do it now.
   Expand the **Ownship** sensor data in the Outline View, and select the sensor cuts from **100112 134230** until the end of the dataset, at **100112 140000**.
   Now use the **Properties** view to change the color of these cuts to **Yellow** (or obviously you could right-click and select Color > Yellow).

4. **Create the scenario**
   The most significant block of information in generating a solution is the bearing data. So, the first step is to provide the bearing data. We are going to use all of the Ownship sensor data for this solution, so right-click on the **Sensor:Plain (145 items)** sensor, and select **Semi Auto TMA** / **Create new scenario from these cuts**.
   As with the previous tutorial, you will see the new scenario (called **121200.00** appear in the Outline View, and the **Maintain Contributions** view will open. You will also see that the **Maintain Contributions** view contains just the one contribution.

5. **Rename the scenario**
   To make it easier to navigate the data, please use the **Properties** view to rename the new scenario (**121200.00**) to **Tutorial Scenario**

6. **Try to generate a solution**

   Hey, why not try to generate a solution. Just click on **Calculate Solution** at the top of the **Maintain Contributions** view. You will see Debrief do a couple of seconds of processing, and then stop.

   Can't you see the solution? Try hiding the **OWNSHIP** sensor data - switch it off. Still can't see it? Oh, this is because Debrief doesn't have enough information to generate a solution. It needs to know one or more straight legs. But, leave the **OWNSHIP** sensor data hidden, for when we do have some data.

Playing with legs

After the bearing measurements, knowledge of the straight legs is the most valuable set of information for SATC.

1. **Mark first leg**

   Ok, let's mark the first leg. In the **Outline View**, expand the Ownship sensor data, and select all of the **Green** cuts. Now, right-click on them, and select **Semi Auto TMA** / **Add to Tutorial Scenario** / **New Straight leg for period covered by [sensor cuts]**. When asked, give it the name **First Leg**.

   Note: selecting the cuts and "giving" them to the solution isn't actually adding the cuts - the solution knows about the cuts already. We're justing using the block of cuts as a convenient way of specifying the start and end times for the leg.

2. **Try to generate a solution (again)**

   Ok, now we should be able to generate a solution. Again, click on **Calculate Solution** at the top of the **Maintain Contributions** view. You will see Debrief do a couple of seconds of processing, you'll see a line graph appearing in the **Performance** area of the **Maintain Contributions** view, and a green line will appear on the plot.

   Zooming in on the plot shows us that the single leg is 9.2 kts, at 319 degrees. If we zoom out again, we can see that, Yes, this could be a solution that fits in the data.

   Note: the use of randomisation in the SATC process means that your calculated speeds may well be different to mine. Don't worry, this is intended.

3. **Mark second leg**

   Now, we'll mark the second leg. In the **Outline View**, expand the Ownship sensor data, and select all of the **Purple** cuts. Now, right-click on them, and select **Semi Auto TMA** / **Add to Tutorial Scenario** / **Straight leg for period covered by [sensor cuts]**. When asked, give it the name **Second Leg**.

   The solution on the plot will disappear, since the new data means that it's probably incorrect.

   To see the effect of the new leg, click again on the **Calculate Solution** button.

4. **Generate updated solution**

   Now generate a new solution. You may need to zoom out to see the target solution. You'll see two legs present, the first with 12.1 knots, and the second with 14.1 knots. Clearly SATC has changed it's optimal solution for the first leg to a faster one that is more compliant with the data in the second leg.

   As before, the SATC randomisation will probably result in you having slightly different speed (and course) values.

5. **Mark third leg**

   Ok, now let's mark the third leg using the **Yellow** cuts (go on, choose your own name), and re-generate the solution again. The solution I see has a speed of 4.8 knots (did I explain the effects of randomisation).

   So, now we have a three-leg solution that is compliant with our sensor data, and our straight leg forecasts.

   We can take a step to verify this by switching on the location constraints. First, select the **Tutorial Scenario** in the **Outline View**. Then, in the **Properties** window, switch on **ShowLocationConstraints**. You'll see lots and lots of clutter on the plot. Also switch on **OnlyPlotLegEnds**. This shows the calculated location constraints at the start and end of each leg. We can see that yes, the solution is compliant with them.

6. **Give speed constraint**

   So, we've got a solution. But, I think it can be improved. Let's try to give the target a consistent speed. We're going to give a speed constraint to the whole period of the engagement. We could have done this by right-clicking on the whole **Sensor:Plain** object, but an alternate way of doing this is to right-click on our **Tutorial Scenario** object in the **Outline View**, and selecting **Add Speed Forecast for period covered by [Tutorial Scenario]**. A wizard will open, name the contribution as **Overall Speed**. You will see this new constraint displayed in the **Maintain Contributions** view - with a default set of hard constraints shown: zero to forty knots.

7. **Adjust speed constraint**

   Ok, let's generate a new solution. A constraint of 0-40 knots isn't much of a constraint at all, so it has little effect. So, expand the **Speed Constraint - overall speed** item in the **Maintain Contributions** view. Now reduce the maximum speed from 40 knots down to 15 knots. If you still have the Location constraints visible, you will see them adjust to repesent the new constraint. This is because the vessel can't travel as far in each leg. Also, increase the minimum speed to 8 knots. Re-generate the solution and see what you think.

8. **Provide speed estimate**

   Lastly, let's try an estimate. The estimate will make the algorithm favour solutions near that value, though it will still consider solutions that are still within the min/max hard constraints. Try an estimate of 9 knots, and re-generate the solution. I get a solution with speeds of 9, 13, and 9 knots (you know, you may get different values). But, I can see that if the overall solution was moved nearer to ownship, I may be able to achieve a consistent speed. So, now reduce the max speed to 10 knots, and re-generate the solution.

   This gives me legs that are 9.6, 8.9 and 9.0 knots. I may then choose to drag in the min/max sliders to really force the solution onto a particular speed, but I'm ok with this answer.

9. **Verify solution**

   Ok, now how good is that solution? In the **Outline View**, make the **SUBJECT** track visible. You should see that the generated solution is very close to the truth track, even with this low bearing rate data. If you wish to verify the calculated solution against the truth track, you can view the XY Range plot (again) and see the separation between the two tracks.

And that's all for the walkthrough of Debrief's Semi-Automatic Track Construction. You're now on your own.

Signed: _____ Date: _____