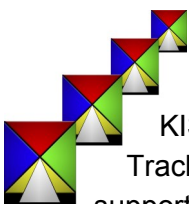




# X-TRACK

FLIGHT MANAGEMENT  
SYSTEM SOFTWARE

snapPLAN



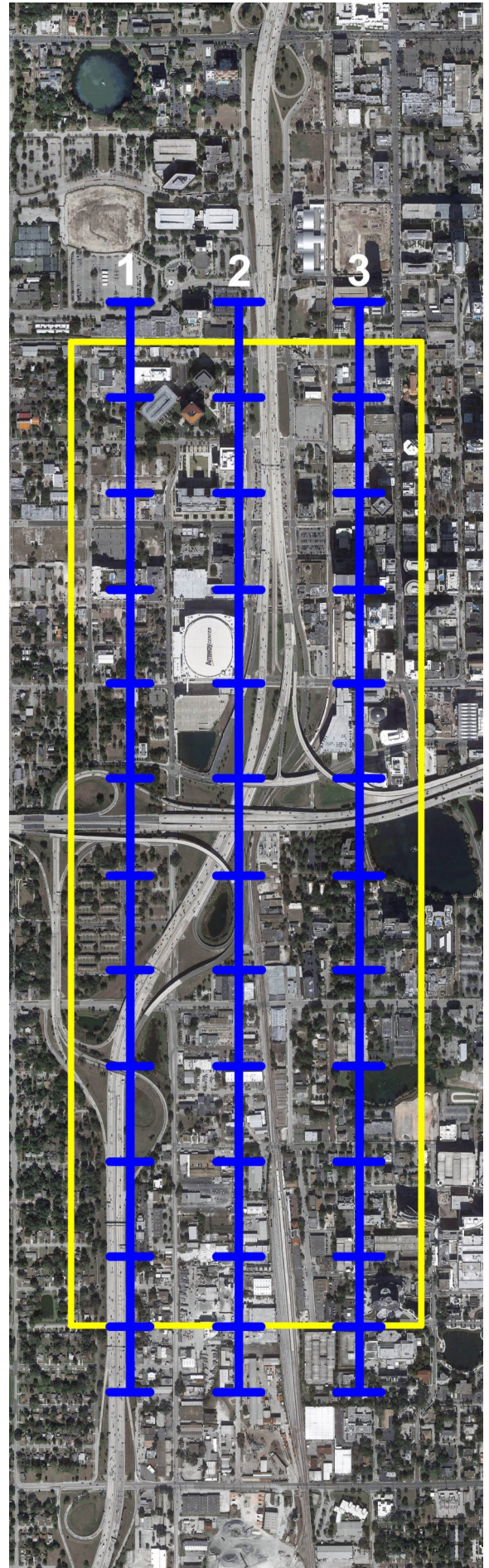
**LEAD' AIR INC**

113 S. Hoagland Boulevard

KISSIMMEE FLORIDA 34741

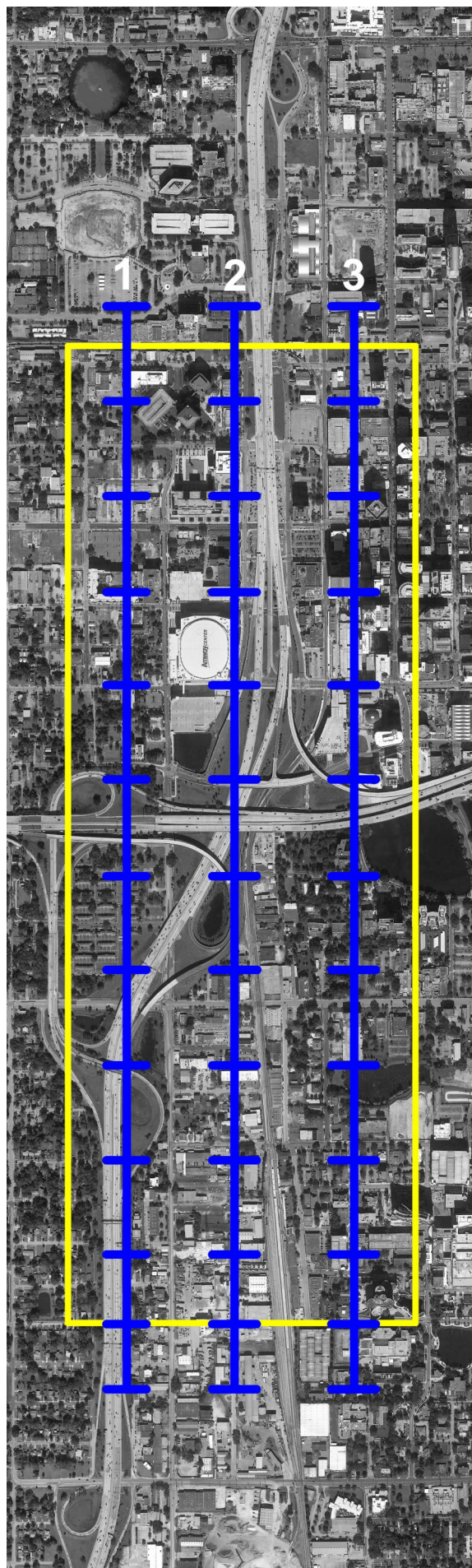
TrackAir.com +1 (407) 343-7571

support@trackair.com



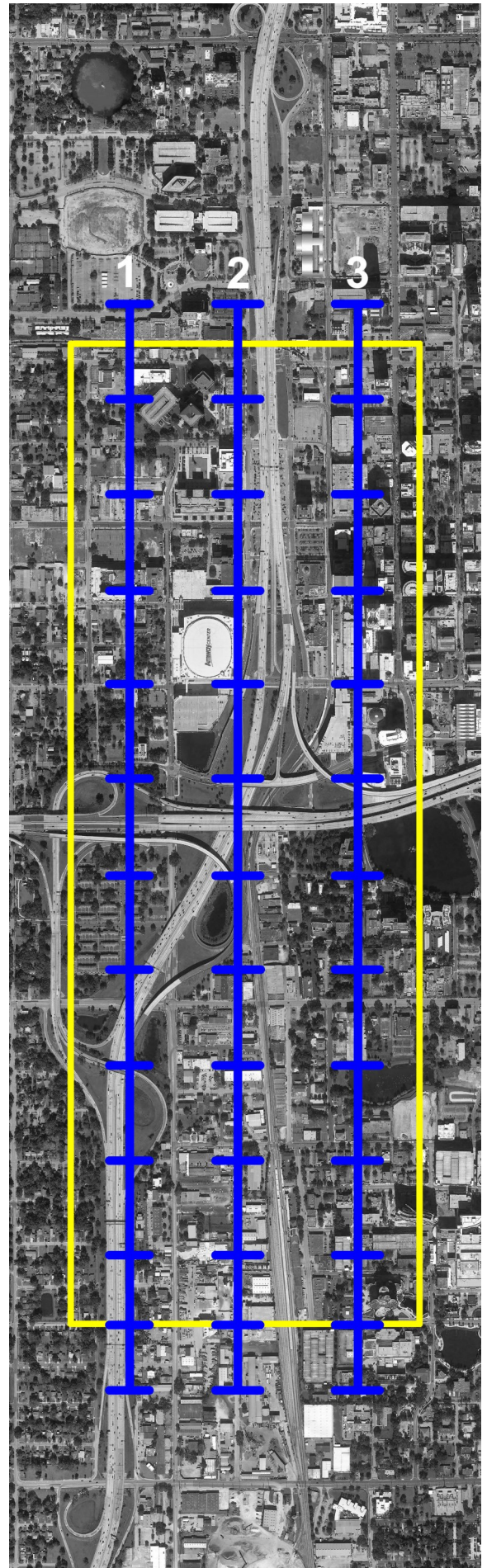
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## Welcome

Welcome to the **Track'Air XTrack Flight Management System**. We are excited that you have chosen the Track'Air Flight Management System for the planning and acquisition needs of your Company.

We trust the **Track'Air Flight Management System** will be your key to increasing productivity and reducing operational costs in your aerial survey missions. If you are a long-standing customer, you will find many improvements and developments, evidence of our on-going efforts to remain in the forefront and your most responsive provider of solutions for the ever-evolving needs of today's ever changing acquisition needs.

This section of the manual details **snapPLAN**, the module that is central to creating flight plans in the **X-Track Software Suite**. This module was created in the first version of the EZ Track software in 1994 and has been continually advanced through the years to include new options and client requested additions now and into the future. As you read through it, you will discover a wealth of planning tools, utilizing some of today's more advanced programming functions to fine tune and streamline your planning and acquisition workflow.

The celebration of 20 years of successful operation in 2014 highlights the quality and reliability of **Track'Air** products.



## System Design

### X-Track Software Design

The X-Track Software is built on a Microsoft Database (MDB) run by the Access Jet Database Engine. This structure preserves and manages all the data generated during the operation of the system. The MDB file allow for the creation of data entry forms, stored procedures, database queries, reports, security settings, etc... The **Tracker.mdb** file is the master file created for your Flight Management System. This master file is located in the TRACKER\MDB folder on the drive you installed the software.

All of the modules in the X-Track FMS access this database to manage your data. The system will not operate without this database so it is important you protect and backup this file. When each module is opened a backup of the current database is created in the Tracker\MDB\dbbackup folder. We encourage you to not rely just on this backup, but to backup this file regularly to an external source in case your database source is corrupted or the drive where the database is located becomes inoperable. This database can be moved to a completely new installation and all of your legacy data will remain intact.

It is possible and advisable to locate a Tracker.mdb master database on a central server so that several users can access it. This centralizes your flight data and allows for easy backup of all of your company's data.

Additionally the Tracker.mdb file is accessible to third party programming so the data that it contains can be queried for outside use in other programs or databases.

The data for each of your required flights can be easily transferred to and from the flight crew by means of email or thumb drive. After each flight **it is important** the flight crew export the flown data for the day from the onboard computer and return it to the office for inclusion in the master database.



## System Requirements

Below are our recommendations and minimum system requirements and are meant only to provide general guidelines.

### For the Office (laptop or desktop):

#### *Recommended configuration:*

<b>Operating System:</b>	Windows 7 or newer
<b>Memory:</b>	6 GB of RAM or more
<b>Storage:</b>	200MB free Hard drive space (a fresh \Tracker folder is 87MB)
<b>Processor (CPU):</b>	Intel Core I-3, AMD FX, or AMD A-series CPU

#### *Absolute minimum configuration:*

<b>Operating System:</b>	Windows XP; SP3 or newer (although the system will run on this Operating System, XP is generally considered too vulnerable and therefore not recommended)
<b>Memory:</b>	2 GB of RAM or more
<b>Storage:</b>	150MB free Hard drive space (a newly installed Tracker folder is 87MB)
<b>Processor (CPU):</b>	Intel Celeron, AMD FX, or AMD A-series CPU

### For the Aircraft:

**Camera/Sensor Operator :** We recommend using our **Surf'Air Sensor Operator Tablet** based on our Ruggedized Microsoft Surface Pro 2 as the main platform for the sensor operator. This system is designed specifically for the Nextrack 2 and is well protected in flight.

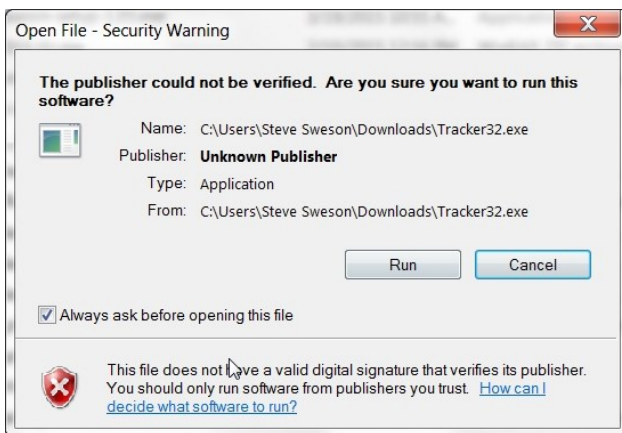
**Pilot:** For the pilot display you may use our Lead'Air 6" display or one of the many mobile options that are now available. The selection of a display for the Pilot is subjective so we have provided possibilities that should satisfy most pilots' requirements.



## Installation

# X-Track Software Installation

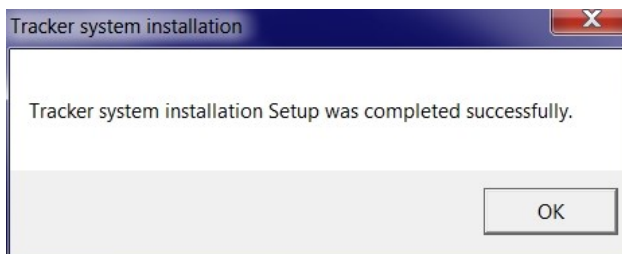
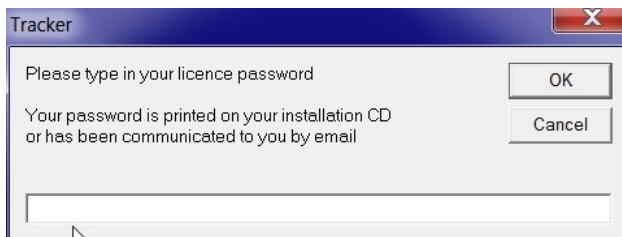
The X-Track Software installs very simply as it is delivered as an executable file. First extract the installation file (TRACKER32.EXE) from the zip file you have been provided. FOR THE NEXT STEPS YOU SHOULD BE AN ADMINISTRATOR ON YOUR COMPUTER. You will need to know your password as the zip file is protected. We suggest you do this from the download or TEMP folder. **We do not advise installing the software from the desktop.**



To begin, right click on the tracker32.exe file and select run as administrator. You might get a security warning but just select “run” and continue.

You may or may not get another user account message about unknown publisher but just select “Yes” and continue.

Now you will be asked to enter your password. Then select the drive where you wish to install the software.



**You will see this message once the install is complete!**

**Not installing Properly? Check our FAQ page for additional solutions for Win 7 or Win 8.**



## Quick Start

### ABOUT snapPLAN

At the heart of the **X-TRACK** program, the powerful **snapPLAN** module has made flight planning faster and easier than ever. Using the visual models imported from **snapVIEW** (or text information from **snapXYZ**) **snapPLAN** makes in a few clicks the detailed flight plan that has traditionally taken painstaking hours in other programs. **snapPLAN** quickly produces flight-ready flight plans from your input, and also incorporates digital elevation model (DEM) data where desired to further enhance your output to the acquisition stage. **snapPLAN** allows detailed grab-and-move fine tuning of your flight plan data to effortlessly fit your flight plan to the coverage of your map data, optimizing flight lines and fitting your coverage to your specific requirements, all with speed and simplicity.

### ABOUT THIS MANUAL

This manual covers the installation and detailed use of the **snapPLAN** module of Lead'Air's **X-TRACK Flight Management System** software program for aerial acquisition. The manual is limited to discussion and instruction of the software. Hardware, sensors or general acquisition topics will not be discussed in this document.

This manual is intended for use by Track'Air users, and offers both a quick-start path to get up and running with your equipment package and more detailed investigation into the multiple options available to customize your installation and fine-tune your workflow. Further information may be found on our website, using Lead'Air's FAQ and support resources.

### USING THIS MANUAL

This manual opens with a step-by-step tutorial, using standard options and features.

This “**Quick-Start**” guide is intended to get you up and running in the shortest time, and as it uses the most standard configuration options, it may be sufficient for many users without further exploration of the multiple options and features. We do encourage users, however, to take the time to explore the options and observe their behavior, as one of the strengths of the Track'Air program is its customizable design. You may find a series of options allowing you to streamline your throughput, saving time and delivering the highest quality in the results you present to your Flight Crew and subsequently your Clients.

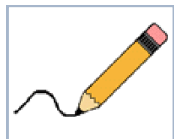
It is time to explore the editing tools that will allow you to prepare a flight plan. We will start with an overview of the editing tools in the **snapPLAN** application, a subset of which is common to all of the **TRACKER** applications.





## Quick Start : Editing Tools

### Editing Tools Common to All Tracker Applications:



#### **REFRESH:**

Click to re-draw the screen to update or remove deleted items



**ZOOM IN:** Click to increase scale. A beep and no further increase will indicate zoom limit has been reached. This is dependent on the original size of the area selected. By default, your scroll wheel will also zoom in and out in real time.



**ZOOM OUT :** Click to decrease scale. A beep and no further increase will indicate zoom limit has been reached. This is dependent on the original size of the area selected. By default, your scroll wheel will also zoom in and out in real time.



**RESTORE :** Click to restore the original zoom factor. This will zoom you to the original extents of the flight plan or screen.



**ZOOM SELECTION :** Draw a rectangle around a selected area to zoom to full screen. Rectangle **MUST** be drawn from the upper left corner to the lower right corner.



#### **OPEN NEW PROJECT :**

Click to return to the project selection dialog box.



#### **SAVE :**

Click to save your work



#### **EXIT :**

Click to quit the application

**PAN :** By default panning is accomplished by left click, hold and drag anywhere on the screen with or without tools selected



## Editing Tools - Main Menu - snapPLAN:



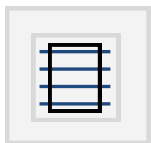
**RETURN TO PLANNING SPEC FORM:** Click to open the planning specification form and modify your planning parameters



**OPEN SPECIFICATIONS FORM:** Opens a window to view the specifications for the current flight plan or current individual flight lines



**ACTIVATE STRIP PLANNING MODE :** Opens a toolbox with tools specific to planning strip flight plans



**ACTIVATE BLOCK PLANNING MODE :** Opens a toolbox with tools specific to planning block flight plans



**REFERENCE TERRAIN HEIGHT :** Opens a window to input terrain height for each flight line



**UNDO :**  
Click to go back one step

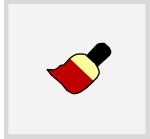


**CORRIDOR MODE :**  
Click to create a corridor on either side of your line for planning purposes



**RESTRICTED AIRSPACE:**  
Click to view restricted airspace near your project



**Editing Tools - Main Menu - snapPLAN:**

**COLOR ENHANCEMENT:** If an image is loaded this will open a toolbox to edit the image's color, brightness, contrast, etc...



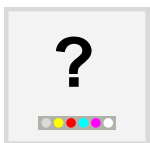
**PRINT A PLANNING REPORT:** Opens a window to select the specifications and compile a planning report for the current flight plan



**RETURN TO SNAPVIEW :** If you entered snapPLAN from the Transfer to snapPLAN button in snapVIEW this allows you to return directly to the snapVIEW application



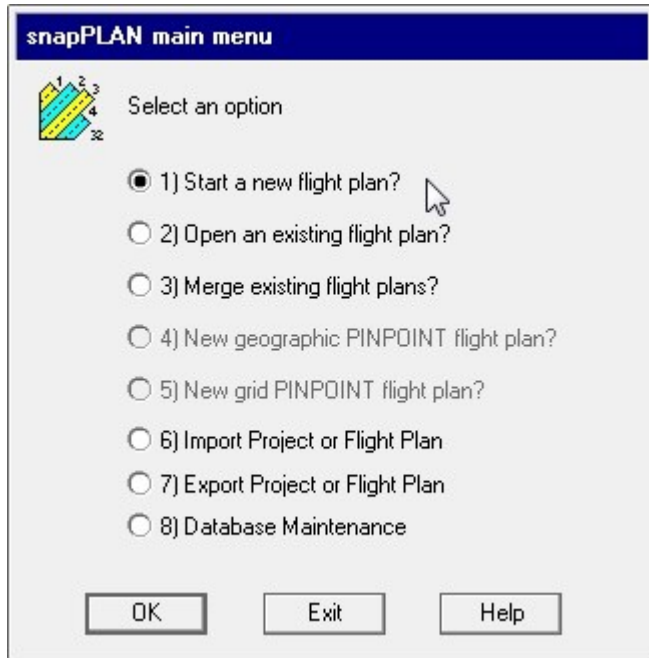
**LOAD FLIGHTPLAN IN snapPLOT :** Opens your flight plan directly in snapPLOT to create a print



**HELP :** Reserved for future use



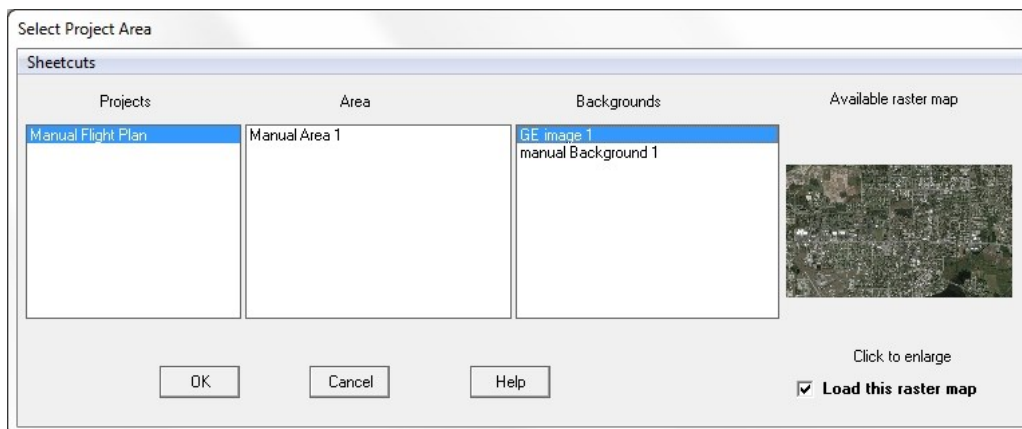
## Quick Start - First Steps



SnapPLAN has two main methods of creating flight plans. Upon opening snapPLAN, and selecting the option “Start a New Flight Plan” you will be prompted to make selections from the work previously saved to the database. The selections you make will open the corresponding planning method .

This Quick Start will guide you consecutively through the **Block Flight Planning** method followed by the **Strip Flight Planning** method. Each method requires a different set of data to begin the process.

The **Block Flight Planning** requires a single, closed polygon that will allow the software to automatically create a set of flight lines to cover the extents of the project.



The **Strip Flight Planning** requires background data either as a set of line work or a single image as a starting point. Single strips will then be created manually to cover the area of interest (AOI).

Each of these methods have a separate set of tools in a toolbox that allow you to manipulate the plans for that particular process. We will begin with Block Flight Planning.

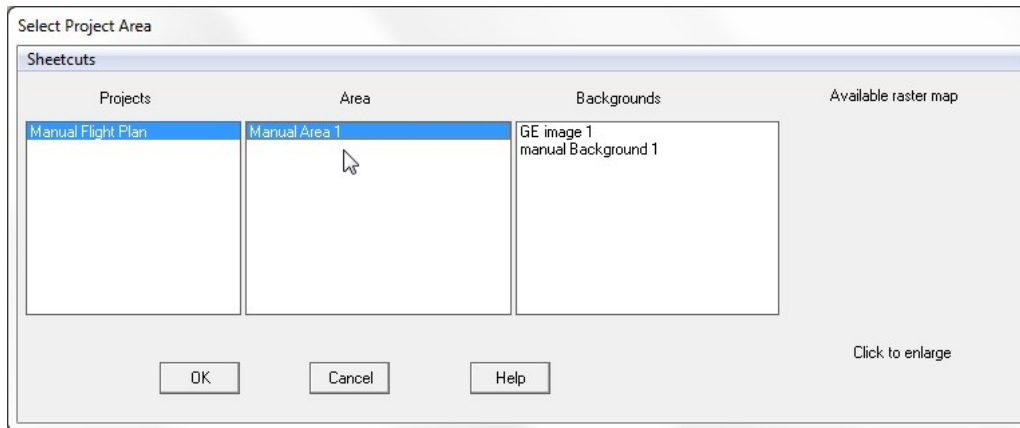


## Quick Start

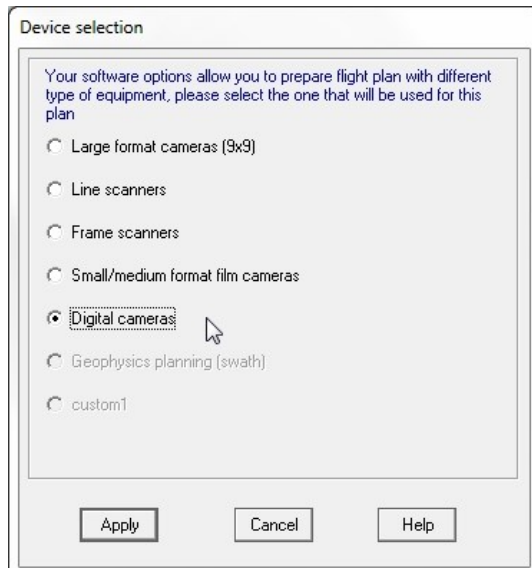
## Block Flight Planning

Assuming you have imported or created an area or background in snapXYZ or captured imagery from snapVIEW and created your background or area there, you are ready to begin the flight planning process.

Simply open snapPLAN, select “Start a new flight plan” (preceding page) and begin.



Select the area you wish to flight plan, and open any raster images you wish to associate



Select the type of sensor you plan to work with.



## Quick Start

## Block Flight Planning

DIGITAL cameras

Scale\_conversions Defaults

**Track Air is not responsible for this list of cameras. Please verify that these parameters actually matches those of your camera!**

Nikon D800 50mm

Change planning parameters | Change camera or add a new camera definition

To adjust the flight parameters, use the scroll bars or type directly in the text boxes.  
If a value exceed the limits, it will be automatically rejected.

Coverage parameters

Pixel size in meter	<input type="text"/>	0.089
Photo scale 1:	<input type="text"/>	18300
Altitude AGL (feet)	<input type="text"/>	3000
Altitude AGL (m)	<input type="text"/>	914
Footprint along the run (m)	<input type="text"/>	439
Footprint across the run (m)	<input type="text"/>	658
Photo area (km2)	<input type="text"/>	0.3

Planning parameters

Sidelap(%)	<input type="text"/>	30.0
Spacing (m)	<input type="text"/>	458.5
Endlap (%)	<input type="text"/>	60.0
Photo Base (m)	<input type="text"/>	175.6

OK Cancel Help

Select the sensor you wish to use for this flight plan.

Set the Coverage Parameters - these are based on the sensor definition you have selected and are interconnected. Changing one parameter will adjust the others so if you change altitude it will give you the calculated pixel size for that altitude based on the sensor you have selected

The Planning parameters are important so make sure these are correct for you project. Sidelap sets the overlap between parallel flight lines and Endlap sets the overlap between successive frames

**NOTE : Lead'Air does not maintain this list of sensor parameters. The pre-loaded numbers are only typical values, and you MUST verify the parameters of your sensors and lenses.**

DIGITAL cameras

Scale\_conversions Defaults

**Track Air is not responsible for this list of cameras. Please verify that these parameters actually matches those of your camera!**

Nikon D800 50mm

Change planning parameters | Change camera or add a new camera definition

To add a new camera system, enter the new system name in the text box below, edit the parameters and press the save button. To change an existing system, edit the parameters and press the save button.  
You can use the scroll bars or type directly in the text boxes.  
If a value exceed the limits, it will be automatically rejected.

Sensor dimensions in millimeters

Side parallel to the run (mm)	<input type="text"/>	24
Side perpendicular to the run (mm)	<input type="text"/>	35.8

Sensor dimensions in pixels (only for digital devices)

Side parallel to the run (pixels)	<input type="text"/>	4912
Side perpendicular to the run (pixels)	<input type="text"/>	7360

Lens

Focal length (1.0 - 500.0 mm)	<input type="text"/>	50
-------------------------------	----------------------	----

Rotate sensor 90 degrees

Save this camera Delete this camera Help

When creating a new sensor definition enter the new name here. Editing an existing definition only requires you to "Save the camera" after you have made your adjustments which will overwrite the camera named at the top.

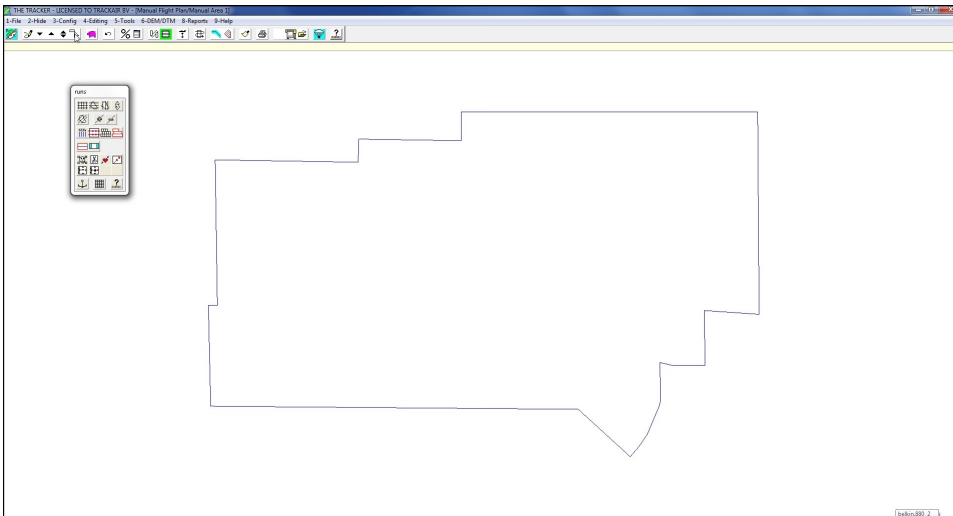
Enter the sensor dimensions boxes for proper settings for your particular sensor. If you wish to fly your sensor in a "Portrait direction" click the "Rotate sensor 90 degrees" button and your landscape sensor dimensions will change to reflect it.

Make sure you enter the proper focal length for your sensor, verify your settings and "Save the camera"



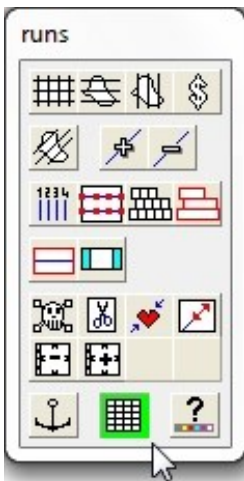
## Quick Start

## Block Flight Planning



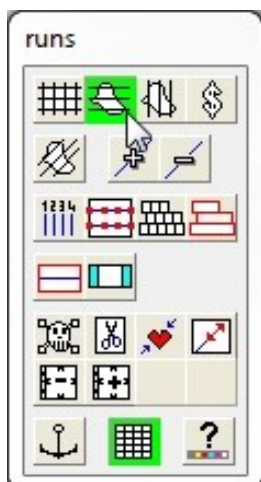
You are now on the main page of snapPLAN with your project boundary and the “Runs” toolbox displayed.

The “runs” toolbox has several types of tools that provide for various options to “block” flight plan your project.



If you want to load an image at this time just go to **1-File/ 4- Load/unload a raster map** and select the image you have saved in the database. We will work without the image to more easily view the planning process.

For purposes of this Quick Start we will utilize the most commonly used tools. The first is the green button in the box to the left called the “**Overlay Grid Mode**”. This button allows you to easily see your “neat model” frames when manipulating the flight plan. Click on it first.



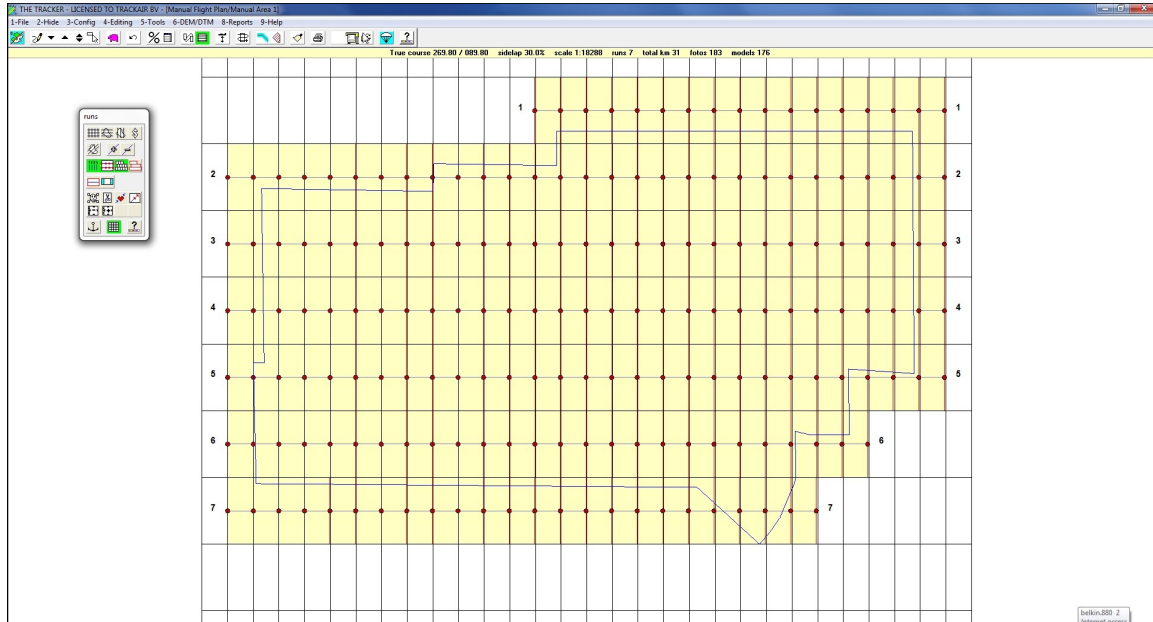
Now click on the button you wish to use for your flight plan. The button highlighted on the left is for East-West (horizontal) flight lines. The button to the right of it is for North-South (vertical) flight lines. The second button down on the left allows you to left click, hold and drag a line to create a custom direction (from 0° to 360°) for your flight lines. The button at the top right gives you an optimal flight plan with the least amount of images required to cover the project.

Due to the shape of this area we will use the East-West (horizontal) button.

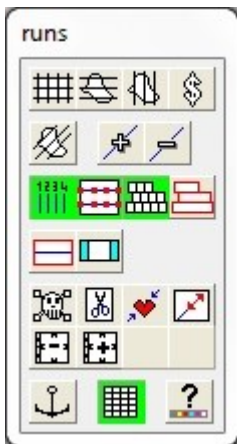


## Quick Start

## Block Flight Planning



The flight runs are now automatically created in a 90°-270° direction.



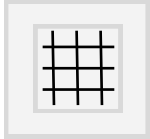
To view the line numbers, photo positions and neat models coverage as shown above click the three buttons highlighted in green to the left. Now review the coverage of your area and verify the plan is acceptable for your flight. This may vary based on the actual coverage you require or the possible placement of ground control for your project. If the flight plan is correct and the way you like it, you can just click the Save (Pink Pig) button, name it and the flight plan is complete. Or you can adjust the block by a “right click and hold” to shift the block over the project. If you wish to change (improve) it, there are several additional tools in the toolbox that are described in the Editing Tools button descriptions on the following pages.

The next step (s) would be to renumber your runs if necessary and add terrain height data to your flight lines either by adding it manually through the reference terrain height button or using the 6-DEM/DTM module. See the Terrain Height section in the manual for further information. **SAVE YOUR FLIGHT PLAN!** Don't lose all your hard work by forgetting to save it.





## Editing Tools used for Block Planning:



### **GRID MODE:**

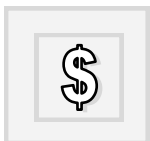
Click to toggle between X,Y and geographic grid alignment



**COMPUTE E/W RUNS:** Automatically create east - west flight lines for the current project area



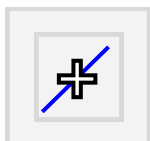
**COMPUTE N/S RUNS:** Automatically create north - south flight lines for the current project area



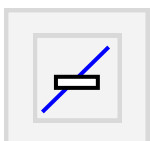
**COMPUTE OPTIMUM RUNS:** Automatically create flight lines for the current project area with the least amount of lines-photos to cover the project



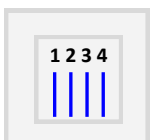
**COMPUTE MANUAL ANGLE RUNS :** Automatically create runs to a given angle. Allows you to “left click, hold and drag a line to create a custom direction (from 0° to 360°) for your flight lines Displayed red line is for reference only



**COMPUTE WITH ONE MORE RUN:** Automatically re-compute the flight plan with one additional flight line.



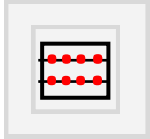
**COMPUTE WITH ONE LESS RUN:** Automatically re-compute the flight plan with one less flight line.



**SHOW RUN NUMBERS:** Toggle the flight line numbers visually on screen for the current flight plan

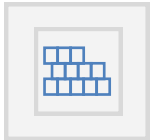


## Editing Tools used for Block Planning:

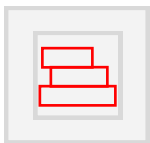


### SHOW PHOTO POSITIONS:

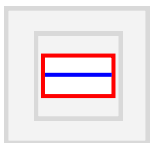
Click to visualize the current photo positions on screen



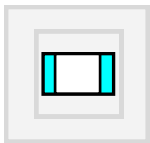
**SHOW NEAT MODELS:** Toggle neat stereo models on screen to verify proper coverage of the project area



**SHOW FULL FRAME COVERAGE:** Toggle full frame coverage of all runs on screen for verification of coverage



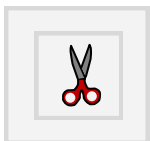
**SHOW FULL FRAME COVERAGE:** Toggle full frame coverage for a single run on screen for verification of coverage



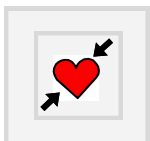
**SHOW STEREO-FULL COVERAGE :** Toggle stereo or full frame coverage for on screen verification of coverage



**KILL RUN:** Click to delete a run. Used in conjunction with the “Sticky Button you can continue deleting runs to customize your photo coverage. **BE CAREFUL AS THERE IS NO UNDO FOR THIS FUNCTION**



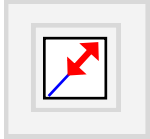
**CUT A RUN:** Click to cut a run anywhere within the line. Used in conjunction with the “Sticky Button you can continue cutting runs to customize your photo coverage. Used when there are “OUT” areas within your full project area



**JOIN RUNS:** Click to join Run(s) that were automatically or previously cut



## Editing Tools used for Block Planning:



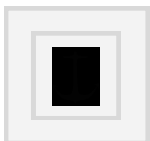
**TRIM - EXTEND:** Activate this button then click, hold near the end of a flight line and drag to shorten or lengthen the run. Used in conjunction with the “Sticky Button you can continue editing runs to customize your photo coverage.



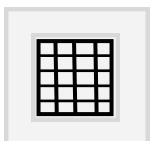
**DELETE PHOTO:** Click to remove a single photo at the end of a line. Used in conjunction with the “Sticky Button you can continue removing photos at the ends of lines to customize your photo coverage



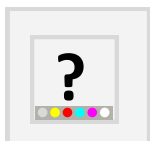
**ADD PHOTO:** Click to add a single photo to the end of a line. Used in conjunction with the “Sticky Button you can continue adding photos to the ends of lines to customize your photo coverage



**STICKY BUTTON:** Toggle to lock the current tool for multiple use, such as deleting or adding photos, trim-extending lines, etc...



**OVERLAY GRID MODE :** Toggle before clicking on the automatic run computing of your choice. This button allows you to easily see your “neat model” frames when manipulating the flight plan.



**Help:** Reserved for future use



**Use the offset instead of limit to generate runs:** Before using this option you must set an offset limit in **3-Config/ 21-Limit offset**. After setting, toggle this button before clicking on the automatic run computing of your choice.

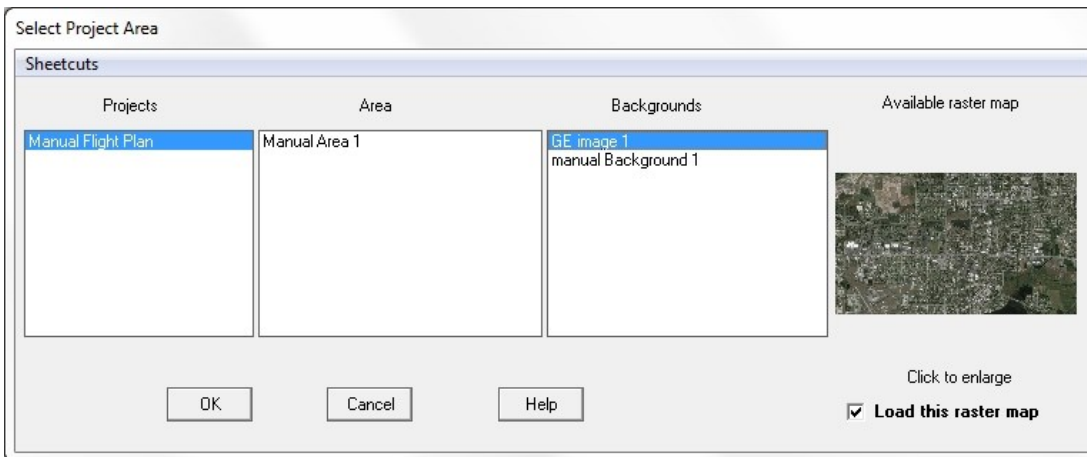


## Quick Start

## Strip Flight Planning

Assuming you have imported or created an area or background in snapXYZ or captured imagery from snapVIEW and created your background or area there, you are ready to begin the flight planning process.

Simply open snapPLAN, select “Start a new flight plan” (preceding page) and begin.



Select the background you require for your flight plan



Select the type of sensor you plan to use.



## Quick Start

## Strip Flight Planning

DIGITAL cameras

Scale\_conversions Defaults

**Track Air is not responsible for this list of cameras. Please verify that these parameters actually matches those of your camera!**

Nikon D800 50mm

Change planning parameters | Change camera or add a new camera definition

To adjust the flight parameters, use the scroll bars or type directly in the text boxes.  
If a value exceed the limits, it will be automatically rejected.

Coverage parameters

Pixel size in meter	<input type="text"/>	0.089
Photo scale 1:	<input type="text"/>	18300
Altitude AGL (feet)	<input type="text"/>	3000
Altitude AGL (m)	<input type="text"/>	914
Footprint along the run (m)	<input type="text"/>	439
Footprint across the run (m)	<input type="text"/>	658
Photo area (km2)	<input type="text"/>	0.3

Planning parameters

Sidelap(%)	<input type="text"/>	30.0
Spacing (m)	<input type="text"/>	458.5
Endlap (%)	<input type="text"/>	60.0
Photo Base (m)	<input type="text"/>	175.6

OK Cancel Help

Select the sensor you wish to use for this flight plan.

Set the Coverage Parameters - these are based on the sensor definition you have selected and are interconnected. Changing one parameter will adjust the others so if you change altitude it will give you the calculated pixel size for that altitude based on the sensor you have selected

The Planning parameters are important so make sure these are correct for you project. Sidelap sets the overlap between parallel flight lines and Endlap sets the overlap between successive frames

DIGITAL cameras

Scale\_conversions Defaults

**Track Air is not responsible for this list of cameras. Please verify that these parameters actually matches those of your camera!**

Nikon D800 50mm

Change planning parameters | Change camera or add a new camera definition

To add a new camera system, enter the new system name in the text box below, edit the parameters and press the save button. To change an existing system, edit the parameters and press the save button.  
You can use the scroll bars or type directly in the text boxes.  
If a value exceed the limits, it will be automatically rejected.

Sensor dimensions in millimeters

Side parallel to the run (mm)	<input type="text"/>	24
Side perpendicular to the run (mm)	<input type="text"/>	35.8

Sensor dimensions in pixels (only for digital devices)

Side parallel to the run (pixels)	<input type="text"/>	4912
Side perpendicular to the run (pixels)	<input type="text"/>	7360

Lens

Focal length (1.0 - 500.0 mm)	<input type="text"/>	50
-------------------------------	----------------------	----

Rotate sensor 90 degrees

Save this camera Delete this camera Help

**NOTE : Lead'Air does not maintain this list of sensor parameters. The pre-loaded numbers are only typical values, and you MUST verify the parameters of your sensors and lenses.**

When creating a new sensor definition enter the new name here. Editing an existing definition only requires you to "Save the camera" after you have made your adjustments which will overwrite the camera named at the top.

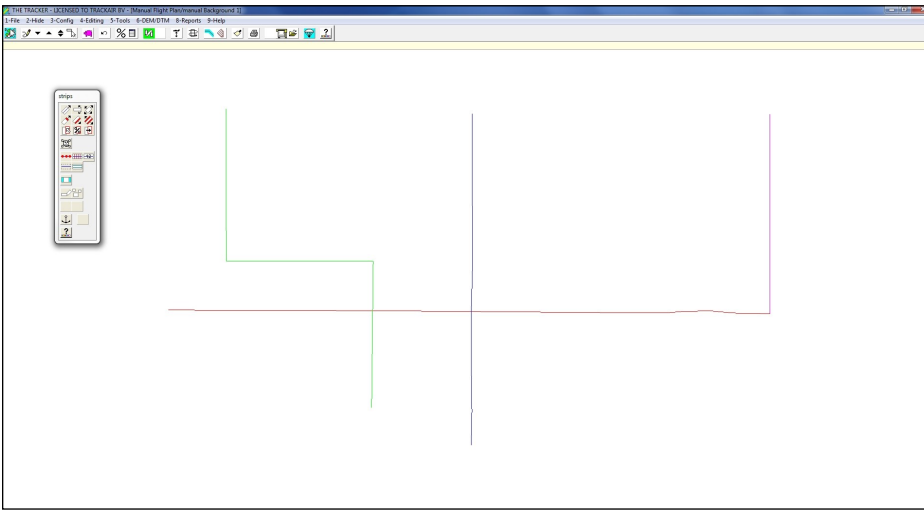
Enter the sensor dimensions boxes for proper settings for your particular sensor. If you wish to fly your sensor in a "Portrait direction" click the "Rotate sensor 90 degrees" button and your landscape sensor dimensions will change to reflect it.

Make sure you enter the proper focal length for your sensor, verify your settings and "Save the camera"



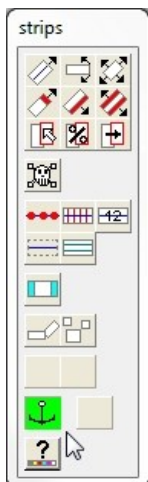
## Quick Start

## Strip Flight Planning



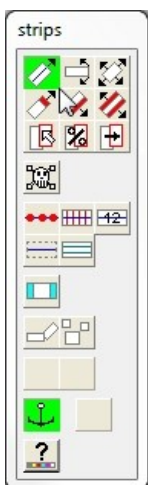
You are now on the main page of snapPLAN with your project background data and the “Strips” toolbox displayed.

The “strips” toolbox has several types of tools that provide for various options to create a custom flight plan your project.



If you want to load an image at this time just go to 1-File/ 4- “Load/unload a raster map” and select the image you have saved in the database. We will work without the image to more easily view the planning process.

For purposes of this Quick Start we will utilize the most commonly used tools. The first is the Anchor button highlighted in the box to the left called the “Sticky Button Mode”. This button allows you to easily see your “neat model” frames when manipulating the flight plan. Click on it first.

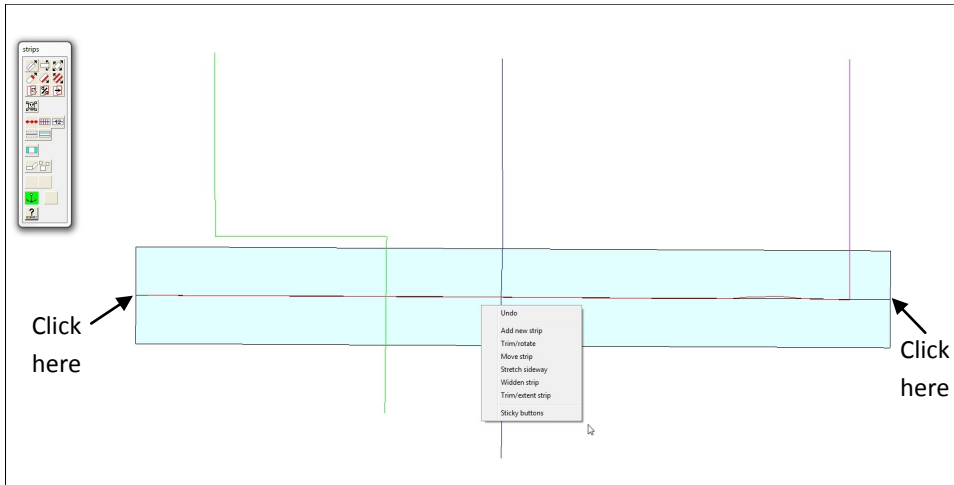


Now click on the single strip drawing button (Upper Left) to begin drawing your strips. Left click on the screen where you wish to begin your first line. Note that you can angle the line in any direction allowing you to place the line precisely where you want it. Move your cursor to the location of the other end and left click again.



## Quick Start

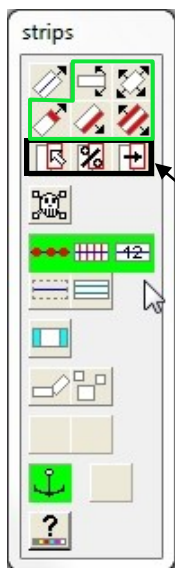
## Strip Flight Planning



Your screen should look something like this.

Several of the frequently used tools are included as a “right click” option to quickly access them. Right click, select the tool and your mode changes.

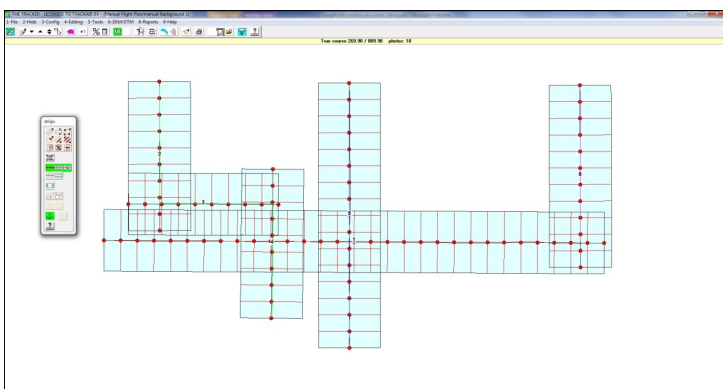
If the sticky button is on you can utilize the tool multiple times without having to re-select it.



These five buttons allow you to edit the strips including rotate, move, lengthen or shorten, *widen one side or widen the strip from the center*. Note that widening the strip will change the scale of the flight strip. These are special purpose buttons and should be used only if you are confident in how they work. Further descriptions are in the following section of the manual.

These three buttons allow you to parallel copy an existing flight line in three different ways.

To view the photo centers, neat model lines and line numbers, activate the three buttons as shown on the left.



Draw several lines and your screen should end up looking something like this. You can continue drawing additional lines or just save your flight plan if you are done (Pink Piggy Bank).

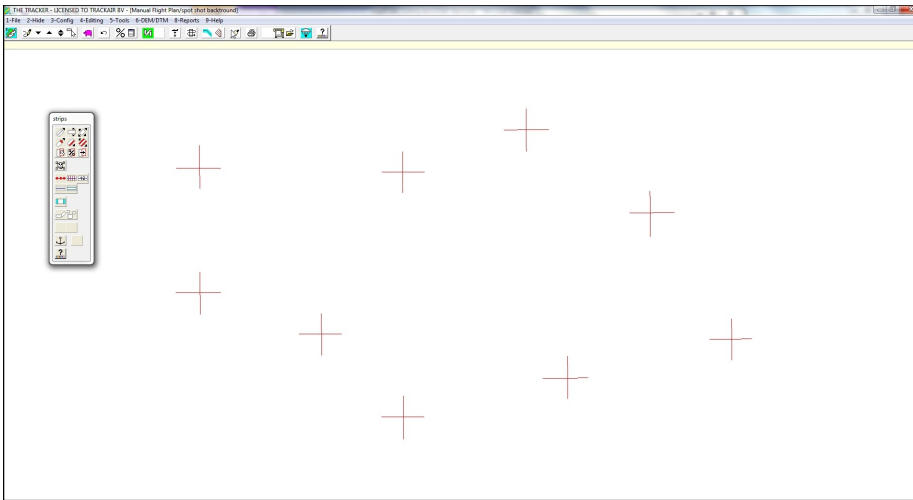
The next step would be to renumber your strips if necessary and add terrain height data to your flight lines either by adding it manually through the reference terrain height button or using the 6-DEM/DTM module.

See the Terrain Height section in the manual for further information. **SAVE IT AGAIN!**

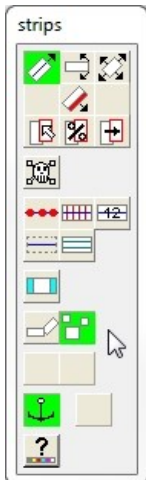


## Quick Start

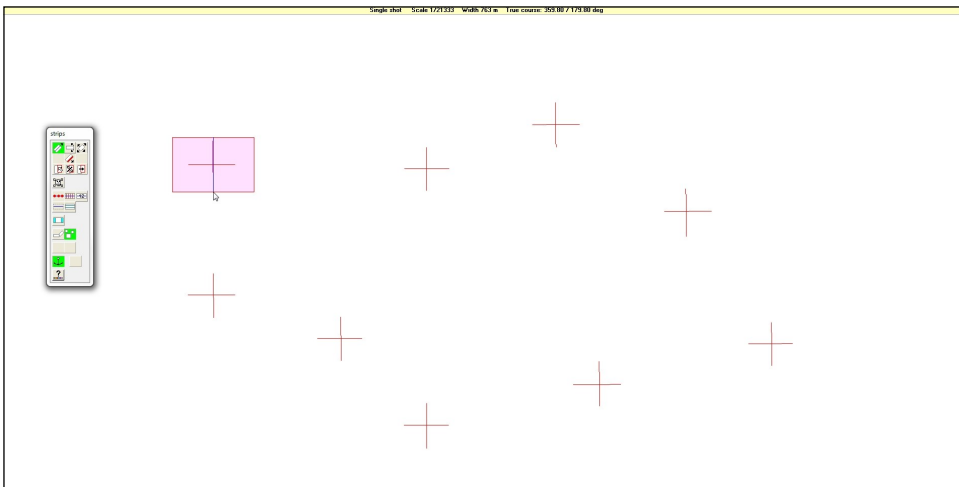
## Single (Spot) Shot Flight Planning



Follow the same processes on Pages 19 and 20. After setting your planning parameters make a note of the scale of your specification. You will need this when creating your single shots. Click OK to continue. Your background may be a series of crosses or just an image encompassing the intersections you wish to capture. To show the process more clearly we will work with crosses.



The strips tool box shown to the left depicts which tools to activate for this process. Since we have more than one location, activate the Sticky Button at the bottom, then the single shot button near the center. Now activate the single strip button in the upper left and you are ready to create spot shots.



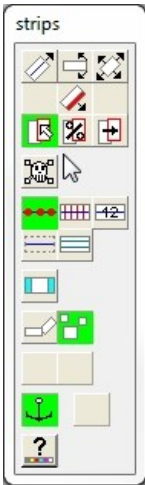
Left click and hold on the center of your spot and drag your mouse in the direction of flight you require. At the top of the screen you will see the scale and direction of flight changing as you move your mouse. Drag until you reach the scale and course of your specifications. Release the mouse and your spot is complete.



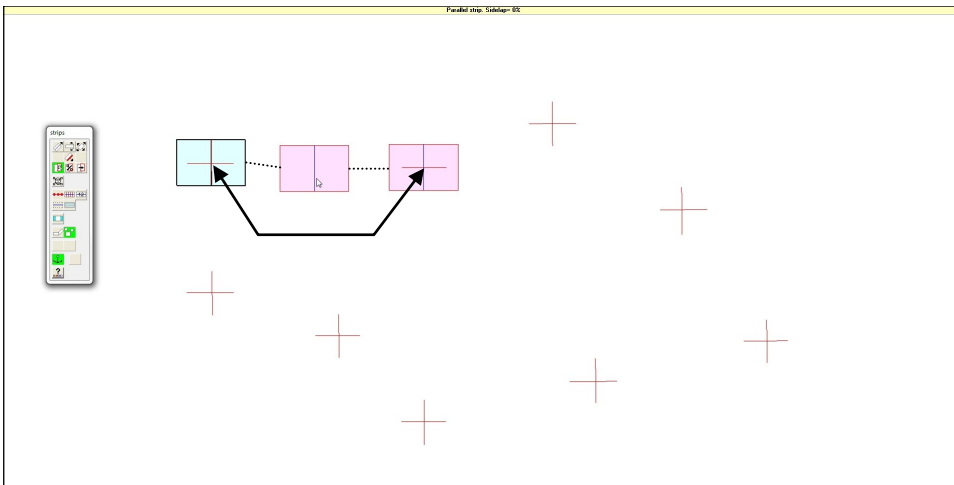


## Quick Start

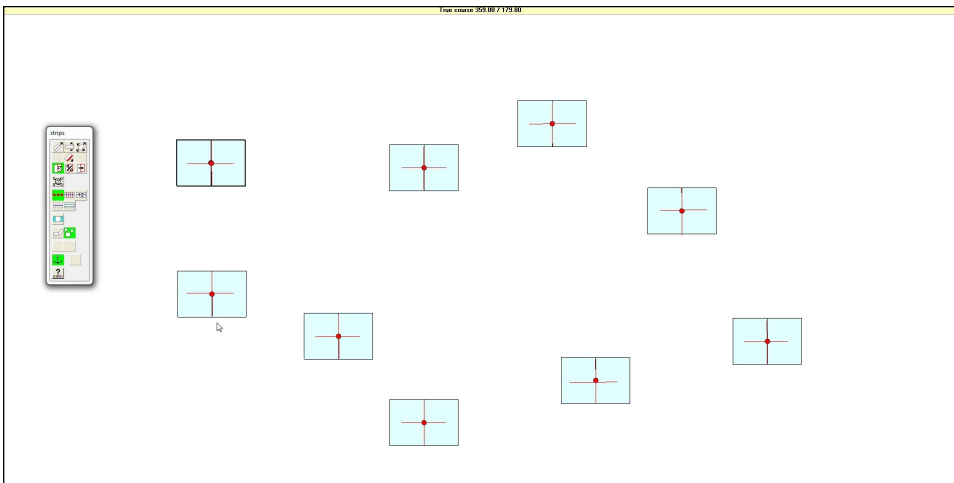
## Single (Spot) Shot Flight Planning



Now you have a single spot at the proper scale and direction. Drawing each one could be tedious, but there is a better way. Configure your toolbox as shown on the left. The “parallel copy by dragging” tool is now activated.



Left click and hold on the center of your first image. Drag it to the center of your next location and release the mouse. Continue this process until you have all your spots in place.

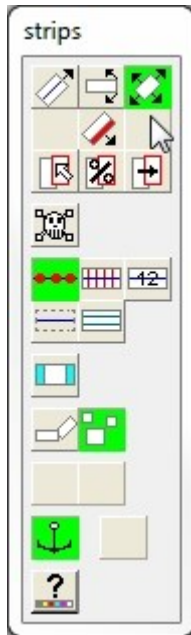


Now you have a completed flight plan. Use Zooming to verify the correct positioning of the spots. Before finalizing your plan.

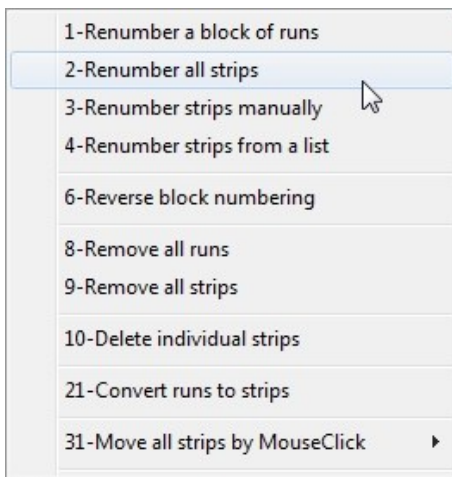


## Quick Start

## Single (Spot) Shot Flight Planning



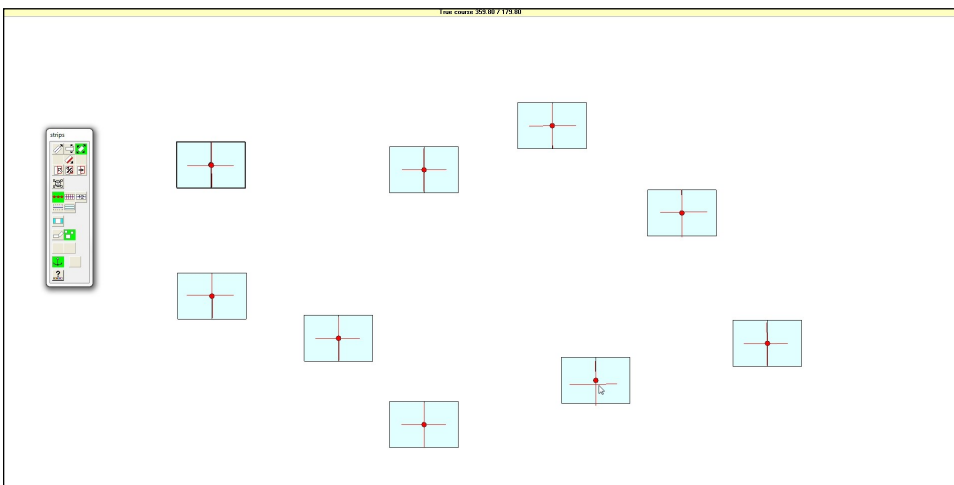
To fine tune your locations set your toolbox to the same setting as on the left. This includes the move tool in the upper right. With these set you can zoom in and move each spot till it is exactly where you want it. Depending on the scale you are working at, this may or may not be necessary.



Once you are satisfied save your flight plan. Check to make sure the spots are number sequenced in a logical manner, or to your client specifications as required. Renumbering is accomplished by selecting 4– Editing and selecting the renumbering method. Click on each line in order and when you click the last line it will automatically change the lines now SAVE IT!



You will want to add your terrain height for each spot, so click the “Terrain Height” button and enter it now.



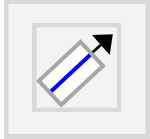
Your flight plan should now be ready for the flight crew. Just one more thing....SAVE IT!



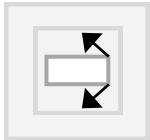
## Quick Start

## Strip and Shot Editing Tools

### Editing Tools used in snapPLAN:



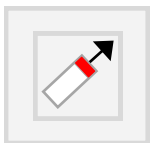
**SINGLE STRIP DRAWING** : Left click on location of beginning of line, move cursor to position the other end of line and left click again.



**TRIM/EXTEND/ROTATE** : Left click and hold on one end of an existing flight strip to trim, extend and/or rotate the line. Action works from either end of the line



**MOVE STRIP** : Left click and hold to reposition and drop an existing flight strip



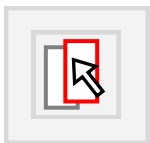
**TRIM/EXTEND** : Left click and hold on one end to extend or trim an existing flight strip



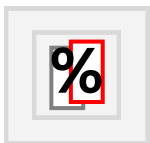
**WIDEN STRIP** : Left click , hold and drag on the side of an existing line to widen coverage, extending one side and moving the center. **SEE \* NOTE BELOW CONCERNING THIS ACTION.**



**WIDEN STRIP FROM CENTER** : Left click, hold and drag on the side of an existing line to widen coverage, extending both sides evenly from the center . **SEE \* NOTE BELOW CONCERNING THIS ACTION.**



**PARALLEL COPY BY CLICK, HOLD AND DRAG** : Click, hold and drag to create a parallel line manually; current side lap shows at top middle of screen during action



**PARALLEL COPY BY OVERLAP PERCENTAGE:** Choose the spacing you require or select the default and click on the side of the line you wish to parallel.

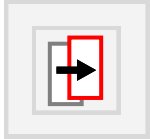
**\* NOTE:** Action changes the scale of the flight line (see the top middle of the screen to see the scale as it changes. This also changes the photo center locations and other specifications to match the scale thereby requiring a different altitude to fly the line. Make sure you understand this action before employing it in your plans!



## Quick Start

## Strip and Shot Editing Tools

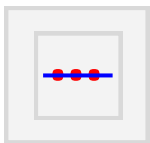
Editing Tools used in snapPLAN:



**PARALLEL COPY BY DISTANCE** : Choose the spacing in meters you require or select the default and click on the side of the line you wish to parallel.

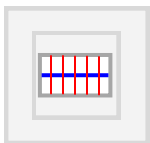


**KILL A STRIP**: Click to delete a strip. Used in conjunction with the “Sticky Button you can continue deleting strips to modify your photo coverage. **BE CAREFUL AS THERE IS NO UNDO FOR THIS FUNCTION!**

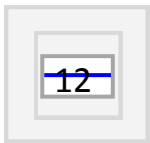


### **SHOW PHOTO POSITIONS:**

Click to visualize the current photo positions on screen



**SHOW NEAT MODELS** : Click to visualize the neat models on screen



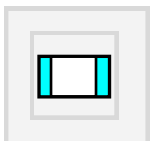
**SINGLE STRIP NUMBERS** : Click to visualize strip numbers on screen



**HIDE OUTLINE OF STRIPS** : Click to hide the strip outlines



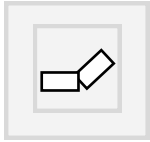
**SHOW SAFETY COVERAGE LINES (NEAT MODELS)** : Click to visualize the sides of the neat model. Default setting is in the 3-Config/ 1-Planning configurations/ 2-Single strips tab. Can be modified as a new default saved based on your specifications



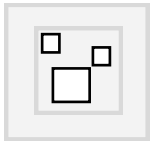
**STEREO AND FULL COVERAGE**: Click to toggle between stereo and full image coverage of flight strips



## Editing Tools used in snapPLAN:



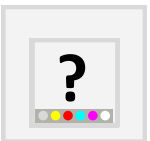
**CHAIN FLIGHT STRIPS** : Activate first then click the single strip drawing button to continuously create strips along a meandering path. Allows continuous flying as the system automatically selects the next line as you approach.



**SINGLE (SPOT) SHOT**: Activate first then click the single strip drawing button to create a single spot. Left click and hold dragging the mouse away in any direction from the start point. Scale shows in the top center so you can drag to proper size.



**STICKY BUTTON**: Toggle to lock the current tool for multiple use, such as deleting or adding photos, trim-extending lines, etc...



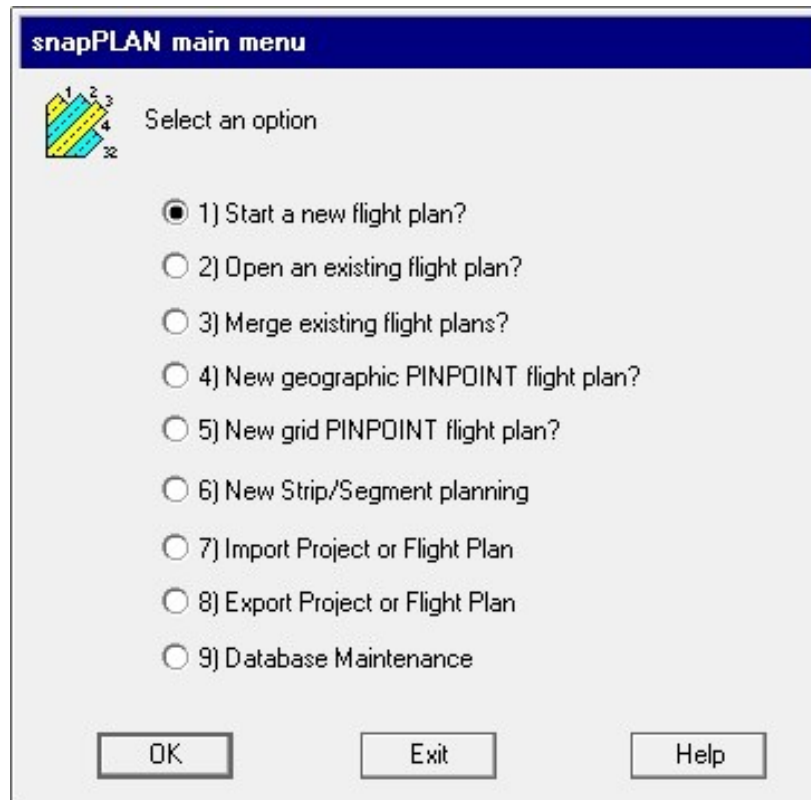
**Help**: Reserved for future use



## Main Menu Options

snapPLAN

The main menu has a few options to choose from and all perform basically as they are stated, yet each selection takes you in varying directions within the software. A step by step explanation of each of the options begins below:



- 1) **Start a new flight plan?** The one requirement for this option is that you have to have an area, background or image saved into the database from either snapVIEW or snapXYZ.
- 2) **Open an existing flight plan?** Allows you to open an existing flight plan to view or modify it. There are a couple of flight plan exceptions that are related to custom planning functions for specific purposes. If you are unable to open your flight plan for any reason, send the flight plan and a screenshot of the error you received to [support@trackair.com](mailto:support@trackair.com).
- 3) **Merge existing flight plans?** It is possible to merge more than one flight plan into a single plan. They can be the same or different altitudes. The system does not allow for the merging of line or frame scanners for technical reasons.



## Main Menu Options

snapPLAN

Geo pinpoints digital camera

Scale\_conversions Defaults

Use the scroll bars or type directly in the text boxes. Press ENTER to validate your entry  
If a value exceed the limits, it will be automatically rejected

Applanix DSS\_301 35 mm

Direction of flight  
 East-West  North-South

Coverage parameters

Photo scale 1:

Altitude AGL (feet)

Altitude AGL (m)

Pixel size in meter

Planning specifications

Latitude of Origin  Longitude of Origin

Minutes and decimal of minutes Corresponding minutes and seconds Approx. % lateral overlap

Run spacing

Photo Base

4) **New geographic PINPOINT flight plan?** Planning based on a known latitude/longitude point of origin and run and photo base spacing input as minutes and decimal minutes or percentage of side and forward overlap. Works with a predefined area only.

5) **New grid PINPOINT flight plan?** Planning based on a known coordinate value for a point of origin and Direction of flight. Works with a predefined area only.

Grid pinpoints digital cameras

Scale\_conversions Defaults

Use the scroll bars or type directly in the text boxes. Press ENTER to validate your entry  
If a value exceed the limits, it will be automatically rejected

Point of origin  
 Required zone number  Easting (when required, print zone in front of coordinate)  Northing

Direction of flight  
 East-West  North-South

Give bearing for the direction of flight (optional)  
 True course from point origin

Define direction of flight as the angle between 2 directions (optional)  
 Angle between the north and the line defined by the origin point and this second point  
 Easting  Northing

6) **New Strip/Segment planning.** This planning methodology was created for purposes of flying single lines with changing angles or curves along the path. It is created as a scanner flight strip and as such will not create photo points. Although a camera can be used with this option X-track will only turn the camera on and off; it must fire continuously on it's own. *A separate manual is available on our website for instructions on how to use this option.*

Import projects

Select one or more database(s) to be imported into the main database.

Single project databases

Curved Flood Test.zip

Do NOT import data tables (cameras, filters, etc)

Import only a specific Flight Plan.

After importing goto Photo index report on all filmrolls

After importing goto project/tp renaming (only single flightplan) (BETA!)

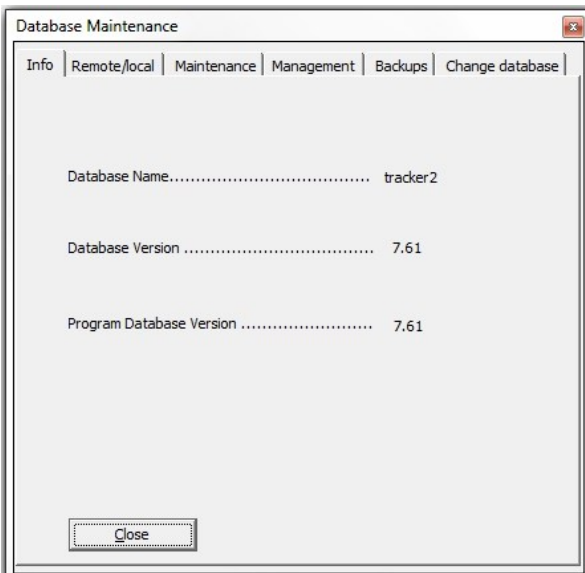
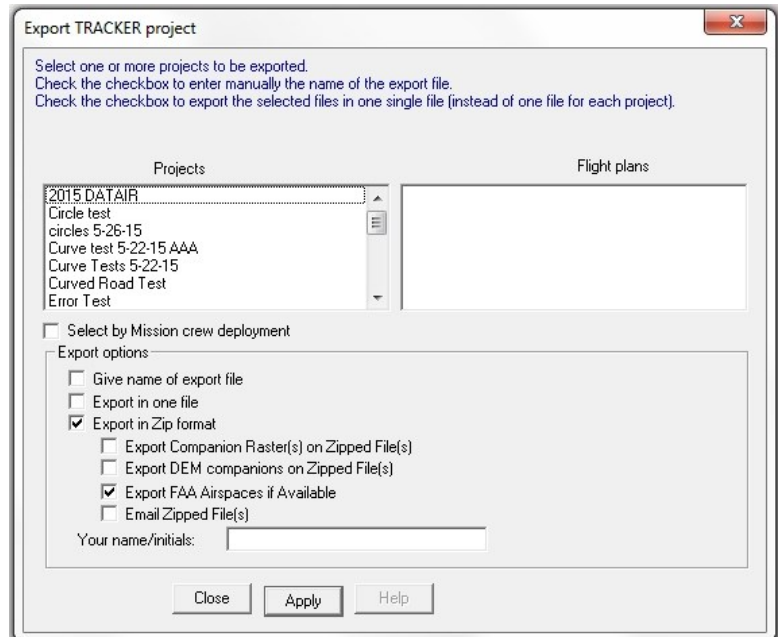
7) **Import Project or Flight Plan.** This option allows the user to import flight plans created on another computer or returned from the flight crew after the acquisition is complete. The data captured during the flight is also included so it can be reintegrated in the master database.



## Main Menu Options

snapPLAN

8) **Export Project or Flight Plan.** This option allows the user to transfer completed flight plans to other devices by way of an.mdb or.zip file of one specific flight plan or an entire project. The user can export additional data by way of check boxes as Export options. **NOTE: Exporting the FAA Airspaces will significantly increase the file size and in some instances may be too large to email.**



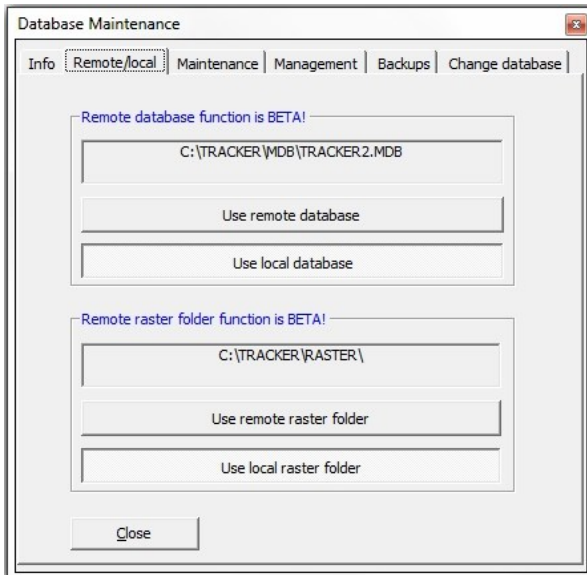
9) **Database Maintenance** This option allows for several types of database management and maintenance as well as other functions. The following will navigate through each tab of the Maintenance options.





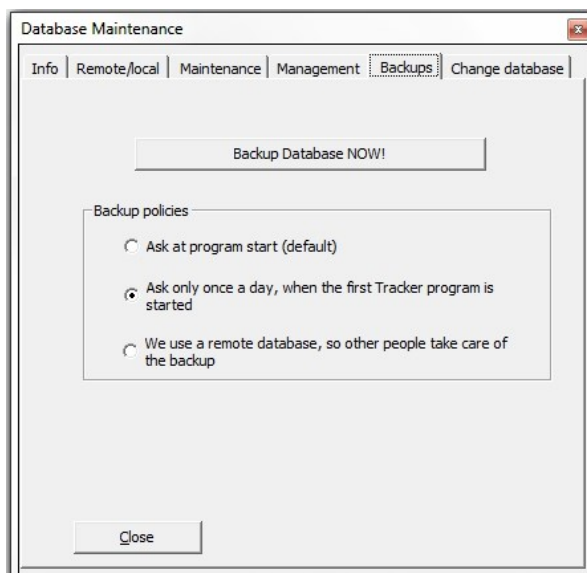
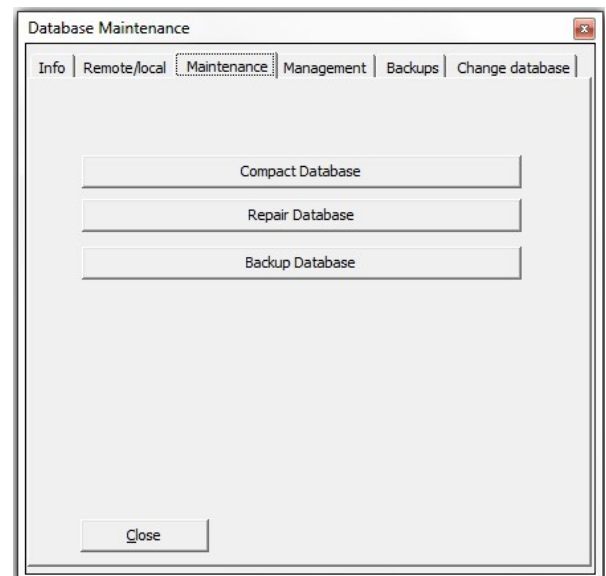
## Main Menu Options

## Database Maintenance



The **Remote-Local** tab provides for the ability to switch between databases on your computer or local server. In addition you can change the default location of the Raster folders that are created when using the snapVIEW module. This allows multiple users access to the same database and Raster data created for each flight plan.

The **Maintenance** Tab is for maintaining the .mdb file, by Compacting and Repairing the data to insure data integrity. In addition you can do an immediate backup of the database to the C:/tracker/MDB/USERBACK folder.

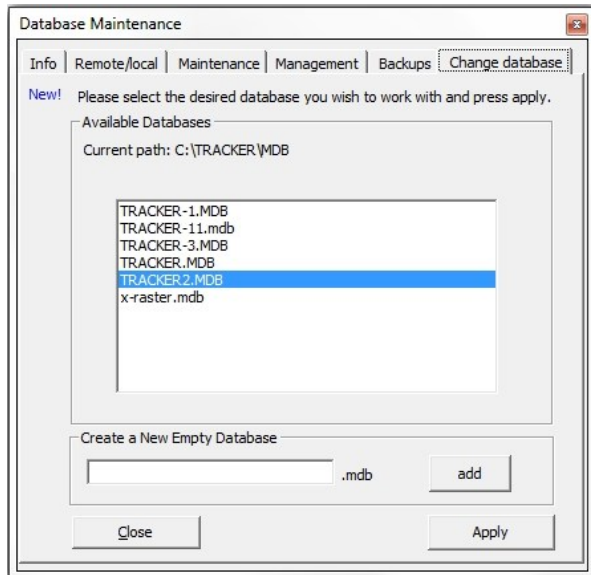


The **Backups** Tab allows you to not only backup your database immediately, but also to set Backup Policies concerning when and how often your database asks to be backed up.



## Main Menu Options

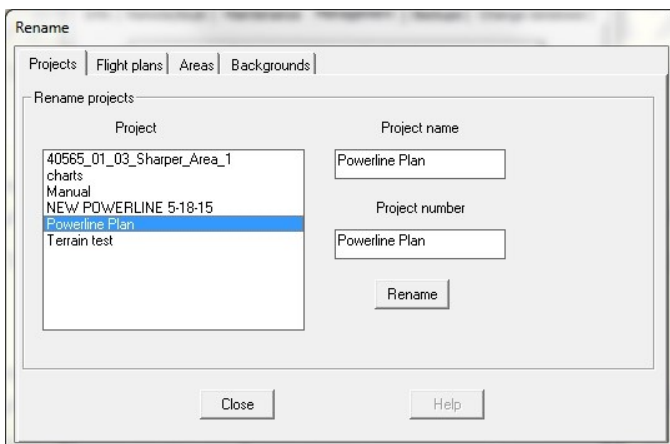
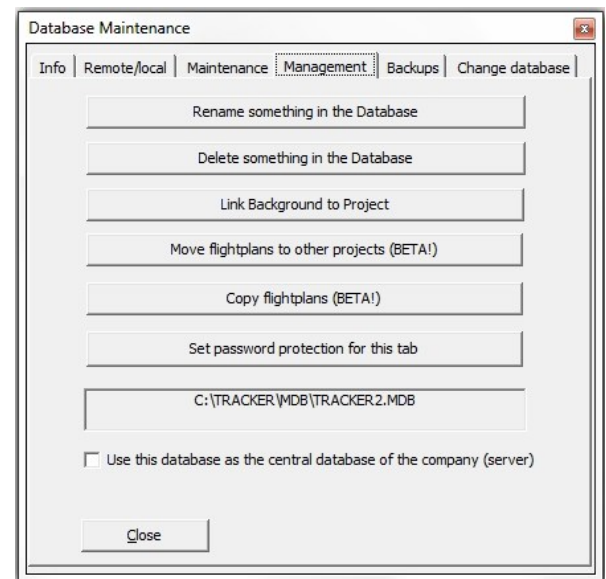
## Database Maintenance



While the remote-local tab allows you to select a particular folder to change your database, this relatively new **Change Database** option allows you to change between Tracker.mdb databases that you have created for compartmentalizing specific types of flight planning or data.

You can also create new blank databases when needed.

The **Management Tab** has extensive abilities to rename, delete, link, move and copy objects in the database for varying purposes. You can set your current database to be the central database of the company so it always opens to that location, and you can set password protection for this tab so only authorized users can perform these functions.

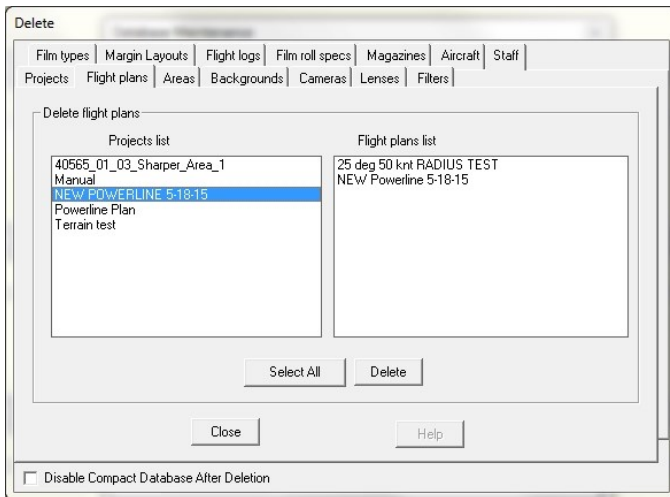


The **Renaming** function is simple. Just click on the tab of the item you need to change, click on the item and it displays to the right. Highlight and change the name and then click Rename at the bottom. Close and your are done.



## Main Menu Options

## Database Maintenance



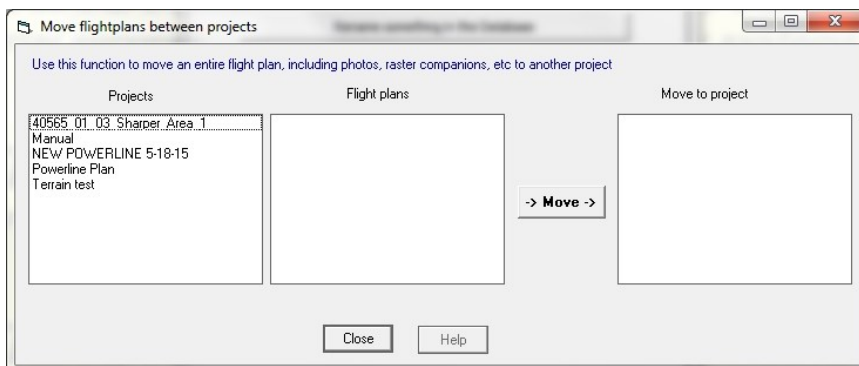
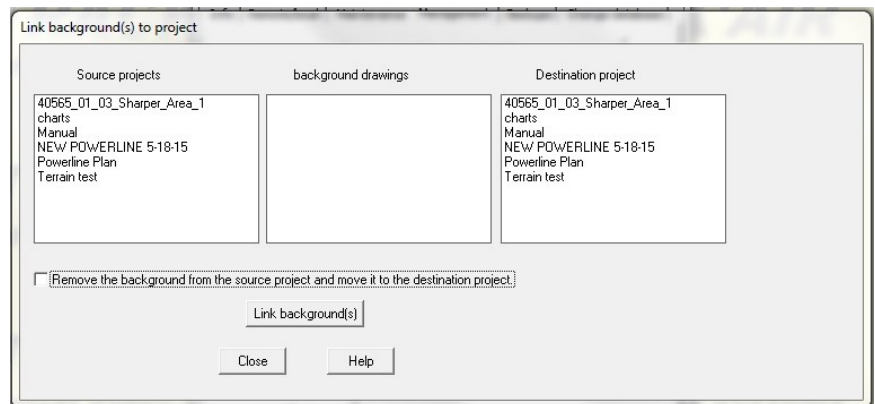
The **Delete** function is for removing data that is no longer relevant in the database. **BE CAREFUL, ONCE DELETED IT CANNOT BE RECOVERED!**

We suggest before you delete anything you make a [backup of the database](#). If you accidentally make a mistake you can recover by reverting to the backup database.

Now, just click on the tab of the item you need to delete. Highlight the item (s) and then click Delete at the bottom. Close and your are done. Note that if you are removing several items from the database

you may want to click on the “Disable Compact Database After Deletion” checkbox. Only uncheck it when you are on your last deletion, so the database can be cleaned of the empty spaces in the database created by the deletions.

The **Link background** tab allows you the option of linking a specific background from one project to another, or permanently moving it to the destination project.



The **Move flight plans** tab allows you the option of moving a flight plan from one project to another.



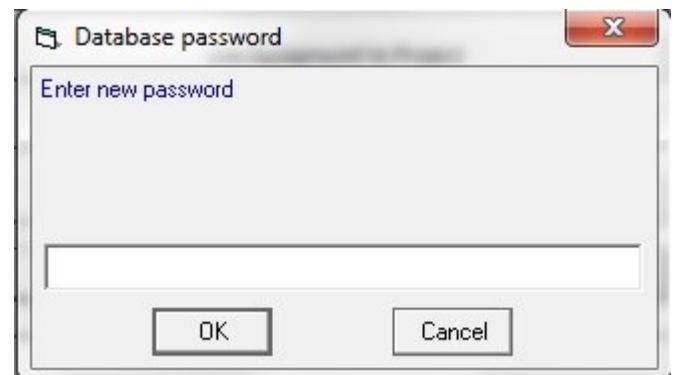
## Main Menu Options

## Database Maintenance



The **Copy Flight Plans** tab allows you the option of copying a flight plan from one project to another. This is helpful if you want to use an existing plan in a new project file.

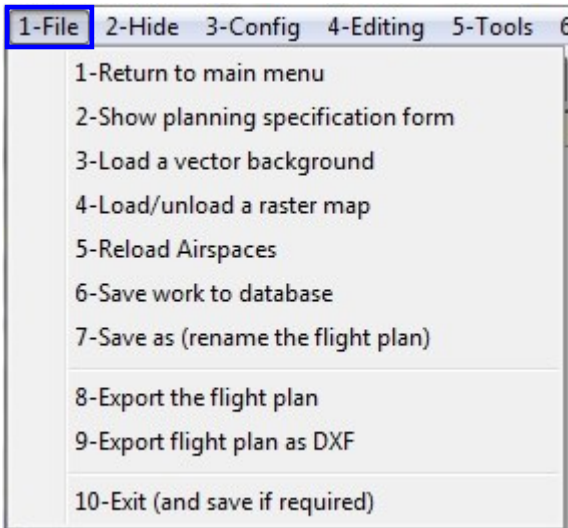
The **Database Password** option allows a database administrator to password protect the data for security reasons.



## Menu Bar Options

## 1-File

The menu bar options are extensive and therefore represent a large portion of this manual. These options are a culmination of the extensive amount of customized programming that has occurred over the past 20+ years to support our customer base and create the most extensive options ever imagined in a flight management system.



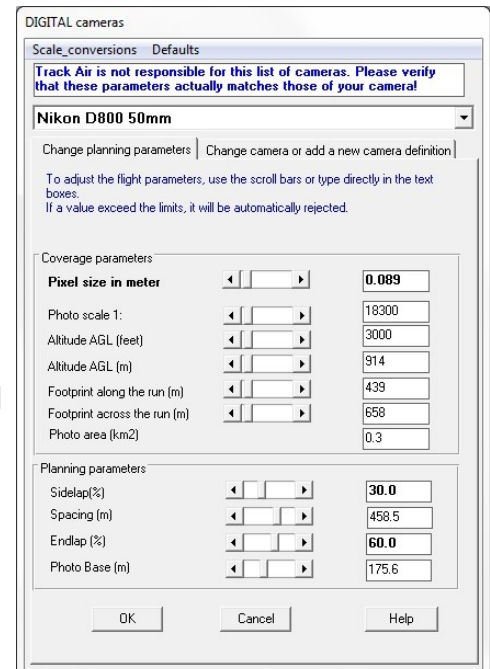
The main menu bar options start with the first **1-File** drop-down menu. Some of the options are self explanatory such as the **1-Return to Main menu**, **5-Reload Airspaces**, **6-Save**, **7-Save As** and **10-Exit** options. The remaining options are described in more detail below and on the following pages.

The **2-Show planning specification** form allows you to select or change the sensor you wish to use for this flight plan.

Then you need to:

**Set the Coverage Parameters** - these are based on the sensor definition you have selected and are interconnected. Changing one parameter will adjust the others so if you change altitude it will give you the calculated pixel size for that altitude based on the sensor you have selected.

**The Planning parameters** are important so make sure these are correct for you project. Sidelap sets the overlap between parallel flight lines and Endlap sets the overlap between successive frames.



## Menu Bar Options

1-File

DIGITAL cameras

Scale\_conversions Defaults

**Track Air is not responsible for this list of cameras. Please verify that these parameters actually matches those of your camera!**

Nikon D800 50mm

Change planning parameters

To add a new camera system, enter the new system name in the text box below, edit the parameters and press the save button. To change an existing system, edit the parameters and press the save button.  
You can use the scroll bars or type directly in the text boxes.  
If a value exceed the limits, it will be automatically rejected.

Sensor dimensions in millimeters

Side parallel to the run (mm)

Side perpendicular to the run (mm)

Sensor dimensions in pixels (only for digital devices)

Side parallel to the run (pixels)

Side perpendicular to the run (pixels)

Lens

Focal length (1.0 - 500.0 mm)

The **2-Show planning specification** form also allows you to change camera or add a new camera sensor definition.

First insert a new name for the Camera or Sensor you are defining.

Set the dimensions for the sensor in millimeters as well as pixels.

Set the focal length of the lens for the sensor.

**Save your camera.**

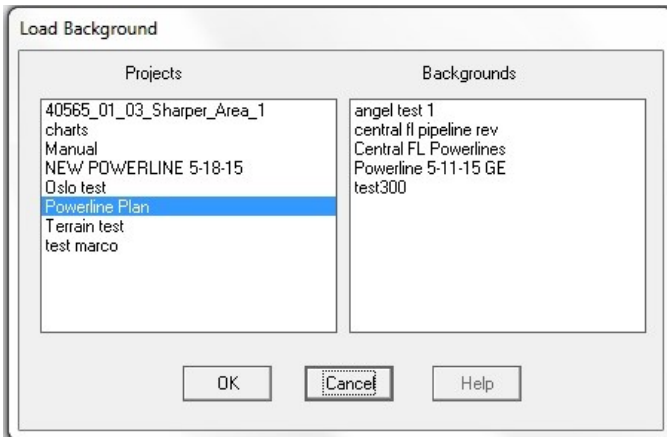
In addition to these settings there is also an option to rotate the sensor settings 90 degrees so the typical landscape mode can be set as a portrait mode. If you

do this rotation, make sure you change the name in the title box so you have both options, and then save the camera again.



## Menu Bar Options

### 1-File

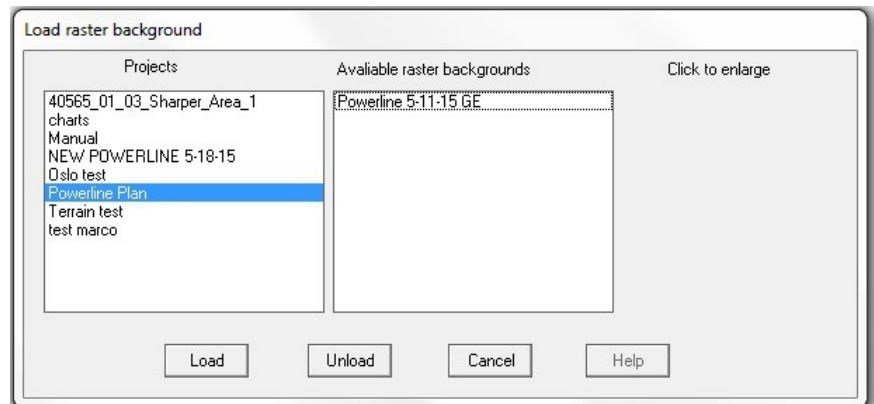


The **3-Load a vector background** option allows you to load a background file of vector data to be used during the flight planning process.

You can only load one at a time from the menu, but you can return to this menu and load additional files for flight planning. You can also **2-Hide** these in the “Hide Backgrounds...” menu option as needed.

The **4- Load a raster background** option allows you to load a raster image file to be used during the flight planning process.

You can only load one image at a time, but can return to this menu and replace the one you are currently viewing with a new one.

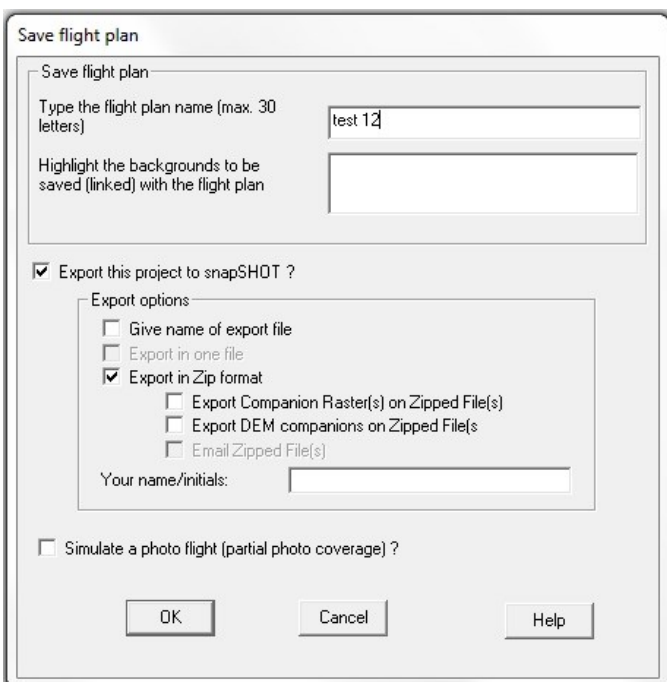


The **8-Export** the flight plan option allows you to save the flight plan file as an mdb file (in which case you uncheck the Export in Zip format box), or export the file in Zip format that is more manageable as a file to email to Flight Acquisition.

You can also give the exported file a different name by checking “give name of export file” and typing a substitute name. This does not rename the flight plan or project name, they remain the same.

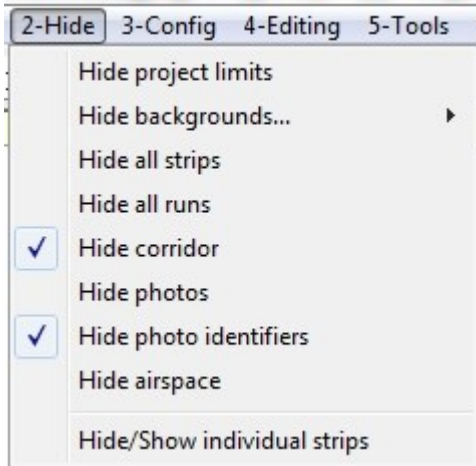
Select the “Simulate a photo flight” option if you need some test data for checking the system and printing functions.

The **9-Export flight plan as DXF** option automatically saves the flight plan as a .zip file in the C:\Tracker\PLOTS folder under the name of the flight plan.



## Menu Bar Options

## 2-Hide 3-Config

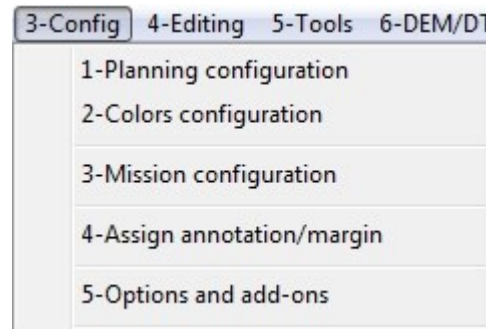


The **2-Hide** menu is just what it implies; many of the screen objects can be temporarily hidden in order to better view other objects during the planning process.

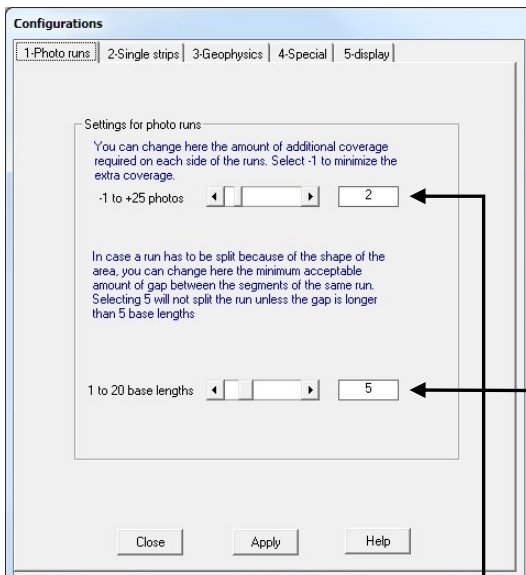
The **Hide backgrounds...** allows you the option of turning on and off any background vectors that are currently loaded.

The **Hide/Show individual strips** option allows you to toggle flight lines on and off as needed by selecting or deselecting the flight line number (s) you wish to hide.

The **3-Config** menu has several options for configuring your current flight plan as well as for general settings for all flight plans.

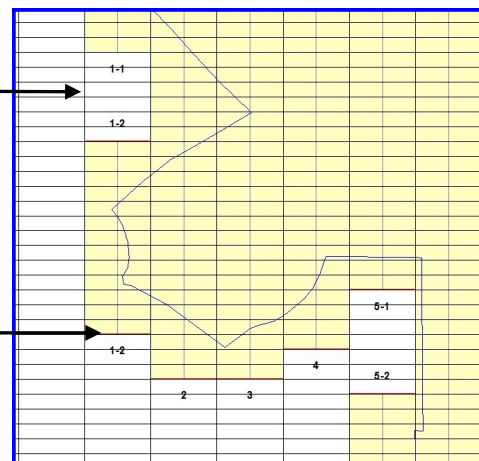


Selecting **1-Planning configuration** opens the Configurations Tab.



The **1-Photo runs** tab contains default settings that include the ability to automatically add additional photos to the pre-calculated lengths of a block of runs.

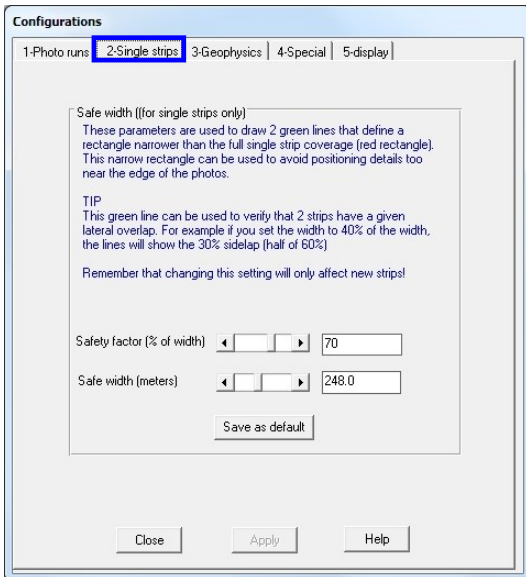
The second section allows you to set an acceptable gap(# of base lengths) when extending flight lines across areas that are outside an irregular shaped boundary.





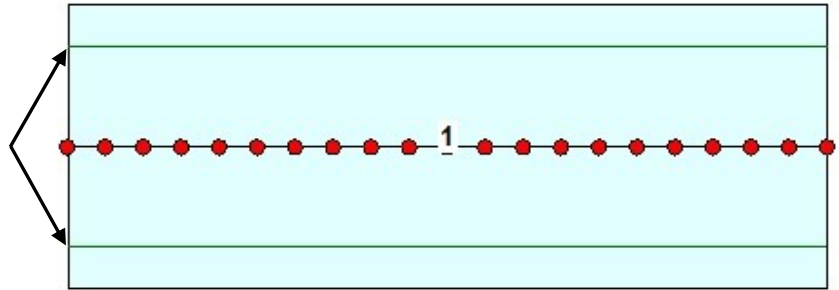
## Menu Bar Options

## 3-Config



The **2-Single strips** tab is for setting your safe width or in photogrammetric terms the Neat Model width of the flight strip.

The width is displayed by green lines as shown below:

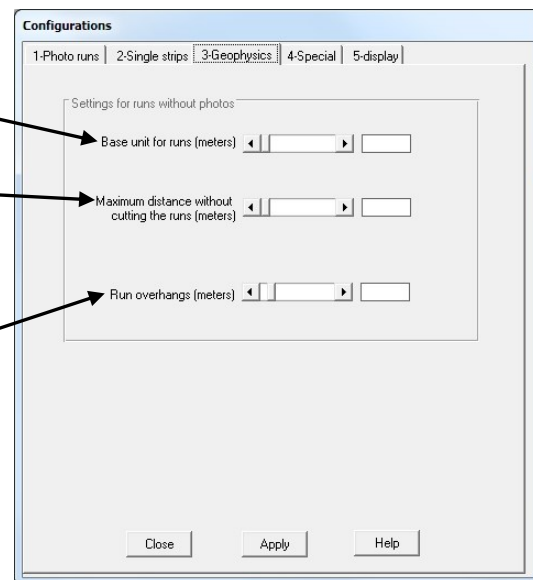


The **3-Geophysics** tab is primarily for settings used with LiDAR type flight lines, or flight lines without calculated photo centers.

The line length is calculated in Base units.  
 100 meters is the minimum length.

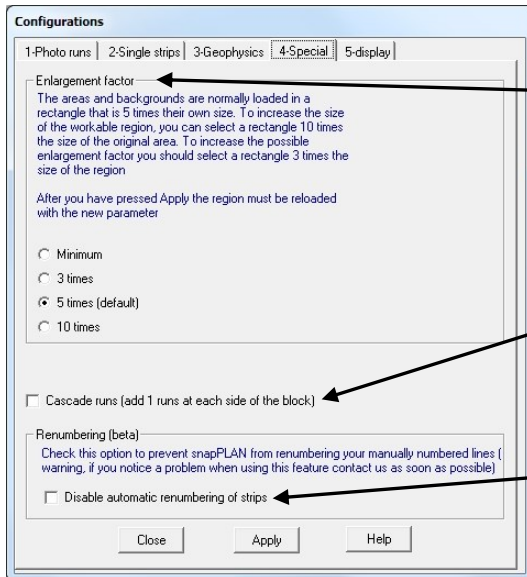
The maximum distance without cutting the runs.  
 See diagram on previous page for explanation of acceptable gap limits.

Run overhangs is the amount of extra coverage you want past the ends of the flight lines.



## Menu Bar Options

## 3-Config



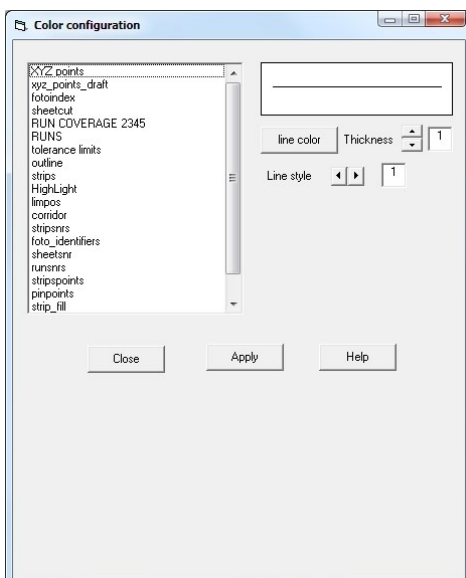
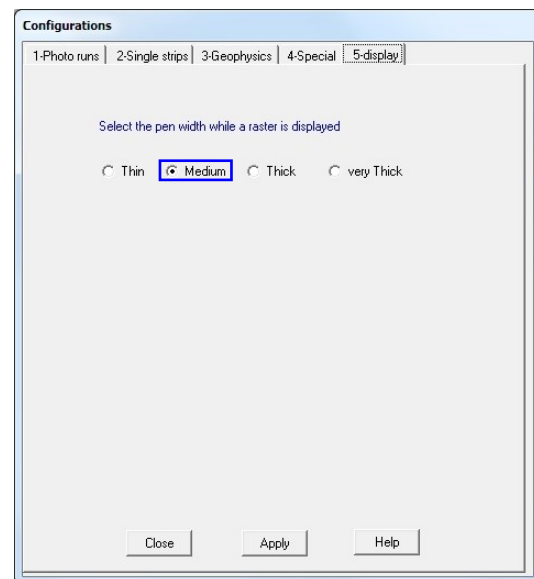
The **4-Special** tab has three options:

The **Enlargement factor** allows you to change the size of the overall area that your block area or background is loaded into. The smaller the overall area is, the greater the zoom capabilities become within your project. The description in the tab contains additional details.

The **Cascade runs** option allows you to add a line to each side of a block of runs that may be outside the actual area limits you have loaded.

The **Renumbering** option prevents snapPLAN from renumbering your lines automatically during the flight planning process.

The **5-display** tab allows you to change the size of the background or area lines to a thinner or thicker line in order to be less or more visible as needed.



The **3-Config** menu/**2-Color configuration** tab is for changing the display colors of many of the vector lines in the system. Select the object on the left and then select the line color, thickness and line style on the right. When complete click apply and close.

This is a Beta version and has limited functionality at this time.



## Menu Bar Options

## 3-Config

**Project and Flightplan mission information**

Defaults  
Use this form to save mission data to the flight plan. To reuse the information, save the data as default

Equipment | Project | Crew | Setup |

Camera type

Lens type

Cal. focal length

Filter type

Film

Close Save Help

The **3-Config** menu/**3-Mission configuration** tab allows you to input database information about your project. The **Equipment** tab allows you to put in information about your camera system.

**Project and Flightplan mission information**

Defaults  
Use this form to save mission data to the flight plan. To reuse the information, save the data as default

Equipment | Project | Crew | Setup |

Client name

Close Save Help

The **Project** tab allows you to input your clients name.

**Project and Flightplan mission information**

Defaults  
Use this form to save mission data to the flight plan. To reuse the information, save the data as default

Equipment | Project | Crew | Setup |

Pilot name

Navigator name

Aircraft registration

Close Save Help

The **Crew** tab allows them to input their names and which aircraft was used for the acquisition of the project.

**Project and Flightplan mission information**

Defaults  
Use this form to save mission data to the flight plan. To reuse the information, save the data as default

Equipment | Project | Crew | Setup |

This data plus the calibrated focal length on the Equipment tab are essential to get a proper realtime

Boresight correction angles (degrees)

Heading/Z-Axis/Kappa	<input type="text" value="0"/>
Pitch/Y-Axis/Phi	<input type="text" value="0"/>
Roll/X-Axis/Omega	<input type="text" value="0"/>

Vertical offset from camera to GPS antenna (m)

User defined altitude correction (m)

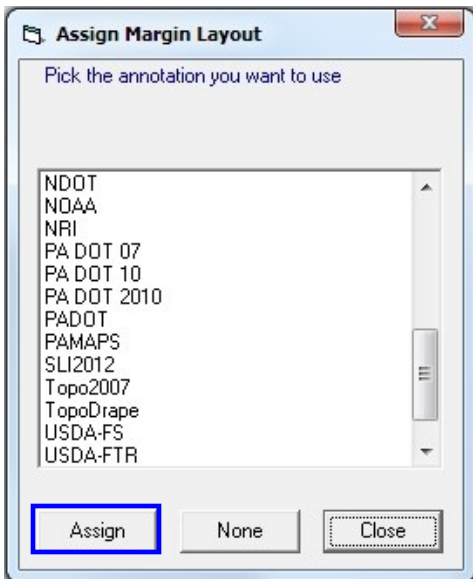
Close Save Help

The **Setup** tab is for saving data about the boresite correction angles and the vertical offset of the antenna, and a user defined altitude correction if needed.



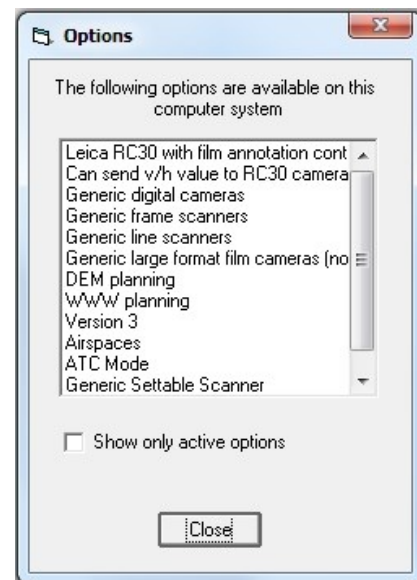
## Menu Bar Options

## 3-Config



**4– Assign annotation/margin**—Some camera systems allow you to send custom annotation to them for inclusion. If you have your annotations already configured you can select it here and save it with the flight plan assuring the correct data is included. The annotation margins are created in the **snapSHOT** module under the **10-Equipment** tab under your particular camera.

The **5-Options** allows you to see the different standard and custom X-Track options that are available under your current license.



If these options are showing in your **3-Config** tab refer to the **MIDAS** manual for instructions on how these perform:

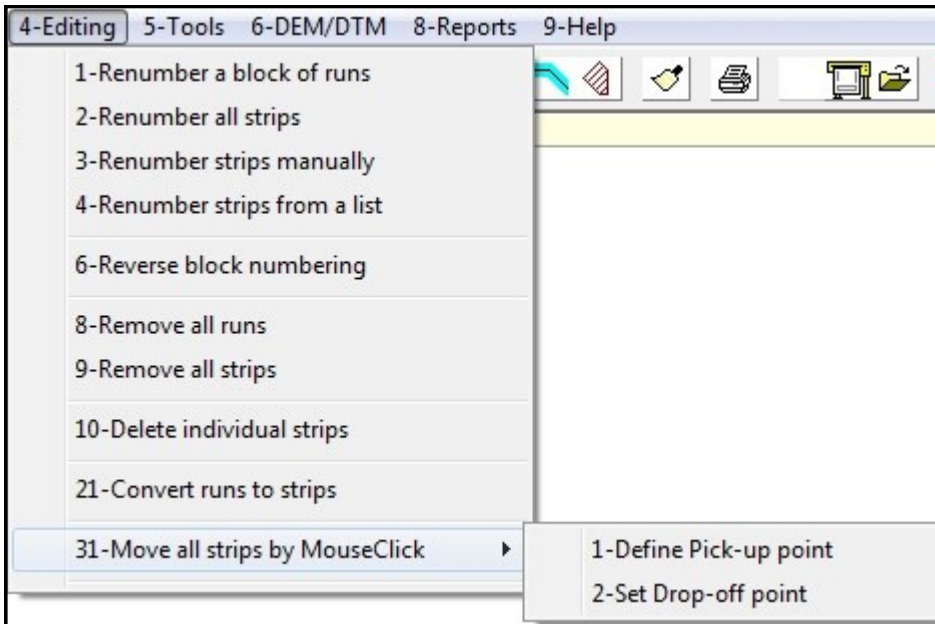
**20-Midas**

**21-Midas limit offset**



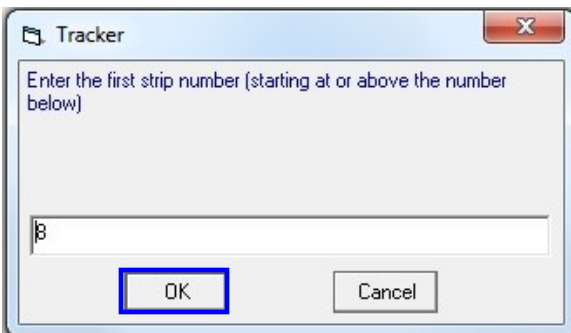
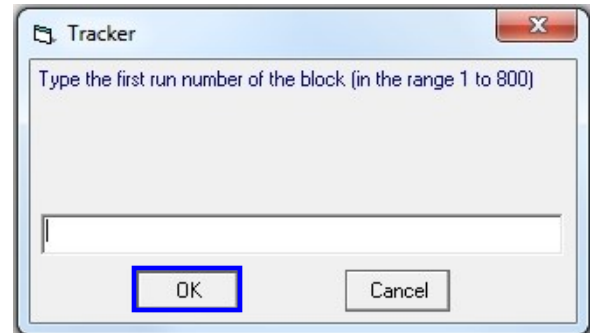
## Menu Bar Options

## 4-Editing



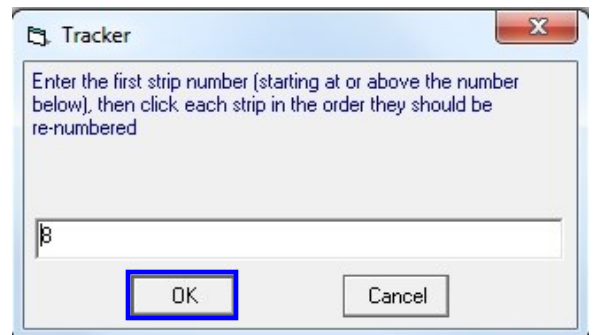
The **3-Config** menu/ **4-Editing** tab has several tool options for editing both runs (block flight lines) and strips (single manually drawn lines). **6-Reverse block numbering** and **21-convert runs to strips** are automatic. Descriptions of each of the other options follows:

The **1- Renumber a block of runs** allows you to select a starting number and then it will auto-number the remaining lines.



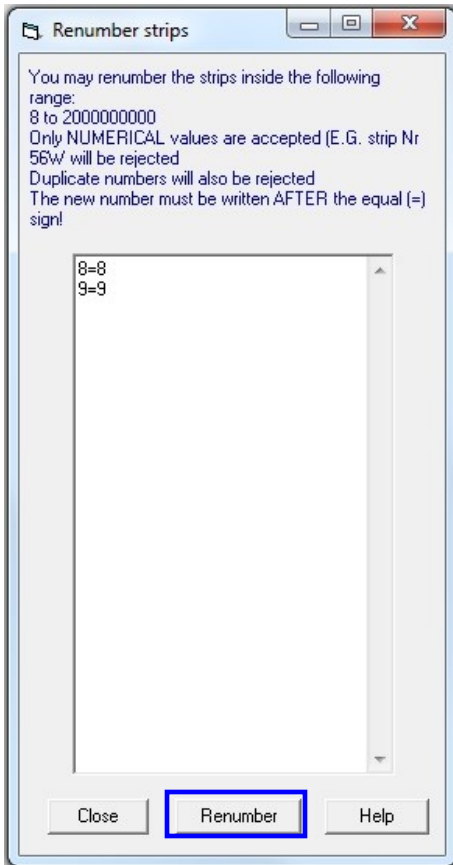
The **2-Renumber all strips** enables you to renumber a set of strips by selecting a starting number. It will then auto-number the remaining lines.

The **3-Renumber strips manually** enables you to select a starting number and then, by clicking on each strip in order, renumber them.



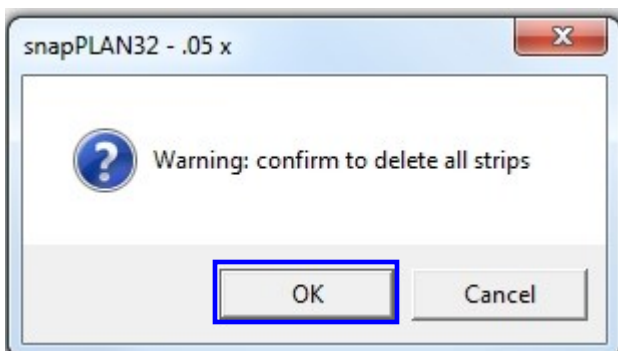
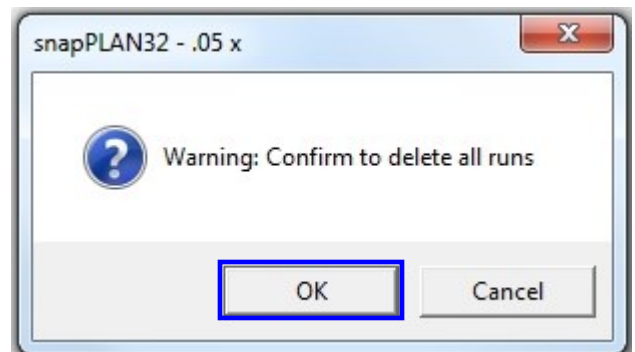
## Menu Bar Options

## 4-Editing



The **4-Renumber strips from a list** enables you to renumber a set of strips by selecting the second number and changing it. They should be numerical only and must not have any duplicate numbers. Duplicate numbers will be rejected. When you have changed the numbers you must click on the Renumber button at the bottom to complete the process.

The **8-Remove all runs** enables you to delete all existing runs from your existing flight plan. You must click OK to confirm the deletion.

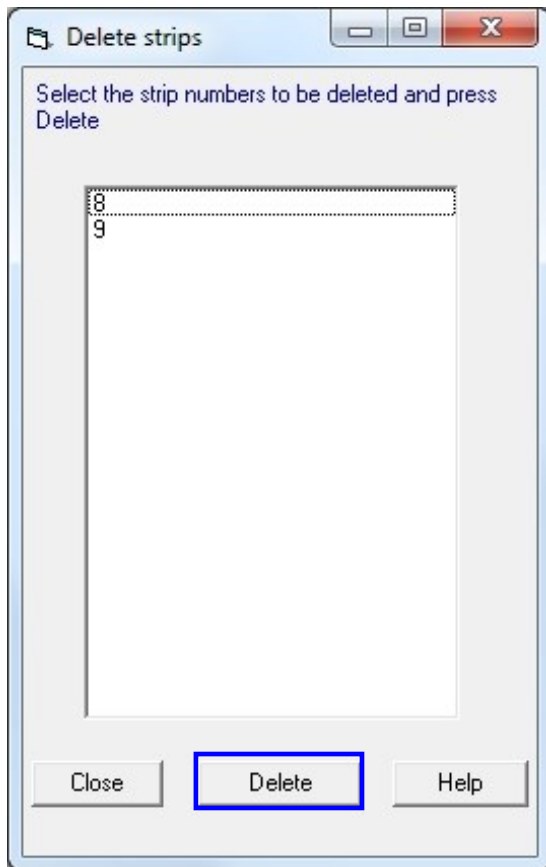


The **9-Remove all strips** enables you to delete all existing strips from your existing flight plan. You must click OK to confirm the deletion.



## Menu Bar Options

## 4-Editing



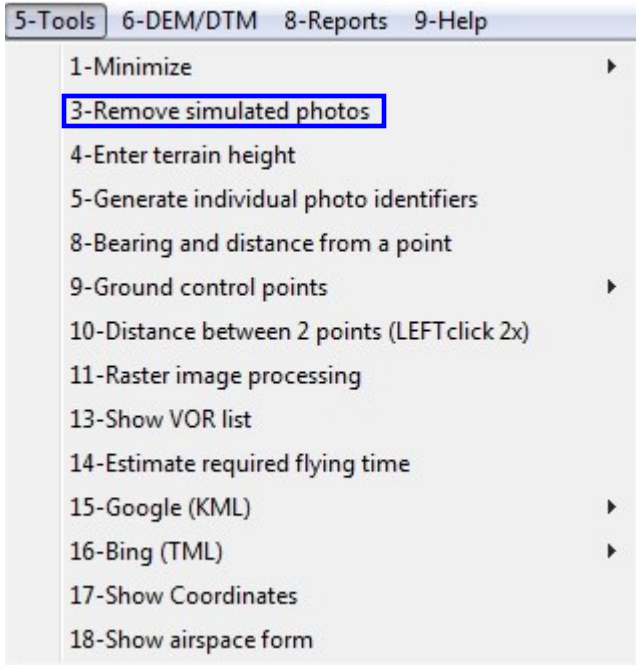
The **10-Delete individual strips (from a list)** enables you to delete strips by selecting all the strips you wish to remove and then click delete to complete the removal.

The **31-Move all strips by Mouse Click** enables you to move an entire flight plan made of “Strips” by selecting a starting (Pick-up point) and then setting a new Drop-off point. Especially useful if you created a complex flight plan and then determined you needed to move it in one direction or another.



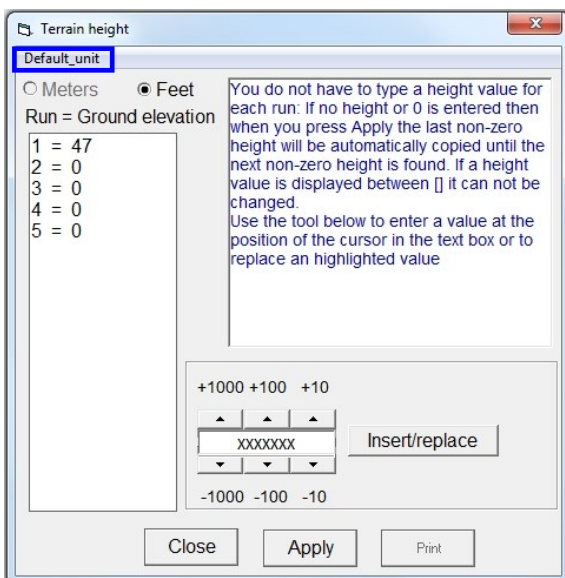
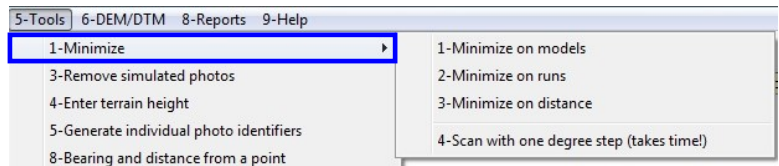
## Menu Bar Options

## 5-Tools



The **5-Tools** menu contains numerous options and possibilities for your flight plan. The **3-Remove simulated photos** option automatically removes any simulation photography that may have been generated for testing purposes.

The **1-Minimize** tab contains automated tools for creating flight plans based on the least possible number of models, runs or distance (total distance of all flight lines) for your flight plan. Selecting **4-Scan with one degree step (takes time)** forces the system to test every degree of angle for the most efficient manner to fly the project.



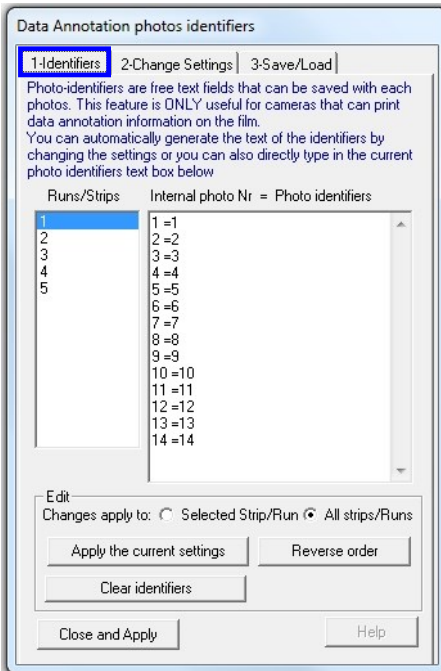
The **4-Enter terrain** height tab is used for manually adding a terrain height for each flight line that corresponds to the average height of the ground above sea level. If the project terrain is relatively flat, then you can simply type the single height in the first line, and then click Apply. This will automatically apply the same height to all of the flight lines that are at a "0" elevation. Set your **Default\_unit** at the top left.





## Menu Bar Options

## 5-Tools

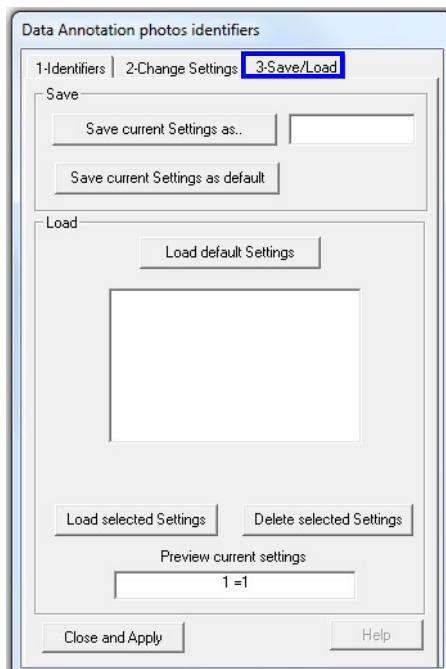
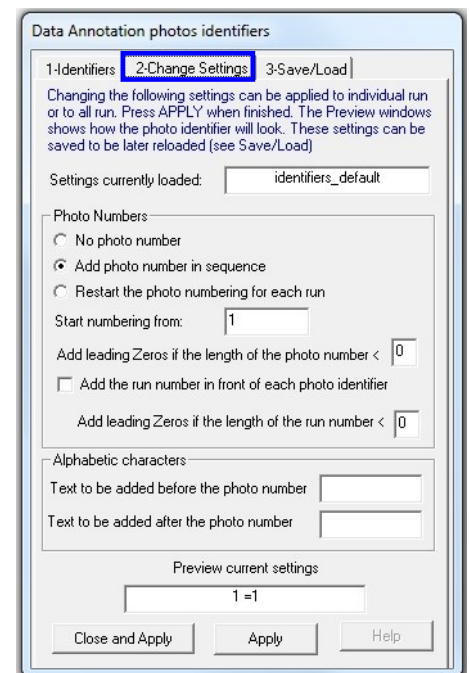


The **5-Generate individual photo identifiers** tab is useful for cameras that can print data annotation information on the film.

You can automatically generate the text by using the **2-Change Settings** tab or you can manually rename frames on the **1-Identifiers** tab shown to the left. The numbers after the = are the editable data. **Do not change the numbering before the = symbol.**

In the Edit section at the bottom you can control the automated data by reversing the numbering of single strips or the entire set of strips or runs as needed. Don't forget to **Close and Apply** after making your changes. Also, save your Project with the Pink Pig so the changes are included in the database.

The **2- Change Settings** tab provides for changing photo numbers, adding leading Zeros if required and adding text for your annotation data. A preview of your data displays at the bottom of the tab.



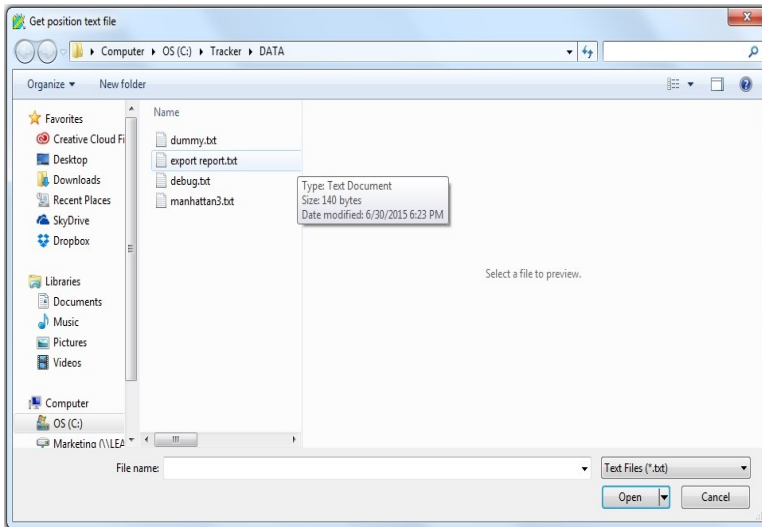
The **3-Save/Load** tab allows you to save the current settings as a specific layout that you can reuse for subsequent projects.

You can also save a default setting if you use a common layout for all annotation.



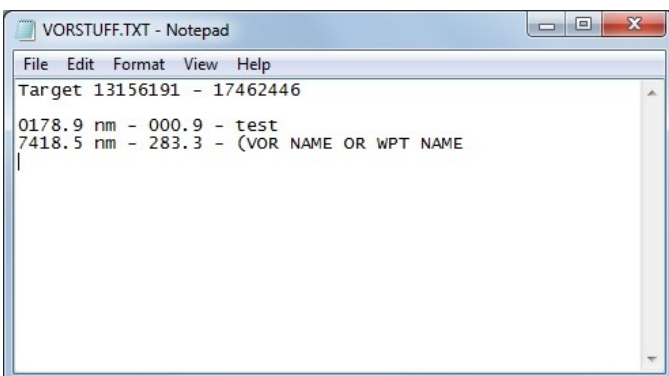
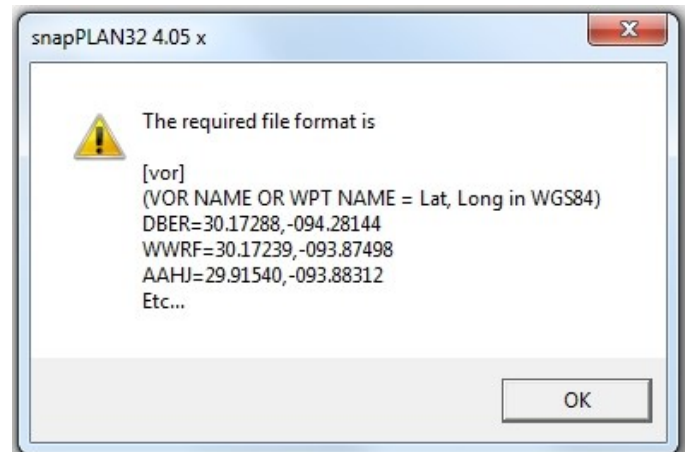
## Menu Bar Options

## 5-Tools



The 8-Bearing and distance from a point is a tool for calculating a distance from a known VOR or other location.

This must be a text file with the file formatted as shown to the right.

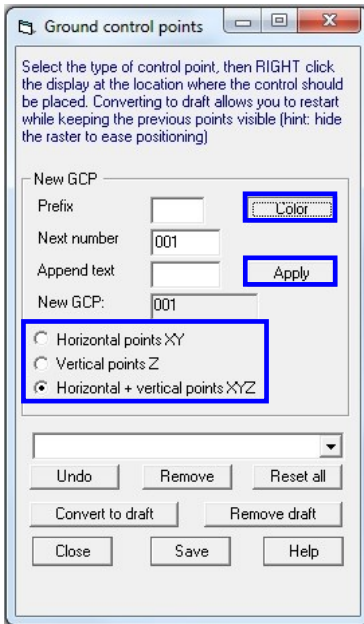


The resulting text file is saved in the C:\Tracker\DATA folder with the default name VORSTUFF.TXT



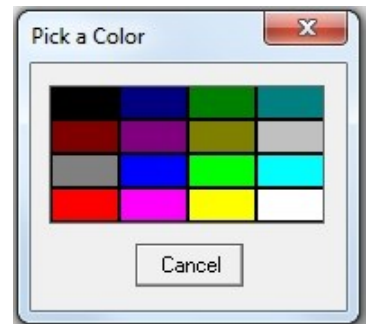
## Menu Bar Options

## 5-Tools



The **9-Ground control points** tab was created so targets for a project can be placed at strategic locations within the neat models. The ability to turn on an image behind your flight plan gives you a quick solution for creating as well as providing ground control points to the land surveyor. When you select the tab you have two selections to choose from; **1-Load file...** and **2-Edit**. The first **1-Load file...** is for loading an existing \*.gcp file that you may want to edit. The second **2-Edit** is where you begin a new task. The image to the left shows several options that are available to you. We will address them from top to bottom beginning with the **Color** button.

This button displays the **Pick a Color** tab so you can select the color of the target to place. Working with images somewhat restricts you to the brighter colors, and yellow seems to stand out well, but feel free to try other colors that suit you.



Set the Prefix (if you need one) and then set your starting target number.

It defaults to 001, but you can change this to suit your particular needs. The Target number is auto sequenced beginning with the first number you set in the Next number box. Anytime you change it you just click **Apply**. Then select the type of control point you want to place. The Horizontal points XY symbol is a *Triangle*, the Vertical points Z is a *Circle* and the Horizontal + vertical points XYZ is a *Square*. *You can switch between symbols as needed. Now you can start adding control points by simply right clicking on the first location.* You can continue right clicking until you have added all of your points. Once complete click the **Save** button at the bottom and a notepad will open with your data. The gcp file is automatically saved to the C:\Tracker\DATA file as "flight plan name.gcp". You can also File-Save as in Notepad if you want to save it elsewhere. The text file consists of **Sequence # = target number, target type, latitude, longitude**. The file is saved as a \*.gcp control file and can be reloaded so edits can be done as necessary. The formatting of the file is set to work within the **X-Track** software so do not change the header information. You can manually add points below the *[xyz controls]* line as long as the sequence number is not skipped and the data remains constant.

```

test-ground-control.gcp - Notepad
File Edit Format View Help
Ground control points for the flight plan: test-ground control
Coordinates are in WGS84
xy = horizontal point, z = height point, xyz = horizontal + height point

[xyz controls]
1=101,XY,28.12119,-81.63663
2=102,XY,28.12453,-81.63655
3=103,XY,28.12734,-81.63630
4=104,XY,28.12854,-81.63592
5=105,XY,28.11999,-81.63439
6=106,XY,28.12371,-81.63442
7=107,XY,28.12539,-81.63454
8=108,XY,28.12904,-81.63445
9=109,XY,28.11396,-81.63158
10=110,XY,28.11686,-81.63161
11=111,XY,28.11910,-81.63166
12=112,XY,28.12128,-81.63174
13=113,XY,28.12324,-81.63174
14=114,XY,28.12593,-81.63191
15=115,XY,28.12863,-81.63178
16=116,XY,28.13053,-81.63173
17=117,XY,28.13235,-81.63174
18=118,XY,28.11400,-81.62913
19=119,XY,28.11726,-81.62902
20=120,XY,28.12080,-81.62905
21=121,XY,28.12400,-81.62909
22=122,XY,28.12576,-81.62909
23=123,XY,28.12948,-81.62911
24=124,XY,28.13231,-81.62913
25=125,XY,28.11739,-81.62662
26=126,XY,28.11935,-81.62639
27=127,XY,28.12234,-81.62673
28=128,XY,28.12246,-81.62619
29=129,XY,28.12471,-81.62695
30=130,XY,28.12464,-81.62340
31=131,XY,28.12719,-81.62642
32=132,XY,28.12934,-81.62650
33=133,XY,28.13236,-81.62647
34=134,XY,28.11949,-81.62497
35=135,XY,28.12131,-81.62411
36=136,XY,28.12469,-81.62374
37=137,XY,28.12863,-81.62377
38=138,XY,28.13050,-81.62378
39=139,XY,28.13048,-81.62539
40=140,XY,28.13231,-81.62539
41=141,XY,28.13229,-81.62383

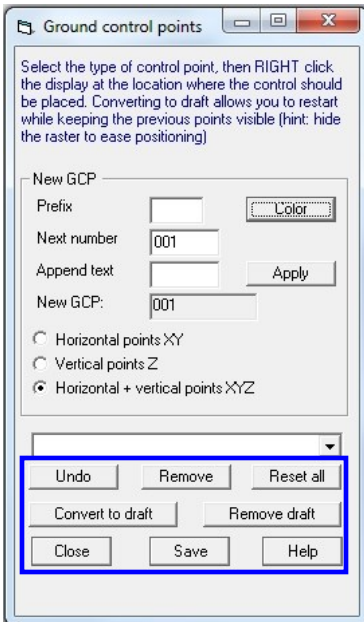
```

format of



## Menu Bar Options

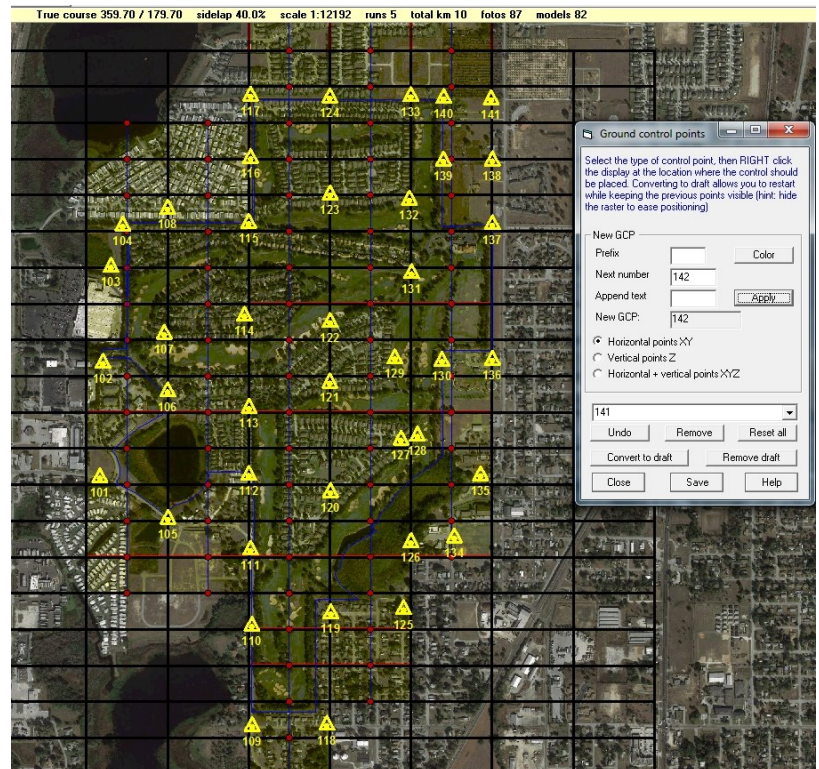
## 5-Tools



There are several tools in the box that allow you to edit your data. You can undo the last point you set. If you remove a point make sure you check the Next number box to verify you aren't out of sequence before continuing. Undo or Remove buttons do not reset the Next number. Always click *Apply* after changing the number.

The *Convert to draft* option allows you to re-number your locations by changing them to unnumbered "draft" locations. Reset your Next number, hide your image and right click on each one of your draft points in the new order. When complete, click *Remove draft* so you only save the new points.

**Your plan should look something like this:**



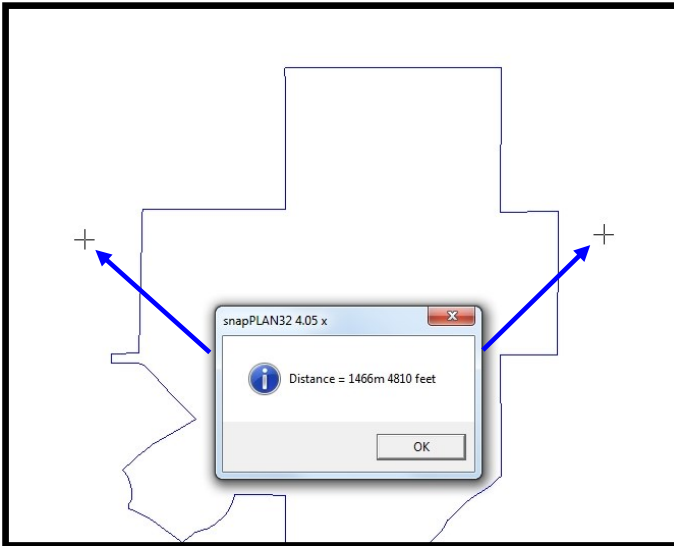
While the control points are still visible on the screen you have the option to export the ground control to a Google \*.kml file at: **5-Tools/ 15-Google (KML)/ 2-Export Ground Control Points.**

If you are using the Bing option you go to **5-Tools/ 16-Bing (TML)/ 2-Export Ground Control Points.**



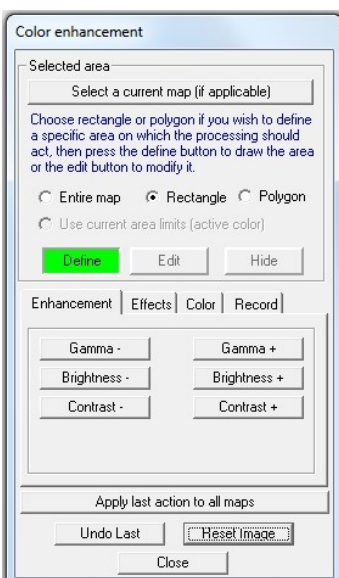
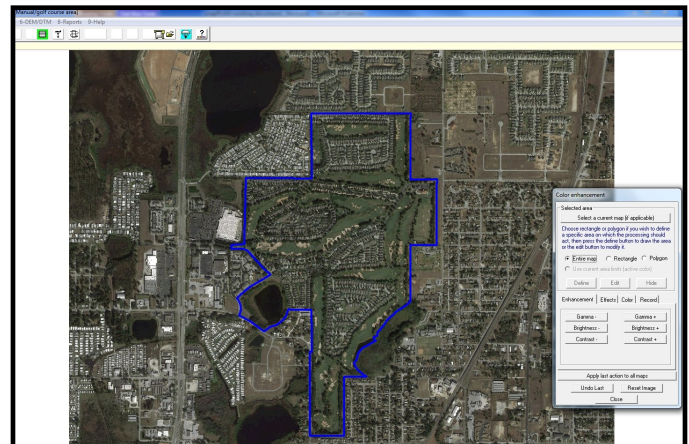
## Menu Bar Options

## 5-Tools



The **10-Distance between 2 points (LEFT click 2x)** tab is available to quickly get a distance between 2 points. Select the tool, click on your first point and then left click on your second point. The dialog box that is shown to the left comes up and provides the distance.

The **11-Raster image processing** is a set of tools for adjusting your imagery to a better density or contrast when working in **snapPLAN**.

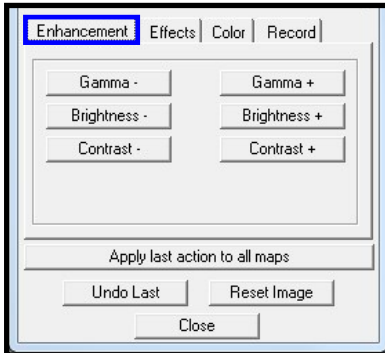


You can select to edit the entire map, a Rectangular or a Polygon of a portion of the image. Once selected there are several options available. There are four tabs—Enhancement, Effects, Color and Record.

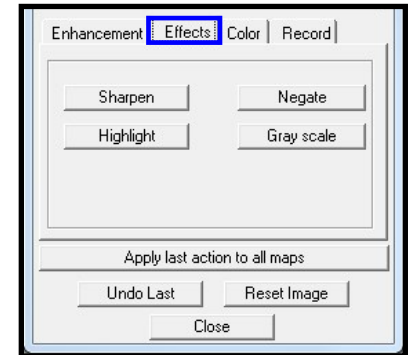


## Menu Bar Options

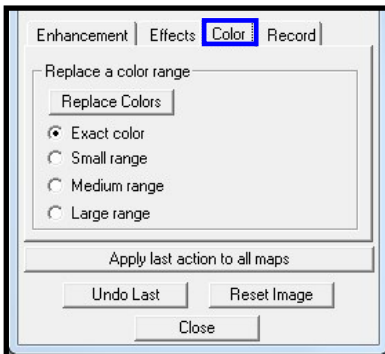
## 5-Tools



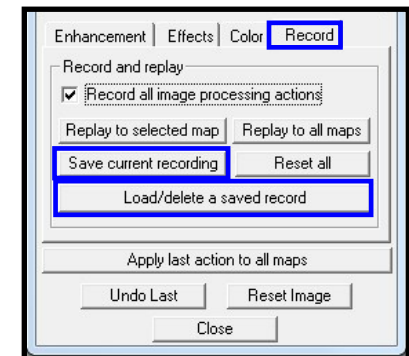
The **Enhancement** tab allows you to edit the image for Gamma, Brightness and Contrast.



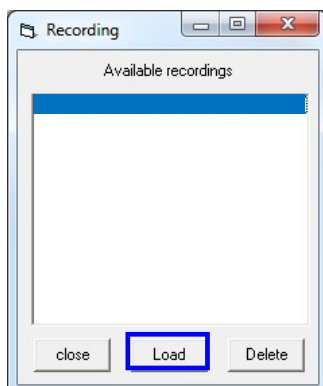
The **Effects** tab provides tools to Sharpen, Highlight, Change to a negative or convert the image to a Gray scale.



The **Color** tab allows you to replace a color in the image. Useful for highlighting a specific object or area within an image.

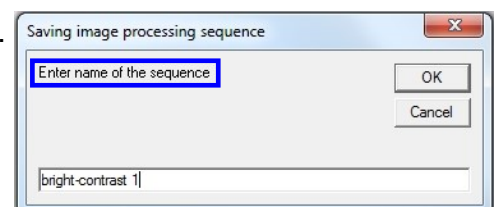


The **Record** tab has several tools to record the changes you are making to an image, so they can be applied to other images as well. Check “*Record all image processing actions*” first. Perform all the necessary functions on the other tabs and then return here to “*Save current recording*”.



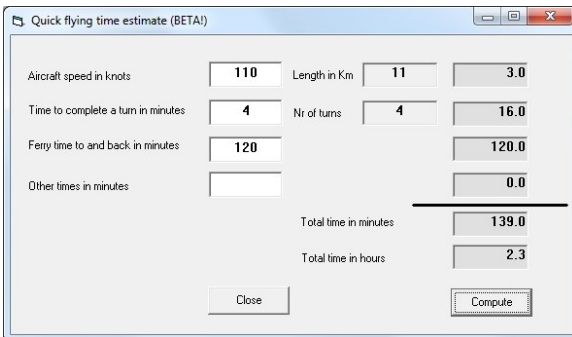
Give it a name and save it.

When you want to load the saved settings click “*Load/delete a saved recording*” and a list of recordings will come up. Select the one you want and load it. Once loaded you can click the “*Replay to selected map*” button and all the settings will be applied to the image you have loaded.



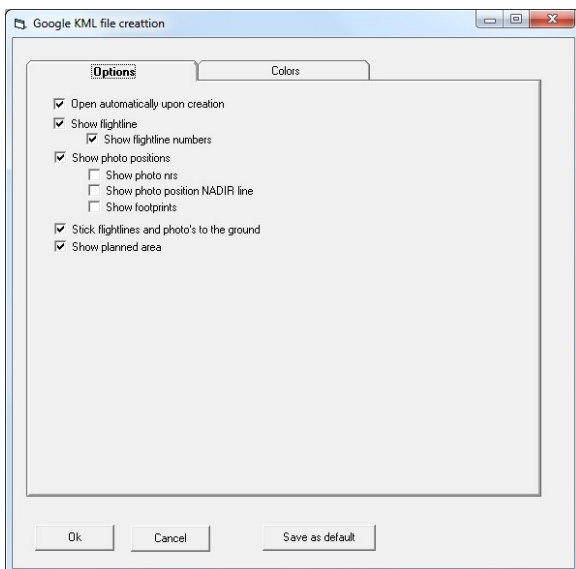
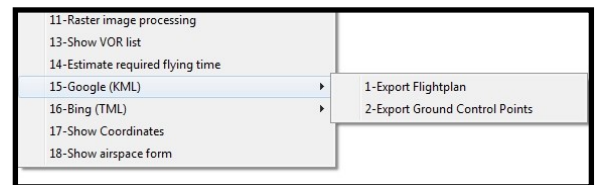
## Menu Bar Options

## 5-Tools



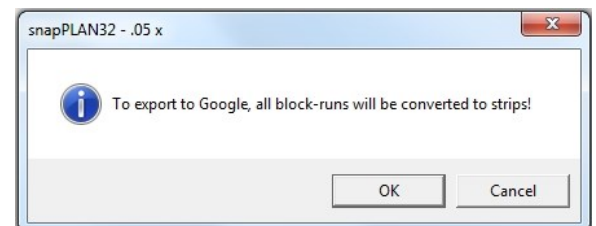
The **14-Estimate required flying time** is a quick calculator to give you some specifics on how long your project will take to fly. You must provide some information such as the Aircraft speed, estimated turn time and how many minutes it will take to fly to the project and back. Click “*Compute*” and you get a good idea of how much time your project will take to fly.

The **15-Google (KML)** is a resource for exporting flight plans or ground control points as Google compatible files. Always save your work before beginning this process.



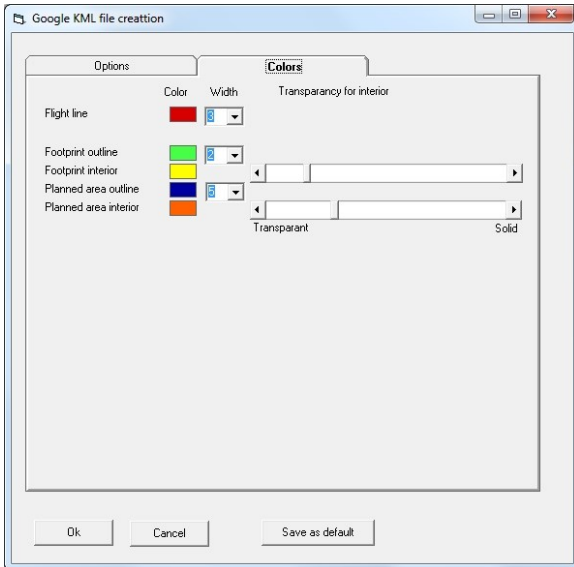
The **1-Export flightplan** opens a box with two tabs. **Options** provides you with a way to choose which data to export. Most items are self explanatory. But a couple need a little explanation. “Open automatically upon creation” option will open Google Earth (as long as you have it installed on your computer) and display the flight plan as you have configured it. “Stick flightlines and photos to the ground” means the flightlines will be displayed on the ground. If this is not checked they will be displayed as 3D in Google and will be at the same altitude as the intended flight altitude. Just make sure your exaggeration level is set to at least a 2 in Google/Options so it will display properly.

You will get this prompt if you are exporting a block of runs. Since Google cannot ingest the data as a block we must convert the “runs” to “strips”. If you want to keep the “runs” version, after you export to Google, just close the flight plan without saving.



## Menu Bar Options

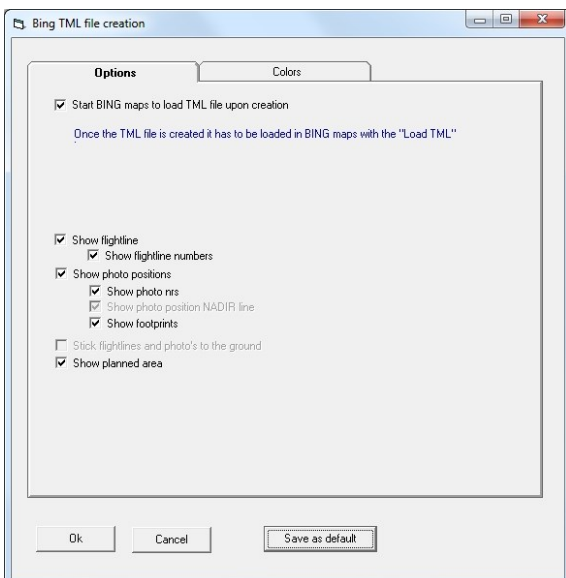
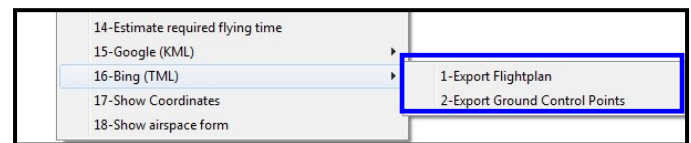
## 5-Tools



The **Colors** tab is used for changing the color of the vector data exported as the flight plan. At the bottom of the tab after you have selected your colors, click the “Save as default” so your settings remain the same.

The **2-Export Ground Control Points** opens a save dialog box and allows you to choose where to save the ground control data file (kml) . When you save it Google Earth will automatically open to display the data.

The **16-Bing (TML)** is a resource for exporting flight plans or ground control points as Bing compatible files. Always save your work before beginning this process.



The **1-Export flightplan** opens a box with two tabs. **Options** provides you with a way to choose which data to export. Most items are self explanatory. But a couple need a little explanation. “Start BING maps... upon creation” option will open BING (as long as you have it installed on your computer) and display the flight plan as you have configured it. “Stick flightlines and photos to the ground” is not available with BING.

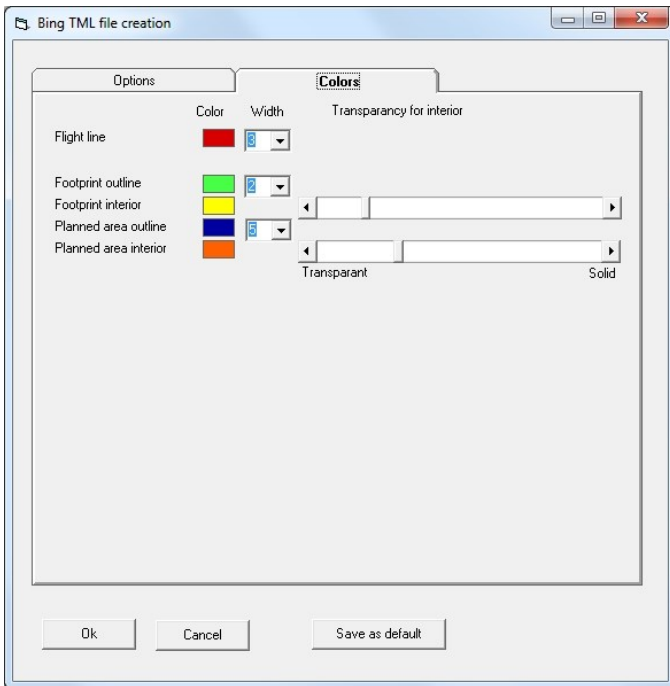
Clicking OK opens a save dialog box and allows you to choose where to save the file. It will also automatically open the Bing App to display the flight plan.





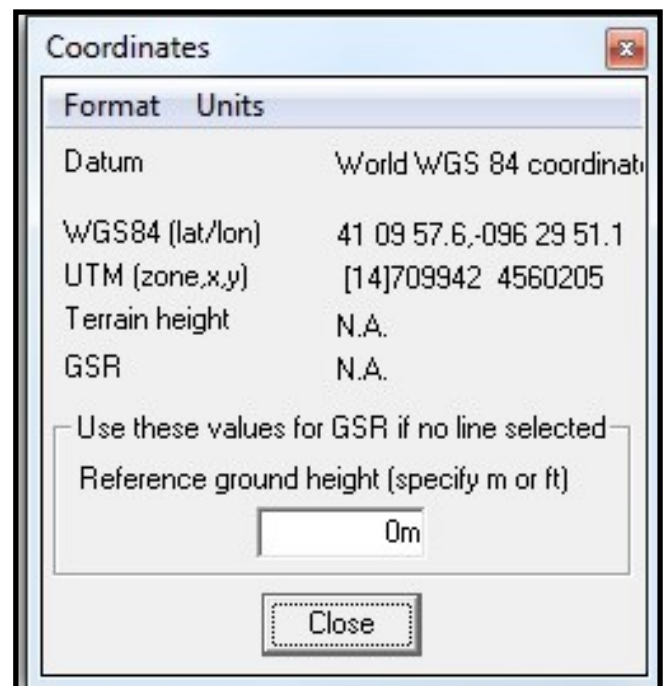
## Menu Bar Options

## 5-Tools



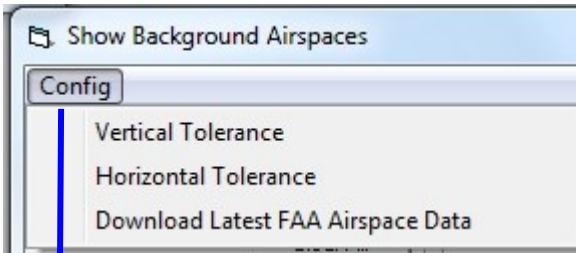
The **Colors** tab is used for changing the color of the vector data exported as the flight plan. At the bottom of the tab after you have selected your colors, click the “Save as default” so your settings remain the same.

The **17– Show Coordinates** tab allows you to display coordinates within the tab by moving your cursor on the screen. The Format and Units are changeable at the top of the tab. Useful for checking coordinates of background or area files to verify location accuracies.

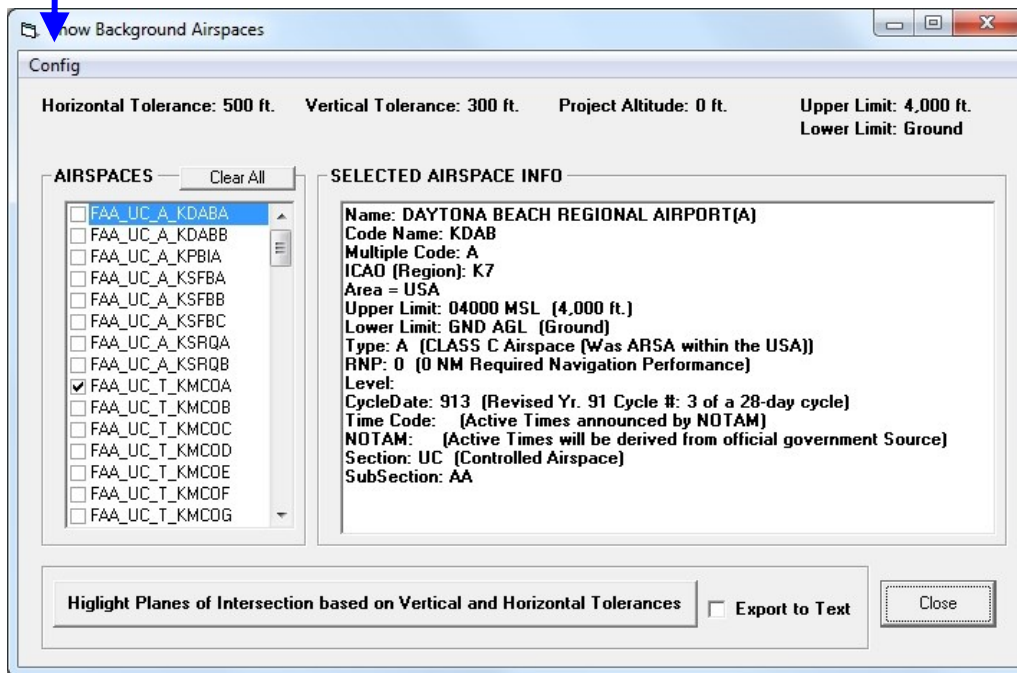


## Menu Bar Options

## 5-Tools



The **18–Show airspace form** tab provides several options to view the impact of Controlled airspace on your project. At least once a month you should go to this form and “Download Latest FAA Airspace Data”. This is updated monthly with the current airspace data available from the FAA. The software will automatically select the areas of importance and show the relevant airspace vector data for your project. By clicking the “Highlight Planes of Intersection...” at the bottom it bolds the areas that are impacting your particular project.

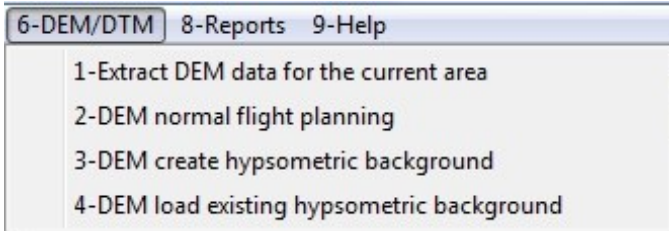


The **30–Show simulated runs in snapBASE** tab directly opens snapBASE so you can simulate runs or strips for testing your flight plan. In snapBASE you will open **9-Tools/ 2-Run photos simulator**. For more information please refer to the **snapBASE** manual.



## Menu Bar Options

## 6-DEM/DTM

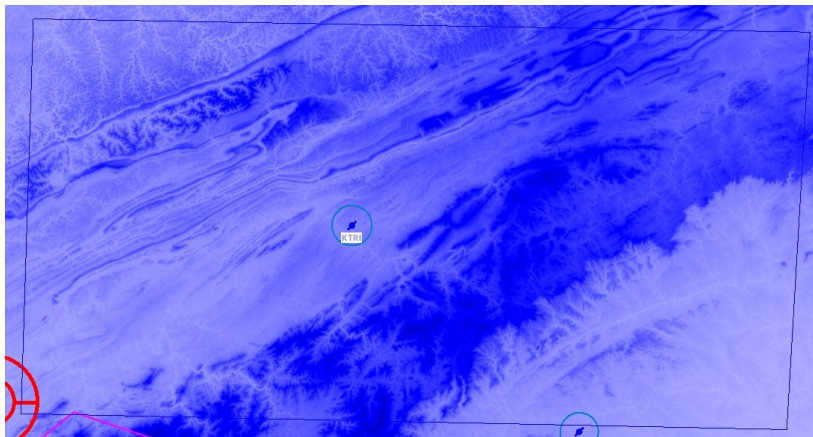
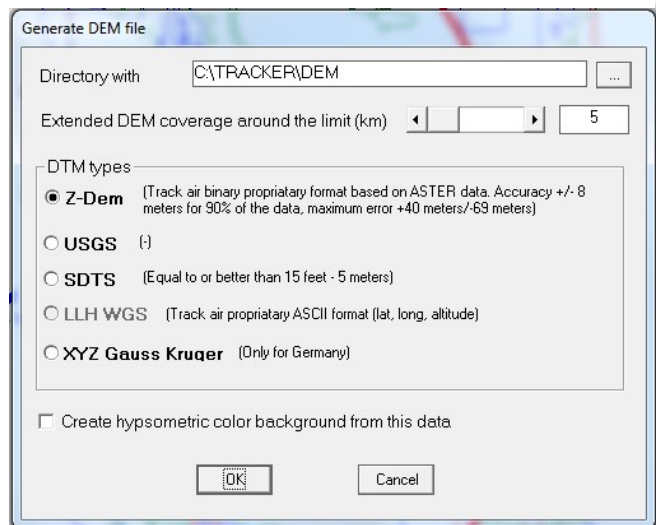
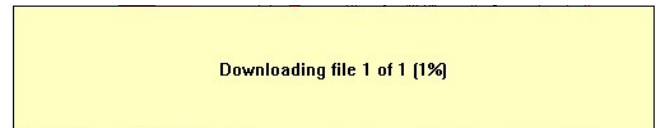


The **6-DEM/DTM** is a resource for applying elevation data to the flight lines you have created. You must first create and save a flight plan before applying the DEM/DTM.

The **1-Extract DEM data for the current area** opens an options tab to select the type of DEM you wish to use for your project. Our proprietary Z-Dem data is based on NASA's Aster GDEM V2\* that covers the entire land base of the earth. This is usually sufficient for most projects, however there are options to use the USGS, SDTS or XYZ Gauss Kruger (for Germany). The LLH WGS has been discontinued.

The DEM coverage defaults to covering 5k(3+miles) outside your project boundary, however you can increase this if needed.

Selecting the "Create hypsometric color background..." allows you to visualize the DEM data with colors distinguishing the varying altitudes within the project.



The dark areas are the higher elevations. Conversely, the light areas are the lower elevations.

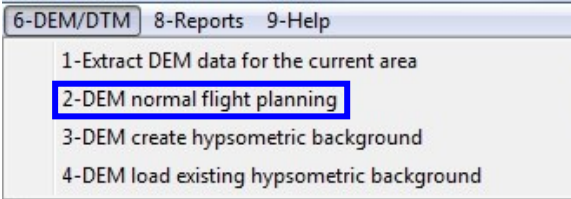
\* The ICESat study concluded that globally (with the exception of Greenland), the GDEM2 elevations are on average within 3 meters of highly edited altimeter measurements, with

standard deviations and RMSEs under 12 meters. For bare ground, the GDEM2 was on average within around 2 meters to the altimeter measurements (with the exception of New Zealand), having standard deviations and RSMEs under 12 meters. Although the GDEM2 exhibits large errors over much of Greenland, for those areas classified as either bare or herbaceous, the errors are on average within 2 meters of the ICESat elevations.



## Menu Bar Options

## 6-DEM/DTM



Once you have extracted your data begin the normal flight planning operation by selecting **2-DEM normal flight planning**.

DEM specifications

Flight planning specs | Run splitting specs | Flight altitude restrictions and safety | Technical limitation | Geoid/ellipsoid

Planning Tolerances

SCALE/GROUND SAMPLING RESOLUTION	Scale 1/	GSR (cm/pix)	RESULTING EFFECTS ON	
%			End lap	Side lap
Max %	15	10000	224.0	
Min %	-2	11500	257.6	65 39
		9800	219.5	60 29

FORWARD OVERLAP (END LAP) Min/max end lap

Max %	5	60
Min %	0	<b>60</b>

LATERAL OVERLAP (SIDE LAP) Min/max Side lap

Max %	10	30
Min %	-10	40
		20

ATTENTION: The MINIMUM forward overlap is used for the photo positions calculations!

Save as new tolerance defaults

Preferences (3-2-2 Bold = most common settings)

Reference datum

- 1-Is halfway between the max and min height
- 2-Is the average terrain height (normal planning method)
- 3-Is computed so that the strip fits between the max min tolerances (most practical)
- 4-Is computed so that the highest point is the at min scale tolerance (nominal reference datum may become negative)
- 5-Is computed so that the lowest point is the at max scale tolerance

Flying altitude

- 1-Use a single reference flight altitude for all runs/strips (specifications are ignored, required for line spacing adjustments)
- 2-Use a single reference height for each run/strip (specifications are ignored)
- 3-Adjust flying height to meet the minimum tolerance (runs and strips will not be cut)
- 4-Adjust flying height to meet all the given specification (runs and strips will automatically be cut)

Forward overlap

- 1-Compute photo positions with the specified fixed photo base distance (the photos are aligned laterally with each other)
- 2-Pre-compute photo positions to achieve the given MINIMUM percentage overlap (e.g.55 0%)

Lateral overlap (BETA!! under development)

Adjust the lines spacing to keep the side lap within tolerances (only possible when a single reference flight altitude was selected for all strips)

Unlock specifications (replan) OK Cancel  Show hypsometric background when available

The **Flight planning specs** tab is provided for setting your tolerances for your forward and Sidelap as well as the GSR (ground sampling resolution). These tolerances will be used when applying adjustments based on the **Preferences** chosen below. We have provided common settings in **Bold** if this is your first time to use this application. Each of these settings function differently. To view how each of these work we suggest you create a test flight plan in an area with some obvious elevation changes and test each of the functions. Doing so will provide a clarity to their interactions with your flight plan.

During the DEM process you have opportunity to split strips where needed to adjust for necessary elevation changes. You can also allow the software to automatically split lines based on settings in the **Flight planning specs** tab under Flying altitude, item 4.

Select either the Align first photo option or the number of models of overlap when cutting strips. If you want the software to Append (join) segments within the given select the checkbox and set your required tolerances.

DEM specifications

Flight planning specs | Run splitting specs | Flight altitude restrictions and safety | Technical limitation | Geoid/ellipsoid

Use for generating or cutting strips: Align first photo or n models overlap

Align first photo

n model overlap

0  1  2  3

Append adjacent segments within the given range

Append segments when less than

Max tol. might reach

Distance

15

Altitude

0 m

0 f

3 models Models

5 kilometers Kilometers

2 miles Miles

Unlock specifications (replan) OK Cancel



## Menu Bar Options

## 6-DEM/DTM

DEM specifications

Flight planning specs | Run splitting specs | **Flight altitude restrictions and safety** | Technical limitation | Geoid/ellipsoid

Flight altitude restrictions

No restriction, use any required flying altitude feet MSL

Use only odd levels (VFR:xx500 feet MSL)

Use only even levels (IFR:xx000 feet MSL)

Use only this altitude MSL:

Other Restrictions

No flight above (feet MSL):

No flight below (feet MSL):

Minimum safe terrain clearance

1) The Minimum safe clearance (AGL) applied in the calculations (0-2000') is the minimum altitude that you allow for planning. The default is 500 feet. If a run altitude is computed below the minimum safety altitude based on the current planning parameters, it will be flagged and you will receive a warning. It is up to you to change its altitude to match the minimum safety altitude you selected.

1) Minimum safe clearance (AGL) applied in the calculations (500-2000')  500 ft / 152 m

Set minimum safe clearance to 0m AGL. (Helicopter or UAS planning)

Unlock specifications (replan) OK Cancel

The **Flight altitude restrictions and safety** tab allows for settings based on airspace restrictions for your particular location.

The Minimum safe terrain clearance can be set with this control. The software will then warn you if you are exceeding the limits, however it is up to you to make the change in the altitude and flight plan.

The **Technical limitation** tab provides aircraft and camera limiting specifications.

DEM specifications

Flight planning specs | Run splitting specs | Flight altitude restrictions and safety | **Technical limitation** | Geoid/ellipsoid

Aircraft

Maximum ground speed  120.00 knots

Turn safety check is based on rate 1 turns (3 minute turns)

Camera

Minimum interval  3.0 seconds per exposure

Unlock specifications (replan) OK Cancel

DEM specifications

Flight planning specs | Run splitting specs | Flight altitude restrictions and safety | Technical limitation | **Geoid/ellipsoid**

**PLEASE READ THIS CAREFULLY!**  
Some GPS receivers do not comply with the NMEA standard and report the altitude relative to the WGS84 ellipsoid instead of reporting the altitude relative to the geoid (MSL).  
As generally is not possible for snapshot to determine if the GPS altitude is geoidal or ellipsoidal you **MUST** give this information yourself!  
If you do not know, then select geoidal which is the default required by the NMEA and make sure to verify this as soon as possible  
because you might get an altitude error equal to the geoidal separation (upto 100 meters = 300 feet!)  
Note that snapSHOT knows POSTRACK altitude is ellipsoidal and compensates for this, and that most GPS receivers altitude are geoidal

Our GPS reports altitude as:

Geoidal (default according to NMEA GGA)

Ellipsoidal (WGS84)

Apply

Unlock specifications (replan) OK Cancel

Geoid/ellipsoid tab requires a setting be chosen for your particular GPS system. Read this section, verify your system reporting and **CHOOSE CAREFULLY**. Differences in some areas can be as much as 300' / 90 meters or more and could affect the accuracy of your flight. It is **your responsibility** to make the correct choice.



## DEM/DTM Tools - DEM flight altitude calculator:



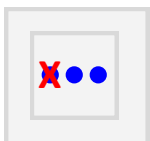
**DELETE SELECTED STRIP:** **BE CAREFUL AS THERE IS NO UNDO FOR THIS FUNCTION**



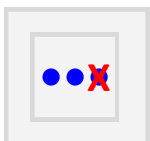
**CUT SELECTED STRIP:** Cut the selected strip at a location chosen in the profile view at the bottom of the page. Used when there is too much terrain change within the line for the min-max specifications.



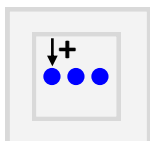
**JOIN SELECTED STRIP :** Joins the selected strip to the adjacent strip and recalculates the photos within the strips to your specifications.



**REMOVE LEFT MOST PHOTO :** Removes the west or south photo from currently selected line.

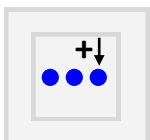


**REMOVE RIGHT MOST PHOTO :** Removes the east or north photo from currently selected line.



**ADD ONE PHOTO LEFT :**

Adds a west or south photo to currently selected line.

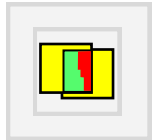


**ADD ONE PHOTO RIGHT :**

Adds a east or north photo to currently selected line.



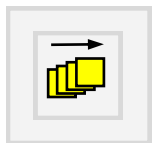
## DEM/DTM Tools - DEM flight altitude calculator:

**SHOW OVERLAP IN BOTH DIRECTION:**

Shows the overlap in both directions.



**SHOW OVERLAP IN FORWARD DIRECTION:** Shows the overlap in the forward direction of the flight line after the DEM is applied.



**SHOW OVERLAP IN BACKWARD DIRECTION:** Shows the overlap in the backward direction of the flight line after the DEM is applied.



**SHOW LATERAL OVERLAP :** Shows the overlap between flight lines after DEM is applied.



**SHOW PIXEL DENSITY :** Shows if the pixel density meets specifications (green), exceeds specifications (red) or falls short of the specifications (magenta).

**DESELECT ALL LINES :**

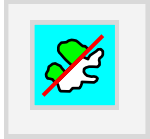
Deselects all lines currently selected.

**CENTER ON SELECTED RUN :**

Center the selected run in your current screen.



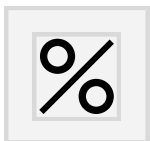
## Editing Tools - Main Menu - snapPLAN:



**HIDE RASTER:** Click to hide the currently loaded raster or hypsometric image.



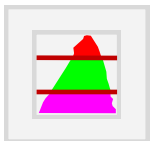
**BRIGHTEN RASTER:** Lightens a raster or hypsometric image to better view the planning.



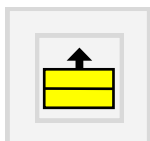
**RESTART THE PLANNING :** Cancels the planning you have already done so you can completely start from the beginning.



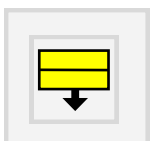
**SWITCH BETWEEN RASTER AND HYPSONOMETRIC :** Toggles between images you have loaded for your flight plan.



**TOGGLE PROFILE VIEW :** Toggles through 4 different profile views available for reviewing and editing your DEM data.



**SHIFT STRIP SIDeways (LEFT):** Shifts the selected flight line to the North or East depending on flight plan direction.



**SHIFT STRIP SIDeways (RIGHT) :** Shifts the selected flight line to the South or West depending on flight plan direction.

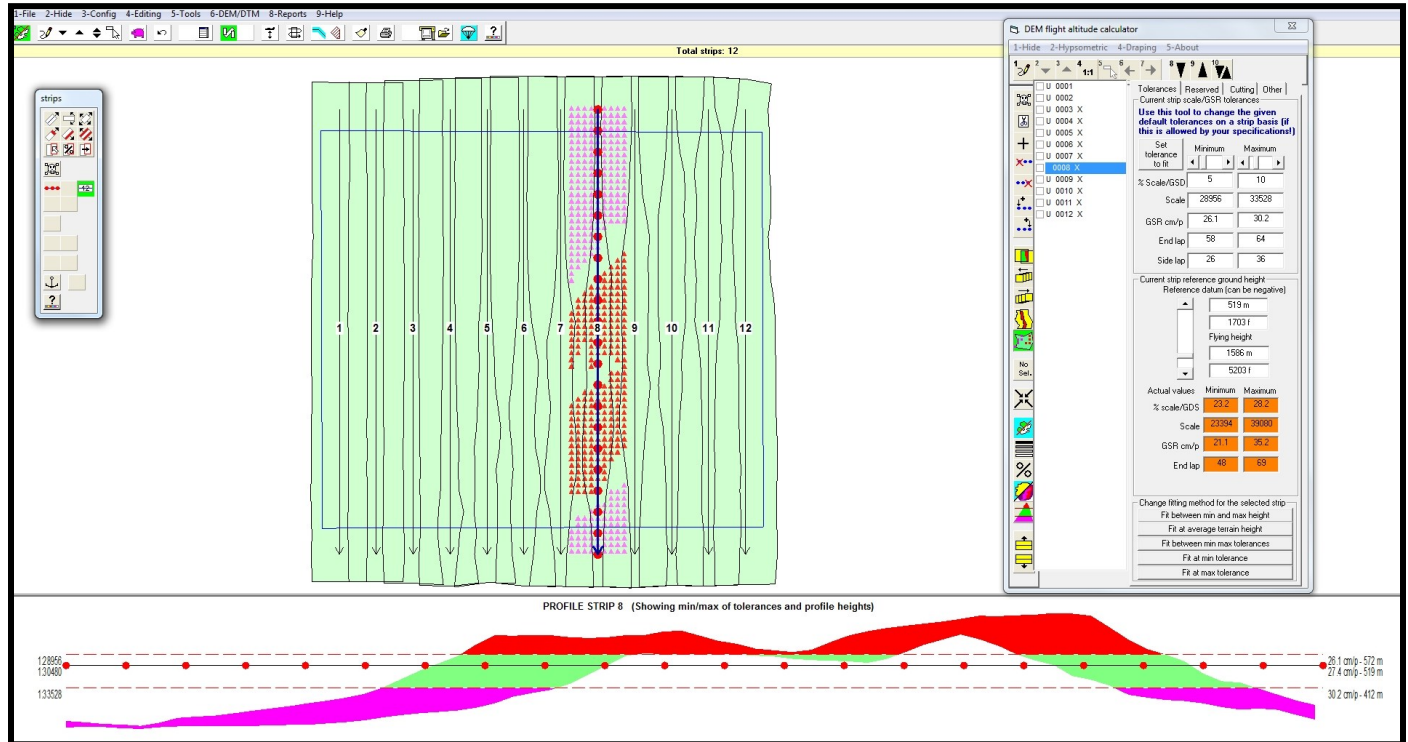




## Menu Bar Options

## 6-DEM/DTM

Following the planning of your flight plan and entering the **6-DEM/DTM / 2-DEM normal flight planning** you will see a screen similar to the one below. The DEM flight altitude calculator is open on the right and the profile view is displayed below the flight plan.



As you select each line in the calculator you will see the profile view change for each flight line. Using the **Toggle profile view** button you can cycle through the four types of views available. The colors indicate whether you are within your specifications, exceed your specifications or fall short of the specifications you selected. This visual allows you to break flight lines at locations within the line to adjust flying altitudes for each segment of the original line. Click on the profile view where you want to break the line and click the **Cut selected strip** button. You now have two flight lines with overlap based on the settings in the Cutting tab in the DEM flight calculator.

Once you have completed your editing click on the Pink Pig to save your changes. The screen will lock after that as we assume the last operation you will accomplish is applying the DEM. You may now exit the program.

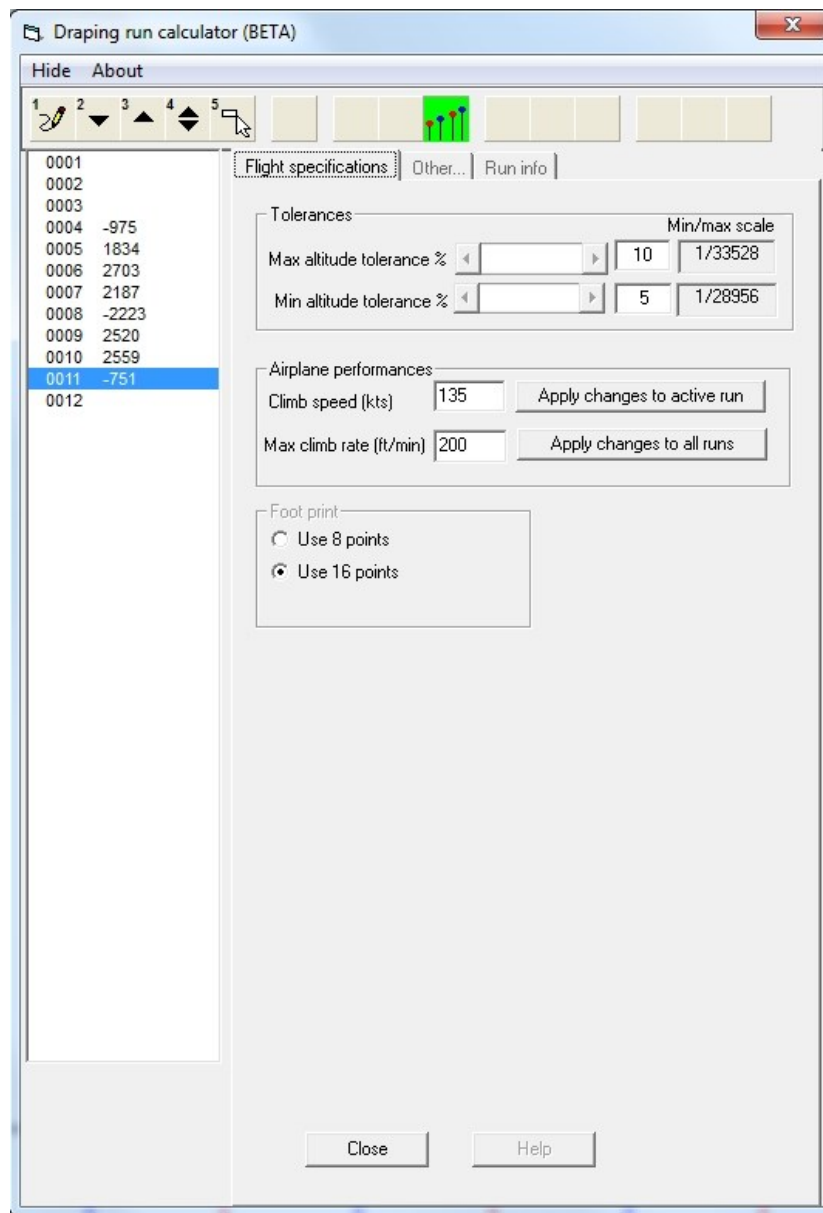
At any time you can load an image or create a hypsometric map using the **2-Hypsometric** tool in the DEM flight altitude calculator.



## Menu Bar Options

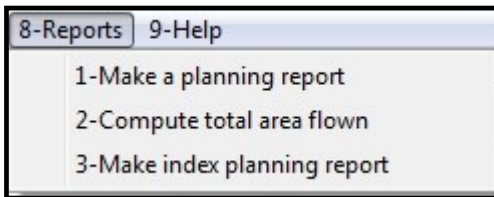
## 6-DEM/DTM

The **4-Draping (BETA)** function within the **DEM flight altitude calculator** provides a method to fly following the terrain to maintain the correct altitude AGL. There are tolerance settings for altitude, climb speed and max climb rate to adjust your flight plan accordingly. It is your responsibility to verify that the settings you use are achievable and that the flight can be accomplished as planned. As this is BETA, we **highly suggest** that you verify these setting with the Pilot before attempting this type of planning. A test flight would be in order to verify that your Pilot is comfortable with this type of flying.



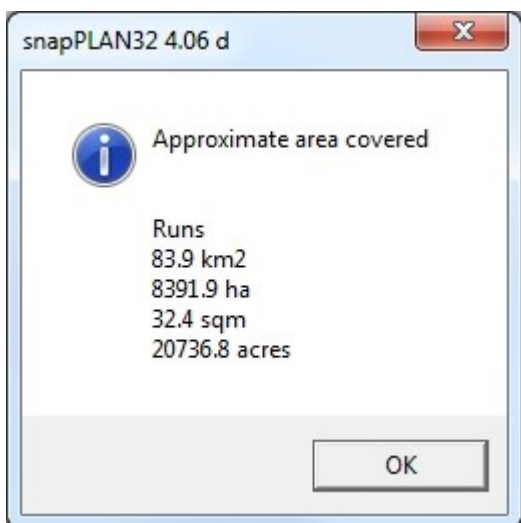
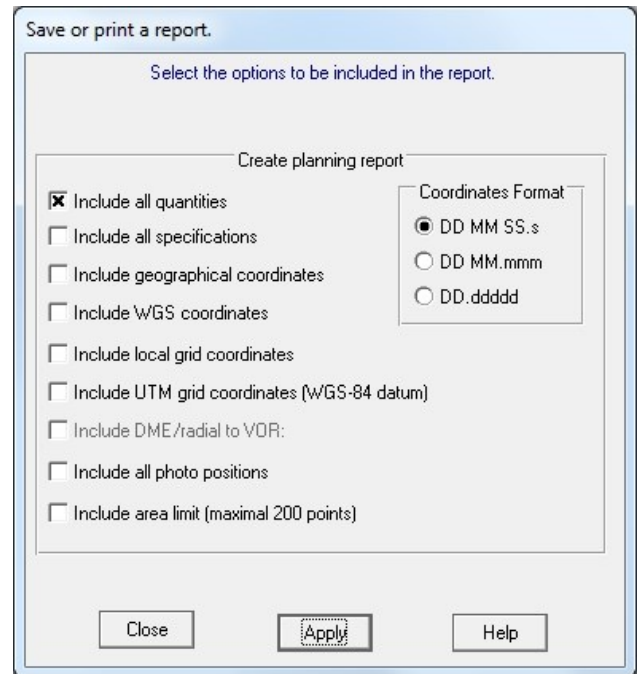
## Menu Bar Options

## 8-Reports



The **8-Reports** tab provides for several options for creating simple text reports of the flight plan. These reports are used by many as a means of checking the specifications of their flight plan before forwarding it to the project or acquisition manager.

The **1-Make a planning report** tab provides a range of possibilities to customize the report you wish to create. All of the options are self explanatory and are viewed by selecting the option and clicking "Apply". A text file will be created with an option for you to provide a name for the file.



The **2-Compute total area flown** tab creates a simple calculation in several different types of measurements of the entire image coverage area. This is only an approximate amount and is not to be misconstrued as an exact analysis of the coverage area.



## Menu Bar Options

## 8-Reports

```

Etowah2.txt - Notepad
File Edit Format View Help
[HEADER]
Project Name: Etowah
Flight Plan Name:
Trackair JOB ID: 0
Total planned exposures: 429
Total planned lines: 13
Cam: 100

[BODY]
1,1,35.31506,-84.56007,1:10000,3281,,60
1,2,35.31263,-84.56015,1:10000,3281,,60
1,3,35.31019,-84.56022,1:10000,3281,,60
1,4,35.30776,-84.56029,1:10000,3281,,60
1,5,35.30533,-84.56037,1:10000,3281,,60
1,6,35.30290,-84.56044,1:10000,3281,,60
1,7,35.30046,-84.56051,1:10000,3281,,60
1,8,35.29803,-84.56058,1:10000,3281,,60
1,9,35.29560,-84.56066,1:10000,3281,,60
1,10,35.29317,-84.56073,1:10000,3281,,60
1,11,35.29074,-84.56080,1:10000,3281,,60
1,12,35.28830,-84.56088,1:10000,3281,,60
1,13,35.28587,-84.56095,1:10000,3281,,60
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1,15,35.28101,-84.56110,1:10000,3281,,60
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1,33,35.23722,-84.56241,1:10000,3281,,60
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3,68,35.31230,-84.54423,1:10000,3281,,60
3,69,35.30987,-84.54431,1:10000,3281,,60

```

The **3-Make index planning report** tab provides a report that includes basic information about the number of lines, photos, and their coordinate values as well as scale ratio, altitude and forward overlap. Other information may show in your report depending on the type of flight plan you are creating.



Still have questions? All customers may submit inquiries to Lead'Air by sending an email to:

**[support@trackair.com](mailto:support@trackair.com)**



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