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USING THIS MANUAL

This manual contains step-by-step instructions on how to perform certain processes. You should be aware that each exercise provides a single path through the application's tools. In most cases, there are various ways to maximize tool usage, depending on the individual project.

This exercise manual is provided to the student, along with all images used by the instructor. Copies of the presentation slides are available upon request. This provides the capability for recreating the processes performed in class at a later date, as well as the key points on any theory involved.

Exercise Conventions

<table>
<thead>
<tr>
<th>Section Title Page</th>
<th>States the objective of the exercises and lists the application tools to be used within the various tasks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise Tasks</td>
<td>Each exercise is split into a set of tasks. After the course, these tasks will help you locate within the manual where you performed a certain set of steps.</td>
</tr>
<tr>
<td>Questions</td>
<td>The instructor may quiz and/or review with you, following each exercise.</td>
</tr>
</tbody>
</table>

Notational Conventions

<table>
<thead>
<tr>
<th>Bold Text</th>
<th>Any text that is bold indicates buttons, tabs, group names, dialogs, and field names that are visible in the workspace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italicised Text</td>
<td>Any text that is italic indicates a file name, text entered by you, or code such as HTML, XML, JavaScript.</td>
</tr>
<tr>
<td>Graphics</td>
<td>To help you locate buttons and objects used in the exercises, the button icons will be next to the button name in the text.</td>
</tr>
<tr>
<td>Diagrams</td>
<td>Optional diagrams can show you how to use some of the application's tools.</td>
</tr>
<tr>
<td>Tip</td>
<td>This is a tip, describing a different way you can enter information into the software or giving relevant information about the software</td>
</tr>
<tr>
<td>Reference Book</td>
<td>This is a reference book, listing an external location (website, Help document) where you can read or see more information.</td>
</tr>
</tbody>
</table>
INTRODUCTION

This document describes a variety of workflows for ingesting aerial frame data into an ImageStation project environment. Although the command was written primarily with UAV data sets in mind, it can also be used for conventional large platform projects as well, as you will see. Each data set demonstrates different aspects of the translation process to show how to handle various situations.

Note that it is assumed that the audience is already familiar with working with the ISPM/ISAT products. Users should also obtain a product that enables viewing EXIF tags in the image files. Many free viewers can be found on the internet.
Background

Most, if not all, UAV vendors offer turn-key solutions which do an admirable job of generating aerial image mosaics over a given area automatically with minimal intervention from the user. In some cases users have expressed the need to have more control over the aerial-triangulation, DTM generation, and ortho-mosaic processes. For this purpose we have created the UAV Import command in ImageStation Photogrammetric Manager. The goal was to automate (as much as possible) the process of ingesting data to:

- Create the ImageStation project
- Create the camera and automatically determine camera IO parameters
- Create photos and assign image filenames to them
- Reformat the image files if necessary
- Assign proper photo exterior orientation parameters

The command has image correlation techniques which help to take the guesswork out of trying to determine the camera’s scanline orientation, as well as determining any flight line crab, and using these to determine the photo’s IO and EO parameters.

Projects like these often report camera rotational parameters in the form of roll, pitch and yaw. The UAV Importer will automatically reduce these parameters and apply them to the photos in the form of omega, phi, and kappa as required by the ImageStation project.
About the Data Sets

A special thanks goes to the following for donating the data sets used in this tutorial:

- **Australia** – Courtesy of *Aero Surveys Pty Ltd., Australia*. Data set is from an area south of Perth, Australia, and was taken with a 35mm digital SLR from a manned fixed wing aircraft.
- **ACRE** – Courtesy of *ACRE Surveying Solutions, Spain*. Data set is from the Madrid, Spain, area using a Pix4D UAV solution.
- **Madrid** – Courtesy of *Leica Geosystems, Switzerland*. Data set is from the Madrid, Spain, area using an Aibotix UAV solution.
- **Monett** – Courtesy of *Pix4D, Switzerland*. Data set is from Monett, Missouri, USA.
- **Alaska** - Courtesy of the *United States Forest Service*. Data set is from Tongass National Forest in Alaska, USA.
- **Aalen** – Courtesy of *Z/I Imaging, Germany*. Data set is from the city of Aalen, Germany, and was taken with the DMC II camera system.
Prelude

Before getting started with the data sets, there are several things to know and/or keep in mind when ingesting aerial frame project data...

Get to know your data

While the UAV Importer makes every attempt to automate the data ingest process, it is possible that some given parameters are missing or even flat out wrong, which can lead to an ill-defined project. Be sure to closely check the following items during and after the process has been completed:

- **Project Coordinate System** – The UAV Importer automatically establishes the project flying height and average ground elevation based on imported photo center coordinates, either from metadata text files or from EXIF tags. Be sure to set the proper projection, datum, and vertical datum when creating the project.
  - **TIP:** EXIF tags almost always report the *Altitude Reference* as *Sea Level*. Don’t believe it! Many projects are recorded with the flying height referenced to the ellipsoid or the local ground elevation.

- **Check the Rows and Columns** – The UAV Importer allows you to ingest data coming from metadata test files, EXIF tags, or a combination of both. When using a metadata text file, open the file with a text editor to get familiar with which data are in which columns, and whether or not any rows at the top of the file need to be skipped.

- **Focal Length and Pixel Size** – The UAV Importer attempts to acquire this information from EXIF tags within the images files, but this information might be missing, or worse yet, incorrect. Be sure to check these values on the **Camera** tab when importing, and override the given values with correct values if necessary.

- **Is it GPS/IMU or Given EO?** – If you have metadata in the form of *Lat/Long* and *Roll/Pitch/Yaw*, you will need to use the **GPS** and **IMU** tabs to define which columns to read the data from. If the data are in the form of *projected coordinates* with *Omega/Phi/Kappa* values, then use the **Given EO** tab. When importing GPS/IMU data, be sure to set the **Camera X-axis orientation** option to **IMU axis** on the **Camera** tab, and use **to flight direction** when importing Given EO.

- **Elevation Reference** – The UAV Importer allows you to transform input metadata to the Project Coordinate System. If you are importing GPS/IMU data, use the **Elevation reference** options on the **GPS** tab to properly define which datum the input metadata are referenced to. If you are importing metadata that have already been reduced to a map projection that is not the same as your Project Coordinate System, use the **Metadata file coordinate system** option on the **Given EO** tab to define what the input coordinate system is.

- **Proper Defaults** – If you are importing Given EO but the metadata file did not include standard deviation values for the photo center and orientation angle parameters, you can use the **Projected map position std. devs** and **Orientation angle std. devs options** on the **Defaults** tab.
to assign them. Don’t worry, if you forget to do this you can do it later with ISPM’s Modify Strip command.

---

**Touch ‘em All!**

The UAV Importer activates and populates certain parameters on various tabs based on inputs from user. Because of that, at a minimum it is required that you click on the *Image, Camera, GPS,* and *Defaults* tabs before the *Apply* button will activate, even though you may not necessarily make any changes to all of them.

---

**What next?**

Assuming that the intended goal is to refine the EO parameters of the photos in the project, after the import process is complete, the user would typically import control points and/or start measuring pass/tie points in *Multiphoto Orientations* for the purpose of performing a bundle adjustment, as would be done with any other aerial frame project.

*A word of warning*... Typically UAV projects are flown with very unstable platforms using very cheap cameras. Consequently, image quality is usually very poor; not only is it often quite blurry but there are usually very large amounts of lens distortion. Therefore any attempts at performing automatic tie-point matching with ISAT often fail. If you should decide to give it a try anyway you might want to try stopping the matching at the 2x or 4x overview level. If you do this, be sure to bump up the *Std. Dev. Of Measurement* setting on the *Edit Project >> Parameter Settings* tab accordingly as well.

---

**Getting Started**

To access the UAV Import command you can simply open ISPM (or ISAT), and then navigate to *Tools > UAV >> Generate/Append ISPM Project.* If you already have a project open with ISPM/ISAT, the *Project Parameters* dialog will NOT appear as the program makes the assumption that you want to append any imported data into the project that you already have open. If you do NOT have a project open then the dialog does appear and you have the option to either create a new project or browse to an existing project to append to.

For the purpose of this tutorial we will always be creating a new project so that you can see how to define the Project Coordinate System for each project.

**TIP:** You can access the UAV Import command outside the ISPM/ISAT environment by creating a shortcut on your desktop and give it the following *Target:*

"C:\Program Files\Common Files\ImageStation\PFProjectCmd.exe" -cam frame -mode 0 -gui dialog
AUSTRALIA

We’ll start with a simple case first. This data set comes with JFIF images that have EXIF tags embedded in them. Here is an example readout of the EXIF tag:

<table>
<thead>
<tr>
<th>EXIF Tag</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPSVersionID</td>
<td>2.3.0.0</td>
</tr>
<tr>
<td>GPSLatitudeRef</td>
<td>S</td>
</tr>
<tr>
<td>GPSLatitude</td>
<td>32.31257 0 (32.520950)</td>
</tr>
<tr>
<td>GPSLongitudeRef</td>
<td>E</td>
</tr>
<tr>
<td>GPSLongitude</td>
<td>115.42.884398 0 (115.714750)</td>
</tr>
<tr>
<td>GPSAltitudeRef</td>
<td>Sea level</td>
</tr>
<tr>
<td>GPSAltitude</td>
<td>596.70 m</td>
</tr>
</tbody>
</table>

[EXIF tag readout image]
Create the Project

1. Start the UAV Import command either with ISPM/ISAT with no open project, or by using the shortcut described in the Getting Started section, then enter a Project name and Project folder location of your choice. (In this example, the UAV Importer will create a new folder for the data at J:\Perth.)

![Project Parameters Dialog Box](image)

2. The goal is to set the project up using a UTM map projection, with elevations referenced to EGM96. Click Define... to open the Define new ISPM project CSF dialog box.

![Define new ISPM project CSF Dialog Box](image)

3. Click the Projection Space tab. Notice that the Projection algorithm is automatically set to Universal Transverse Mercator, and if you click Projection Parameters you can see that Hemisphere is set to Northern and Zone is set to 15. Even though these are the wrong values, we can leave these as they are because the UAV Importer will automatically assign the proper value based on the latitude and longitude defined by the EXIF metadata.
4. Click on the **Geographic Space** tab and change the **Vertical datum** to *EGM96*:
5. Click **OK** to dismiss the **Define new ISPM project CSF** dialog box and return to the **Project Parameters** dialog box.

![Project Parameters dialog box]

6. Click **OK** to create the new ISPM project folder, close the **Project Parameters** dialog box, and continue to the **Import GPS/IMU Frame Photos** dialog box.
Run the Importer

1. Place a checkmark in the Use GPS/Cam EXIF tags option, Browse to the folder that contains the image files, select them all and click Open to return to the Photo tab.

![Import GPS/IMU Frame Photos](image)

2. Click the Image tab. The settings here are entirely optional, but typically you will want to use Reformat images to convert JFIF files into tiled TIFF format with overviews as shown here. Be sure to specify an Output Folder location.

3. Update TIFF scanline orientation modifies the header of the image files to coincide with the direction of flight. While this might be useful for projects flown in cardinal directions, the Auto-rotate mono views option in ISAT typically works better.

4. The Correct IO scanline orientation option uses image correlation techniques to attempt to automatically determine the positive X axis of the photo coordinate system. Some projects, such as those that cover homogeneous crop fields, may prove impossible to solve for, in which case you must manually determine the proper orientation and set it in the Camera tab under Scanline orientation in camera axes.

5. The Auto-adjust crab angle also uses image correlation to attempt to determine the crab angle and apply the proper rotations to the angular values of the EO parameters. This project has virtually no crab so this option is not necessary for this project.
6. Click the Camera tab. Notice that the Camera name, Number and Samples per line, Pixel size, and Focal length were all automatically derived from the EXIF tags of the image files. Notice too that the Scanline orientation in camera axes defaults to Col-Major-Upper-Right. The Correct IO scanline orientation process will overwrite this value when the processing finishes.

7. Click the GPS tab. No changes need to be made for this particular case, but this is where you would typically set the Elevation reference of the metadata file. The Named geoid defaults to EGM96, which matches this project. Other choices include NAVD88 and USGG, but these apply to the US and its territories.
8. Sometimes metadata is referenced to the local ground elevation, in which case you would check the **Height is above ground level** option. The **Mean terrain height** is based on a probed elevation from the first selected photo but can be overwritten if necessary.

![Import GPS/IMU Frame Photos](image)

9. Click the **Defaults** tab. No changes are really necessary here, although if you intended to use the imported metadata to help control a bundle adjustment later you could set appropriate values for **Projected map position std. devs** and **Orientation angle std. devs**.

10. And although rarely necessary, **Estimated averages** can be used to override the calculated values for the **Average flying height** and **Average elevation** parameters. Leave them set to -1 to have the UAV Importer use automatically calculated values.

![Import GPS/IMU Frame Photos](image)
11. Click **Apply**. Focus will automatically be returned to the **Photo** tab and progress will be displayed in the lower right corner as the images are processed.

![Import GPS/IMU Frame Photos dialog](image1)

12. Click **Close** to dismiss the **Import GPS/IMU Frame Photos** dialog, then use **ISPM** or **ISAT** to open the newly created project. Use the **Footprint Viewer** to check your work. As you click on photo footprints you should see that the **Photo ID** and **Strip ID** for each photo were automatically set.

![Footprint Viewer](image2)
13. Close the **Footprint Viewer** and navigate to **Edit >> Project** to verify that the coordinate system **Projection Parameters** were automatically set to the *Southern* Hemisphere, Zone 50, then close out of **Edit Project**.

![Projection Parameters dialog box]

- **Hemisphere**: Southern
- **Zone**: 50
- **Longitude of origin**: 117°00'00.000' d.m.s
- **Latitude of origin**: 0°00'00.000' d.m.s
- **False X**: 500000.00 m
- **False Y**: 10000000.00 m
- **Scale reduction factor along longitude of origin**: 0.9996
This data set is comprised of JFIF files with EXIF tags, but the tags don’t contain any georeferencing information. Instead, georeferencing will be ingested by way of a metadata text file that is included with the project, `geotags.txt`. However, the tags can still be used to help define the camera parameters.
Create the Project

1. Start the UAV Import command either with ISPM/ISAT with no open project, or by using the shortcut described in the Getting Started section, then enter a **Project name** and **Project folder** location of your choice. *(In this example, the UAV Importer will create a new folder for the data at J:\ACRE.)*

![Project Parameters dialog box](image)

2. As in the previous project, the goal is to set the project up using a UTM map projection, with elevations referenced to EGM96. Click **Define...** to open the **Define new ISPM project CSF** dialog box.

![Define new ISPM project CSF dialog box](image)

3. And also as in the previous project, the **Projection algorithm** on the **Projection Space** tab is automatically set to *Universal Transverse Mercator* with the **Hemisphere** set to *Northern* and **Zone** set to **15**. We will leave these and let the UAV Importer automatically assign the proper value based on the latitude and longitude defined by the EXIF metadata.

4. Click on the **Geographic Space** tab and change the **Vertical datum** to *EGM96*:
5. Click OK to dismiss the Define new ISPM project CSF dialog box and return to the Project Parameters dialog box.
Run the Importer

If you open the input metadata file in a text editor you will see this:

<table>
<thead>
<tr>
<th>Image</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Alt[m]</th>
<th>Pitch</th>
<th>Roll</th>
<th>HAGL</th>
<th>Compass</th>
<th>Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>_1320256</td>
<td>40.130168</td>
<td>-3.844966</td>
<td>691</td>
<td>-14</td>
<td>-54</td>
<td>65.6</td>
<td>60</td>
<td>343</td>
</tr>
<tr>
<td>_1320257</td>
<td>40.130279</td>
<td>-3.844843</td>
<td>691</td>
<td>21</td>
<td>-61</td>
<td>65.9</td>
<td>55</td>
<td>364</td>
</tr>
<tr>
<td>_1320258</td>
<td>40.130279</td>
<td>-3.844711</td>
<td>690</td>
<td>12</td>
<td>-29</td>
<td>65.5</td>
<td>52</td>
<td>359</td>
</tr>
<tr>
<td>_1320259</td>
<td>40.130323</td>
<td>-3.844652</td>
<td>691</td>
<td>23</td>
<td>-38</td>
<td>65.8</td>
<td>52</td>
<td>368</td>
</tr>
<tr>
<td>_1320260</td>
<td>40.130388</td>
<td>-3.844395</td>
<td>690</td>
<td>23</td>
<td>-36</td>
<td>65.5</td>
<td>53</td>
<td>365</td>
</tr>
</tbody>
</table>

We need to take note that there is one header line to skip during the import, and we need to note the columns for the rest of the parameters. The Compass value will be used as Yaw.

1. Fill out the **Photo** tab parameters as shown below:
   a. **Set Number of lines to skip** to 1
   b. Use the **Browse** button to locate the *geotags.txt* file
   c. Check the **Use GPS/CAM EXIF tags** option
   d. **Browse** to and select all the *Image files*
   e. Leave **Strip ID** set to *auto*
   f. Set **Photo ID** to *ImageID*
   g. **Set Image ID** to *1*

![Import GPS/IMU Frame Photos](image)

2. Click the **Images** tab. As before, you will want to reformat the images to tiled TIFF to make them easier to use with the rest of the ImageStation applications.
3. Click the **Camera** tab. As in the previous project, all camera parameters were successfully retrieved from the EXIF tags. However, because we are reading in raw GPS/IMU data with Roll/Pitch/Yaw parameters, be sure to set the **Camera X-axis orientation** to **IMU X-axis**.

4. Click the **GPS** tab and set the following parameters:
   a. Set **Unit information > Geodetic** to **decimal deg**
   b. Set the **GPS antenna position columns** to:
   c. **Longitude** = 3
   d. **Latitude** = 2
   e. **Altitude** = 7
   f. Set **Named geoid** to **EGM96**
   g. Check the **Height is above ground level** option
   h. Leave **Mean terrain height** set to 0
5. Click on the IMU tab, then return to the GPS tab. Notice that the UAV Importer automatically calculated the Mean terrain height based on the lat/long value of the first photo from the input metadata file.

6. Return to the IMU tab and set the IMU attitude > Yaw value to column 8. Note that we will ignore the Roll and Pitch columns because the platform is quite unstable and we assume that the camera is pointed downward.
7. Click the **Defaults** tab. No changes are necessary here but this needs to be done to activate the **Apply** button.

8. Click **Apply** to process the photos and images...
9. Once the process is complete, **Close** the UAV Import dialog and check your work with ISPM/ISAT.
This project is very similar to the previous project. It uses JFIF images with EXIF tags that have good camera information and georeferencing, but it also comes with a metadata text file that has valid Pitch, Roll, and Yaw values, so we will use that instead.

There is an interesting point about this data set. As mentioned at the beginning of this tutorial, sometimes EXIF tags can be misleading. In this example, the GPSAltitudeRef tag indicates that the flying height is referenced to Sea Level...

But a look at the metadata file shows that the heights are actually referenced to the ellipsoid...

<table>
<thead>
<tr>
<th>Filename</th>
<th>Timestamp</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Altitude(AEL)</th>
<th>Pitch</th>
<th>Roll</th>
<th>Yaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSC_0212.JPG</td>
<td>17:36:09</td>
<td>40.53876511</td>
<td>-3.662526588</td>
<td>760.36</td>
<td>3.51</td>
<td>-0.52</td>
<td>41.26</td>
</tr>
<tr>
<td>DSC_0213.JPG</td>
<td>17:36:11</td>
<td>40.53876511</td>
<td>-3.662526588</td>
<td>759.14</td>
<td>-1.43</td>
<td>-1.22</td>
<td>51.14</td>
</tr>
<tr>
<td>DSC_0214.JPG</td>
<td>17:36:13</td>
<td>40.53876511</td>
<td>-3.662526588</td>
<td>759.14</td>
<td>-3.61</td>
<td>-0.76</td>
<td>52.94</td>
</tr>
<tr>
<td>DSC_0215.JPG</td>
<td>17:36:15</td>
<td>40.53876511</td>
<td>-3.662526588</td>
<td>759.14</td>
<td>-6.41</td>
<td>-0.13</td>
<td>50.63</td>
</tr>
</tbody>
</table>

So we will leave the Project Coordinate System set to ellipsoid when we create the project.
Create the Project

1. Start the UAV Import command either with ISPM/ISAT with no open project, or by using the shortcut described in the Getting Started section, then enter a Project name and Project folder location of your choice. *(In this example, the UAV Importer will create a new folder for the data at J:\Madrid.)*

2. In this case, because the Coordinate system defaults to UTM with Ellipsoid heights, you can simply click Define and then Cancel the dialog box that appears. The importer will automatically set the Coordinate system as you see here and will adjust the UTM Zone later.

3. Click OK to create the new ISPM project folder, close the Project Parameters dialog box, and continue to the Import GPS/IMU Frame Photos dialog box.
Run the Importer

1. Fill out all the parameters on the tabs as shown in the screenshots below. Use the Browse button to select all the photo image files from the indicated folder...

2. The default Scanline orientation in camera axis for this project is Column-Major-Upper-Right, so it is not necessary to use the Correct IO scanline orientation option in this case...

3. Don’t forget to change the Camera X-axis orientation to IMU X-axis on this one...
4. ✨ Don’t forget to change the **Elevation reference** to **WGS84 Ellipsoid** on this one...

5. This platform is more stable than the one used for the last project so we’ll go ahead and use the **Pitch** and **Roll** values...
6. From here, click the **Defaults** tab to activate the **Apply** button and process the project. After that your project should look like this in **ISPM/ISAT**:
This is another project that uses JFIF files with EXIF tags. The only thing different about this project is the datum used for the Project Coordinate System.
Create the Project

1. Start the UAV Import command either with ISPM/ISAT with no open project, or by using the shortcut described in the Getting Started section, then enter a **Project name** and **Project folder** location of your choice. (In this example, the UAV Importer will create a new folder for the data at J:\Monett.)

2. This particular project actually does fall within the UTM Zone 15 projection space, but the **Geodetic datum** and **Vertical datum** need to be set to *NAD83, NAVD88*...

![Image of ISPM project settings]

3. Click **OK** to create the new ISPM project folder, close the **Project Parameters** dialog box, and continue to the **Import GPS/IMU Frame Photos** dialog box.
Run the Importer

1. Fill out all the parameters on the tabs as shown in the screenshots below...

2. The default **Scanline orientation in camera axis** for this project is *Column-Major-Upper-Right*, so it is not necessary to use the **Correct IO scanline orientation** option in this case...
3. Click the **GPS** tab and change the **Named geoid** to **NAVD88**.

4. Click the **Defaults** tab to activate the **Apply** button and process the project. After that your project should look like this in **ISPM/ISAT**:
ALASKA

This data set is comprised of TIFF format files with EXIF tags, but the tags do not contain any georeferencing information so we’ll use a metadata text file as input. The project offers some new twists that will need to be addressed...
Create the Project

1. Start the UAV Import command either with ISPM/ISAT with no open project, or by using the shortcut described in the Getting Started section, then enter a Project name and Project folder location of your choice. (In this example, the UAV Importer will create a new folder for the data at J:\Tongass_National_Forest.)

2. This project uses a Project Coordinate System of State Plane, Alaska Zone 1, and NAD83 datum settings.
3. Click **OK** to create the new ISPM project folder, close the **Project Parameters** dialog box, and continue to the **Import GPS/IMU Frame Photos** dialog box.
Run the Importer

1. Fill out all the parameters on the tabs as shown in the screenshots below...

2. Even though the images are already in TIFF format, they are not tiled nor do they have overviews. In addition, they are 16-bit images. By setting the Maximum input value to 65535 (which is the largest value for a 16-bit image) we can cause the UAV Importer to reformat the images to an Output pixel bit depth of 8 bits to conserve disk space if needed. The default Scanline orientation in camera axis for this project is Column-Major-Upper-Right, so it is not necessary to use the Correct IO scanline orientation option in this case...
3. When you click on the **Camera** tab you will notice that all the camera parameters have been defined based on the camera type defined by the EXIF tags, but the problem is that the camera used in this case is a digital SLR that has a varying focal length. If you look in the project folder and open `cannon EOS 5D mark ii.cam` you will find more accurate camera calibration parameters. For this case we need to:
   a. Set **Camera X-axis orientation** to **IMU X-axis**
   b. Set the **Focal length** to **52.8679**

![Camera Calibration Interface](image)

4. **Click the GPS tab** and enter the parameters as shown below...

![GPS Tab Interface](image)

5. **Click the IMU tab** and take the default parameters as shown below...
6. From here, click the **Defaults** tab to activate the **Apply** button and process the project. After that your project should look like this in **ISPM/ISAT**:
In this example we'll take a look at how to import project data from a “regular” aerial frame camera.
Create the Project in ISPM/ISAT First

While it is not mandatory, when creating a project that was flown with a Hexagon company sensor, you can save yourself some work by creating the project first with ISPM/ISAT because the Camera Wizard will automatically populate all the camera parameters for you.

1. Start ISPM/ISAT and create a new project as you normally would for an Aerial Frame project.
2. When you get to the Project Units tab, define the Coordinate System with Storage Space units set to meters, the Projection algorithm on the Projection Space should be set to Gauss-Kruger (3-degree) and the Projection Parameters should be set to Zone 3.

3. On the Geographic Space tab, set the Geodetic datum to Deutsche Hauptdreiecksnetz and the Vertical datum to EGM 96.
4. Save these settings and move on through the rest of the wizard. You can set the rest of the parameters as you see fit if you like but it really isn’t necessary for the sake of this exercise, but be aware that the Flying Height (AMSL) and Ground Elevation (AMSL) values will be overwritten by the UAV Importer.

5. Now run the Edit >> Camera Wizard command. Key in a Camera Name, set the Camera Type to Digital, and then select the DMC 140 from the pick list.
6. Click **Next** to advance to the **Camera Data** tab. Notice that all the camera parameters have been automatically defined. Continue to click **Next** until you get to the end of the wizard and then click **Finish** to add the camera to your project.
Run the Importer

1. Navigate to Tools >> UAV >> Generate/Append ISPM Project while we’re still in ISPM/ISAT with the new project open. This will cause the Project Parameters dialog to be skipped and we’ll be taken straight to the Import GPS/IMU Frame Photos dialog.

2. Fill out all the parameters on the tabs as shown in the screenshots below, using PhotoData.txt as the Input metadata text file. Assuming that the image files are not located in the path contained in the PhotoData.txt file, check the Use folder path only option, and then browse to and select a photo image file. The importer will use this information to update the image files’ location in the new project.

3. Click on the Image tab. No changes are needed here.
4. Click the **Camera** tab. No changes are needed here as all the parameters will already be assigned based on the camera we created earlier.

5. Click the **GPS** tab and set the **GPS time column** to 10.
6. Click the **Given EO** tab and enter the parameter values as shown below...

![Given EO Tab](image)

7. Click the **Defaults** tab. For a project like this where the Given EO values can be used to help control the AT bundle adjustment, you would typically set the standard deviation values to use in the **Projected map position std. devs** and **Orientation angle std. devs** fields as shown here.

![Defaults Tab](image)
8. Click **Apply** button to process the project. After that your project should look like this in ISPM/ISAT:
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