

The Olympus Flyer

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Inter-Office Memo: Photogrammetry

*By Karl M. Pia, President
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The other day I had the unusual opportunity to watch one of our competitors get nailed to the wall and be meticulously dissected in front of eight attorneys. It was a vivid reminder of how vulnerable each of us can be in our business.

I am reminded that most of us in the photogrammetric business have not had the technical, or engineering training that would have prepared us psychologically, to keep accurate records, be systematic and consistent in every phase of the jobs we do. "On the job" training has conditioned us to be a little lax at times in our approach, or to use momentary rational to change our judgements that should have been consistent with standard training.

The following are strong requirements for anyone that desires to become a recognized professional in photogrammetry:

- A strong academic background.
- A college degree, (preferably in the same, or an associated field).
- Specialized training (seminars, extension classes, etc.).

- Professional association, ASP, ACSM or both.
- ASP certification as "Certified Photogrammetrist".
- Develop work habits consistent with professional practices
 - Understand what you are doing
 - Keep careful and consistent records
 - Be able to explain what you do

In some instances, photogrammetry can have a strong liability attachment, particularly to the corporation and possibly to the individual photogrammetrist, if shown neglectful. Everyone's best protection is thorough knowledge of what we are doing and accurate meaningful records of what was done, so someone else can follow our reasoning.

Photogrammetry, like other professions, requires constant learning, both within and in regards to associated fields, where it is used. I trust that we all have sufficient interest and satisfaction in the work, to make this effort worth while and have a strong concern for the results we leave behind us.

The above 20-year-old memo written by Maurice X. Pia, former president and co-founder of Olympus is very applicable to photogrammetry today. Today our mapping procedures employ the powerful tools of Air Borne GPS, automatic aerial triangulation, auto-correlation and computer generated DEM (digital elevation model) and contours. It is very easy to assume the computer program is doing everything required to produce a quality map. Just like with ground surveying, the most important component of photogrammetry is procedure, procedure, procedure. The shiny new tools with all the bells and whistles can not make up for sloppy or neglectful work. ■

INSIDE THIS ISSUE

- 1** Inter-Office Memo:Photogrammetry
- 2** O.A.S Mapping Procedures
- 4** New Products and Services

Olympus Aerial Surveys, Inc.

Mapping Procedures

*By Karl M. Pia, President
Olympus Aerial Surveys, Inc.*

The procedures used by Olympus, or any other firm, are only as good as the people that employ them. The average experience in the mapping industry of any Olympus employee is over 20 years, with several over 30 years, and a few over 40 years. Our employees range from a Certified Photogrammetrist and a Licensed Surveyor, to Geography majors and graduates. We have a serious commitment to efficiently provide accurate mapping and photographic products at the lowest expense to our client. This has been true for nearly 40 years. The following is a summary of a typical project's development.

When we receive a request for mapping we study the configuration of the area and the terrain characteristics. We then plan the flight lines to cover the area in the most effective manner for the scale and contour interval required. The decision to use Air Borne GPS is made and the ground control is laid out on the flight plan. The flight plan is then reviewed (frequently with a fellow planner) and any adjustments made that would improve the efficiency of the mapping project. The costs for photography, aerial triangulation, compilation, orthophotography and editing are totaled, the proposal prepared, reviewed (usually with me) and submitted to the client.

More often than not the client calls us to say the project is a "go" and requests our mapping services.

We start by talking with the client to inquire if there are any changes to the project. The work order is made up by the salesperson and reviewed by me. The flight map is updated if required, the surveyor is notified and the satellite constellation and weather forecasts are monitored for the time period that coincides with the completion of the field target paneling. When the target panels are completed we schedule the flight mission for the day with the best weather forecast, atmospheric conditions, and satellite constellation geometry. The flight mission is conducted in our Cessna T210 aircraft using our precision Zeiss RMK aerial camera (last calibration February 2002). The mission is controlled by our Track 'Air Aerial Survey System

which keeps the plane on "line" and triggers the camera shutter at the appropriate coordinates as computed from the flight map. Our Ashtech Air borne GPS unit records the coordinates of the film platen of the camera at the precise moment of exposure. Our surveyor will incorporate this data with readings of the satellites from the ground to supply the final adjusted coordinates of the camera's platen at the moment of exposure.

When the flight mission is completed, I review it with the photographer. The Track 'Air report is run and reviewed for compliance to the original flight map. The film is then processed. The photographer examines the film for coverage and defects due to atmospheric conditions not previously noted or any other problems. The salesperson then re-checks the film also noting control targets as well as coverage and defects. The film is then annotated. Usually at this point the photo lab makes the contact prints, diapositives and any enlargements that were requested. Then the film is scanned on our high-resolution scanner. The scan resolution will be finer than the final GSD of the orthophoto.

While this preparatory work is going on, the surveyor has computed the coordinates and reduced them to a usable form by Olympus. A copy of the solution, its accuracy, the satellite geometry and any problems is provided along with the camera's coordinates. I review the data with the surveyor. If everything looks good the project is prepared for aerial triangulation. A photogrammetrist will measure the photos, control points and tie points on our first order Kern DSR 14. We also use our Z/I Imaging Photogrammetric Workstation to do this work completely digitally. In either case the solution is reviewed by our licensed surveyor or myself before it is ready for compilation (or DTM collection) and orthophoto generation.

The compilers/photogrammetrists then compile traditional contours and planimetry or collect a DTM (digital terrain model). These are all highly experienced stereo compilers working on first order Kern DSR analytical stereo plotters. They can observe and digitize accurately the position of contours, breaklines, spot elevations and planimetry. This can be done in the automated environment of the Z/I Imaging Workstation also, but this may increase the editing process dramatically. While the

continued on page 3

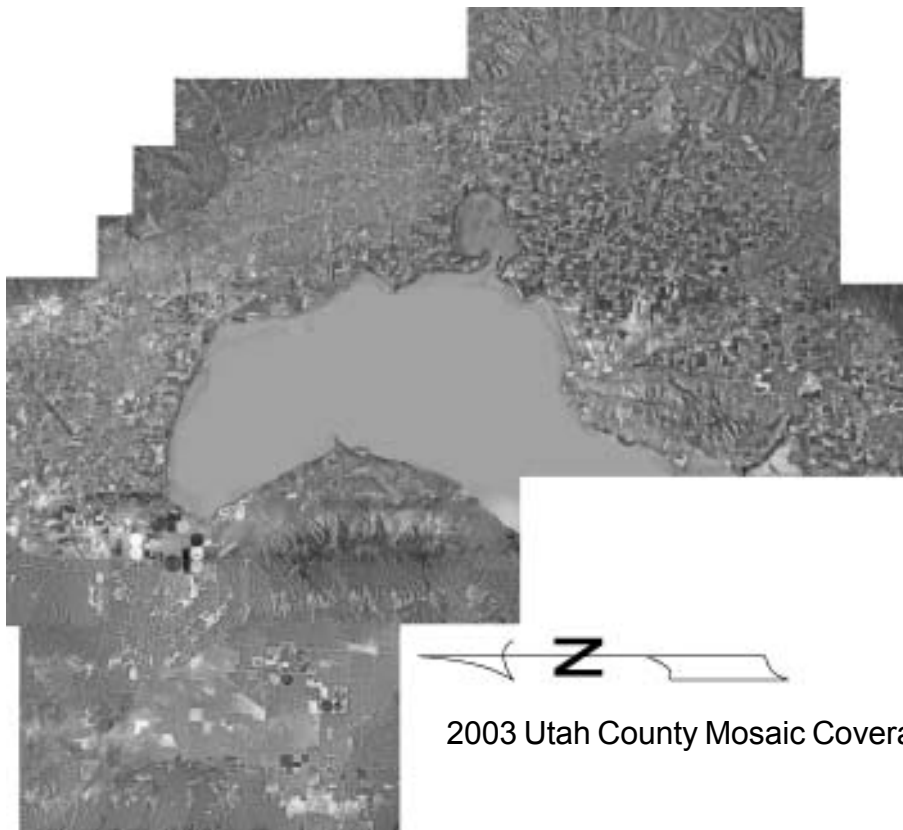
compilation is being accomplished our soft copy technician will be importing the digital imagery into our Z/I Imaging Photogrammetric Workstation. The models will be set-up as they are in the DSRs.

The DTM data compiled on the DSRs will be imported into the Z/I Imaging Photogrammetric Workstation to strengthen the auto-correlation process and the creation of the DEM (digital elevation model-mass points). The DEM is then edited and used in conjunction with the breaklines and spot elevations to generate the orthophoto. The final orthophoto is a color-balanced image that is geo-referenced to the mapping and shows the true position of the ground. Those features that are not on the ground (like building rooftops) will not necessarily be in their true horizontal positions. These features can be brought into their true horizontal positions for an additional cost. Usually only cities with a lot of large buildings or skyscrapers have a need for this type of orthophoto.

The editors will do the final production checking of the mapping and orthophoto. If the mapping was collected traditionally; digitized contours, spot elevations and planimetry will be

edited for completeness. If the mapping was collected using the DTM method they will generate contours from the DTM breaklines, spot elevations and the ground based planimetry. In either case they will bring the orthophoto up in the background to verify the features collected. The mapping is also checked for content, consistency and conformance to the project's specifications. Check plots are made and reviewed by the salesperson. I also review the plots and digitally check potential problem areas. When everything is signed off the mapping is cut into tiles the client can use in their software systems.

As noted above we have several checks on ourselves as we produce the mapping and orthophotography. Because we usually "observe" our compiled contours or breaklines and spot elevations in stereo with high end optical equipment the extraordinary editing that is required by computer generated breaklines and spot elevations is not necessary. They are checked, however, during the DEM and orthophoto generation process and then again in the editing process along with the DEM and orthophotography. This quality control and assurance procedure has proven highly successful for many years. ■



2003 Utah County Mosaic Coverage

New Products and Services

We have the following digital and hard copy mosaics available:

Salt Lake County	Color	May 2003
Park City vicinity	Color	June 2003
Heber/Midway	Color	July 2002
Utah County	Color	May 2003
Weber/Davis County	Black&White	April 2002
Cedar City	Color	April 2002
St. George	Color	May 2002

Color Orthophotography is now comparative in price to Black and White. Let us provide to you a free estimate of how little your cost could be to receive such a rich data set.

Yes, I am interested in:

Mapping
Orthophoto
Current topic

Name _____

Company _____

Address _____

City/State/Zip _____

Mail, fax, or e-mail to:

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30 West 2950 South
Salt Lake City, UT 84115

Phone (801) 484-4351

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