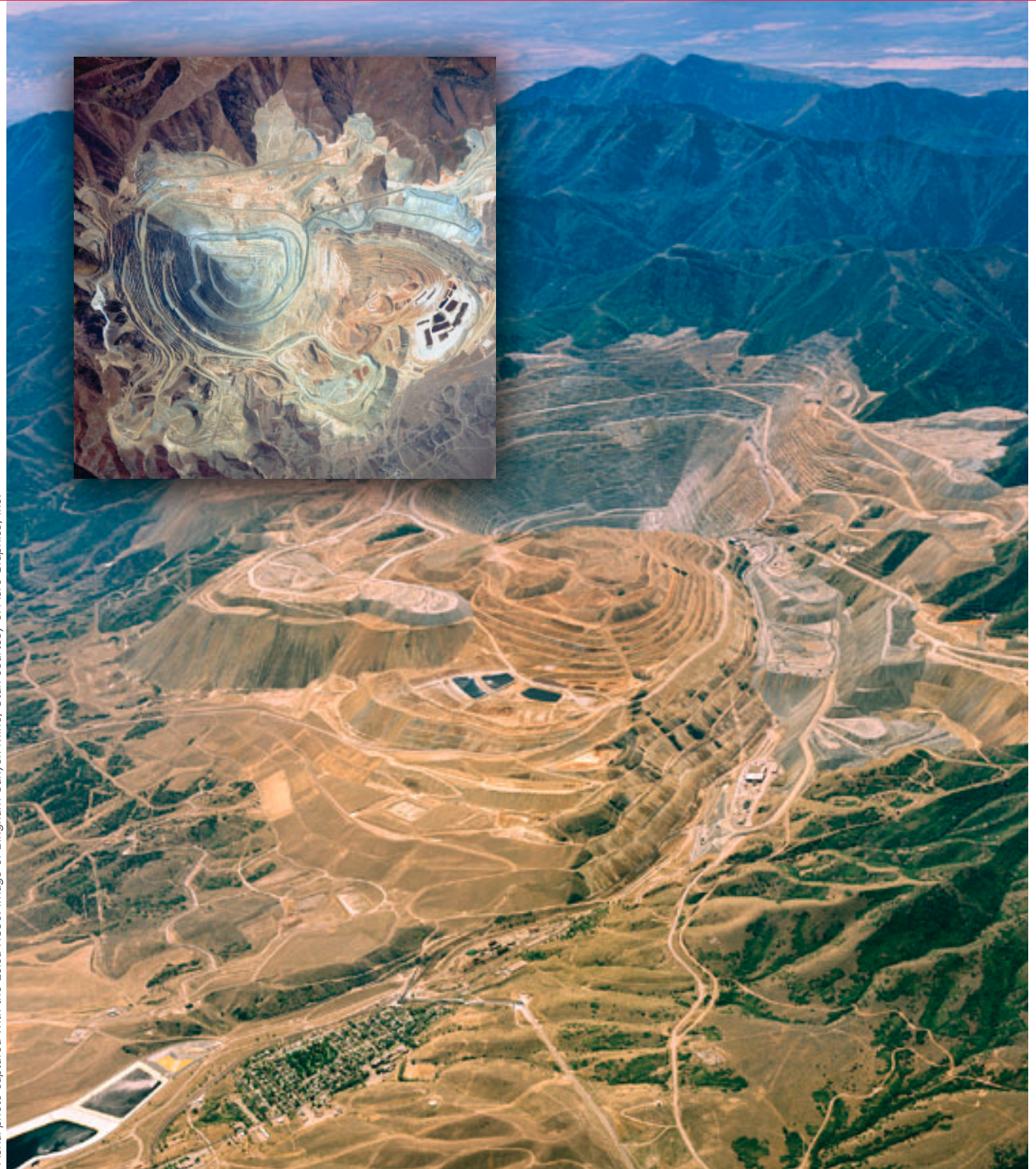


Leica Flykin Suite+



Aerial photo captured with the Leica RC30. Image of Bingham Canyon Mine, Utah courtesy of Aero-Graphics, Inc.



***Complete Software Package
for Kinematic GPS Post-Processing***

Leica
Geosystems

Leica Flykin Suite+

State-of-the-Art Post-Processing

The use of GPS coordinates from the exposure stations in block triangulation is widespread. The accuracy of these coordinates depends on having powerful, state-of-the-art software for post-processing the raw data from the airborne GPS system. Leica Flykin Suite+ is a software package for kinematic GPS post-processing, specially enhanced for Leica Geosystems and fully integrated into the Leica Geosystems' solution for aerial photography and image processing.

Leica Flykin Suite+ is the successor of Flykin for Windows, the market leading software package for airborne GPS post-processing developed by Mosaic Mapping Systems Inc. (Ottawa, Canada), which has been processing kinematic data since 1990. Leica Flykin Suite+ is a version of Mosaic Mapping's product developed exclusively for Leica Geosystems. It features all the benefits for which Mosaic Mapping products are renowned.

Leica Flykin Suite+ is fully integrated between ASCOT (flight management) and ORIMA (aerial triangulation and bundle block adjustment), two leading products in the aerial photography world. SOCET SET® and IMAGINE OrthoBASE® customers also enjoy a smooth data flow from Leica Flykin Suite+.

Features

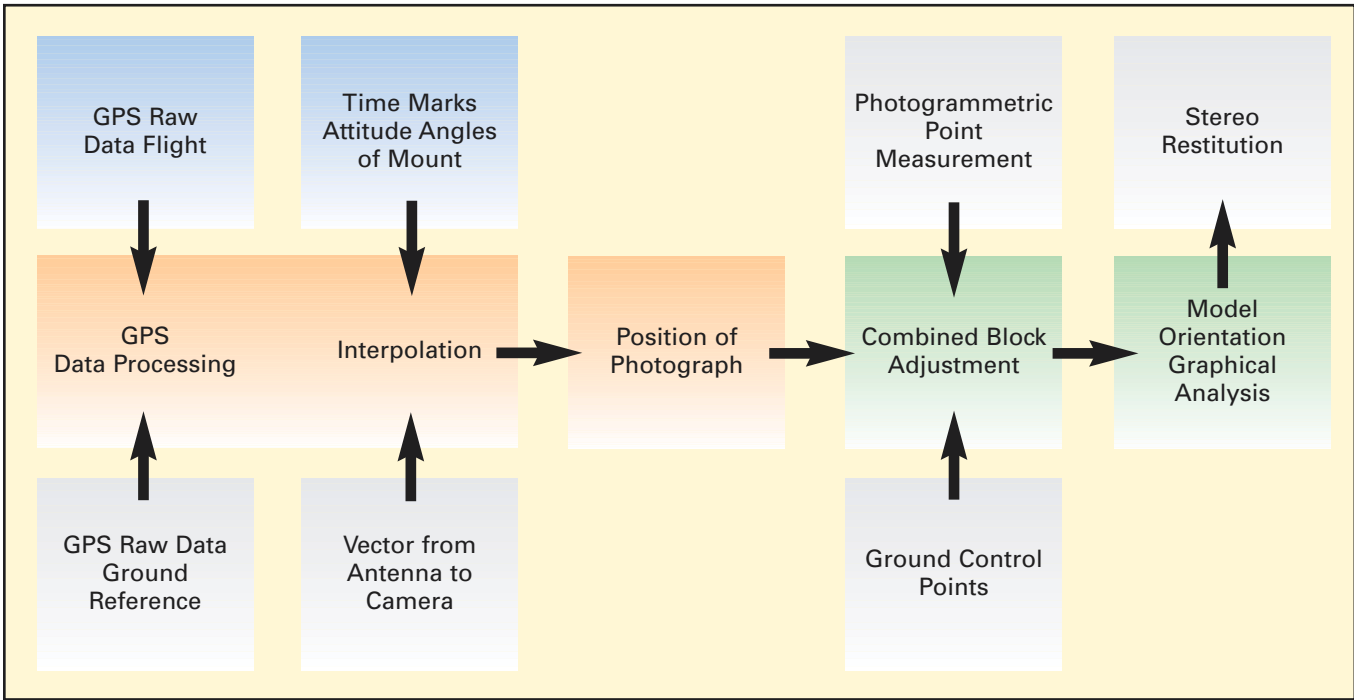
- GPS software developed with the photogrammetrist's needs in mind
- Full support of OTF and CBA methods of aerotriangulation
- Compute multiple scenarios with different parameter sets
- Transparent file structure
- Parameters for advanced user
- Graphical comparison of trajectories
- Graphical user interface and interactive processes
- State-of-the-art interpolation method
- Multiple raw data converter, use of foreign ground stations
- Fully integrated in Leica Geosystems' data flow: ASCOT to Flykin Suite+ to ORIMA

Benefits

- Flexibility improves productivity and reduces learning phase
- Interface allows user to choose the most effective approach for each case
- Robust solution rescues "tough" data other solutions leave behind
- Power-users may improve results by using the best parameters
- Quality control, reliability, evaluation of accuracy
- Familiar environment; easy to learn
- Improves accuracy, reduces amount of data, reduces computation time
- Increases reliability, reduces baseline length, improves final result
- Optimal use of equipment, shorter processing time, higher productivity

Streamlined Data Flow

Aerial Survey Data Flow

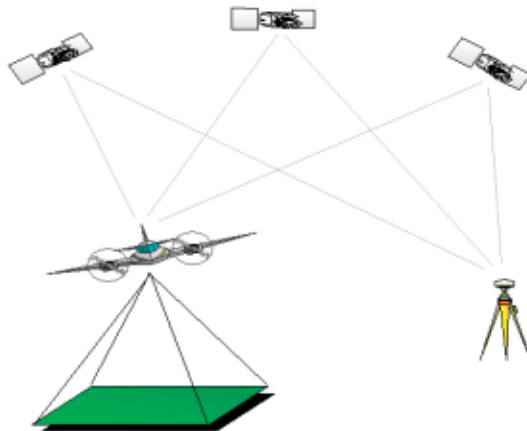


ASCOT FLYKIN SUITE+ ORIMA

Data Flow of the Leica Geosystems Solution

Leica Flykin Suite+ features an intelligent, streamlined data flow for maximum versatility and top productivity.

- All formats are compatible without loss of information, including GPS raw data (Leica Geosystems, RINEX or other formats), ASCOT event files, and ORIMA projection centers input files. This makes it unnecessary to retype data or rename files.
- Wide project structure allows multiple sessions with the same raw data, which saves disk space, allows comparisons, and helps with quality control.

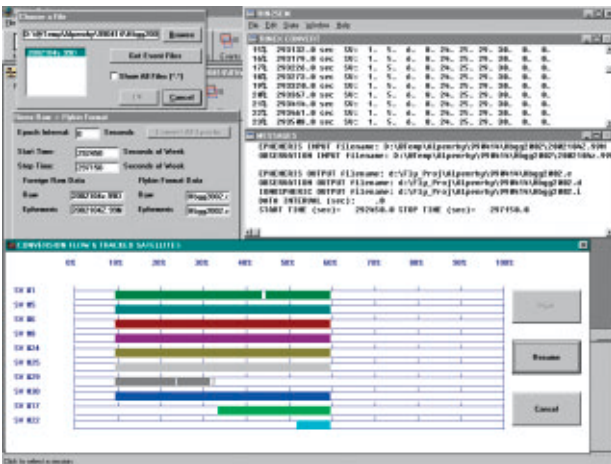


Components and Features

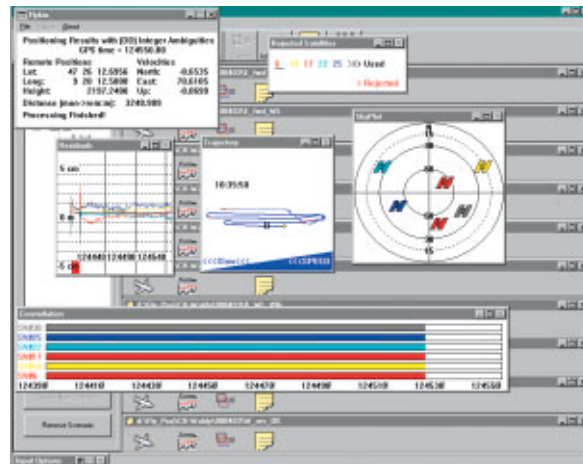
Expertly Designed, Modular Structure with Helpful Interface

Leica Flykin Suite+ runs under Microsoft Windows 95/98 or Windows NT and is composed of several wizards, which guide the user through the process.

- **Project Management:** Create, rename and delete projects.
- **Data Conversion:** Convert raw GPS data into formats from Leica Geosystems, RINEX, Trimble, Thales, and Novatel.
- **Flykin:** Compute kinematic and static data, single or dual frequency, forward and reverse, from any instant in the session. There is only one control panel and multiple interactive windows for processing control.
- **Trajectory:** Display trajectory with photo coverage and ground control points, as well as graphical trajectory differences such as forward against reverse direction.
- **Residuals:** Graphical check of phase residuals, with each satellite displayed in a different color.
- **Events:** Convert ASCOT event file into internal format with strip ID, point ID, camera photo number and time; compute an offset for each photo event integrating aircraft's attitude.



All data is accessible, even during raw data conversion.



During trajectory processing, interface allows the user to monitor the process and interact where necessary.

- **Interpolator:** Determines coordinates for each photo event, including attitude angles and relative positions of camera and GPS antenna. Linear and non-linear (polynomial) interpolation, depending on the roughness of the flight.

The Coordinate Conversion Module (CCM) allows conversion of the geographical GPS coordinates into nearly every national grid system, including ellipsoid, datum and projection definition; even special projections (such as those found in Switzerland) are included. It also includes a geoid model to compute orthometric altitude.

This creates an ORIMA input file, which is then ready to use with 12 parameters, including grid coordinates, accuracy, time, antenna to camera vector, and profile separation.

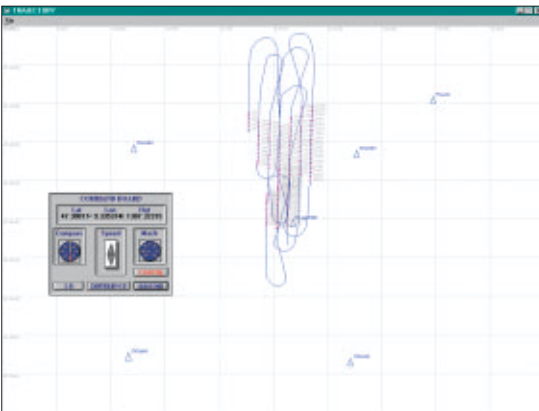
- **Reporter:** Generates and displays several ASCII files, including epoch coordinates and ambiguity resolution.
- **Adjustment:** Creates an observation file that is compatible with the GPS Environment for GeoLab.

Functionality

Easy-to-Use, High-Performance Solution

User-Friendly Design

- All processing is controlled from the main window, where there is an overview of the project structure including the progress of work and the processing stages.
- All functions can be accessed quickly from the main window. There is no need to go to a sub-menu and then back.
- The logical structure from left to right (progress of work) and top to bottom (session order) enables the user to manage many sessions simultaneously or consecutively. All parameters are defined in clear and structured hyper-menus. The user can click the right mouse button to enter or check a parameter, and click the left mouse button to start the module.
- Most information is displayed graphically. OTF (On-The-Fly) and CBA (Combined Block Adjustment) methods are treated equally. The user may choose either method, in the same environment, without preference.



Overview of a flight and ground segment.



Comparison of trajectories computed from two base stations.

High-Performance Processing

Leica Flykin Suite+ features many performance enhancing options including:

- **Full multi-tasking capability:** You can switch to another task at any time, even during processing.
- **Computing speed is up to 100 times the speed of flight:** For 100 minutes of data, at one sec/epoch (one Hz), processing takes one minute (one GHz processor).
- **Process only the necessary data:** Easily ignore take-off, approach and landing by defining the time range of the photo session.
- **During data import and processing:** The user is always aware of the project status.

GPS in Photogrammetry

OTF or CBA

The use of GPS in photogrammetry has become widely accepted, first for navigation (airborne management), and more recently for projection center determination. GPS coordinates in block triangulation are accepted and popular. Two methods are in common use: On-The-Fly (OTF) method, popular in North America, and Combined Block Adjustment (CBA) method, popular in Europe and Japan.

The OTF method is straightforward and provides a solution with limited accuracy and low reliability. The CBA method is indirect, but provides a solution with higher potential for accuracy dependent on the ground control points, and a reasonable reliability.

Same Dataflow and Equipment for Both Methods

Leica Flykin Suite+ is the only software that can compute the same flight using both methods simultaneously and compare the results, giving the user the ability to choose which method is appropriate for the situation and ensuring the most accurate results.

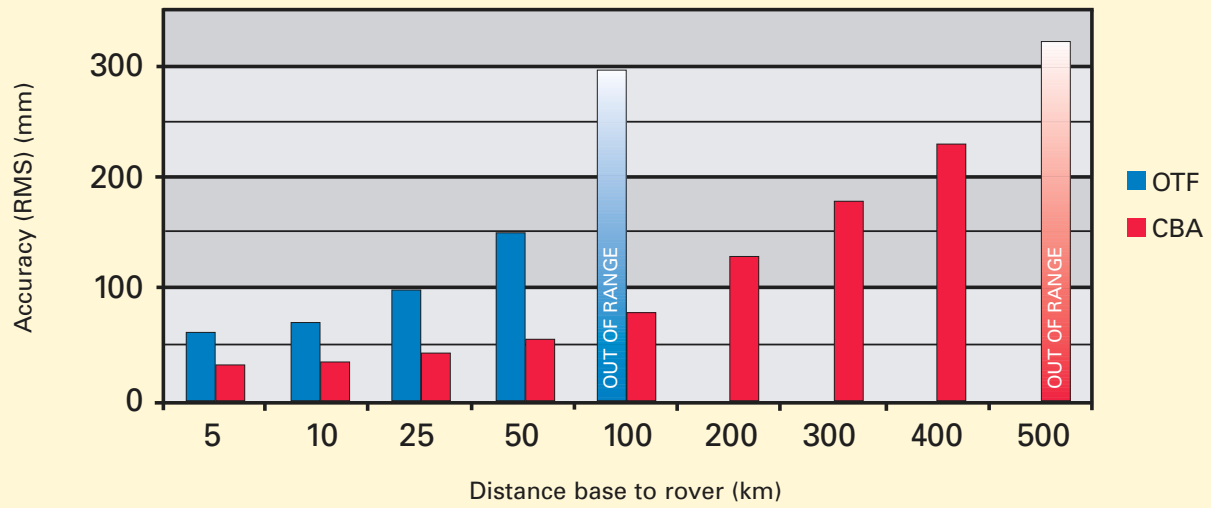
The table below gives a selection of criteria and helpful information on CBA and OTF.

	CBA Combined Block Adjustment of GPS, ground control points and image data.	OTF Ambiguity Resolution On-The-Fly.
Receiver	Single frequency receiver and/or dual frequency receiver.	Dual frequency receiver.
Philosophy and Principles	Ambiguities are incorrectly resolved in the GPS post-processing step. Errors due to incorrect ambiguities are accepted as systematic errors to be eliminated by using a suitable block adjustment program in the photogrammetric stage.	Ambiguities are correctly resolved in the GPS post-processing step. No systematic error is assumed.
Distance of Aircraft to GPS Ground Reference Station	Up to 500 km. The single ground reference station can be set up at a home office or airport.	20 km-60 km. The ground reference station must be set up close to the survey area. Large projects may need many ground reference stations placed properly throughout the project area.
Applicability	Suitable for undeveloped areas where it is difficult to set up a ground reference station within the area during the aerial survey flight.	Mainly for accessible areas where the set up of ground reference stations within the area is possible during the aerial survey flight.
Ground Control/Check Points for Blocks	At least one 3D control point is needed at each corner of the block area.	A few 3D check points are recommended.
Cross-Strips	Cross-strips or height control points are necessary on the block borders.	Not necessary.
Resulting Accuracy	Typically < 15 cm.	Typically < 15 cm.

Accuracy of GPS in Photogrammetry

AIRBORNE GPS ACCURACY

Photo Center Coordinates (E,N)



Oblique aerial photograph captured with the Leica RC30. Image courtesy of Aero-Graphics, Inc.

Further Resources

Leica Flykin Suite+ Evaluation

The Leica Flykin Suite+ Evaluation is a fully-functioning, time-limited version of Leica Flykin Suite+. The amount of time before expiration is normally 30 days. It is possible to remove the time limitation if a purchase is desired. Time-limited evaluations are available for a nominal cost, plus shipping. To order an evaluation copy, send an email to: info@gis-leica-leica.geosystems.com.

Leica Flykin Suite+ Manual

The Leica Flykin Suite+ manual is provided on the product CD-ROM. To order a digital copy (free of charge) from Leica Geosystems, send an e-mail to: info@gis.leica-geosystems.com.

Leica Flykin Suite+ Demo

The Leica Flykin Suite+ demo allows a user to install and run Leica Flykin Suite+ with the following limitations: the sample raw data provided with the program must be used and the processor cannot save the final results. Final results can be viewed since they were previously computed and are provided with the installation. No hardware lock is required. Leica Flykin Suite+ demos are available. Contact Leica Geosystems via e-mail at: info@gis.leica-geosystems.com for a free CD-ROM.



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