



Technical Specifications

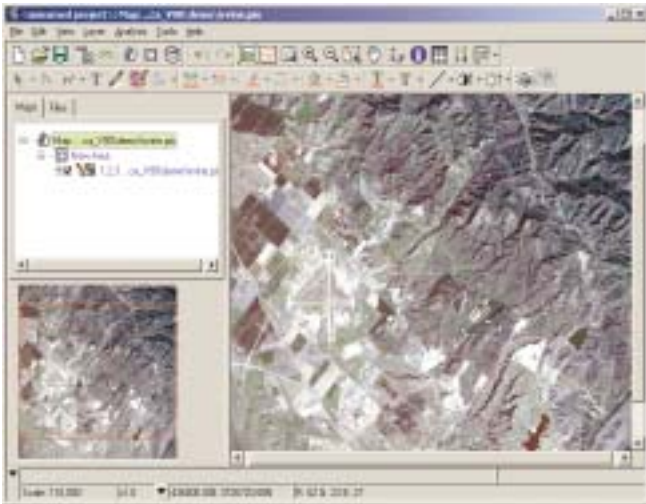
Geomatica® 9 Prime

Includes Fundamentals, PCI Visual Modeler™, EASI +, Algorithms, and Fly!™

GEOMATICA SOFTWARE SOLUTIONS

Geomatica Prime is the powerful, low-cost solution with tools for image correction, data visualization and analysis, and cartographic map production. Geomatica Prime includes:

- Focus, PCI Geomatics' visual environment for working with a variety of data, including imagery, vectors, and graphical bitmaps. This is an application for viewing, enhancing, and examining remotely sensed imagery such as LANDSAT, SPOT, RADARSAT, ERS-1, NOAA AVHRR, IKONOS, QuickBird and aerial photography.



Geomatica Focus - PCI Geomatics visual environment

- Users can overlay their GIS data and view the attribute information associated with such data.
- Focus includes many useful display tools, such as fast roam and zoom, image enhancements, numeric value display, named regions, multi-histogram display, scatter plot, profile windows, attribute table display and information reports.
- World-class OrthoEngine technology for performing image geocorrection and mosaicking.
- OrthoEngine provides an easy to use GUI interface for project set-up, GCP collection, and correction by warping transformation for airphotos and satellite data, DEM building and mosaicking of imagery
- Geomatica provides the production management capabilities needed to initiate, monitor, and complete projects with ease, including workflow, imagery and vector data management, and error reporting.
- Underlying both the visual environment and OrthoEngine is PCI Geomatics' GDB (Generic Database) technology, which gives users the ability to directly read/write 100+ imagery, vector, and other data formats.

TABLE OF CONTENTS

GEOMATICA PRIME SOFTWARE OVERVIEW	4
FOCUS - VIEWING ENVIRONMENT	4
A - Menu Bar	4
B - Icon Toolbars	5
C - Maps/Files Tree List	6
D - View Area	8
E - Overview Window	10
F - Status/Message Bar	10
VIEWING ENVIRONMENT - TOOLS	10
Loading Data	10
Project Files	10
DATA MANAGEMENT TOOLS	10
Import/Link	10
Clipping/Subsetting Panel	10
Reproject Panel	11
Translate (Export) Panel	12
Conversion Algorithms	12
INFORMATION TOOLS	12
Numeric Values Panel	12
Cursor Control Panel	12
Information Report	13
ANALYSIS TOOLS	13
Named Regions	13
Multi-Histogram Display	13
Scatter Plot	14
Profile Windows	14
Filter	15
VECTOR DATA TOOLS	15
Attribute Manager	15
Dissolve	16
Buffer	16
Overlay	16
Aggregate Attributes	16
Spatial Queries	17
Display Styles	17
EDITING TOOLS	18
DEM Editing	18
IMAGE CLASSIFICATION	19
MAP PRODUCTION	21
Map Printing	21
ON-LINE HELP SYSTEM	21
GEOMATICA ORTHOENGINE	22
OrthoEngine Technology	22
Project Setup	22

GCP Collection	22
Image Layout Panel	23
Residual Report Panel	23
Import and Build DEM Information	23
Image Correction	23
Mosaicking	23
Image Display	23
Project Report	24
IMPORT/EXPORT OF DATA	24
GDB (Generic Database) Technology	24
PCI VISUAL MODELER	24
Main Panel	24
Module Librarian Window	24
Processing Modules	24
EASI PROGRAMMING LANGUAGE	25
FLY!	25
3-D Perspective Scenes and Real Time Fly-Throughs	25
Options	26
Rendering Window	26
Speed/Quality	27
Flight Panel	27
Movie Loop	27
Nadir View	27
SPACEBALL (Only available on SGI platforms)	28
ALGORITHM LIBRARIAN	28
Algorithm Librarian Module List	29







GEOMATICA PRIME SOFTWARE OVERVIEW

When Geomatica is installed, an icon for the Geomatica toolbar is placed on the desktop. When licensed for Geomatica Prime, the following toolbar will be opened.



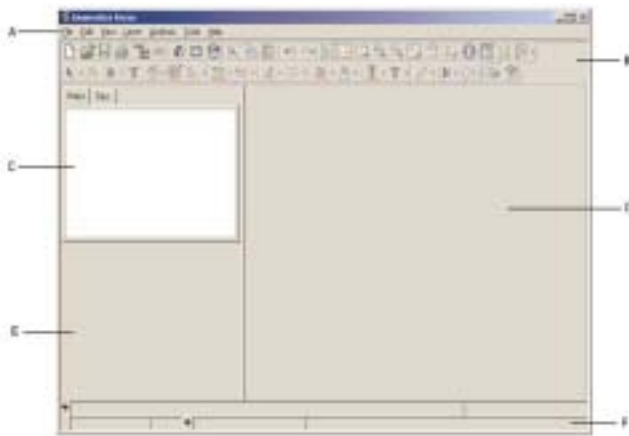
Geomatica Toolbar

The icons presented in the toolbar are:

- Focus 
- PCI Modeler 
- EASI 
- OrthoEngine 
- FLY! 
- License Manager 

FOCUS - VIEWING ENVIRONMENT

The Focus viewing environment is divided into six sections as shown:



Focus: A - Menu Bar, B - Icon Toolbars, C - Maps/Files Treelist, D - View Area, E - Overview Window, F - Status/Message Bar

A - MENU BAR



Menu Bar

FILE menu

- **New Project** - starts a new project and clears the viewer interface
- **Open** - access existing data files or a project file (.gpr)
- **Save Project or Save Project As** - saves projects to specific destinations or overwrites existing project files

Utility ->

- Import to PCIDSK*
- Link*
- Translate*
- Transfer layers*
- Import ASCII table/points*
- Export XML project*

- **Print Map** - for full cartographic map production
- **Print Map to File** - to print the current map composition to Postscript, TIFF, JPEG, or HTML format file

EDIT Menu

The EDIT menu includes items that allow the user to:

- **Undo/Redo** edits
- **Cut, Copy and Paste** layers in the tree list
- **Group/Ungroup** - vector elements such as polygons, shapes, text, and symbols
- **Attach/Detach** - items in the same layer using the Attribute Manager or Arrow Selector
- **Set RepCode** - special map editing tools for complex map production

VIEW Menu

- **Area View Mode** - shows the data in the full extents of the view area, in this mode no cartographic elements are shown, just the geospatial data that has been loaded
- **Map View Mode** - shows the data as it will be printed on piece of paper and cartographic elements are shown
- **Zoom Window** - this option creates a secondary viewer window that can be used to create different views of the same data sets
- **Clone View** - this option creates a secondary viewer window that can be used to reorder the layers and create different views
- **Zoom To ->**
 - Overview of Area*
 - Zoom In*
 - Zoom Out*
 - 1:1 Image Resolution*
 - Zoom Percent*
- **Named Regions** - tools for creating and utilizing custom zoom levels based on specific locations
- **Visualization Tools**
 - Flicker
 - Swipe
 - Blend
 - Loop
 - Cycle
- **Toolbars** - select toolbars to be displayed
- **Show Grid** - draws grid lines
- **Snap to Grid** - snaps text to grid lines
- **Layout Grid Set-up** - define grid properties
- **Display Options** - controls the Focus viewing environment
- **Properties** - view properties for the current highlighted layer in the tree list

LAYER Menu

- **Add** - allows users to add the following layers to the View Area:
 - Vector
 - RGB

- Greyscale
- Pseudocolored
- Bitmap
- **Visible** - allows the user to turn a layer on/off
- **Selectable** - sets whether the user can select shapes from the current vector layer
- **Attribute Manager** - view the attributes of a selected vector layer
- **Histograms and Numeric Values** - open analysis panels for the selected image layer
- **Scatter Plot** - a data visualization tool, it allows the user to instantly see where the majority of the data values are concentrated
- **Profile** - view a graph profile of the image layer
- **Filter** - apply a low pass, high pass, or custom filter to the image layer
- **Area Neighbors** - determines the adjacent polygons of selected polygons of interest
- **Aggregate Attributes** - shows summary statistics for an attribute table
- **RGB Mapper** - change the RGB combination of a layer that is displayed within the viewer

ANALYSIS Menu

- **Image Classification** ->
 - Supervised*
 - Unsupervised*
 Classification Analysis including:
 - Accuracy Assessment
 - Aggregation
 - Class Editing
 - Class Labeling
- **DEM Editing** - carry out simple editing procedures specifically designed for elevation data
- **Buffer** - create buffers for both vectors and polygons
- **Dissolve** - merge features with common attributes
- **Overlay** - carry out spatial, statistical, and suitability overlays

TOOLS Menu

- **Algorithm Librarian** - provides easy access to many robust algorithms for image/vector processing and analysis
- **EASI Modeling** - access to Geomatica's command-line based interface and scripting environment
- **Raster Calculator** - can be used on any file with raster channels, supports multiple files and raster attributes
- **Data Merge**
 - Select input data
 - Setup output file
 - Setup output layers
- **Reprojection** - reproject and export data to a new file
- **Clipping/Subsetting** - create a new subset database derived from selected layers and other information sampled from an existing source file
- **Digitizing Tablet** ->
 - Register*
 - Start Digitizing*
 - Stop Digitizing*
- **GPS Tool** - update the cursor within an area from a GPS unit or utilize GPS data for a new vector layer

- **Representation Editor** - supports thematic mapping
- **Options** - Several options are available for users to customize how Focus handles certain features and utilizes system resources.

HELP Menu

The Help menu includes the new HTML on-line help system, automated check for updates option, and a set of links to the PCI Geomatica web site.

B - ICON TOOLBARS



Icon Toolbars

The toolbars provide easy access to the following functions:

- New project
- Open file
- Save
- Toggle treelist
- Link windows
- New map
- New area
- Launch the add layer wizard
- Cut
- Copy
- Paste
- Undo
- Redo
- Zoom to overview
- Named regions
- Zoom interactive
- Zoom in
- Zoom out
- Zoom to 1:1 image resolution
- Pan
- Cursor control panel
- Open the information report panel
- Open the attribute manager
- Numeric values reports
- Measurement tools
- Selection tools
- Vector editing
- New shapes
- New text
- Raster erase
- Raster editing
- Spatial query
- Set symbol color
- Set symbol style
- Set line color
- Set line style
- Set area color
- Set area style
- Set text color
- Set text style
- Image enhancement tools
- Contrasts

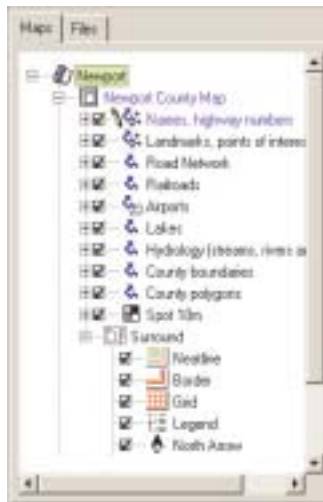
- Brightness
- Map view
- Area view

C - MAPS/FILES TREE LIST

MAPS Tab

This tab contains the layers that are currently being displayed in the VIEW area. The basic layer types include:

- RGB image layer
- Grey scale image layer
- Pseudocolor image layer
- Vector layer
- Bitmap layer



Maps Tab

For each of these layer types, there is a context menu, available with a right-mouse click. The functions within this menu affect the selected layer only.

These options are different for different layer types. They include:

RGB/BW Image Layer

- Cut/Copy - for moving the layer in the tree list
- Save - for saving edited layer
- Save as - for saving edited layer into a new file or as a new layer in an existing file
- Remove - to remove the layer from the view
- Rename - to rename the layer in the tree list
- Layer Manager - specify layer properties (i.e. Layer Visible)
- Overview of layer - fits the selected layer into the view area
- 1:1 image resolution - Zoom to 1:1 resolution based on the selected layer
- Enhance - a sub-menu of options to apply various automatic enhancements, including the Edit LUT option for creating custom enhancements
- Filter - opens the panel for filtering the chosen layer
- Attribute Manager - opens the attached attribute table (if present) (BW Layers only)

- Numeric values - opens the numeric values panel for the chosen layer
- Histograms - opens the histogram panel for the chosen layer
- Scatter plot - opens a scatterplot panel for the chosen layer
- 3-D data cube
- Profile - opens the image profile panel (a vector will be added, although by using the selection tools, the user can select an element from a previously-loaded layer)
- Image Classification - provides a sub-menu for starting either a supervised or unsupervised classification session
- Properties - shows the layer properties, including file information, enhancement applied, and resampling method

PCT Image Layer

- Includes all the same choices as the RGB/BW layers except for: enhance, scatter plot, and image classification
- Selectable (thematic layers)
- Select all shapes (thematic layers)
- Unselect all shapes
- Edit PCT - allows the user to define the colours for the values in the selected image
- Representation editor
- Legend items

Bitmap Layer

- Cut/Copy - for moving the layer in the tree list
- Save - for saving an edited layer
- Export (Save as) - for saving an edited layer into a new file or as a new layer in an existing file
- Remove - to remove a selected layer from the project
- Rename - to rename the selected layer in the tree list
- Layer Manager - specify layer properties (i.e. Layer Visible)
- Overview - fits the selected layer into the view area
- 1:1 resolution - Zoom to 1:1 resolution based on the selected layer
- Color - this sub-menu allows the user to choose a predefined color or create a color for the layer
- Representation Editor - gives access to representation editor for thematic mapping.
- Properties - shows the layer properties, including file information and color applied to the bitmap layer

Vector Layer

- Cut/Copy - moves the layer in the tree list
- Save - saves the edited layer
- Save as - saves the edited layer into a new file or as a new layer in an existing file
- Remove - removes the layer from the view
- Rename - renames the layer in the tree list
- Layer Manager - specify layer properties (i.e. Layer Visible)
- Selectable - sets whether the user can select shapes from the current layer
- Select all shapes - select all shapes from the current layer
- Unselect all shapes - unselect all selected shapes from the current layer
- Overview of layer - fits selected layer into the view area
- Color - sub-menu allows the user to choose a predefined color or create a color for the entire layer

- Representation editor - gives access to representation editor for thematic mapping
- Legend items - turn legend items off and on
- Attribute Manager - opens the spreadsheet function, viewing the attribute table for the selected layer
- Properties - shows the layer properties, including file information and what type of representation is applied

A menu also appears when a right-click is done without any layer being selected. The options provided in this menu include:

- Paste
- Save Project/Save Project As - to save the current set-up as a Geomatica project file (.gpr)
- Open - opens any GDB supported file format into the current view
- New Project - clears the current view to start a new project
- New Map - allows the user to create another map view in the current project
- Layer Manager

LEGEND in MAPS Tab

This feature is set by default under Tools->Options->General Interface menu and selecting the "Legend in Maps Tab" checkbox.



Vector layer legend in MAPS Tab tree list showing counties within the state of California, USA

The displayed layers are represented in a legend tree list. The legend itemizes the representation and is unique for the type of layer selected as follows:

Vector

- Shows the legend entries for all the representation that is being used for that layer. For an RST all of the repcodes that are present in this layer are listed.

RGB image layers

- Shows a color ramp for each band and shows the range of raw pixel values in that layer.

Greyscale

- Shows a grey ramp along with the range of raw pixel values.
- If the layer is represented using thematic display, then each class in the GTD file will be shown.

Pseudocolored

- One entry for each range in the PCT. If the layer has metadata specifying the legend items, then only those will be shown.
- If the layer is represented using thematic display, then each class in the GTD file will be shown.

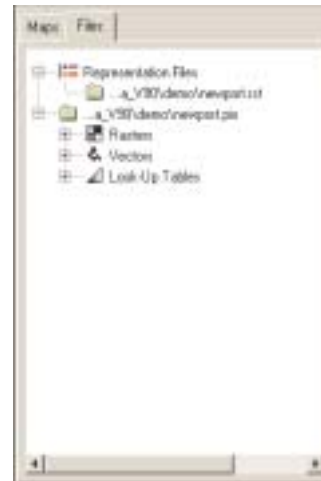
Bitmap

- One entry showing the color of the bitmap and optionally a description of the bitmap.
- If the bitmap is represented using thematic display, then there will be two legend entries.

These layers can be turned on and off by selecting the Legend Items option from the context menu, available from a right-mouse click in the Maps tab.

FILES Tab

This tab contains the information about all of the files that have been loaded into a project. Each file is listed, along with all of the layers within those files.



Files Tab

A right click without selecting a layer in the tree list will open a menu. Which allows users to Add a file to the current project, launch the Data Merge wizard or access the Utility functions, such as Import, Link, Export, Reproject, and Clipping/Subsetting.

In the FILES tab, there is a right-click context menu associated with every item.

Files

For files, this menu includes:

- Save - to save the entire file with any edits that have been done
- Translate - options for translating the file into any other GDB supported file format
- New - sub-menu allows the user to add different layer types to the selected file
- Remove - allows the current user to remove the file from the current project
- Delete - removes the file from the project and deletes the file on disk

- Build overviews - allows the user to build overview layers for faster rendering of data in the application (note that this option from the File menu will build pyramids for all layers in the file)
- Delete overviews - allows the users to delete any pyramids that may exist in the file
- Algorithm librarian
- Properties - opens the properties panel for files, which contains a number of tabs, including:
 - General Tab - contains information about the path to the file, the type of file and the size of the file
 - History Tab - contains a listing of the operations that have been done to this file
 - Metadata Tab - contains any metadata available for this file
 - Projection Tab - lists the projection information for the file, including the projection, datum, and corner coordinates

For each layer type, there is also a right-click context menu. Each of the layer types is described below.

Image Layers

- Save - to save the layer with any edits that have been completed during the session
- Delete - removes the layer from the file
- View - automatically loads the layer to the view area and places the layer in the current area in the MAPS tree list.
- Attribute manager - opens the Attribute Manager if this layer has attributes associated.
- Export (Save as) - for saving edited layer into a new file or as a new layer in an existing file.
- Histogram stats - opens the histogram panel for the chosen layer.
- Build overviews - allows users to build overviews for the chosen layer. (Overviews are used for faster rendering of data in the application.)
- Delete overviews - allows the users to delete any pyramids that may exist for the chosen layer
 - Properties - contains three different tabs of information:
 - General Tab - lists general information about the selected channel, including description, data type, and disk size
 - History Tab - shows the processes that have been run on this particular image channel
 - MetaData Tab - Lists any meta data that has been created for this image, such as a default LUT segment to be applied or a default background value, etc.

Vector Layers

- Save - to save the layer with any edits that have been completed during the session
- Delete - removes the layer from the file
- View - automatically loads the layer to the view area, and places the layer in the current area in the MAPS tree list
- Attribute Manager - Opens the spreadsheet function, viewing the attribute table for the selected layer
- Export (Save As) - for saving edited layer into a new file or as a new layer in an existing file.
- Properties - contains four different tabs of information:
 - General Tab - lists information about the vector layer, including short name, description, entity, count, and vector layer type

- History Tab - shows the processes that have been run on this particular layer
- Metadata Tab - lists any metadata that has been created for this layer
- Projection Tab - lists the projection information for this particular layer
- Edit combined layers

Other layers

(i.e. Look-up tables, Bitmaps, Psuedo-color tables, GCPs, Signatures, Text)

- Save - to save the layer with any edits that have been completed during the session
- Delete - removes the layer from the file
- View - will either load the data to the current view (bitmaps), or open the data in a text viewer (GCPs, text). May not be available for all layer types.
- Export (Save As) - for saving edited layer into a new file or as a new layer in an existing file
- Properties - contains 3 different tabs of information:
 - General Tab - lists information about the name and description of the layer
 - History Tab - shows the processes that have been run on this particular layer
 - Metadata Tab - Lists any metadata that has been created for this layer

D - VIEW AREA

The View area contains the actual data that has been loaded. Within this area, a user can use the system cursor (typically a cross-hair) to place the cross-hair cursor where they want within the data they have loaded. The resulting position, image value(s), or vector ID will be displayed in the message bar at the bottom of the window. The information that is displayed also depends on what layer is currently selected in the MAPS tree list. If an image layer is selected and the selection tool is enabled, the vector layer name, entity ID, and length will be displayed.

For some of the functions in the toolbar, the cursor location in the view area controls what image should be affected. If a user has two images loaded to the window, the top image over which the cursor is positioned, is the one that will be affected should the user select an enhancement. In addition, if the user decides to zoom in to 1:1 resolution, they will do so based upon the image visible where the cursor is located.

View Modes

In the Focus viewing environment, there are two view modes, Area mode and Map mode.

Area view mode shows the data in the full extents of the view area. In this mode, no cartographic elements are shown, just the geospatial data that has been loaded.



Area View Icon

Map view mode shows the data, as it will be printed out on a piece of paper. The size of the paper is controlled by selecting the map layer in the tree list and choosing the properties option. In this panel, there is a tab for paper size.



Map View Icon

Added cartographic *surround* elements (scale bars, legends, and north arrows) will now show up in the view.

At any time, the user can switch back to Area mode, where they are now viewing data for a particular area rather than an entire map composition. The cartographic elements will not be displayed in this mode, but they are still active in the project.

The different view modes make it simple to do analysis work and create cartographic output, all in the same interface.

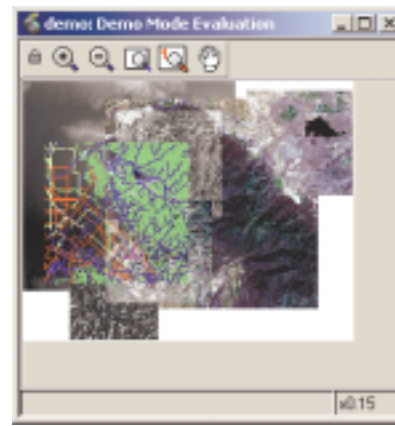
A menu also appears when a right-click is made in the view area. The options provided in this menu include:

- Clone view - creates a secondary viewer window
- View map - allows users to view a selected map from the Maps tree list
- Zoom to - which allows selection of the following:
 - Zoom to Overview
 - Zoom In
 - Zoom Out
 - 1:1 Image Resolution
 - Zoom Percent
 - Named Region
- New Shapes - which allows selection of the following:
 - Points
 - Line
 - Polygon
 - Rectangle
 - Ellipse
 - Trace
 - Raster seeding
- Cut/Copy/Paste
- Vector Editing
- Set RepCode

Secondary View Windows

In the Geomatica viewing environment, there are two different types of secondary windows available.

View -> Zoom Window - this option creates a secondary viewer window that can be used to create different views of the same data sets. For example, if someone wishes to zoom in within one window and leave the second at overview zoom level, they can do so with this function.



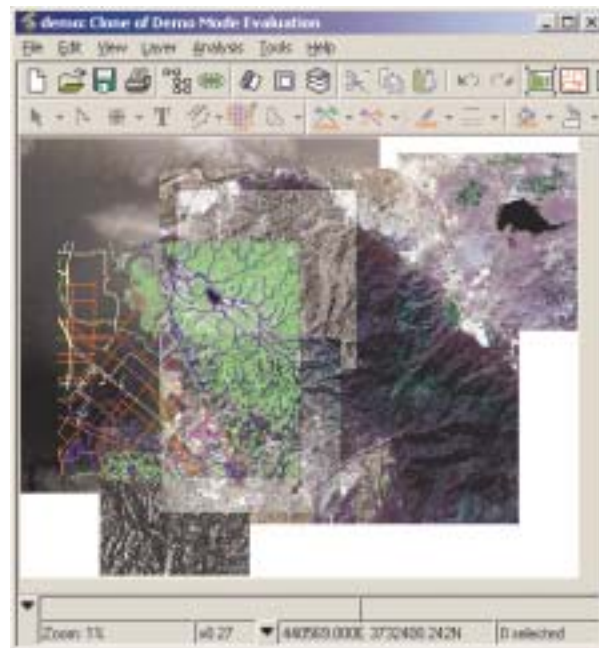
Zoom View Window

Once the second window is open, the user can lock the window's position by selecting the Lock Window Position icon in the tool bar.



Lock Window Position Icon

View -> Clone View - This option creates a secondary viewer window, which can be used to create a completely different layer view from the main window.



Clone View Window

When the clone window is opened, a copy of the entire map from the main window is created in a separate window excluding the tree list. The user can then reorder the layers in the original view, and thus look at different data sets in the two windows.

Once the Clone View Window is open, the user can link the cursor in the two windows by selecting the Link Windows icon in the tool bar.



E - OVERVIEW WINDOW

An Overview Window has been added to the Focus viewing environment for version 9.0. The Overview Window is located to the left of the View Area under the Maps/Files tree list.

When the user opens image data in Focus, the Overview Window shows a smaller version of the image in the Focus View Area. The Overview window has a bounding outline that the user can use to control the view in the View Area. Users can resize the bounding outline and zoom the View Area image.

F - STATUS/MESSAGE BAR



Status/Message Bar

The Status Bar

The message bar at the bottom of the interface displays particular values based on the location of the cursor. These include:

- **Location coordinates** - can be any of the following units (if georeferencing is properly applied to the data)
 - Paper (mm)
 - Raster (pixels/lines)
 - Geocoded (projection)
 - Geographic (Lat/Long)
 - MGRS (US military grid reference system)
 - Screen (based on window size)
- The user can select the units desired by selecting the second down arrow in the message bar.
- **Image layer value(s)** - If an image layer is selected in the Maps tree list, the gray level values of that layer will be displayed in the message bar for the cursor location. This includes the three values for an RGB layer or one value for a BW or Pseudocolor layer.
- **Vector ID** - If the user is in vector selection mode, and a single vector is selected, then the following information is displayed about that line: layer name, ID number and length of the line. If the user selects multiple entities, the number of selected lines is displayed.
- **Zoom factor** for the current layer
- **Approximate scale factor** that is calculated based on an assumed screen size
- **Hint text** for the icons in the toolbar. As the cursor passes over the icon, the hint text is displayed.

- **Progress Monitor** - Appears when longer running processes are ongoing. (left side of status area)

All of these options can be turned on or off using the first down arrow in the message bar. That way the user will only have the information they desire displayed.

VIEWING ENVIRONMENT - TOOLS

LOADING DATA

Geomatica Viewing Environment utilizes the GDB technology for directly reading raster, vector, and other information from an extensive list of supported file formats. This offers the advantage of quick and direct access to data, while eliminating the need to reproduce files since no conversion is necessary.

For a list of supported formats, please see the GDB Technology Technical Specification sheet.

Data of any bit depth, size, or resolution can be read into a single viewing window (as long as the projection information is correct).

Imagine being able to view all of your data in a single viewing environment without having to resample the data to a single resolution. All layers can be viewed at their own resolution at any time.

PROJECT FILES

Geomatica utilizes project files. Within the application, one can save a project and also open up an existing project.

Projects are a collection of links to data files with references to the way data from those files is currently being viewed. This includes the order in which Geomatica displays the layers, and any enhancements that have been applied to the imagery.

A project is a way of saving information and being able to distribute it to others so they can see exactly what you are seeing (data files must be sent as well). They are also handy because you do not have to start from scratch again the next time you start Geomatica. You can begin where you left off.

DATA MANAGEMENT TOOLS

IMPORT/LINK

Under the FILE->UTILITY menu, there is an option for Import and also one for Link. These two tools allow users to import their data into PCIDSK format., and also the ability to create a file interleaved PCIDSK format file by linking to the existing files.

CLIPPING/SUBSETTING PANEL

Selecting the "Clipping/Subsetting" option from the TOOLS menu option allows the user to create a new subset database derived from selected layers and other information sampled from an existing source file. Users may select from a variety of output formats.

There are 4 areas to the subset panel:

A: Input file selection area

Here the user can select the input file.

B: Available layers area

This is where the user selects the layers from the input file that they want subsetted to the output file. Any number of layers can be done at once.

One helpful capability of the subset panel is the ability to create a script that will subset a single file into a group of smaller files, the size of which is determined by the script.

C: Define clip region

This section allows the user to select the clip or subset area they want to use based on the extents of the input file. They can do this visually by displaying a preview and then using their mouse to drag the box in the thumbnail window. They can also enter the coordinates manually in the provided text boxes.

Different methods can be defined for the selection of the clip or subset region, including:

- User defined co-ordinates
- Select a file
- Select a clip layer
- Select a named region



Clipping/Subsetting Panel

Different reference systems can be used for the selection of the subset area, including:

- Database corners (pixel/line of upper left and lower right corner)
- Geocoded corners (projection coordinates of corners)
- Long/Lat corners (long/lat of corners points)
- Database offset/size (pixel/line of upper left with width and height in pixels/lines)
- Geocoded offset/size (projection coordinates of upper left and width/height)

An option to create tiles from the input file is also available.

D: Output file selection area

Here the user can select the output file name and the output file format. The Output file selection area also offers users to specify No Data Values or create an Output Clip Boundary Vector layer.

REPROJECT PANEL

Selecting the "Reprojection" option from the TOOLS menu option allows the user to reproject an existing file, thus creating a new file with the same data in a different projection.

There are 3 areas to the reproject panel:

A: Source and destination file selection area

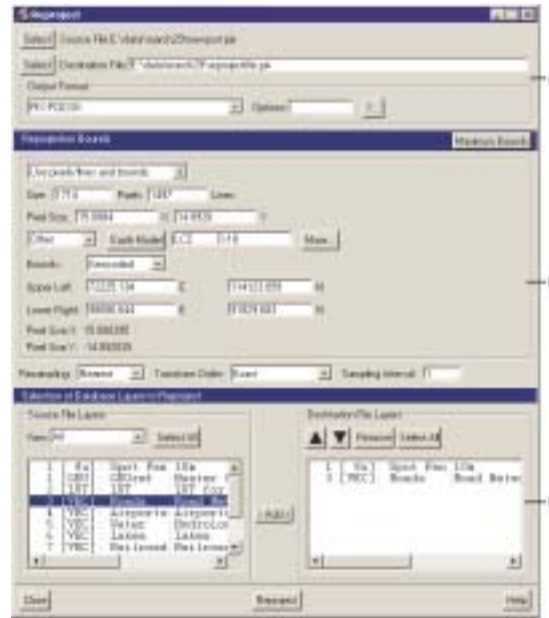
Here the input and output files are chosen, along with what format file the user wants to create.

B: Reprojection bounds area

In this section, the user must select the type of bounds to use:

- Pixels/lines and bounds varies the pixel size to create a file with the pixel, lines and bounds values that the user selects.
- Pixel/lines and resolution varies the bounds based on the resolution of the source file.
- Bounds and resolution allows the user to input file size in pixels and lines and to set the pixel size.

The user will then select the projection they wish to reproject to, setting up the projection parameters as prompted by the system.



Reprojection Panel

Then select the Resampling and Transform orders.

Resampling options include:

- Nearest
- Bilinear
- Cubic

C: Selectable Layers area

This is where the user selects the layers from the input file that they want in the output file. Any number of layers can be done at once.

TRANSLATE (EXPORT) PANEL

The Translate (Export) panel can be accessed by choosing the FILE/UTILITY -> TRANSLATE option. This panel will allow users to translate a file from one format to another. Neither the source or destination file has to be in PCIDSK format.

The Translate panel consists of three sections:

A: Source and destination file selection area

Here the input and output files are chosen. The select buttons allow the user to browse their file system.

B: Format selection

The user can choose from any of the GDB supported formats.

For a list of supported formats, please see the GDB Technology Technical Specification sheet.

There is also an options box available in this section. Some formats have different options associated with them. By selecting the "?" icon, one can see the available options for the selected format. For example, a TIFF file can be compressed using any one of five different methods.



Translate (Export) Panel

C: Selectable layers area

This is where the user selects the layers from the input file that they want in the output file. Any number of layers can be done at once. When a particular format is selected, only the layers that are applicable to that format will be available from the input list. For example, if one is translating from PCIDSK format to Shapefile format, only vector layers will be available for selection.

CONVERSION ALGORITHMS

The Algorithm Librarian includes 20+ algorithms for data conversion. These algorithms enable users to convert existing data layers into new data layers utilizing a variety of output formats (i.e. RAS2BIT - Converts a raster layer to a bitmap layer).

INFORMATION TOOLS

NUMERIC VALUES PANEL

The Numeric Values panel contains a text display of the digital values in one or more image layers, centered on the current cursor position. This panel can be accessed from the icon on the toolbar or from the LAYER pulldown menu.



Numeric Values Icon

The panel will display raw or enhanced data values.



Numeric Values Panel

The numeric values panel can be opened for one image layer while the user investigates another layer. This is a very handy tool for completing image investigation.

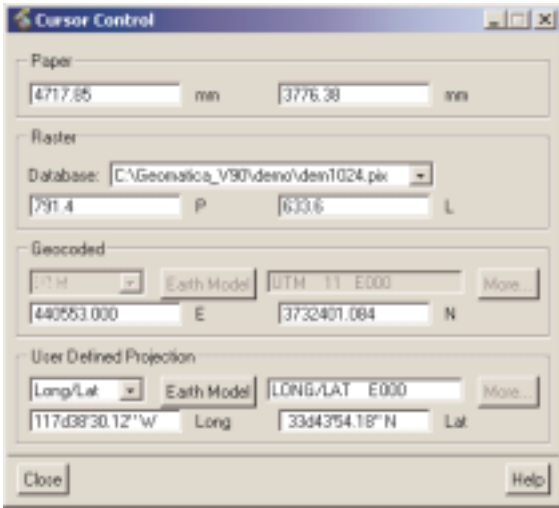
CURSOR CONTROL PANEL

The Cursor Control panel available from the icon toolbar allows the user to view the different coordinates of the cursor location all at once. The coordinates shown include paper, raster, geocoded (based on the selected file), and user-defined (default is Latitude/Longitude).



Cursor Control Icon

This panel can also be used to place the cursor at a particular location using any of the displayed coordinate systems.



Cursor Control Panel

For the user-defined section, one can choose any of the supported PCI projections.

For a list of supported projections, please see the Georeferencing Technical Specifications sheet.

INFORMATION REPORT

Display the individual attributes of selected vectors or the uppermost raster layer (whatever is under the cursor) with the Information Report. You can view and edit the attributes in the Information Report Panel. Changes to representational attributes are shown automatically in the view area. To open the Information Report panel select from the Icon Toolbar, the Information report icon.



Information Report Icon



Information Report Panel

ANALYSIS TOOLS

NAMED REGIONS

Create a custom view of your map or image with the Named Regions tool. When you create and open a Named Region, the Viewer roams

and zooms the Named Region making it fit into the Focus viewer. To open the Named Regions dialog box:

- In the View menu, click Named Regions.
- You can also click the Named Regions icon on the Icon Toolbar.



Named Regions Icon

When adding a new Named Region, you must define the boundaries of your new region using either the zoom tools on the Focus toolbar, or by using the Advanced features of the Named Regions panel.

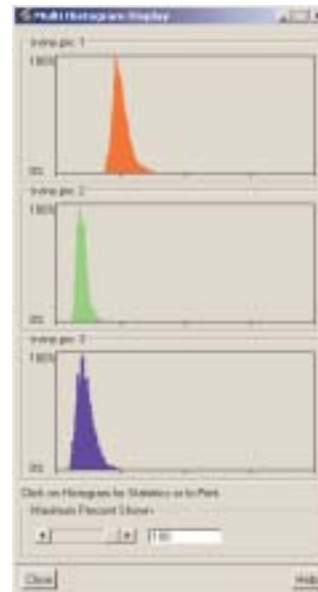


Named Regions Panel

MULTI-HISTOGRAM DISPLAY

The first panel shows an overview of the histogram for the number of images in the selected layer (3 for RGB, 1 for BW). By clicking on one of the histograms, a more detailed panel opens with the following:

- Horizontal dimension represents the gray level values from the minimum on the left to the maximum
- Vertical dimension is the frequency of each value in the selected layer



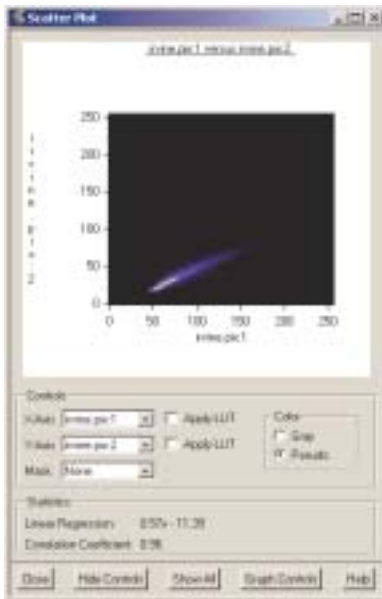
Multi Histogram Display Panel

The panel displays the statistics including the mean, median, standard deviation, minimum value, maximum value, and the number of pixels for the entire selected layer.

Allows the user to select the minimum and maximum gray levels, and the minimum and maximum occurrence count on the histogram. The selected histogram can be printed in PostScript or ASCII, or exported out to a text file.

SCATTER PLOT

The Scatter Plot operation is primarily used as a data visualization tool. It allows the user to instantly see where the majority of data values (or pixels) are concentrated.



Scatter Plot Panel

The Scatter Plot operation takes two specified image channels and displays a scatter plot of the pixel distributions, with one channel used as the x-axis and the other as the y-axis.

The Statistics Area displays the linear equation for derived from a linear regression calculation and the correlation coefficient associated with the scatter plot.

The selected plot can be printed in PostScript or ASCII, or exported out to a graphic file format, such as BMP or TIFF.

PROFILE WINDOWS

The profile Viewer allows for viewing of the profile of the currently loaded images using the currently selected vector. It consists of two main panels:



Profile Graph Panel

The profile graph panel that shows the input channels plotted with the gray values on the y-axis, and the distance along the vector on the x-axis.

The x-axis is measured in meters, and represents the distance between the end points of the vector. The range of the x-axis depends on the length of the vector and the scale of the area or the ground distance covered by the image.

There are two mensuration bars, which control the values in the mensuration area of the dialog box. These allow the user to measure between any points along the profile line.

The selected profile graph can be printed in PostScript or ASCII, or exported out to a graphic file format, such as BMP or TIFF.

Sample	Channel 1	Channel 2	Channel 3	Pixel Size	X Position	Y Position	Distance
1	46	27	36	594	428073	370863	878
2	46	27	36	594	428183	370863	878
3	46	27	36	594	428303	370863	878
4	46	27	36	594	428423	370863	878
5	47	27	36	594	428543	370863	878
6	50	25	34	594	428663	370863	878
7	52	25	34	594	428783	370863	878
8	55	27	34	594	428903	370863	878
9	55	27	34	594	429023	370863	878
10	56	25	34	594	429143	370863	878
11	57	27	34	594	429263	370863	878
12	59	25	34	594	429383	370863	878
13	56	27	34	594	429503	370863	878
14	57	25	34	594	429623	370863	878
15	50	27	34	594	429743	370863	878
16	57	25	34	594	429863	370863	878
17	57	25	34	594	429983	370863	878
18	56	25	34	594	430103	370863	878
19	55	27	34	594	430223	370863	878
20	57	25	34	594	430343	370863	878
21	57	27	34	594	430463	370863	878
22	54	25	34	594	430583	370863	878
23	47	25	34	594	430703	370863	878

Profile Table Panel

The profile table panel lists numeric information for each sample point along the current profile. A sample point is a pixel. The spacing is determined by the pixel size. The range depends on the length of the vector and the image scale. The table contains the following information:

- Sample number depends on the length of the vector and the size of the pixels.
- The first set of channels or columns contains the gray level values of the currently selected layer(s).
- The position of the sample point in pixel/line coordinates.
- The georeferenced X position of the sample point.
- The georeferenced Y position of the sample point.
- The distance in meters relative to the first sample point.
- Note that the table of values can be exported to a text file.

FILTER

The Filter dialog box is used to enhance or subdue the details of the active image in the MAPS tree. The dialog box is used to provide different filter operations on an image. A filter can be used to sharpen, smooth, or detect edges that are present in an image.



Filter Panel

Some of the filters supported include Average, Gaussian, Median, Mode, Gamma, Edge Detector, Laplacian, Sobel, and Prewitt. There is also an option for creating user defined custom filters.

The filters can be applied in two different ways:

- Apply to view - filters currently loaded data on the fly. The filter will be reapplied everytime the view is changed.
- Apply to file - this option will filter the entire layer on disk, creating a new filtered layer, which the user can output to the file of their choice.

VECTOR DATA TOOLS

ATTRIBUTE MANAGER

The Attribute Manager table allows for viewing the attribute data of the selected layer. To open this panel, select a vector layer in the MAPS tree list and then choose the Attribute Manager option in the LAYERS pull-down menu, or use the "open the Attribute Manager icon in the toolbar.

Name of	length	class	elevation
0	0.528	1740322	1803
1	0.934	1700309	1804
2	0.948	1700309	1804
3	0.207	1700309	1804
4	0.198	1700309	1804
5	0.097	1700309	1804
6	0.083	1700309	1804
7	0.069	1700309	1803
8	0.152	1700309	1804
9	0.627	1700309	1804
10	0.224	1700309	1804
11	0.198	1700309	1804
12	0.307	1700309	1804
13	0.268	1700309	1803
14	0.827	1700309	1803
15	0.708	1700309	1804
16	0.198	1700309	1804
17	0.938	1700309	1804
18	0.135	1740322	1803
19	0.257	1700309	1804
20	0.448	1700309	1804

Attribute Manager

This attribute table includes many functions typically found in spreadsheet tools.

Functions include:

- Find capability to search for particular values
- Ability to change view to single record or table style
- Choice of viewing all data or only the selected data
- Functionality for sorting based upon a particular attribute or multiple attributes, in either ascending or descending order
- Ability to select a particular record and have it highlighted in the view area, as well as having selections in the view area highlighted in the spreadsheet
- Capability to build complex queries based upon the attribute data (query by example)
- Print to file
- Adding and deleting records
- Adding and deleting fields
- Computing new fields based on existing fields
- Zoom to selected shapes after the selection is performed in the attribute manager
- Table join is available, which links attribute tables based on like attributes. In addition, the table is linked with the main view area. When vectors are selected in the view area, they are highlighted in the attribute table (if opened). Conversely, when a record is selected in the table, it is simultaneously highlighted in the view area.

DISSOLVE

Merge features with common attributes that meet your specific requirements using the Dissolve command. To open this panel choose the Dissolve option in the Tools pull-down menu.

Based on the attribute or group, generate statistics using the following drop down function selections: First, Last, Sum, Mean, Min, Max, Mode, Median, Standard Deviation, Ignore, and Weighted Average.

You can use the Dissolve Attributes function on vector layers only. In some cases adjacency criteria are required. Vector layers do not have to be open in the current project.

Dissolve Attributes produces either a vector or thematic raster layer result. When the dissolving is completed, your output is added to the FILES tree list. You do not need to add new layers to the MAPS tree list.



Dissolve Panel

BUFFER

Add buffer polygons, around specified objects in your input data based on their location. To open this panel, choose the "Buffer" option in the Tools pull down menu.



Buffer Wizard Panels

Use the Focus Buffer Wizard to create buffer zones. Options include:

- Buffer Distances option, select Simple, Current Display or Attributes and specify the buffer levels and units to be used.
- Specify the type of buffer to display based on Vertex, Line or Polygon options
- Create Buffers for both vectors and polygons.
- Vector layers do not have to be part of the current project.
- When vector buffering is complete, the output is added to the FILES tree list.

OVERLAY

The Overlay Wizard offers users three overlay options:

Spatial Overlay

- One output based on many vector and/or thematic raster inputs

Statistical Overlay

- Compute statistics by virtually overlaying two layers

Suitability Overlay

- Create one raster layer showing suitability of the many input raster layers



Overlay Wizard

AGGREGATE ATTRIBUTES

Show summary statistics for an attribute table with the Aggregate Attributes panel. To open this panel, choose the Aggregate Attributes option in the Tools pull down menu.



Aggregate Attributes Panel

- Based on the pixel value or area, generate statistics using the following drop down Function selections: First, Last, Sum, Mean, Min, Max, Mode, Median, Standard Deviation, Ignore, and Weighted Average.
- The Aggregate Attributes function is similar to the Dissolve Attributes function. Although they perform the same operation, the Aggregate Attributes function produces a tabular result while the Dissolve Attributes produces either a vector or thematic raster layer result.
- Aggregate Attributes can be used only on layers with a currently opened attribute table.
- Aggregate Attributes are displayed in a new spreadsheet window that exists in memory only.

SPATIAL QUERIES

For vector data, spatial queries can be accessed from the icon toolbar.

Possible queries include:

- Fully Within
- Partially Within
- Within Distance
- Fully Within Distance
- Crosses
- Contains
- Query By Example (QBE)

DISPLAY STYLES

Within the Geomatica Focus, there are multiple ways to display vectors. These methods include:

Default Representation

There is a default representation automatically applied to each Vector layer when it is opened. This type of representation is simple and is used when no other representation style is applied to the layer.

For this type of representation, the default color is unique to each layer. In addition, this representation is project specific, that is, it is saved in the Geomatica Project file (*.gpr) and is not portable.

The Default Representation can be customized using the Style Selector. The Style Selector can be accessed by selecting Options from the Tools menu. From the options panel, select Default Representation from the treelist, then select Point, Line, or Polygon.



Style Selector

Internal Representation Mechanism (IRM)

For IRM, the vector representation is stored internally in the PCIDSK file. This is a simple representation and is controlled by the Representation Editor.

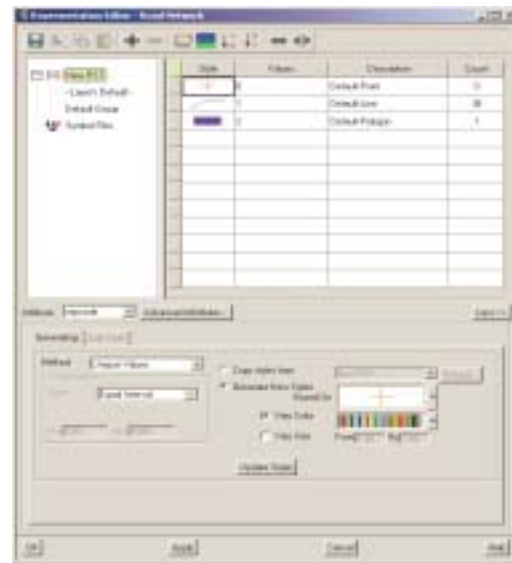
The Representation Editor can be accessed by right-clicking the active layer and selecting Representation Editor from the context menu. Colors can also be changed by selecting Color and desired representations can be saved by selecting Save or Save As from the context menu.

This type of representation is restricted to PCIDSK files only, and the representation cannot be separated from the PIX file or used with another project or file.

Representation Style Table (.rst)

This is the method used most often for complex map production. It is a complex representation that uses a multi-part RepCode. The RST representation is portable from any Map or Project to any Map or Project. It can also be linked to any GDB supported vector format, not just PCIDSK.

The Representation Editor panel can be opened by right-clicking on the active layer within the MAPS tree and selecting the Representation Editor option.



Representation Editor Panel

An RST can be created or modified by right-clicking the RST from the treelist within the Representation Editor Panel.

EDITING TOOLS

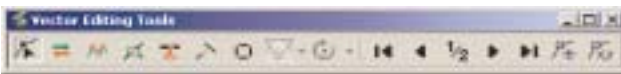
There are a series of tools that can be used for editing any layer that has been loaded into the Geomatica Viewer area. This includes image, vector, and bitmap layers. These tools can be accessed from the icon toolbar, as shown below. For image and bitmap layers, these tools are only available if the zoom level of the data in the view is 1:1 or greater.



Editing Tools Toolbar

The tools in this section of the toolbar include:

- Selection tools, discussed earlier
- Vector editing tools, for opening auxiliary toolbar as shown



Vector Editing Tools Toolbar

This toolbar includes these vector editing tools:

- Find
 - Reverse
 - Add Vertices
 - Join
 - Split
 - Extend
 - Merge
 - Mirror Tools
 - Rotation Tools
 - Start Node
 - Previous Vertex
 - Midpoint of Segment
 - Next Vertex
 - End Node
 - Show Vertices
 - Vertices
- Line drawing tools - Included in the pull down are tools for freehand tracing and adding points.
 - Shape drawing tools - Includes tools for drawing squares, rectangles, circles, ovals, polygons, and also a tool for seeding a polygon.
 - Text editing tool - Allows user to place text in a vector layer. With RST attached to a vector layer, a more complex text tool is enabled.
 - Erase tool - for erasing edits in bitmap layers and classification sessions.
 - Raster editing - setting fill, pixel values, line width
 - Spatial query, discussed earlier

When editing layers, the display toolbar can control the color, line style, thickness, fill color, fill pattern, font color, font, and point symbol being used.



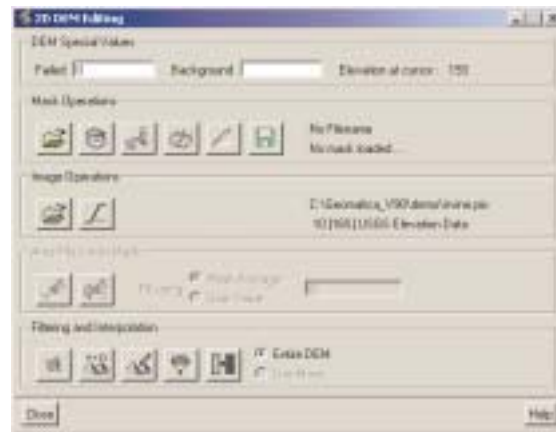
Display Tools Toolbar

When editing an image layer, please keep in mind that the color selected from the display toolbar is the “non-enhanced” value. This means that it may not show up exactly as selected in the tool when drawn in an enhanced image.

When editing a vector layer with an RST attached, there is a tool available from the menu system for controlling the RepCode being used. This is the Edit->Set RepCodes option.

DEM EDITING

2-D DEM editing is available from the Analysis menu. This option allows the user to carry out some simple editing procedures specifically designed for 8, 16, and 32-bit elevation data.



2D DEM Editing Panel

The panel enables the user to apply functions under a mask area, or to apply the functions to the entire layer.

Once a mask is created, the user is able to fill the area under that mask using the average value or a user-defined value.

Filtering and Interpolation functions available on the 2D-DEM Editing panel include:

- Remove noise
- Erode holes
- Interpolation
- Median filter
- Smooth DEM

Each of these functions runs on a disk level, meaning the result will be stored in another image layer. The user will be prompted to enter the layer when the a function is selected.

IMAGE CLASSIFICATION

Image classification is a fundamental part of image analysis and Geomatica Focus provides users with interactive classification functionality. All of the class information and setup is stored as metadata for the layers being used in the classification process. This enables the user to carry out a classification over a number of different sessions without losing any of the previous work.

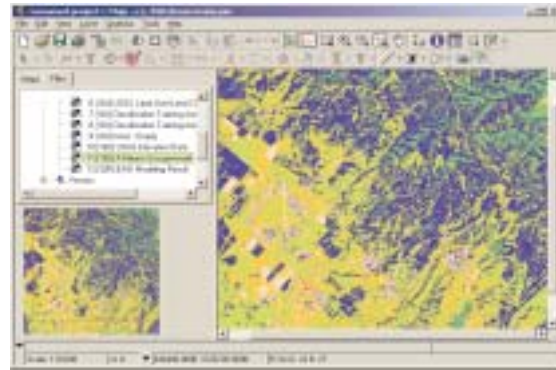
Within Geomatica Focus all of the layers being used in the classification process are grouped into a “meta-layer” in the tree list. This organizes all of the necessary layers into one place in the tree list. The “meta-layer” has a number of options available in a right-click context menu. These include:

- **Remove** - to remove the meta-layer from the view. (This also removes all the layers included underneath.)
- **Rename** - to rename the layer in the tree list
- **Configuration** - opens the session configuration panel, enabling the user to change the input, visible, training site, and output layers
- **Edit PCT** - allows the user to change the class colors using the standard PCT editing panel
- **Open training sites** - opens the training site editing panel
- **Run classification** - opens the panel for running the classification process using any of the supported algorithms
- **Utilities** - includes options for displaying the signature separabilities or classification preview
- **Post-classification analysis** - with options for starting any of the post-classification options, using the current configuration. (The “meta-layer” will change based on the type of action being undertaken.) The post-classification options include:
 - Accuracy assessment
 - Aggregation
 - Class editing
 - Class labeling

Image classification capability includes:

UNSUPERVISED CLASSIFICATION

- Isodata, K-Means (Minimum Distance) and Fuzzy K-Means unsupervised clustering (255 classes, 16 input channels).
- Specify a background value to be ignored during classification or the number of samples to collect on which to perform the iterative clustering.
- Use of bitmap possible to include or exclude areas for classification



K-Means Unsupervised Classification displayed in Focus

SUPERVISED CLASSIFICATION

- Parallelepiped and Parallelepiped with Maximum Likelihood Classification tie breaker (254 classes, 16 input channels).
- Maximum Likelihood Classification with optional null class.
- Minimum Distance Classification based on Euclidean distance (256 classes, 16 input channels).
- Use of bitmap to include or exclude areas for classification.
- Create signatures for a region under a mask using data from a set of image channels.
- Use of table for displaying class information, which makes all information fully editable.
- Training site editing, uses the same editing tools as discussed in the section above, including the polygon seeding function that helps to easily define training sites.

Class and Training Site Editing

Use the training site editor to create and edit your classes so you can use them to supervise your classification.



Training Site Editing Panel

The editing options include:

Value

- Specify class values

Name

- Provide a name for each class

Color

- Select a color to represent each class

Threshold

- Set threshold values to reduce the chances of pixels being classified into more than one class

Bias

- Weigh one class in favor of another to resolve overlap between classes

Imported Signature

- Import signatures to define training sites for classes. Signatures can be imported by right-clicking within the Imported Signature column.

Description

- Provide a description for each class

Opacity

- Specify opacity to enhance display of training areas.

The menubar offers three options:

1. Class
2. Edit
3. Tools

1. Class Menu

The Class menu includes:

New

- Create new classes

Import

- Import bitmap, vector, or signature segments to use as training areas.

Merge

- Merge classes

2. Edit Menu

The Edit menu includes:

Clear Selected

- Clear all training sites from any classes selected within the Training Sites Editing panel.

Clear All

- Clear training sites from all classes within the Training sites Editing Panel

Delete Selected

- Delete selected classes from the Training Sites Editing panel.

Delete All

- Delete all classes from the Training Sites Editing panel

3. Tools Menu

The Tools menu includes:

Signature Separability

- mean and standard deviation for each input channel under the class's training area mask
- correlation and covariance matrices

Scatter plot

- Data visualization tool that allows the user to instantly see where the majority of data values (or pixels) are concentrated
- Takes two specified image channels and displays a scatterplot of the pixel distributions, with one channel used as the x-axis and the other as the y-axis
- User can view results for the entire layer, or just for a selected class
- Class ellipses and means plotted with controls on a per class basis

Signature Statistics

- mean and standard deviation for each input channel under the class's training area mask
- correlation and covariance matrices

Histograms

- Creates a Signature Histogram panel showing histograms for the currently selected training site for each classification Input channel.
- Shows if the training site data is normally distributed or not

Classification Preview

- Allows the user to generate a preview of the classification using any one of the supported algorithms:
 - Maximum Likelihood
 - Maximum Likelihood with Null Class
 - Parallelepiped
 - Parallelepiped with MLC Tie Breaker
 - Minimum Distance
 - There is also an option to Show Training Sites
- Preview can be generated at any resolution

POST CLASSIFICATION ANALYSIS

A number of post classification analysis options are available. In the MAPS tree, right-click the Classification MetaLayer. The options include:

- Accuracy Assessment
- Aggregation
- Class Editing
- Class Labeling

Accuracy Assessment

- Generate area and percentage reports on classification results for the entire image, or a user specified sub area
- Confusion matrix reports
- Report of user's and producers accuracies, overall accuracy, and kappa statistic

Class Editing

- Edit or modify class signatures prior to classification

- Merge two class signatures to create a new class signature. Select the threshold, and the a priori probability for the new signature class
- Automatically merge signature pairs, which have the lowest separability among a set of signatures, until a minimum separability threshold value is reached

Class Aggregation

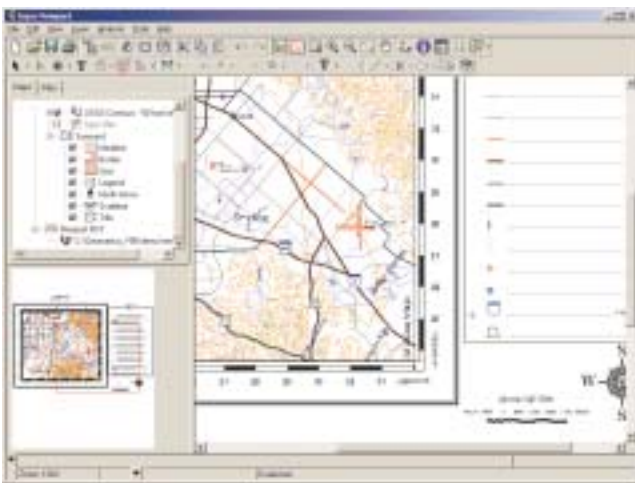
- Display upto 255 selected classes in different colors, group classes into aggregates
- Ability to edit the colors of classes, and change classes under graphic masks to another class
- Aggregation includes the ability to import class definition and the generation of pseudo-color tables is possible

Class Labeling

- Interactively view or modify the class information list associated with a particular channel
- Create, delete, import, and save classes in the class information list
- Allows editing of the value, name, color, and description of the class information list
- The class information list can be sorted in ascending order by value, name, color, or description
- Isolate which classes have a duplicate name or color by sorting
- Column headers for the Name and Color field containing duplicates will be displayed in red

MAP PRODUCTION

One of the most unique features of Geomatica Focus is the ability to create cartographic maps within the same environment that the geospatial analysis is carried out in. By simply switching from “Area” view to “Map” view, one can create and print a professional map.



Cartographic Map Production in Geomatica Focus

MAP PRODUCTION IN FOCUS

The properties of the map being produced are controlled by the properties of the map layer in the tree list. These properties include:

- Map Name
- Page Setup
- Default RST

Within a single map, there may be many different georeferenced areas. Each area can have a set of cartographic elements assigned to it. The surround elements can be created by right-clicking on the area in the tree list and selecting the “Surround” menu option. The following elements can be created:

- Neatline
- Border
- Grid - either georeferenced or paper coordinates
- Legend - for both imagery and vectors
- Logo - users can import their own logo quickly and easily
- North Arrow - 22 different styles are supplied
- Scalebar - 6 different styles supplied
- Title/Sub-title

Also available within Geomatica is the ability to index a legend. From the area right-click menu, the user can select the “indexation” option.

MAP PRINTING

The printing process can use Windows native printer drivers to send your map directly to a printer configured on your system. There are two selections of printing to choose from:

- **Print Map** - for full cartographic map production for:
 - Native Windows printing - Supported
 - Color Separation - Separates colors in a map into primary colors for professional commercial printing.
- **Print Map to File** - To print map composition to the following formats:
 - Adobe Illustrator (AI, EPS)
 - PCIDSK
 - TIFF
 - HP RTL
 - BITMAP
 - JPEG
 - Web Publishing (HTML)

ON-LINE HELP SYSTEM

PCI Geomatics is proud to include a new on-line help system, which utilizes your HTML/Web Browser system. This help structure will be simpler to use, providing a more modern system that includes screen snaps and automatic links.

The help system is accessed from the Help pull-down menu and selecting the General option, which starts at the top level of help. In addition, help is available by choosing the Help button found in many panels, which will open the help for that specific panel. From there

you will be able to access the help information for any of the features in Geomatica.

Also available from the HELP menu is:

- About Geomatica Focus
- Check For Updates
- PCI Geomatics On The Web, including:
 - Free Stuff
 - Product Information
 - Online Support
 - Best of the Web
 - PCI Partners
 - PCI Geomatics Home Page



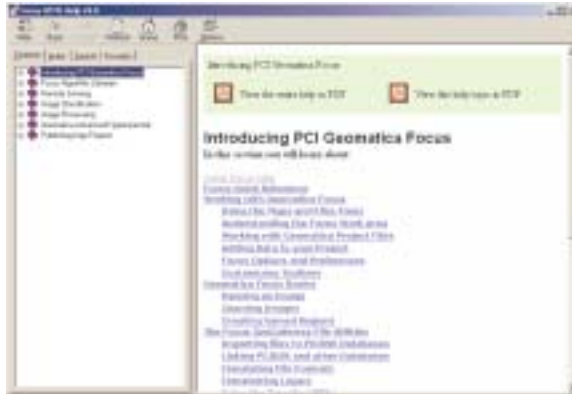
OrthoEngine Toolbar

OrthoEngine technology is included within Geomatica Fundamentals and Geomatica Prime packages. This functionality is expanded by specially sensor math models in the OrthoEngine Airphoto Models, Satellite Models, High-Resolution Models, and RPC-Generic Models packages, allowing orthorectification of air photos, digital camera frames, and optical and radar satellite imagery. Automatic DEM extraction is also available for selected stereo image pairs and 3D stereo viewing. Moreover, processing efficiency for large projects is improved significantly with Productivity Tools for chip database matching, automatic tie point collection, and automatic mosaicking. These features can be added to Geomatica, creating a package tailored to user requirements.

Project Setup

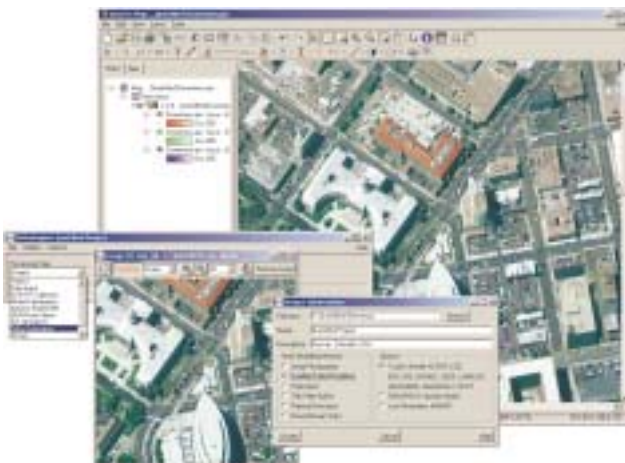
OrthoEngine's simple GUI allows easy project set-up and workflow management.

- Create a project file that will contain all project data.
- Delete an image from the project.
- Rename/move an image within a project.
- Automatic project backup.
- Set orthorectified image output format to PCIDSK, TIFF or GeoTIFF, or use the File Utility to export to another format.
- Set GCP and output projections. The user can input GCPs in multiple projections, and use a DEM in another projection.
- View and edit the georeferencing system, bounds, and projection definition for the data layers.
- A variety of datum's and ellipsoids are supported and extra ones can be added via a text file.
- *Ctrl/Shift* for multiple file import.



General Help Panel

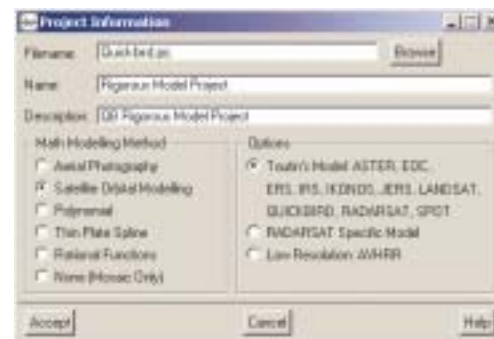
GEOMATICA ORTHOENGINE



Geomatica OrthoEngine displayed with Geomatica Focus

ORTHOENGINE TECHNOLOGY

Geomatica OrthoEngine provides an easy to use GUI for project set-up, GCP collection, and geometric correction/registration, DEM building and mosaicking of imagery. It provides the production management tools needed to begin, monitor, and complete projects with ease, including workflow, imagery, and vector data management and error reporting.



OrthoEngine Project Information Panel

GCP Collection

- Collect GCPs:
 - Manually
 - From Geocoded image files
 - From Geocoded vector files

- From a Chip Database file, including correlation
- Collect GCPs from digitizing tablet
- Import GCPs from text file
- Customize the colors of GCPs and tie points
- Given a georeferenced position, automatically estimate locations of new GCPs based in uncorrected imagery once a model has been established.
- Set point as GCP or check point
- Delete GCP from list
- Use previously collected GCPs in overlapping images
- The geocoded X,Y and elevation values of the existing GCP will be extracted and filled in automatically
- Enter uncertainty values for GCP ground position or elevation to control weighting
- When manually collecting GCPs with only "x,y" coordinates, the user may extract a "z" value from a DEM file

Image Layout Panel

- View relative layout of all project images
- Review distribution of GCPs

Residual Report Panel

- View residual errors for each GCP
- Set residual error computation to micron, pixel, or ground units
- Computed x, y, and z values can be viewed for GCPs (in ground units)
- Report summary statistics for overall project accuracy
- Save report to text file for project records or delivery to client

Import and Build DEM Information (add-on)

- Raster Digital Elevation Models (DEMs) can be generated from the following sources:
 - Raster files, such as DTED, USGS, DEM, or any supported raster format
 - Contours, points and break lines from any supported vector format
 - TIN models
 - 2D DEM editing tool is supplied
 - DEM can be used as input for GCP elevations or ortho generation



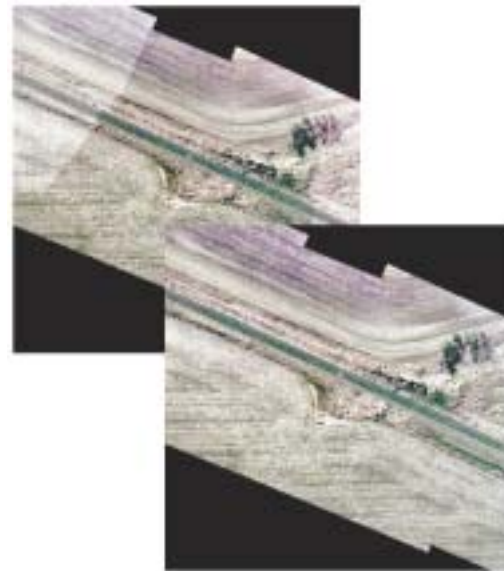
Use OrthoEngine to build DEMs from "contour" vector files

Image Correction

- Polynomial and Thin Plate Spline math models for geometric correction using GCPs
- Mosaic-Only option for assembling existing orthoimages or tiled image products without geometric changes
- Set up and schedule the production of geometrically corrected images
- Several images can be selected and then processed in batch mode
- Select output resolution
- Output bounds can be edited for the image being corrected
- Optionally delete uncorrected images to save disk space
- Adjust cache size to improve processing speed
- Resample using nearest neighbor, bilinear, cubic convolution, sin x/x algorithms or filter using average, median, Gaussian, or user-defined algorithms

Mosaicking

- Create a new output mosaic file or select an existing one from the disk. The user can define or view the current size and geographic extents of the mosaic file
- View the positioning of files relative to the mosaic area
- Manually select cut lines, and perform blending and color balancing on a per image basis
- Preview the effects of mosaicking without actually performing the operation to disk. Preview windows are updated interactively when you make changes to cut lines or LUTs
- User can select background color when creating mosaic file
- Reapply saved cut lines and LUTs to regenerate mosaic
- Clipping/Subsetting of output mosaic into smaller files (tiles)



Perform Blending and Color Balancing

Image Display

- View uncorrected or raw image data along with the clip region, tie points, GCPs, elevation match points, in an image window
- Display graphical overview of the relative positioning of the project images, and GCPs using the layout panel

- Enhance each image view with one of three enhancements: Linear, Equal, or Root
- Display full resolution subset, or select zoom factor
- Recenter the view on the current cursor location

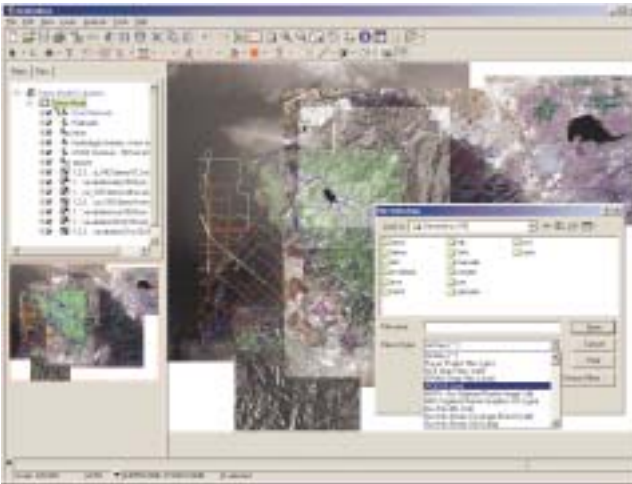
Project Report

- The "Project Report" panel is used to provide a text report of the project information:
- Easily customizable to include any of the following:
 - General information such as the filename and description
 - Information about the output mosaic such as its resolution and georeferencing
 - Information about the image such as the uncorrected and orthorectified filenames, the clip region, and the selected DEM file
 - Computed geometric model information
 - Ground control point information lists the GCPs collected on the image, with ground and image coordinates
- Save report to text file for project records or delivery to client

IMPORT/EXPORT OF DATA

GDB (GENERIC DATABASE) TECHNOLOGY

PCI Geomatics software uses GDB Technology to directly read and write raster, vector, and other information from an extensive list of supported file formats. This offers the advantage of quick and direct access to data, and eliminates the need to replicate files since conversion is no longer necessary.



GDB technology offers an extensive list of supported file formats

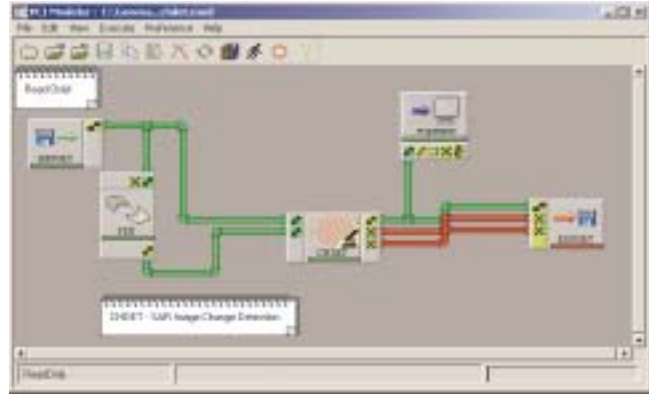
Supported Formats: See GDB (Generic Database) Technology Technical Specification Sheet

PCI VISUAL MODELER

PCI Visual Modeler gives professionals, even those with a limited programming background, the ability to develop sophisticated process flows. The intuitive visual-scripting environment allows these processing flows to be constructed via a simple "point-and-click" interface.

Main Panel

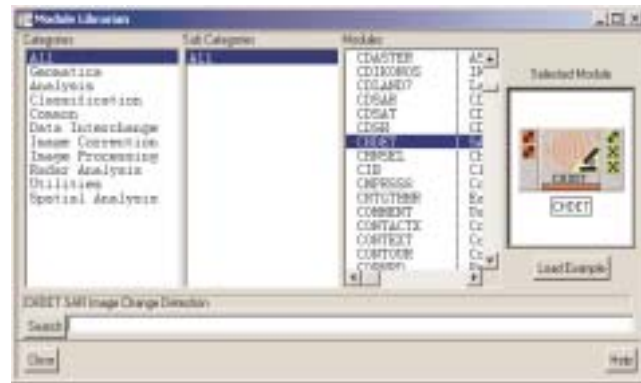
- Provides an interactive methodology for the creation of sophisticated data processing flows.
- Process flows have an easy-to-interpret flow chart look.
- Process flows can be saved in a device-independent format.
- Executed process flows can be stopped and started easily.
- Inspection of intermediate results possible via pipe caches.
- Ability to do batch execution of several process flows.
- Stand alone module execution is supported.
- All GeoGateway data types are supported.
- Full data rendering support (raster, bitmaps, vectors, etc.).
- Integrated on-line help facility to display information related to the help option/topic selected.



PCI Visual Modeler Main Panel

Module Librarian Window

- Over 275 processing modules categorized in an easy to navigate Module Librarian
- Example models (processing flows) are provided for each of the supported modules
- Module search capability
- Task description adjacent to each module



Module Librarian Window

Processing Modules

- Modules have unique icon groupings for clear task identification.
- Icons located over the input and output ports of a module help identify its data processing needs.
- Parameters within each Module's processing panel have intelligent defaults.



Module Control Panel

PCI Visual Modeler includes a broad spectrum of remote sensing and spatial analysis functions. These same functions can also be accessed via the Algorithm Librarian window in Focus. For a complete list of the tasks available, please see the Algorithm Librarian entry in this document.

PCI Geomatics acknowledges the support of the RADARSAT user Development Program of the Canadian Space Agency for partial funding of PCI Visual Modeler. We also acknowledge the technical support of the Canada Centre for Remote Sensing.

EASI PROGRAMMING LANGUAGE

EASI is a full-featured interpreted programming language. The command-line based interface and scripting environment provide the user with powerful tools for customization and programming.



EASI Command Window

- Support for scripting the Geomatica Viewer using Java, and COM supported languages such as MS Visual Basic.
- Support for object-oriented programming
- Error handling produces a numeric error code and corresponding textual error message
- Support for all PCI Geomatics command mode functions, with complete syntax documentation
- Perform data modeling through direct access to strings, projections, vectors, rasters, binary files and text files
- Define local or global variables. Variables types include:
 - Integer - 4 byte signed integer number
 - float - 4 byte single precision floating point number
 - double - 8 byte double precision floating point number
 - char - single character (1 byte)
 - byte - single unsigned byte

- string - arbitrary long string of characters
- mstring - multi-line string
- mvar - modeling intermediate array
- arrays
- Declare local or global pointers with dynamic memory allocation
- Use conditional statements (if, else, elseif)
- Create expressions (Numeric, string, mstring and logical), logical expressions include:
 - logical numeric expressions (= , < , > , <= , >= , <>)
 - logical string expressions (= , <> , literal string, string variable, indexed element of an mstring variable, character or character array variable, character parameter)
 - logical relations (and, or, not)
 - looping (while)
 - counted loop (for)
 - branching (goto)
 - returning (return)
 - stopping (stop)
- Build structures and functions.
- Modify command files in the Text Editor. Tools include: open, new, save, save as, execute, cut, copy, paste, clear.
- Specify your favorite editor as the default in the system settings
- The add-on Software Development Kit w/ GDB Technology can be used for user developed PACE programs using FORTRAN or C/C++

FLY!

FLY is a powerful terrain visualization tool, which drapes imagery and vectors over DEM data to create 3-D perspective scenes in near real-time. An intuitive point-and-click user interface enables you to control flight speed, direction, elevation and perspective parameters interactively during flight. With FLY you can quickly and easily view imagery in 3-D from any position or perspective! FLY also allows for rendering in anaglyph 3-D mode and includes fogging effects.



Fly!

3-D PERSPECTIVE SCENES AND REAL TIME FLY-THROUGHS

- Create a terrain using elevation data and color information from an image database file
- Full color - Three-color channels are required, one each for red, green and blue
- Gray level - One channel is required to specify the brightness

- 8-bit pseudo color - Only one channel is required. Use imagery such as 8 bit TIFF, BMP and SPANS files
- Specify a directional light source
- Save terrain renderings to an image file on disk in a variety of supported formats. Once saved to disk, rendered scenes can be imported or printed by other software packages
- True vector overlay - (all GeoGateway® vector formats are supported)



Fly! Toolbar

Options

Change Position/Speed/Direction

- Modify the viewing position as well as the speed and movement direction with user entered values

Change Render Size

- Specify the size of the rendering window with user entered values or by interactively resizing display. The minimum is 64 by 64. The maximum is 1024 by 768

Change Perspective

- Modify the perspective parameters of the rendered image with user entered values for 'Height Magnification' elevation, 'Horizon Tilt' degrees, 'Pixel Zoom' foreground pixels at low elevations, and 'View Cone' to exaggerate the effects of the perspective

Change 3-D

- Modify the parameters which control 3-D viewing with user entered values for 'Base Line' (specifies how far apart the left/right images are) and 'Focal Length' (specifies the focusing point in pixels)

Render mode

- Fogging - simulates a fogging effect in rendered scenes
- 2-D perspective color mode
- Anaglyph 3-D: Render frames which give an appearance of true 3-D depth by generating slightly different left and right eye views. The user must wear anaglyph glasses (glasses with a blue lens for the left eye, red for right) when viewing the merged stereo image
- SGI workstations, allows for full color true 3-D depth flight that can be played back. The following rendering modes are available:
 - *Stereoglasses*: Puts FLY! into color stereo mode. Special hardware liquid crystal stereoglasses are required to view in this mode
 - *Stereoglasses (expanded)*: The stereo view is expanded in both the vertical and horizontal directions to produce an image 4x as large as the regular stereoglasses mode

Control Panel

- Set and report parameters relating to the viewer position, direction, elevation and speed



FLY! Control Panel

Coordinates

- Choose a reporting system for position: Options:
 - Display: Position reported in pixels and lines in the loaded terrain
 - Geocoded: Position reported in geocoded units as eastings and northings
 - Geographic: Position reported in geographic units as longitude and latitude

Units

- Choose a reporting unit for distance and speed values. Options:
 - Metric: distance reported in m, speed in km per hour
 - Imperial: distance reported in ft, speed in miles per hour

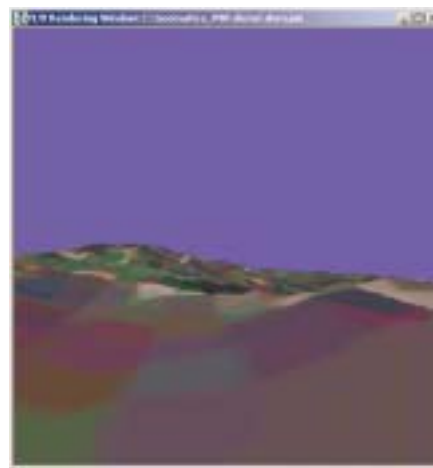
Speed Options

- Speed Maximum determines the range of speed values used. The minimum is always 0
- Scaling' determines the type of scale used to translate the range value to an actual speed

Rendering Window

Mouse buttons can be used to turn, pause/run, and change elevation quickly and naturally. The following button assignments are made:

- *Left button* - Turn. Changes the direction of viewing (and of movement). The new direction faces the position clicked on in the rendered image
- *Middle button* - Run/pause. User free flight is a special FLY! mode in which the viewer is continuously moving forward and toggles between pause (stop) and run (go)
- *Right button* - Change Elevation. Changes elevation proportional to the position of the mouse cursor in the vertical direction



FLY! Rendering Window

Elevation Options

- Set the viewer elevation with the following options:
 - 'Elevation Minimum' and 'Elevation Maximum' - determine the range of elevation values used
 - 'Scaling' - determines the type of scale used to translate the range value to an actual elevation
 - 'Mode' - dictates how the elevation value is actually translated into the viewer's elevation
 - 'No collision' mode, - the rendering height is never allowed to occur below the land elevation
 - 'Relative' mode, - the view elevation is the land elevation plus the value of the elevation scale
 - 'Absolute' mode, the elevation scale value is used directly as the rendering height



Fly! Flight Control Panel

Speed/Quality

Frames Per Second

- The distance, which the viewer advances, is based on the number of frames being generated per second and the specified flying speed

Rendering Quality

- Specify the quality of the images being rendered. Three options are available:
 - Blocky rendering mode: each pixel appears as a box with pronounced steps between pixels
 - Fitted rendering mode: the edges of the pixels are interpolated so they fit together without any step effects.
 - Smooth rendering mode: the edges of the pixels are interpolated so they fit together without any step effects and the colors of the pixels are smoothly blended

Flight Control Panel

- Create a flight path composed of several user-specified nodes. Nodes are selected on the nadir image
- Store the position, direction, and speed parameters as well as selected perspective parameters such as pitch, view cone, and zoom level for each node in a flight path
- The path is composed of a series of Bezier Splines made to fit through the nodes
- View the total length of the current flight path
- Edit nodes: Update changes the selected node to the current rendering parameters. Insert a new node. Add a node to the end of the current list. Delete a node. Clear all the nodes
- Play the flight back, with VCR-style controls (forward and reverse). Continuous playback mode can be used to cause the path to be flown repeatedly

Movie Loop

Choose from several movie formats. It is possible to write out the movie as a series of individual images (i.e., frames). TIFF, TARGA, BMP, PPM and JPEG format files are available. Report the number of frames that should be generated for each second of playback time in the final movie loop product

Parallax Movie Loops

- Generate Movie Loops in the UNIX versions of FLY! that are written to the Parallax JPEG movie format (a Parallax video card is required)

Nadir View

- Show the overhead (or nadir) view of the terrain. This window is approximately 512 pixels by 512 lines in size and shows a decimated overview of the data if the loaded imagery is larger than this size. The window dimensions will vary to maintain a 1:1 aspect ratio
- Current position is shown in the nadir view as a black and white marker. The extension on the marker indicates the current movement direction
- Zoom imagery in nadir window



FLY! Nadir Window

Mouse controls on the nadir view

- A left click in the nadir view will place the viewer at that location on the terrain
- A right click will change the move and viewing directions to point to that location
- A middle click changes the viewing direction only
- Toggle between views of the nadir terrain imagery or elevation

Nadir Options

- Show Path: the flight path is drawn in the nadir view
- Show Node Numbering: each node in the path is shown with its node number
- Path Color: flight path color can be changed
- Highlight Color: currently highlighted node color can be changed
- Path Resolution: Determines how many total line segments to use for drawing the splined path

Color Mixer

- Edit RGB colors in text fields with interactive selection menu

SPACEBALL (Only available on SGI platforms)

If a spaceball is attached to the workstation, it is possible to use it to maneuver through the image. Its usage is intuitive. Simply push the spaceball in the direction of movement: forwards, backward, left, right, up or down. Twisting the ball will also change the view/movement direction as well as the horizontal tilt

ALGORITHM LIBRARIAN

Geomatica's Algorithm Librarian provides easy access to hundreds of robust algorithms for image / vector processing and analysis. These tasks can be accessed either through the Focus viewer's Tools menu bar, or via the Modeler visual-scripting environment.

The Algorithm Librarian window lists the modules by category and subcategory. Selecting "All Algorithms" will list all the modules by their short form, alphabetically. By right clicking on the Algorithm heading, the Find search tool allows the user to perform intelligent keyword searches for individual tasks.



Algorithm Librarian Window

Below are comprehensive lists of the algorithm categories and specific tasks available in the Algorithm Librarian.

Geomatica

- PRIME
- Advanced Optical (add-on)
- Advanced Radar (add-on)
- Advanced GIS (add-on)
- Advanced Hyperspectral (add-on)
- OrthoEngine Satellite Models (add-on)

Analysis

- AVHRR Analysis
- Change Detection
- DEM Analysis
- Favourability Analysis
- Geological/Geophysical Analysis
- Hydrogeologic Analysis
- Hyperspectral Analysis
- Multi-Layer Modeling

Classification

- Advanced Classification
- Data Exploration
- Neural Networks
- Post-Classification Analysis
- Supervised Classification
- Unsupervised Classification

Common Tasks

- Common
- Image
- Vector

Data Interchange

- CD Reading/Utilities
- Image Interchange
- Tape Reading
- Tape Writing/Utilities
- Text File Interchange
- Vector Interchange

Image Correction

- Atmospheric Correction
- AVHRR Orbital Navigation
- DEM Extraction/Generation
- Geometric Correction
- Orthorectification
- Image Mosaicking

Image Processing

- 3-D Rendering
- Data Fusion
- Enhancements
- Frequency Transforms
- Image Filtering
- Image Operations
- Image Transformations

<i>Package</i>	<i>Module</i>
Advanced Radar	FSPEC
Prime	FSTDDEV
Prime	FTF
Prime	FTI
Advanced Hyperspectral	FTLOC
Prime	FUN
Prime	FUSE
Prime	FUSEPCT
Prime	FUZCLUS
Prime	FVDIF
Prime	GCPELEV
Prime	GCPFOOT
Prime	GCPPRO
Prime	GCPREAD
Prime	GCPREP
Prime	GCPWRIT
Prime	GNG
Prime	GRATGRID
Prime	GRATIC
Prime	GRDINT
Prime	GRDPIN
Prime	GRDPNT
Prime	GRDPOL
Prime	GRDVEC
Advanced Hyperspectral	HDF2VQ
Advanced Radar	HEADMOD
Advanced Radar	HEADREP
Prime	HIS
Prime	HISDUMP
Prime	HOM
Advanced Hyperspectral	I2SP
Prime	IDINT
Prime	IHR
Prime	IHS
Prime	IMAGEADD
Prime	IMAGECOS
Prime	IMAGEDIV
Prime	IMAGEINV
Prime	IMAGELG2
Prime	IMAGELN
Prime	IMAGEMUL
Prime	IMAGENEG
Prime	IMAGERD
Prime	IMAGESIN
Prime	IMAGESQR
Prime	IMAGESUB
Prime	IMAGESUM
Prime	IMAGEWR
Prime	IML
Prime	IMPORT
Prime	IND
Prime	IPG
Prime	IPPI
Prime	ISOCLUS
Prime	KCLUS
Prime	KNN
Prime	KRIGING
Prime	LINE
Fundamentals	LINE2PNT
Fundamentals	LINE2POLY
Fundamentals	LINE2RAS
Fundamentals	LINE2TLNE
Advanced Hyperspectral	LINTRN
Prime	LRP
Prime	LUT
Prime	LUTREAD
Prime	LUTREP
Prime	LUTWRIT
Prime	MAGREP

<i>Package</i>	<i>Module</i>
Prime	MAGSTRU
Advanced Optical	MAL
Prime	MAP
Prime	MARSHALL
Prime	MAT
Prime	MATCH
Fundamentals	MEOSAT
Prime	MERGE
Fundamentals	METAIN
Fundamentals	METAOUT
Prime	MIAVHRR
Prime	MIB
Prime	MIDFAD
Prime	MIDLG
Satellite Models	MIEOSAT
Prime	MIFF
Advanced Radar	MIJPL
Prime	MIL
Prime	MINDIS
Prime	MIRROR
Fundamentals	MIRSS
Fundamentals	MJERS1
Fundamentals	MLANDC
Prime	MLC
Prime	MLR
Advanced Hyperspectral	MNFLT
Advanced Hyperspectral	MNFNR
Prime	MOSAIC
Prime	MQSINT
Fundamentals	MSAR
Prime	MSH
Fundamentals	MSPOT
Prime	MTE
Fundamentals	MTEXTRD
Fundamentals	MTEXTWR
Prime	MWW
Prime	NDVI
Prime	NGCLUS
Prime	NGCLUS2
Advanced Optical	NNCLASS
Advanced Optical	NNCREAT
Prime	NNINT
Advanced Optical	NNREP
Advanced Optical	NNTRAIN
Prime	NUM
Prime	NUMREAD
Prime	NUMWRIT
Prime	OLO
Satellite Models	ORBITRD
Satellite Models	ORBITWR
Prime	OVERLND
Prime	OVL
Prime	PANFUSE
Advanced Pan Sharpening	PANSHARP
Prime	PCA
Prime	PCE
Advanced Hyperspectral	PCLT
Prime	PCTFUS
Prime	PCTINT
Prime	PCTMAKE
Prime	PCTREAD
Prime	PCTREP
Prime	PCTWRIT
Prime	PCXREAD
Prime	PCXWRIT
Prime	POG
Prime	POL
Prime	POLY2BIT
Prime	POLY2LINE

<i>Package</i>	<i>Module</i>
Prime	POLY2PNT
Prime	POTMAPSTAT
Prime	POTMAPSUR
Prime	PPTABLE
Advanced Hyperspectral	PRINTLT
Prime	PROCONV
Prime	PROREP
Prime	PROSET
Prime	PRX
Prime	PSGIMAG
Prime	PSGMESH
Prime	PWLUT
Prime	PWLUT2
Prime	PYRAMID
Advanced Radar	QAREP
Prime	RANDBIT
Fundamentals	RAS2BIT
Fundamentals	RAS2LINE
Fundamentals	RAS2PNT
Fundamentals	RAS2POLY
Prime	RAS2THMR
Prime	RCSTATS
Prime	REC
Advanced Optical	REDUCE
Prime	REG
Prime	REGUT
Prime	REL
Prime	RGB
Prime	RGB2PCT
Prime	RGBFUS
Advanced Hyperspectral	ROLLCOR
Prime	ROT
Prime	ROTBIT
Advanced Radar	RSTR
Prime	RTR
Fundamentals	RTV
Fundamentals	RVRSBITS
Advanced Hyperspectral	SAM
Advanced Radar	SARBETA
Advanced Radar	SARGEO
Advanced Radar	SARINCD
Advanced Radar	SARSIGM
Advanced Radar	SARSIM1
Advanced Radar	SARSIM2
Fundamentals	SCALE
Advanced Radar	SCATREP
Prime	SCIWRIT
Prime	SEED
Prime	SEENARE
Fundamentals	SETELEV
Advanced Hyperspectral	SHFTCW
Advanced Radar	SHRINK
Prime	SIEVE
Prime	SIGCLAS
Prime	SIGMERG
Prime	SIGSEP
Prime	SLC2IMG
Prime	SLP
Prime	SMBOYLE
Prime	SMCHAIKEN

<i>Package</i>	<i>Module</i>
Prime	SMMCMaster
Advanced Hyperspectral	SP2RT
Advanced Hyperspectral	SP2SP
Advanced Hyperspectral	SPCONVP
Prime	SPLIT
Prime	SPLREG
Advanced Hyperspectral	SPUNMIX
Advanced Radar	SRTOGR
Advanced Optical	SST
Fundamentals	STAMPJOIN
Advanced Radar	STATJPL
Advanced Radar	STDIJPL
Prime	STE
Advanced Radar	STGBIG
Advanced Radar	STOKREP
Prime	STR
Advanced Hyperspectral	STRPCOR
Prime	SUPCLAS
Prime	SVFRD
Prime	SVFWR
Advanced Radar	SYNTH
Prime	TASSEL
Advanced Radar	TEX
Prime	TEXREAD
Prime	TEXREP
Prime	TEXWRIT
Prime	THMR2RAS
Prime	THMRMER
Prime	THMRORV
Prime	THR
Prime	THSNPOLY
Prime	TIG
Prime	TININT
Fundamentals	TLINE2LINE
Advanced Radar	TOPCLS
Fundamentals	TPOLY2POLY
Prime	TPSINT
Prime	TRANSEC
Advanced Optical	UNMIX
Prime	USUPCLAS
Prime	VBUFFER
Prime	VDEMINT
Prime	VECBUF
Prime	VECCLEAN
Prime	VECMERG
Prime	VECREG
Prime	VECREP
Prime	VECSEL
Prime	VECTHIN
Prime	VIEWBW
Prime	VIEWRGB
Fundamentals	VIMAGE
Prime	VLM
Prime	VPROJ
Hyperspectral Compressor	VQHSOC
Prime	VREAD
Fundamentals	VSAMPLE
Prime	VWRITE
Prime	WTRSHED



Committed to GEO-intelligence Solutions

For more information contact:

United States	Tel: (703) 243-3700	Fax: (703) 243-3705
Canada & International	Tel: (905) 764-0614	Fax: (905) 764-9604
Europe	Tel: +44 1491 412 114	Fax: +44 1491 412 115
Email: info@pci-geomatics.com		Web: www.pci-geomatics.com

Distributed By:

Updated: 03 / 11 / 03

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.