Province of British Columbia

Ministry of Enviroment Lands and Parks

Specifications for
the Creation of
Preset Models

(Release 1.0, March 2001)

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FOREWORD

The term " **preset model** " has been used in the mapping industry of late to refer to the complete suite of files as employed by stereo viewing applications.

This document provides the specification for the creation of a DiAP (Digital image Analytical Plotter) Viewer Stereo Model and the components necessary for a DiAP Viewer user to initiate a model. These components comprise DISM (DiAP-compatible Integrated Surface Models)

References throughout this document will be made to the User Guides for ISM DiAP Viewer, ISM DiAP NT workstation, and the ISM SysImage TIN/CIP Terrain Modelling System. The reader is encouraged to obtain the latest versions of these guides when referring to them.

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1.0 INTRODUCTION

The DiAP Viewer has been developed as a versatile desktop mapping system, and is in common industrial use by Provincial Government clients. The Viewer user is able to digitize image features in 3 dimensions by interpreting scanned air photos. The images appear in stereo via interleaving of 2 overlapping photo images.

The Viewer uses overlapping image pairs that have been pre-oriented, by incorporating control points, or bundle parameters, derived from aerial triangulation. It is for users wishing to incorporate the existing "soft" products of the various Provincial Government mapping programs. Soft products of the Provincial Government program include: scanned photo imagery, digital elevation model files, and aerial triangulation output in the form of NAD 83 coordinated control points

2.0 DEFINITION OF TERMS

DEM - Digital Elevation Model

DiAP - Digital image Analytical Plotter

DTM - Digital Terrain Model

I.S.M. - ISM International Systemap Corp.

TIN - Triangulated Irregular Network

3.0 FILE NAMING CONVENTIONS

To facilitate the search for pertinent files, and for the sake of conformity, the following file naming conventions are to be maintained both for input files and deliverable files. In addition, the DiAP system also incorporates filters which searches for specific filename extensions. Any italicized file names below, are either proprietary ISM formats, or have been used as convention in the DiAP and/or DiAP Viewer documentation.

*.bin	binary image
.cam	camera file
.con	control file
*.dgn	Microstation design file
.mod	model file
*.pos	positional file
.prj	project file
.sdi	<u>S</u>ysteMap <u>D</u>ata format for <u>I</u>magery
.sdt	<u>S</u>ysteMap <u>D</u>ata format for <u>T</u>IN
.sis	ISM proprietary image file format
*.tif	TIFF image
.tsu	TIN setup file

For reasons of compatibility, and in order to retain the usefulness of archived models, it is assumed that all of the formats related to the above files shall be deemed to be backwards and forwards compatible to any improvements in the Viewer system.

4.0 HARDWARE / SOFTWARE REQUIREMENTS

The following DiAP hardware and software requirements directly affect the ability to perform the photogrammetric functions inherent in the creation of any preset models. As a minimum, the contractor is expected to have the following configuration in place. Other configurations are permissible if they do not affect the performance, or accuracy, of the creation of the preset models.

4.1 DiAP Photogrammetric workstation *
- for Windows NT and Microstation 95

4.2 Windows NT *
- version 4.0 operating system, with the most recent service pack

4.3 MicroStation 95 *
- at this time MicroStation SE is fully compatible but not required

4.4 StereoGraphics Corp. CrystalEyes LCD or NuVision Active Shuttering
EyeWear and Signal Emitter.

4.5 SysImageTIN/CIP Terrain Modelling System *
- the version of TIN/CIP should allow for the processing of an entire
1:20000 mapsheet surface.

4.6 Pentium CPU with 128 MB RAM minimum, DiAP NT compatible high
resolution monitor * (minimum 96 Khz Horizontal-Sync)

4.7 3-D input Device *
- Immersion C3DM Mouse (Immersion Corp.) or ISM handwheels and
footdisk system.

* For the latest specifications regarding DiAP hardware and software requirements, please see the pertinent user guide or documentation as listed in the reference section of this manual (page 11)

5.0 INPUT FILES AND MATERIALS

In all instances, input files and source materials shall conform to the relevant Provincial Government specifications. In addition, the contractor is expected, for the sake of conformity, to maintain the following project directory structure. Within an appropriately named project specific directory, subdirectories named image, dgn, and data, are created to hold the following information:

image: ISM format image files [*.sis], or other acceptable Viewer format.

dgn: MicroStation design files [*.dgn]

data: camera files [*.cam]
control files [*.con]
model files [*.mod]
project files [*.prj]
DEM topography [*.sdt]

5.1 Image files

The proprietary SysteMap Data format for Imagery (.sis) is employed in the DiAP Viewer and accepted as input.

5.0 INPUT FILES AND MATERIALS cont'd

5.2 Camera calibration data

The contractor is responsible for acquiring the camera calibration report used in the aerial triangulation for the imagery being employed. The report not only provides the calibrated focal length for the camera, but the measured fiducial positions. Both the focal length and fiducial positions are required inputs within the camera definition dialogue box of DiAP. Attention should be paid to the flight direction and enter the fiducial distances accordingly. Generally, each camera file is labelled either left panel or right panel, depending on the position of the camera panel (with camera data) when viewing the photo with north to the top. In the case of photography containing 8 fiducial marks, all fiducials shall be measured. See Appendix for sample camera file format.

5.3 Model control

Only approved, adjusted coordinates derived from a Provincial Government accepted aerotriangulation program shall be used. "Retrofitted" models are permissible only if all Provincial Government accuracy requirements are met. See appendix for sample of Base Mapping TRIM specification.

5.0 INPUT FILES AND MATERIALS cont'd

5.4 Provincial Government files

Unless specified otherwise, the surface files (.sdt) delivered with each set of preset models shall comprise of entire Provincial Government mapsheets, at the project specific scale, including the 200 m extended boundary. Thus, the input files for the creation of the TIN surface will consist of the complete Provincial Government approved DEM file for each mapsheet required. All DEM points, areas of exclusion, breakline and derived breakline information, shall be included.

The following feature will <u>not</u> be included in the generation of the TIN surface: Area of Indefinite Contours (i.e. indefinite DEM's).

6.0 DELIVERABLES

Model files, image files, and associated surface files may be delivered on CD or other suitable media, depending on total file size, and project specific requirements. Unless specified otherwise, scanned images in .sis format shall be delivered on CD, compatible to the user. Where possible, 2 images may reside on one CD. Removable hard drive systems may be employed only when requested. Hard drive partitioning and security settings should be established prior to use; removable drives shall be formatted to be NT compatible. All file names should consist of a maximum 8 characters, to allow backwards compatibility with any agencies managing files in a DOS operating environment.

Three separate sets of files are required as deliverables:

6.1 Image files (example: 98032157.sis)

The CD shall be physically labelled to include:

- contents (DiAP viewer .sis images), contractor, date of creation,
  mapsheet, list of images, scan resolution in microns

6.2 Model files (example 4237.mod)

Naming convention shall coincide with the aerial triangulation system. Truncated .mod files are permissible as long as the file contains all of the camera, fiducial, photo center, and rotation matrices. See Appendix for sample model file.

6.3 Surface files (example 93J046.sdt)

Each surface shall be named by the mapsheet it represents, with the .sdt extension.

6.4 DGN seed file

A MicroStation seed design file with appropriate units and global origin, it may also contain relevant planimetric or breakline data enabling the DiAP user to verify model positioning.

6.5 Removable Hard Drive Directory Structure

The following file directory structure, particularly when submitting removable hard drives, shall be maintained unless specified otherwise.

project\dgn\	(seed files, mapsheet files)
project\images\	(image files)
project\models\	(created models)
project\readme\	(spreadsheet with model details *)
project\surfaces\	(.sdt surface files)

- the spreadsheet shall contain a listing of each scanned image and referenced to the corresponding unique model number, contractor, mapsheet, scan resolution and date created.

Any and all hard drives, shall be stand alone, in that all models contained therein should be viewable without the need to import data from another source.

7.0 REFERENCES

British Columbia Specifications and Guidelines for Geomatics, Digital Baseline Mapping at 1:20 000, Geographic Data BC, Content Series, Volume 3, Release 2.0, January, 1992

Policies and Specifications for TRIM II (1:20000 and 1:10000) Revision Data Capture. TRIM Data Maintenance Project, Geographic Data BC, Version 2.0, January, 1998

Specifications and Guidelines for Aerial Triangulation, Surveys and Resource Mapping Branch, Release 2.0, October 1997 and Amendments.

DiAP NT Digital Analytical Plotter User Guide for Windows NT and MicroStation 95, I.S.M. International Systemap Corp., Version 1.6, January, 1999

DiAP Viewer Stereo Viewing System User Guide for Windows NT and MicroStation 95, I.S.M. International Systemap Corp.

8.0 APPENDICES

The following samples are provided:

- DiAP Viewer Hardware and Software Requirements

- Sample TRIM deliverables

- Reference file size chart

- Sample camera file

- Sample model file

DiAP Viewer Hardware and Software Requirements

DiAP Viewer Stereo Viewing System *
   - for Windows NT and MicroStation 95

Windows NT *
   - version 4.0 operating system, with the most recent service pack

MicroStation 95 *
   - at this time MicroStation SE is fully compatible but not required

NT capable PC with minimum 166 Mhz CPU, 64MB RAM

DiAP compatible high resoultion monitor *

3-D input Device *
   - mouse with built in scroll wheel
     (i.e. Microsoft Intellimouse/Wheelmouse)

* For the latest specifications regarding DiAP hardware and software requirements, please see the pertinent user guide or documentation as listed in the reference section (page 11)

Sample TRIM Deliverables

1. For the creation of TRIM specific preset models, the accuracy requirements relating to the input data (i.e. aerial triangulation output) shall be derived from the specifications as outlined in the document: British Columbia Specifications and Guidelines for Geomatics Digital Baseline Mapping at 1:20 000.

In terms of absolute orientation accuracy, the following is stated:

"Scaling - At least six ground/photogrammetric control points located at the von Gruber positions in the model shall be positioned such that all controlpoints fit to within 4 metres of the adjusted coordinates.

Levelling - At least six ground/photogrammetric control points located at the von Gruber positions in the model shall be positioned such that all controlpoints fit to within 4 metres of the adjusted coordinates.

Any control points not meeting the stated specification will be recorded and submitted to the Branch in the form of a report."

2. The following file directory structure, particularly when submitting removable hard drives, shall be maintained unless specified otherwise.

>   project\dgn\   (seed files, mapsheet files)
>   project\images\   (image files)
>   project\models\   (created models)
>   project\readme\   (spreadsheet with model details *)
>   project\surfaces\   (.sdt surface files)

>   * the spreadsheet shall contain a listing of each scanned image and referenced to the corresponding unique model number, contractor, mapsheet, scan resolution and date created.

3. The original TRIM scanning resolution shall be maintained in the import of imagery, filtering or resampling resulting in the loss of information is not permissible.

File size chart (reference only)

SCAN RATE (microns)	RAW FILE SIZE (.tif)	PROCESSED FILE SIZE (.sis)
7	1066 MB	1421 MB
10	523 MB	697 MB
12	380 MB	506 MB
14	285 MB	380MB
15	232 MB	310 MB
20	131 MB	175 MB
21	114 MB	152 MB

.mod (model) files = 7 Kb approx.
.sdt (surface) files = 4 MB approx.

Sample Camera File

SYSTEMAP CAMC110

wild4567pl.cam

 301.980

   -106.003 1   106.001 1

     0.000 1   111.994 1
    105.996 1   105.997 1
   -111.997 1   0.003 1
     0.000 1   0.000 1
    111.995 1   -0.001 1
   -105.998 1   -105.999 1
    -0.002 1   -111.997 1
    106.001 1   -105.998 1
   0.0000   0.0000
0.0000000e+000 0.0000000e+000 0.0000000e+000 0.0000000e+000

Sample Model File

DIAP MODEL M100

f:\project123\image\98032145.sis
f:\project123\image\98032146.sis
f:\project123\data\wild4567pl.cam
f:\project123\data\wild4567pl.cam

DIAP PROJECTP100

02-19-01

0

SYSTEMAP CAMC100

 152.823
    -106.010 1   105.999 1
     -0.010 1   109.992 1
     105.994 1   105.995 1
    -110.012 1   0.001 1
 -999999.999 0 -999999.999 0
     110.004 1   -0.003 1
    -106.003 1   -106.003 1
       0.001 1   -109.998 1
     106.005 1   -106.003 1

SYSTEMAP CAMC100

152.823
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     -0.010 1   109.992 1
     105.994 1   105.995 1
    -110.012 1   0.001 1
 -999999.999 0 -999999.999 0
     110.004 1   -0.003 1
    -106.003 1   -106.003 1
       0.001 1   -109.998 1
     106.005 1   -106.003 1

 1
2
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-1.1489739270e+02 1.1330908346e+02
    9.997621e-04   3.317125e-06   -1.148974e+02
   -3.311247e-06   9.999196e-04   1.133091e+02
    1.000227e+03   -3.318147e+00   1.152994e+05
    3.312262e+00   1.000069e+03   -1.129364e+05
2
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-1.1478489987e+02 1.1333374631e+02
    9.997804e-04   1.088521e-06   -1.147849e+02
   -1.069389e-06   9.998785e-04   1.133337e+02
    1.000218e+03   -1.088893e+00   1.149334e+05
    1.069751e+00   1.000120e+03   -1.132246e+05
1
1
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 5.4077984359e+05 6.1700892204e+06 7.9373849946e+03
 9.9425132510e-01 1.0613793360e-01 1.4108209821e-02 5.3765290416e+05
-1.0621195449e-01 9.9433285780e-01 4.6031110526e-03 6.1700639406e+06
-1.3539691894e-02 -6.0751098031e-03 9.9988987883e-01 7.9281611155e+03
 9.9420157443e-01 1.0645251833e-01 1.5201669019e-02 5.4077984359e+05
-1.0653781688e-01 9.9429650919e-01 4.9137965182e-03 6.1700892204e+06
-1.4591880425e-02 -6.5048568650e-03 9.9987237379e-01 7.9373849946e+03
1   -1.060100e+02   1.059990e+02
     8.918570e+03   -7.276243e+03   -4.919080e+00   -4.893737e+00
1   -1.000000e-02   1.099920e+02
     1.149178e+05   -2.933804e+03   6.699445e+00   -2.994368e+00
1   1.059940e+02   1.059950e+02
     2.209568e+05   -6.588678e+03   8.973336e+00   5.707413e+00
1   -1.100120e+02   1.000000e-03
     5.268725e+03   -1.133022e+05   -6.241397e+00   2.493947e+00
0   0.000000e+00   0.000000e+00
     0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00

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      2.253441e+05    -1.125764e+05    -1.570028e+01    1.461766e+00
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      9.614082e+03    -2.193087e+05     1.007251e+01    1.080499e+01
1     1.000000e-03    -1.099980e+02
      1.156703e+05    -2.229281e+05    -4.886681e+00    -1.385707e+01
1     1.060050e+02    -1.060030e+02
      2.216742e+05    -2.185969e+05     6.002148e+00    1.277054e+00
1    -1.060100e+02     1.059990e+02
      8.792217e+03    -7.326390e+03    -7.411627e+00    1.559270e-01
1    -1.000000e-02     1.099920e+02
      1.148001e+05    -3.205632e+03     3.446539e+00    -1.373786e+01
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      2.208219e+05    -7.114033e+03     1.320736e+01    1.056691e+01
1    -1.100120e+02     1.000000e-03
      4.899597e+03    -1.133442e+05    -2.243442e+00    2.938651e+00
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      2.249779e+05    -1.131132e+05    -1.648088e+01    3.308809e+00
1    -1.060030e+02    -1.060030e+02
      9.013520e+03    -2.193616e+05     9.138361e+00    7.823503e+00
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      1.150571e+05    -2.232277e+05    -2.957117e+00    -8.085389e+00
1     1.060050e+02    -1.060030e+02
      2.210737e+05    -2.191240e+05     3.300810e+00    -2.970552e+00
 10
823268
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  1.00  1.00  1.00  1.00
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  1.00  1.00  1.00  1.00
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  2.66  0.70 -2.51 -8.27
  1.00  1.00  1.00  1.00


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 -0.22  6.77  1.38 -2.60
  1.00  1.00  1.00  1.00
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 11.06 -5.09 12.91 -5.12
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833388
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     59900   79881   -8048   86924
 0.2693 -0.7083 1.0641
-13.85 2.80 -3.28 3.63
  1.00   1.00   1.00   1.00
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