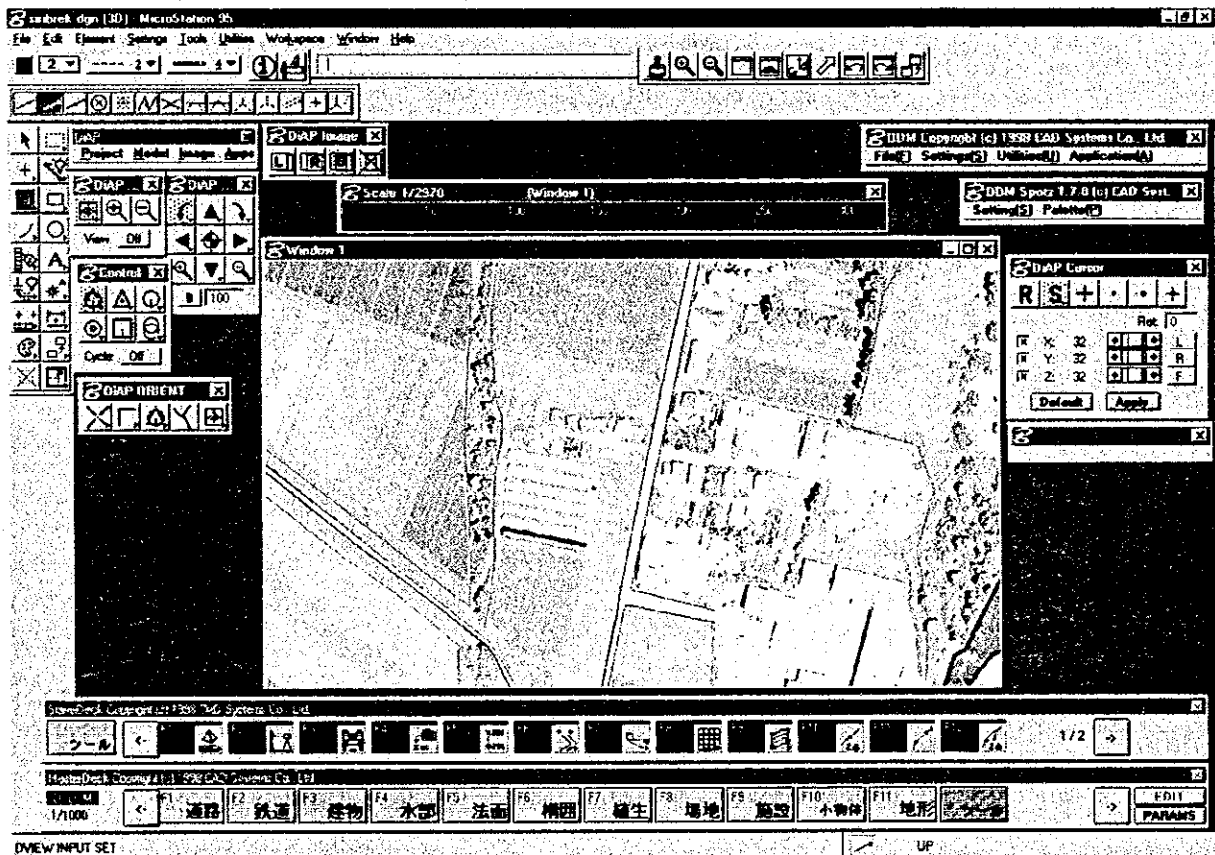


ORIENTATION USING THE DiAP DIGITAL PLOTTER MANUAL V1.03



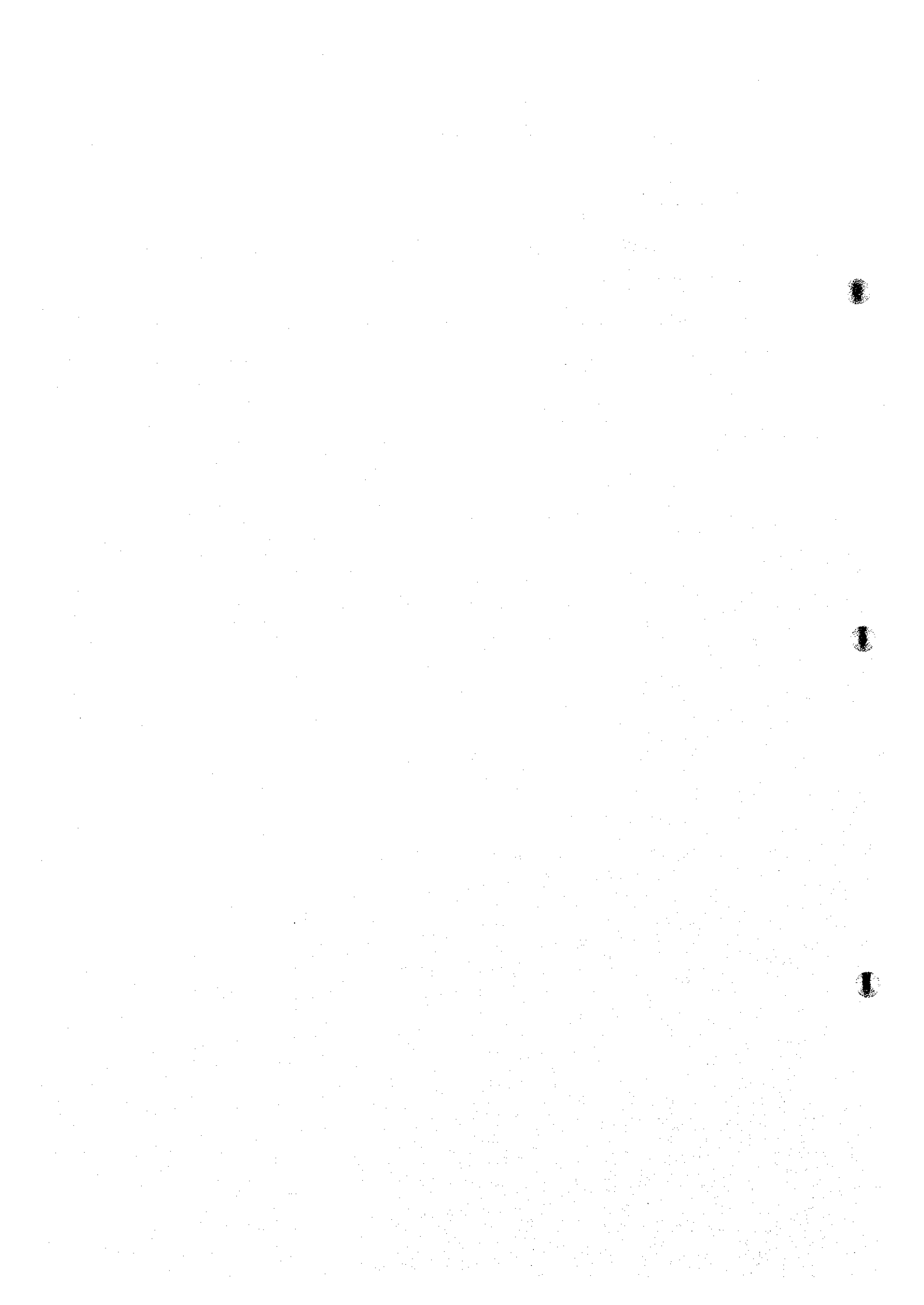
JULY 2000

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JICA STUDY TEAM

[The page contains extremely faint and illegible text, likely due to low contrast or poor scan quality. The text is distributed across the page but cannot be transcribed.]

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The following 4 types of data are necessary when using DiAP for orientation:

1. Raster data (sis)···photo images data scanned from positive and negative films
2. Control points (con)···text file of the aerial triangulation results and photo control points that will be used as absolute orientation
3. Camera data (cam)···focal distance, coordinate of fiducial marks, etc.
4. Design file (dgn)···copy the dgn file where delineated data will be incorporated into, from the original file: C:\win2app\ustation\dgn\diap\dpmod.dgn

The camera data can be created after DiAP is started, while the remaining three data shall have to be prepared in advance.

1. MicroStation Startup

Double click on the MicroStation icon on the desktop and start the MicroStation manager to select the design file or select the design file from the explorer to start the MicroStation program.

2. DiAP Startup

Key-in “MDL L DIAP” in the MicroStation command window. This will access and start DiAP, showing several DiAP dialogue boxes on screen.

3. Setting up of a Model

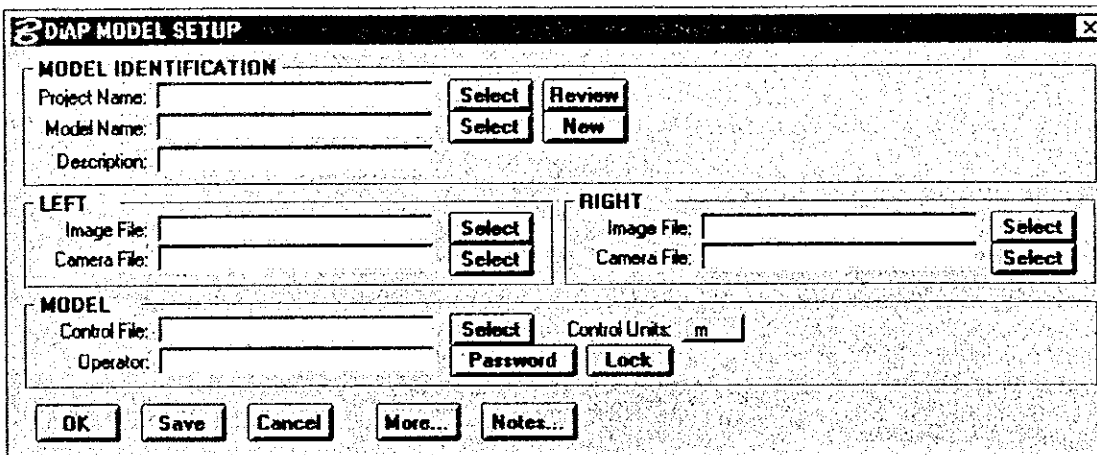
DiAP menu



Select “model..setup” from the DiAP menu to open the model setup dialogue box.

Click on “new” on the right side of the “model name” in the model setup palette to open the dialogue box for model naming. Specify the drive and the directory, and name the model file.

Model setup palette



Next select the raster data (image file) and camera file, specify the name for the control point file, click "Save" and then "OK".

4. Allocation of Models

From the DiAP menu select "model.attach" to open the dialogue box for model allocation. The model established in the setup is automatically selected and click "OK".

5. Orientation

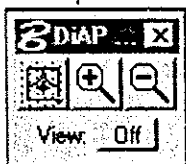
Orientation comprises interior orientation and exterior orientation, and the latter involves relative orientation and absolute orientation.

1. Interior orientation

① Initial Setup

Select the "model.orient.interior" from the DiAP menu. The palette necessary for interior orientation will be displayed on screen.

View palette



Select "View" 1 in the view palette and then select "cw" under "cycle" in the fiducials palette. With this, the direction of the observations will be automatically carried out clockwise, from one fiducial to another.

Image palette

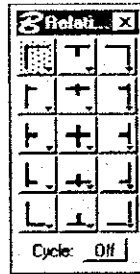


Select "L" from the image palette and click on "View". This will show the raster image of the photo on the left within the view.

Orientation point palette

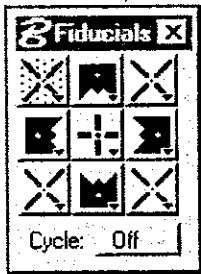


Relative palette



Drag on the relative button of the orientation point palette to pull out the relative palette. This is carried out during external orientation.

Fiducials palette



By clicking on the upper left button of the fiducial palette that indicates the fiducials, DiAP automatically shifts the image, putting the fiducials near the center of the view.

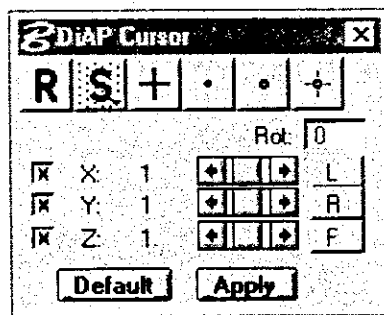
View control palette



Click on the "Pan View" button in the view control palette and click on view, then the cursor of X mark will be changed to floating mark that enables the operation of the handle (external entry); the message window below on the right will show "Auxiliary input ON".

② External Settings

Cursor palette

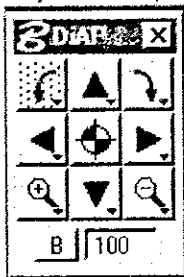


Select "S" and pull down the cursor setting box. Set up the degrees of sensitivity of the X, Y, and Z boxes and click on the "Apply" button.

*make sure that the view and dialogue boxes do not pile on each other.

③ Zoom up Adjustments

Adjustment palette



The scale of the image for display on screen should be adjusted (magnification) prior to fiducial observations. Click on the zoom in button (+) of the adjustment palette, move the floating mark near the fiducials and click on the foot switch button (hereafter called data button). This will magnify the image; continue the adjustments until a suitable image scale is attained. After magnification is completed, push the reset of the data button.

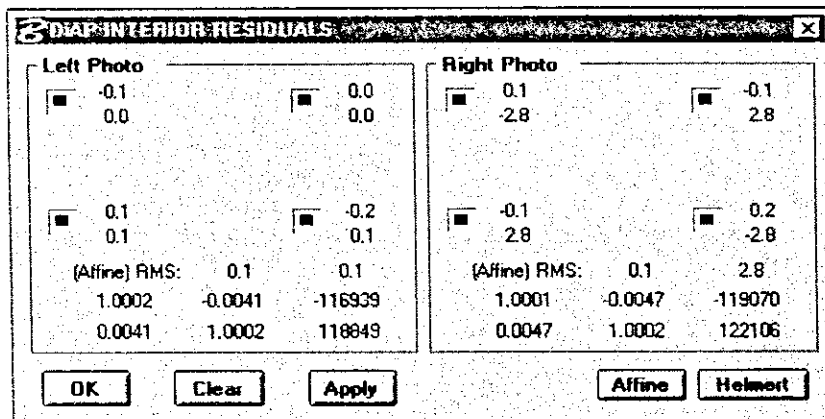
The button on the upper left of the fiducial palette will be on reverse display.

④ Measurement of fiducials

Use both handles to move the floating mark to the center of the fiducial and then click on the data button. Figures (at this time: 0, 0) appear in the section that shows the interior orientation results. The image near the fiducial mark on the upper right, which is the second observation point, is replaced. Measure the fiducial marks according to their order of appearance, using similar methods. Satisfactory orientation results will not be obtained in the first round of measurements. After the second round of measurements, the image is zoomed up sufficiently the interior orientation is carried out until the specified accuracy is obtained.

Once the interior orientation of the left photo is completed, select "R" in the image palette and click on view to prompt the photo on the right. The same method and procedure shall be used for the measurements for this photo.

Interior orientation



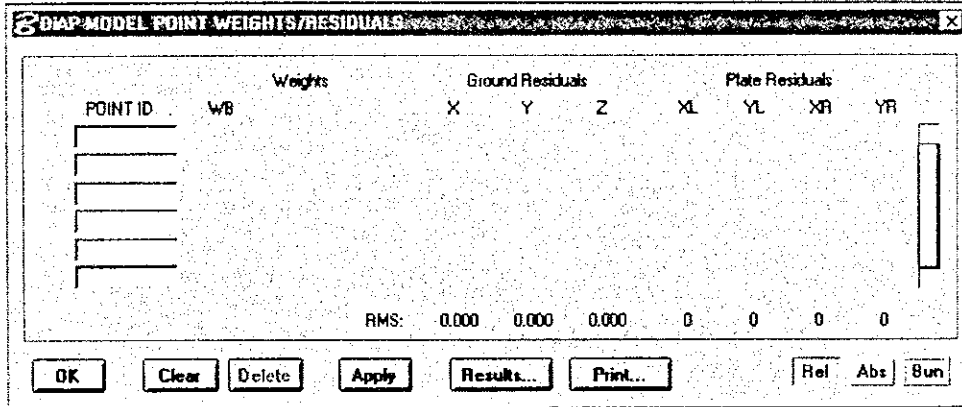
Once the interior orientation of the right photo is also completed, click on the "APPLY" and then "OK" button in the interior orientation dialogue box. This will save the interior orientation results.

2. Relative Orientation

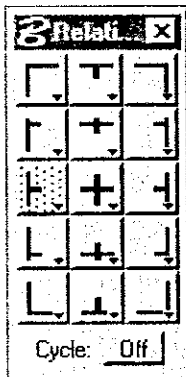
In preparation for relative orientation, zoom out on the entire image on view before clicking on "S" in the image palette for stereo representation.

From the DiAP menu, prompt the exterior orientation palette by making the selection starting from the "model..orient..exterior", and the screen for relative orientation will appear.

Exterior orientation palette



Relative palette



Each of the buttons in the relative palette indicates the rough positions in the model.

Select the automatic shifting cycle by clicking "Off" (normally 6). If you click on the B point on the left, the stereo image will move.

The parallax in this area can be eliminated after the zoom up is suitably adjusted. If the foot lock button is clicked, only the left side image moves.

This should be adjusted to make sure that the left and right floating marks are perfectly in the same place.

Click on the data button after the parallax of the points has been somewhat eliminated. The results for this point will be entered, and focus will automatically move to the next point. Repeat the same process. After one round, click on the "Rel" button in the exterior orientation palette to view the relative orientation results. Then click "Apply".

As in interior orientation, satisfactory results will not be attained in the first round of observations. Zoom up should be fully carried out after the second round and orientation should be repeatedly carried out until the specified observation accuracy is attained.

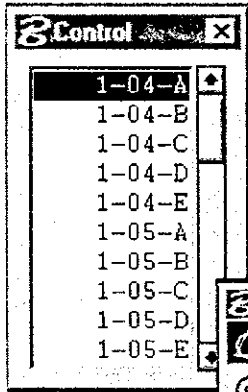
Once a satisfactory relative orientation result is attained, click on "Apply" and then save the results.

3. Absolute Orientation

In the commencement of absolute orientation, select the 3 points to gain the first orientation results. Generally, A & C points on the left and B point on the right are recommended. The process is explained below using these three points.

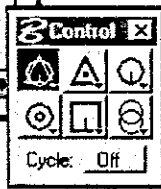
Click the control point button in the control palette to prompt the control point list box.

Control point list box



In this state, click the button for the A point on the left side of the Relative palette to move the image. Select the A point from the control point list box using the mouse for reverse display.

Control palette



Accurately measure the control point after clicking on the control point button in the control palette. If this operation is applied on two other points, click on the Abs button and carry out the initial absolute orientation calculation.

Sample Table on Orientation Calculation Results

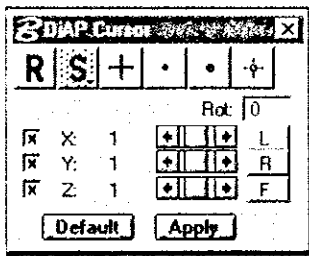
POINT ID	Weights				Ground Residuals			Plate Residuals			
	WB	WX	WY	WZ	X	Y	Z	XL	YL	XR	YR
C305A	1.0	1.0	1.0	1.0	-0.046	-0.029	0.060	0	0	0	0
C305B	1.0	1.0	1.0	1.0	-0.044	-0.003	0.037	0	0	0	0
C305C	1.0	1.0	1.0	1.0	0.108	0.009	0.029	0	0	0	0
C305D	1.0	1.0	1.0	1.0	-0.088	0.001	0.106	0	0	0	0
C305E	1.0	1.0	1.0	1.0	0.023	-0.033	-0.174	0	0	0	0
C305F	1.0	1.0	1.0	1.0	-0.004	-0.021	-0.011	0	0	0	0
RMS:					0.063	0.023	0.083	0	1	0	1

If the error is not huge, click on "Apply" and use this orientation.

Afterwards, this can be immediately moved to the coordinate of any other control point by just clicking on the point name in the control point list box.

*If absolute orientation is to be carried out, changes in sensitivity in the operation of the handle and in shifting directions may occur.

Cursor palette

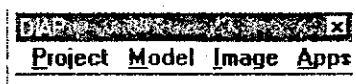


For shifting sensitivity, select "S" in the cursor palette and re-adjust cursor settings. For shifting direction, enter the angle of the flight course in the "Rot" column.

All points in the model shall be measured in order, and the results should meet the specified accuracy. Once a satisfactory absolute orientation result is attained, click on the "apply" button in the exterior orientation palette to save the results. Then click on "OK" and close the dialogue box. This completes the orientation of the models.

Accessing the Orientation Model

1. Start the MicroStation with the dgn file that obtains imagedata.
2. Enter "MDL L DIAP"
3. Select "model...attach" from the DiAP menu and select the orientation model.



4. Select "S" from the image palette and click on view.



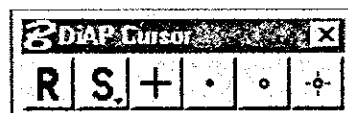
5. In the view control palette, select "fit" and then click on view.



6. Select "pan view" in the view control palette and click on view.



7. Set up the sensitivity and shifting direction for the handle and foot disk from the cursor palette.





**DIGITAL PLOTTER UTILITY
DiAP Dynamic Menus (DiAP DDM)
MANUAL
2nd Edition**

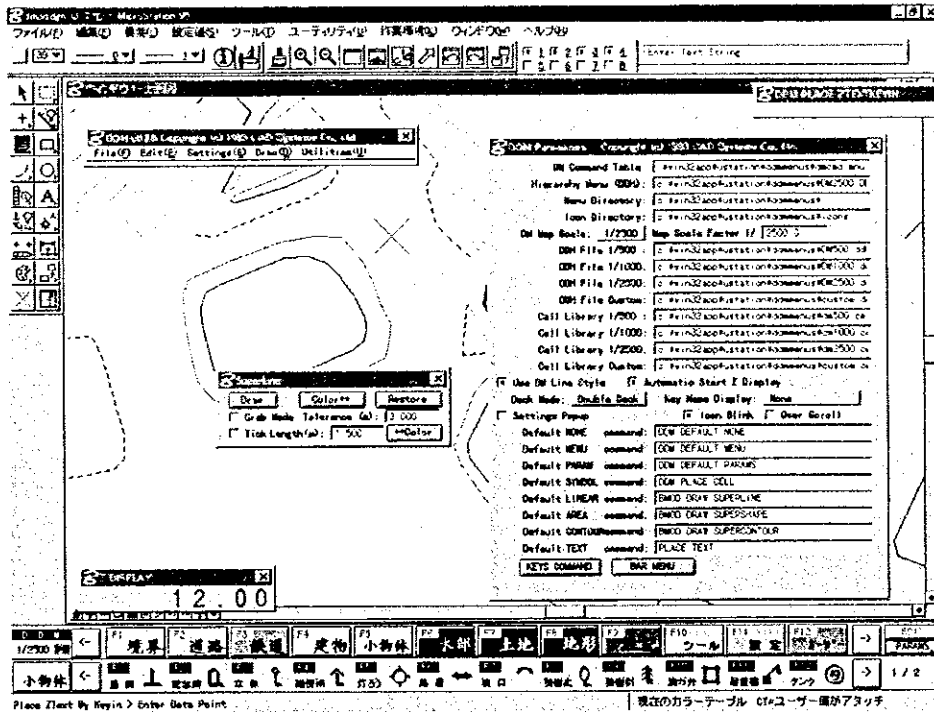
JULY 2000

**DINAGECA
JICA STUDY TEAM**

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1. What is DDM?



DDM is a DiAP tool for the selection of map symbols using function keys. Its main features are:

1. Function key interface allowing the display of a larger screen

Most DDM commands are assigned function keys. As the commands are automatically displayed on screen, the operations are quite similar to that of an analytical plotter. The commands can, of course, be accessed using the mouse.

2. Various mapping tools that reduce plotting workload

DDM has various functions that facilitate the use of DiAP, as shown below:

- ◆ Scale bar function convenient for determining approximate distances on screen.
- ◆ Superline function that draws lines using even the z values of other lines.
- ◆ Paraline function essential to the plotting of city block lines.

Note: DDM cannot be used unless DiAP is running.

2. Installing DDM

Prior to Installation

The DDM install program will overwrite any existing DDM file. If DM tables (DMCMD.MNU, etc.) or DDH files in use have been modified, create backup files prior to installing the program. (It would be best to create a backup for the whole C:/win32app/ustation/ddmmenus directory.)

The install program will also ask whether you agree to overwrite the following files:

C:/WIN32APP\USTATION\WSMOD\DEFAULT\SYMB\500.RSC

C:/WIN32APP\USTATION\WSMOD\DEFAULT\SYMB\1000.RSC

C:/WIN32APP\USTATION\WSMOD\DEFAULT\SYMB\2500.RSC

These are set up files for various custom lines. If you have been using your own custom lines, it is advisable that you back them up before reinstalling the program.

Preparations

The following should be carried out prior to the installation:

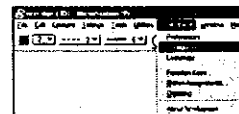
Enabling DiAP Application

DDM must be installed in the same directory as MicroStation (English version). Make sure to check beforehand in which directory MicroStation is installed.

Searching the MicroStation Directory

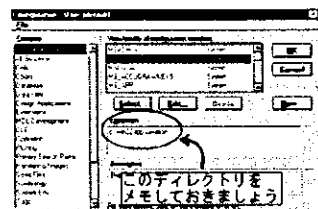
Start MicroStation at any DGN and select the following:

Workspace > Configuration



In the menu, click on "All (by Alphabetic)" under Category and select "MSDIR" in the list appearing on the right.

Note down the directory that appears, as shown in the box on the right. This is the directory where MicroStation is installed.



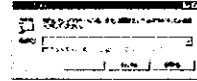
Operation

1. Copy all files in both floppies into the hard disk.

Create a folder (your choice of name and drive). Insert the floppies one at a time and copy the entire contents into the folder.

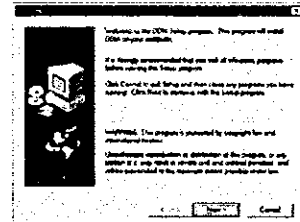
2. From the "Start" button, select "Name the file and Run".

Use the Browse button to search for the folder containing the file copied from the floppies. From the file, select "SETUP.EXE" and click the "OK" button.

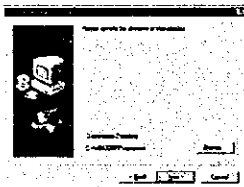


3. The confirmation message will appear on screen. If in agreement to the message contained, press "Next".

The DDM install program will not run properly if another program such as MicroStation is starting. In this case, select "Cancel", quit the install program, and close all other applications before launching the DDM install program again. (If another program is running, it will be displayed on the taskbar along with the Start button.)



4. Specify the MicroStation directory when the confirmation message below appears on screen.



MicroStation is usually stored in C:\win32app\ustation, although sometimes it is in other directories, e.g. D:\ustation. To be sure, check with the system administrator in which directory MicroStation is stored.

If the directory prompted on screen is correct, click on "Next".

5. The message below confirms whether you agree to overwrite the previous DDM version.



Click on Yes to proceed with the installation.

File copying starts after the "Yes" button is clicked.

6. The message below shows that the installation is complete. Click on "OK" to quit the install program.



3. DDH Files and DM Tables

The DDM directory (C:\win32app\ustation\ddmmenus) contains two set up files that control DDM operation: DDH file and DM table.

DDH file is the file with the extension “.DDH”. The DDH file assigns map symbols and functions to each of the buttons in the Master Deck Menu and Slave Deck Menu of DDM by clicking on these buttons (see Section 4).

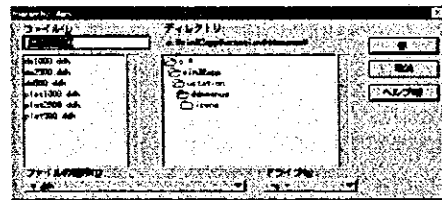
Basically a DDH file should be created for every map scale. The following files are provided as typical menus:

- ◆ DM500.DDH Sample in conformity with 1:500 mapping regulations
- ◆ DM1000.DDH Sample in conformity with 1:1000 mapping regulations
- ◆ DM2500.DDH Sample in conformity with 1:2500 mapping regulations
- ◆ PLOT500.DDH Settings suitable for 1:500 plotting work
- ◆ PLOT1000.DDH Settings suitable for 1:1000 plotting work
- ◆ PLOT2500.DDH Settings suitable for 1:2500 plotting work

The scale can be set by activating another DDH file. After starting the software, use the command below to replace the DDH file.



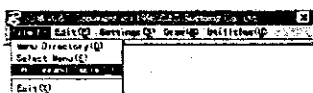
File > Select Menu



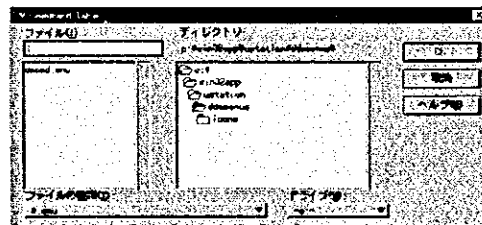
A DM table is an operation set up file. It is used to set up the map symbols assigned to each button in the Master Deck and Slave Deck menus of DDM according to the following:

- ◆ How the symbols will be plotted (LV, CO, WT, LC)
- ◆ What cell to use with the cell allocation command

It is also possible to replace the DM table in DDM.



File > DM Command Table



Caution!!!

Replacing the DM table during plotting work would compromise data compatibility.

*: See the appendix for rules regarding the description of the DM Table and DDH File.

4. DDM Startup and Special Keyboard Functions

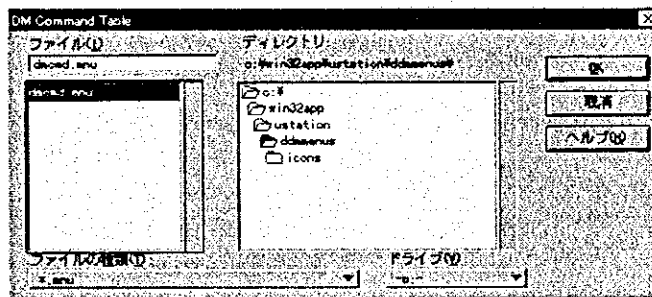
Startup Method

Run DiAP in MicroStation and enter the following command:

MDL LOAD DDM

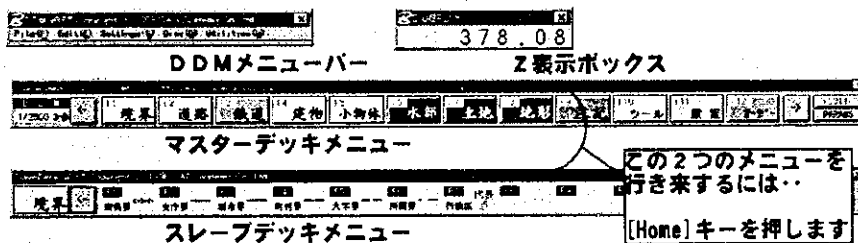
When starting DDM for the first time right after installation, the menu below will appear.

Select DM table "DMCMD.MNU" from the dialogue box.



The following DDM menu will appear on screen.

Menu Names and Key Operations

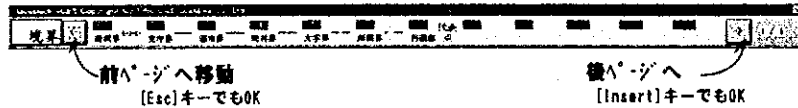


- | | |
|------------------|--|
| DDM Menu Bar | Contains various DDM settings, mapping commands and tools. |
| Master Deck Menu | Offers a row of 12 function keys for the quick selection of main categories of planimetric features. |

Slave Deck Menu This menu appears on screen when clicking a master deck button.
This menu also offers function keys.

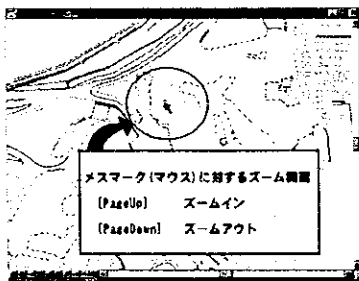
[Home] Key When both the Master Deck and Slave Deck menus are on screen, this key is used to switch between these two menus.

If there are more than 12 buttons on the Slave Deck Menu, switch between menu pages as shown below.

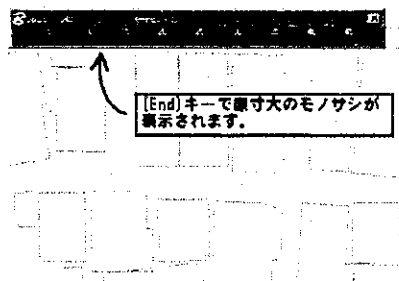


Other Key Functions

Keyboard Zoom Function

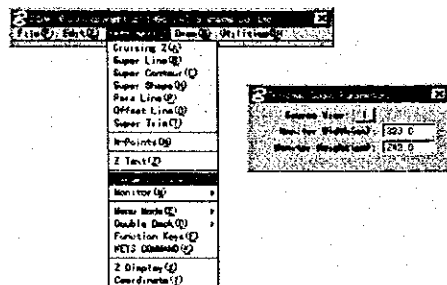


Scale Bar Function



Scale Bar Settings

- Source View The view which enables scale bar operation.
- Monitor Width Enter the desired width of the display screen.
- Monitor Height Enter the desired height of the display screen.



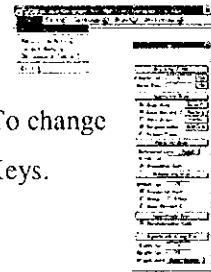
Settings > Dynamic Scale

5. Drawing Commands

ABC Panel

File > ABC Panel

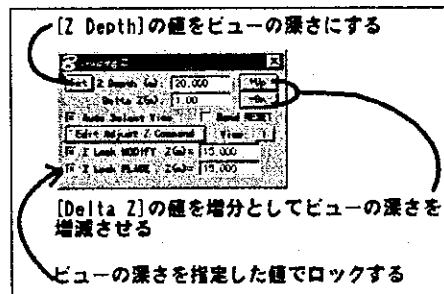
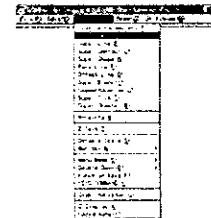
Each DDM drawing command has setting boxes with fixed values. The ABC panel allows docking to form one box containing all these commands.



The ABC panel is always initially set up to appear during DDM operations. To change this setting, switch off the Automatic Start ABC Panel in Settings/Function Keys.

Cruise Command

The DVIEW ADJUST AZ function of DiAP to set up Z values is not a key-in command but cruise command makes it to access from the menu. This command is convenient for the plotting of contours.



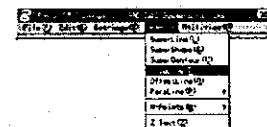
Settings > Cruising Z

“Adjust Z Comamand” has A key-in command that works when cruise command is selected. The command usually entered is “DVIEW AJDUST AZ”, although it is also possible to just enter “AZ=”. (The key-in command for DiAP view control can also be entered.)

Freeline Command

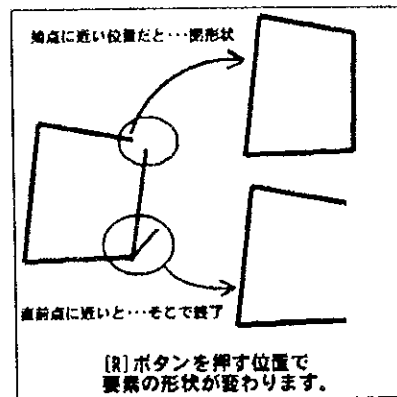
Key Input: BMOD DRAW FREELINE

Although this command is used in as same as for the drawing of the 3D continuous line segment, it is possible to decide whether to close the line or not when clicking on the reset button to complete the drawing, based on whether the cursor (measuring mark or mouse) is closer to the start point or the end point



The feature that will be formed, regardless of whether it is closed or not, will be considered as a continuous line segment.

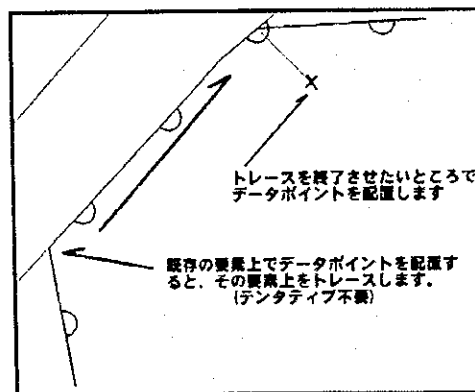
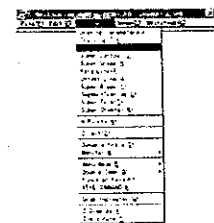
Draw > Free Line



Super Line Command

Key Input: BMOD DRAW SUPERLINE

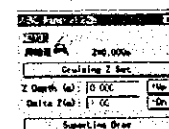
This command is identical with the freeline command, where the terminal of the line can be operated through the "R" button. Moreover, this command also conveniently enables the tracing of existing lines when delineating the upper and lower lines of hachure and covering, etc.



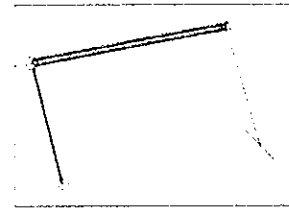
Settings > Super Line

"Existing Line Tracing Function"

- * This function is activated when the Grab Mode in the superline setting box (Setting>Superline) is switched on.
- * If existing lines are seized using this function, the map symbol for the elements grabbed and the height of the elements will be indicated on the ABC panel (or on the Grab indicator).



- * When this function is activated, the following three special symbols appear at the location traced.



□ Indicates where drawing starts. Press the “R” button in the middle of this square at the end of the line segment to unite the start and end points and close the figure. This line segment is considered a continuous line segment.

△ Indicates the location where the traced existing line bends.

○ Indicates that the location is on the existing line that was traced.

- * When tracing for Polygon features, an arrow appears to indicate the tracing direction.

“Letter Key Switch Function”

- * This is a function of the superline command, and the letter keys shown below switches the setting box on or off. The functions allocated to the letter keys can be altered under

Settings>Function Keys>ABC Commands.

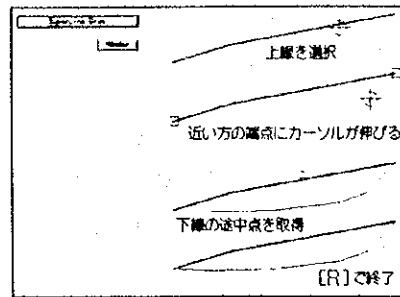
<u>Letter Keys</u>	<u>Functions</u>
G	Grab Mode
K	Keep Current Z
M	Make Shape
P	Perpendicular
H	Hidden Trace
O	Overlay

Attention!

Activating the superline command switches on this letter key function and neutralizes normal keyboard functions. When key-in functions such as “MDL LOAD ~” are entered, “DL LAD” appears on screen instead resulting in error.

“+Under Function”

The “+Under” button in Superline on the ABC panel is convenient when lower lines for hachures are unintentionally omitted.



- .1 When selecting “+Under”, choose the upper line.

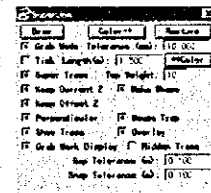
The square mark (□) appears at the terminal of the upper line, and the line can be extended towards the cursor.

- .2 Acquire the point located somewhere in the middle of the lower line. Once this is completed, conclude this operation by clicking on “R”.

Using the attributes of the selected upper line, the lower line to be drawn under this command will be automatically allocated the Color No.+1 attribute.

Settings Box

Select Settings>Superline to activate the box on the right.



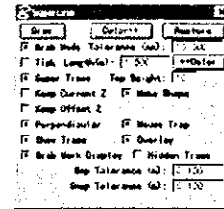
- [Draw] To draw the superline
- [Color++] Clicking on this button halfway through the line drawing work will divide the line into parts. From this location, drawing will be carried out at the line given the Color +1 attribute. This function is very convenient for charting hachures and covering with width.
- [Restore] Restores before altering the active color through the “Color++” function
- Grab Mode Used to determine whether an existing line should be traced or not
- Tolerance Acknowledged distance when the start and end points are made to coincide

Tick Length	Also switched on when the tick of the bridge is simultaneously drawn. The numeral represents the length of the tick.
[++Color]	This sets the color number of the existing element to +1.
Super Trace	Switch that enables the tracing of the multiple elements that were divided.
Tmp Weight	Thickness of the highlighted section during grabbing.
Keep Current Z	If switched ON during grabbing, the Z of the measuring mark is used as the Z of the lines being drawn. If OFF, the Z value of the line grabbed is used as the Z value of the lines being drawn.
Keep Offset Z	If switched ON during grabbing, the height of the measuring mark for the line to be traced should be kept parallel by controlling the Z value. If OFF, the shift in the Z value from the start point until the end point of the trace should be controlled to achieve balance.
Make Shape	Forms a polygon once the figure is closed.
Perpendicular	Enables the use and non-usage of the right angle correction function.
Mouse Trap	Switch to activate right angle correction function: this function is activated if the data point is within the perimeter of the designated angle. When OFF, drawing is carried out in a right angle regardless of the location of the data point.
Show Trace	Switch to show the tracing of existing lines.
Overlay	Switch that traces (ON) the line that has been grabbed or, when OFF, points are placed on the line. This function cannot be used when the Grab Mode is OFF.
Grab Mark Display	Always displays on the cursor the symbol that shows the grabbing extent.
Hidden Trace	When ON, the line grabbed and the overlapping section become the copy and the section that does not overlap become the original. Also, the lines that were drawn becomes a compound line which is a mixture of lines from the copy and the original.
Gap Tolerance	The minimum gap established when tracing a line with gaps; this gap is usually ignored. This refers to the acknowledged distance for grabbing.

Drawing Ex. 1: Representation of upper and lower lines (hachures, covering with width)

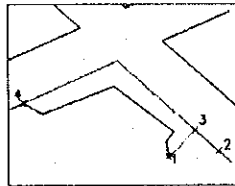
1. Select "Draw"

A setting that traces the existing line by making the Z value coincide. The main feature of this function is having the Super Trace and Grab Mode commands on at the same time.



Drawing is done counterclockwise, although for hachures, it is originally done clockwise.

2. Start Drawing



- ① Specify the start point
- ② Grab the line at the data point. The type of lines to grab will be indicated on the ABC panel. If the specified line is not indicated, push the reset button.

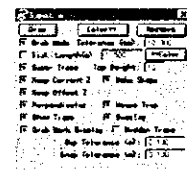
- ③ Use the data button to specify where tracing should start and finish.

3. Choose "Color++" from the setting box (or ABC panel) to draw lower lines.
4. When approaching the start point of the upper line, push the reset button at the start point to unite the end and start point; this ends the drawing.

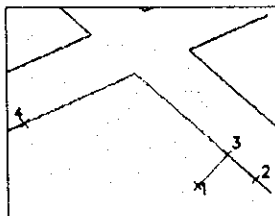
Drawing Ex. 2 Features (e.g. encircling features such as hedges, fences, etc.) with varying Z values

1. Select "Draw"

This drawing function entails the use of the Keep Current Z and Keep Offset Z commands.



2. Start Drawing



- ① Specify the start point. The height of the measuring mark becomes equivalent to the height of point 1.
- ② Grab the line at the data point. The type of lines to grab will be indicated on the ABC panel. If the specified line is not indicated, push the reset button.

- ③ Use the data button to specify where tracing should start. The height of the measuring mark becomes equivalent to the height of point 3.

④ Use the data button to specify the extent of the trace. The height of the measuring mark becomes equivalent to the height of point 4. The height of the bend point in between points 3 and 4 will change depending on the condition of "Keep Offset Z", after point 4 is determined.

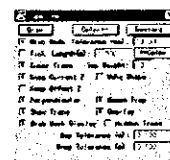
Keep Offset Z ON Tracing is carried out by point 4 while maintaining the height of the measuring mark for the height of the line (line for roads) grabbed at point 3.

Keep Offset Z OFF Insert middle Z points to indicate the shift in the height of the measuring mark from point 3 to point 4.

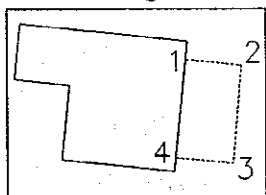
Drawing Ex. 3 Connecting un-walled structures to buildings

1. Select "Draw"

This drawing function entails the use of the Keep Current Z and Perpendicular commands. Also, put the Make Shape command on or off as necessary. (On if houses are to be acquired using E1 and Off if using E2.)



2. Start Drawing



- ① Specify start point (point 1). The procedures are:
 - .1 Specify data point by building height.
 - .2 Re-specify data point by height of un-walled structures.
 - .3 When an arrow appears; push the reset button.

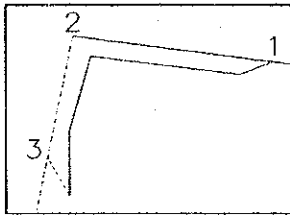
② Acquire points 2 and 3 using the data point. If Perpendicular is on, points 2 and 3 will form right angles.

③ Point 4 specifies the data point at the height of the un-walled structure; push the reset button twice.

Drawing Ex. 4 Drawing upper lines by the combination of draft attributes and the original copy (e.g. a special case of hachures)

This drawing function entails the use of the Hidden Trace command. Hidden Trace is a command used to turn a part of the line drawn into a draft feature; it is used for special case, e.g. shading the section of garden paths that coincide with the upper hachures. Also the drawn feature becomes a compound line segment that corresponds with the DM-Pro hachure batch.

1. Choose "Draw" and start drawing. (Put Keep Current Z off to unite the road line and hachure line.)



① Specify the start point (point 1). The procedures are as follows:

.1 First select the road features using the data button. Select the reset button until the road line is grabbed.

.2 Once the road line is selected, push the data button at the location of the start point.

② Once the cursor indicates a triangle, Δ , on point 2, click the data button once. Put the "Hidden Trace" function "ON".

③ The mode has been switched to draft lines, so obtain points 2 and 3.

.1 To grab the garden path, click the data button on points 2 and 3.

.2 Once the cursor indicates a triangle, Δ , on point 2, click on the data button once to activate tracing conditions.

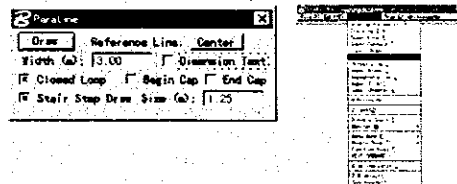
.3 Specify point 3 using the data button and switch the "Hidden Trace" function off.

Paraline Command

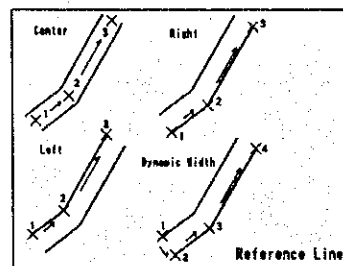
Key Input: BMOD DRAW PARALINE CENTER

Settings > Para Line

Draws parallel lines according to the specified width. Stone steps can also be drawn with the use of this command.



- | | |
|-------------|---|
| Width | To set up the road width value |
| Begin Cap | To close the start point with a line |
| End Cap | To close the end point with a line |
| Stair Step | Switched on when drawing stone steps |
| Draw Size | To set up the stone step width |
| Closed Loop | If switched ON, the arrangement of the end line is done through the [R] button, |

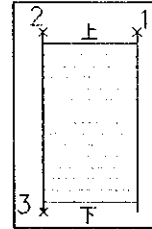


and is similar to the freeline command.

Reference	Selects the standard position for
Line	acquisition. See diagram to the right.
Dimension	The road width is indicated near the
Text	middle of the parallel line drawn.

Options for drawing stone steps

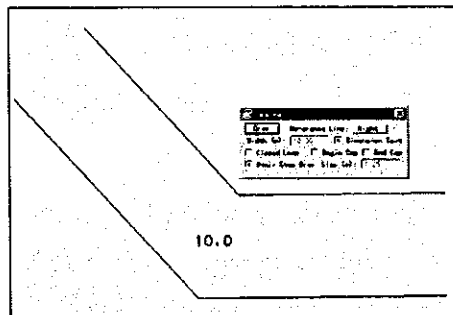
This is carried out with the key-in command "BMOD DRAW PARALINE DYNAMIC". Drawing is carried out from the higher section to the lower section. Under this command, features will be drawn using active LV, WT, and LC, but for CO (color) the following shall be applied:



Parallel lines:	As shown in the table
Upper step lines	Parallel line +1
Lower step lines	Parallel line +2
Supplementary line	Parallel line +3

Dimension Text Function

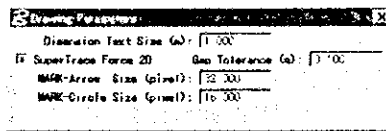
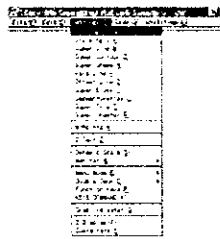
Dimension Text is an option for the inspection of plotting data. Switching the function on would leave the base for road width; the width is represented by a character somewhere at the center of the feature. The drawing attribute of the character is Dimension; if the character interferes with the work, click on "OFF" under Dimension of the MicroStation View Attribute so the character will not appear on screen. This function is considered convenient for the inspection of the output after plotting is completed.



The characters that represent the width values under the Dimension Text shall be based on the same standards applied for parallel line attributes, e.g. LV, CO, WT, LC, etc. However, size will

be established based on the Dimension Text Size of the settings box shown below.

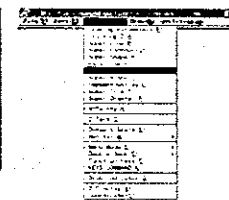
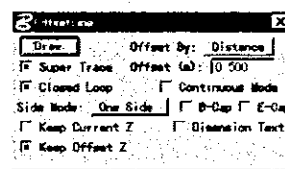
Settings > Drawing Parameter



OFFSET LINE COMMAND

Draws the parallel line using existing features. The height of the parallel line shall be as the height of the existing feature it was based on.

Key Input: BMOD DRAW OFFSETLINE



Settings > Offset Line

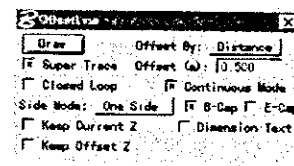
- Offset by [Distance] Draws the parallel line by the distance under the Offset column
- [Dynamic] Draws the parallel line after specifying the width at the first two points.
- Closed Loop If switched on, the arrangement of the end line is done through the "R" button, and is similar to the freeline command.
- Begin Cap Closes the start point with a line.
- End Cap Closes the end point with a line.
- Side Mode[One Side] Draws a parallel line only on one side of the existing feature.
- [Both Side] Draws parallel lines on both sides of the existing feature.
- Continue Mode Enables the delineation of continuous parallel lines.
- Super Trace Switch that enables the tracing of the multiple elements that were divided.
- Keep Current Z If switched on during grabbing, the Z of the measuring mark is used as the Z of the lines being drawn. If off, the Z value of the line grabbed will be used as the Z value of the lines being drawn. This is used to draw encircling features.

Keep Offset Z	If switched on during grabbing, the height of the measuring mark for the line to be traced should be kept parallel by controlling the Z value. If off, the shift in the Z value from the start point to the end point should be controlled.
Dimension Text	Shows the road width somewhere at the center of the drawn parallel line. The width is indicated in letters, with the LV and CO representing the same standards as those for parallel lines. However, these attributes are for dimensions (Display on screen is controlled through the View Attributes/Dimension button).

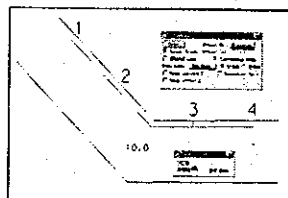
Drawing Ex. Continuous drawing of side ditches (making Z values coincide)

1. Select "Draw"

Makes the Z value coincide with the existing line to draw a parallel line, although this function makes delineating easy regardless of whether there are covers or none. This function entails the use of the Continuous Mode, End Cap, and Begin Cap.



2. Start Drawing



① Select "none covered side ditches"

② Specify the start point

Grab the line at the data point. The type of lines to grab will be indicated on the ABC panel. If the specified

line is not indicated, push the reset button.

③ Specify at the data button (point 1) where tracing should start.

④ Push data button (points 2, 3) for covered and uncovered items.

⑤ Switch on the button below immediately before clicking the data button at the terminal of the line (point 4).

■ E-Cap

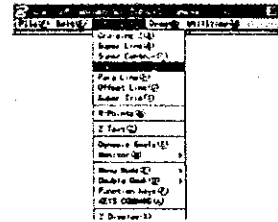
⑥ Specify the terminal of the line with the data button.

⑦ Choose "covered side ditches". With the command for altering attributes, apply covered section as an attribute.

SUPER SHAPE COMMAND

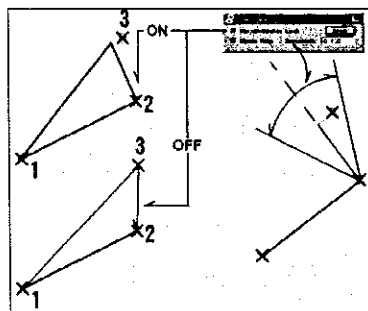
Key Input: BMOD DRAW SUPERSHAPE

Draws the corners of buildings in right angle. Angles should be fixed to form right angles; if the data point (degree of tolerance) exists within these angles, they will automatically be adjusted to form a right angle.



Settings > Super Shape

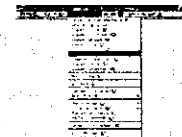
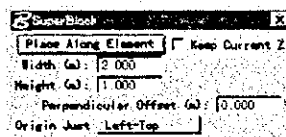
- Perpendicular ON activates the function that adjusts angles to form right angle
- Lock OFF the function is not activated
- Mouse Trap ON If the data point is within the specified angular limit, the function that adjusts angles to a form right angle will be activated.
- OFF Regardless of the location of the data point, shapes will always be created in right angles.
- Tolerance This is specified through a radian which is used to determine the allowable limit for adjustments to form right angles.



SUPER BLOCK COMMAND

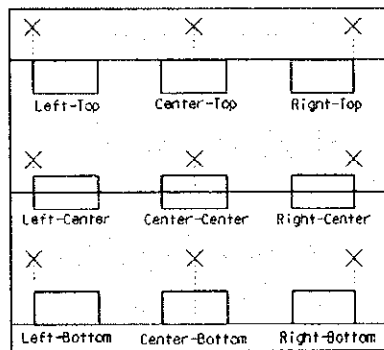
Key Input: DDM PLACE BLOCK ALINGELEMENT

A command convenient for drawing features that have length and width like a box of trees, and that have to be arranged along existing lines.



Settings > Super Block

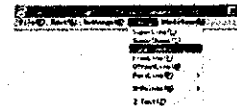
Width	Width of rectangular features to be drawn (longer direction of the traced feature)
Height	Height of rectangular features to be drawn
Keep Current Z	If ON during grabbing, the Z value of the measuring mark is used as the Z value of the feature being drawn. If OFF, the Z value of the feature being traced is used as the Z value of the feature being drawn.
Perpendicular Offset	Distance that determines how far the rectangular feature should be from the traced feature.
Origin Just	Switch that determines where the acquired location should be allocated on the rectangular feature to be drawn. (See graph below for reference.)

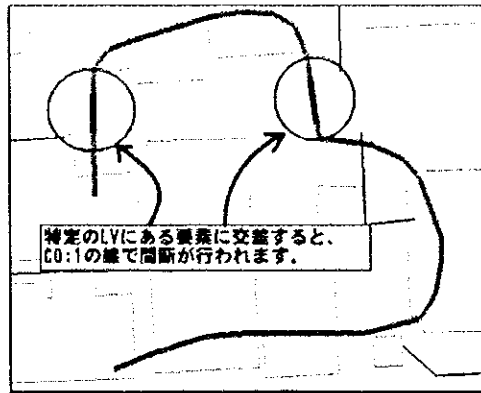


SUPER CONTOUR COMMAND

Key Input: BMOD DRAW SUPERCONTOUR

A freeline command with the (Dynamic Trim) function. The Dynamic Trim function divides the feature as it intersects with another feature at the time of delineation at the point where they intersect. The dynamic trim section element is always CO = 1.

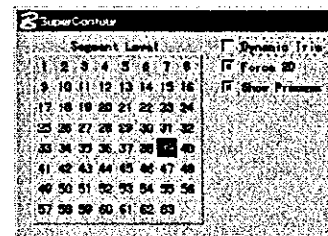




[Motions Setting]

This menu appears on screen when Super Contour in Settings is chosen.

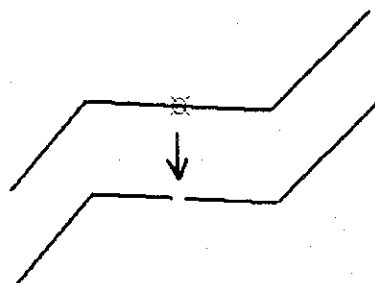
- Dynamic Trim enables the use of dynamic trim functions.
- Force 2d carries out trim calculations in two dimensions.
- Show process confirms the trim calculation process
- Segment level specifies the LV of the feature for trimming.



6. Editing Command

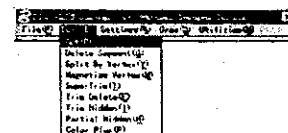
Cutting Command

Divides the elements at the specified point



Edit > Cut

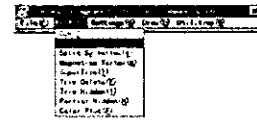
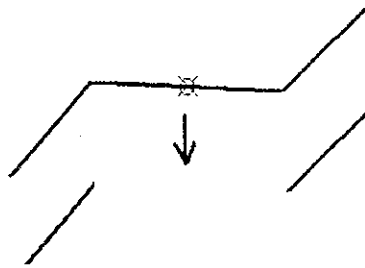
Key Input: BMOD EDIT CUT



Delete Segment Command

Key Input: BMOD EDIT DELETEDSEGMENT

Deletes the specified segment of the feature. Splits the feature into two when the feature segment that excludes the terminal point is deleted.

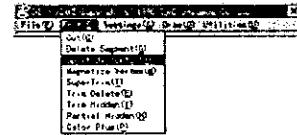
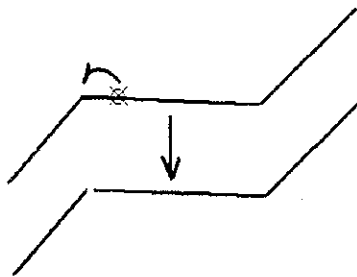


Edit > Delete Segment

Split by Vertex Command

Key Input: BMOD EDIT SPLITBYVERTEX

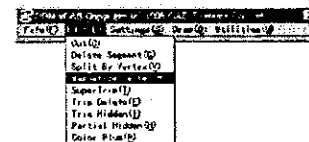
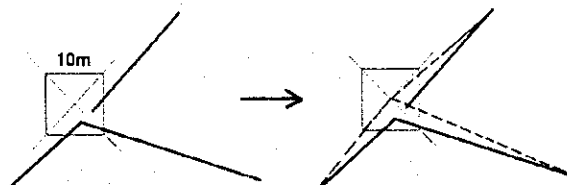
Splits the features at the vertex closest to the specified point. This is not applicable to polygons.



Magnetize Vertex Command

Key Input: BMOD EDIT MAGNETIZE VERTEX

Adjoins the coordinates of the compound features within the grabbing limit (within 10m), and moves them to the specified one point.

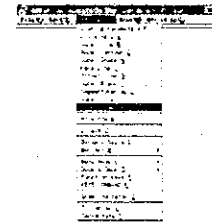


Edit > Magnetize Vertex

Super Chamfer Command

Key Input: BMOD EDIT SUPERCHAMFER

This cuts corners. This command is applicable to features where lines at the nodal point are accurately consistent.



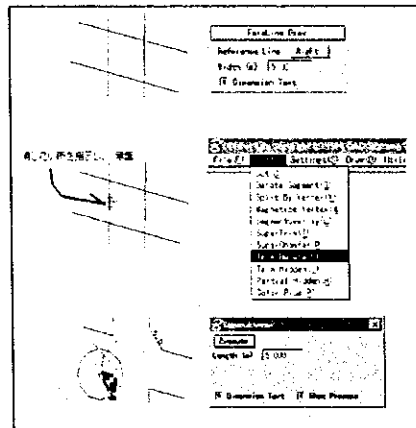
Settings > Super Chamfer

Line consistency here refers to consistency between the XY plane and this command can be used even if the Z value is off, as long as the line looks consistent from the top view. This command can also be effectively used with polygons. If this command is used for polygons, a continuous line segment will be created.

- | | |
|----------------|--|
| Dimension Text | Displays the length of the corner cut somewhere around the middle of the line drawn. |
| Show Process | Enables on screen verification of the operation procedures. |

Drawing Ex. Combination of Trim (Delete) Functions

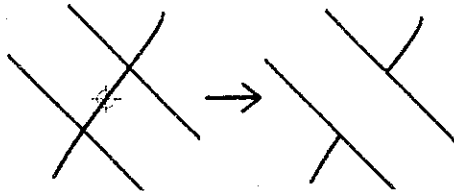
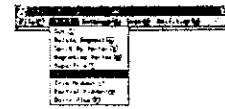
1. Creates a parallel line using the paraline function.
2. Finishes with an intersection without cut corners using the trim (delete) function.
3. Cuts corners using the super chamfer command.



Trim (Delete) Command

Key Input: BMOD EDIT TRIMDELETE

Finds the nodal point of the specified feature and another feature for deletion.

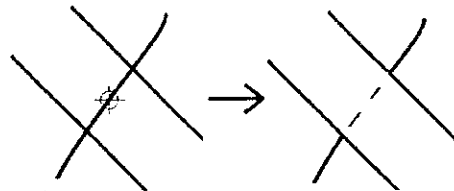
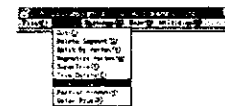


Edit > Trim Delete

Trim (Hidden) Command

Key Input: BMOD EDIT TRIMHIDDEN

Finds the nodal point of the specified feature and another feature and makes the class attribute of this section a hidden feature.



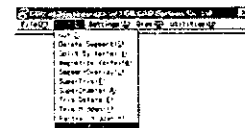
Edit > Trim Hidden

Color+1 Command

Key Input: BMOD EDIT COLORPLUS

When an existing feature is selected, add +1 to the color allocated to this feature.

Edit > Color Plus

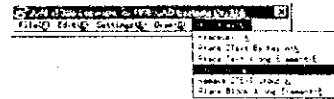


Clear Group

Key Input: DDM UTILITY CLEARGROUP

Clear 0 the group function applied on the feature within the territory specified by a ring.

Utility > Clear Group

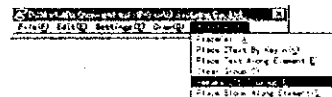


Add Text Group to Spot High Point

Key Input: DDM UTILITY REMAKEZTEXTGROUP

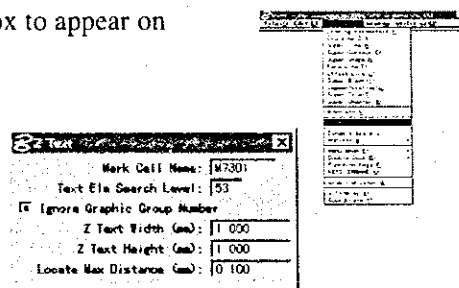
From the cell name and the LV in the line of letters in the spot high point cell, group features that are closest to each other.

Utility > Remake Z TEXT Group



Settings Box

Select [Settings] and then [Z Text] for the settings box to appear on screen.

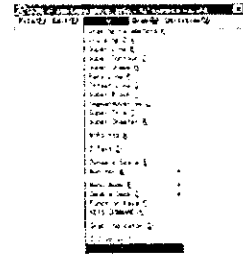
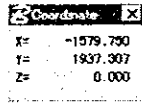


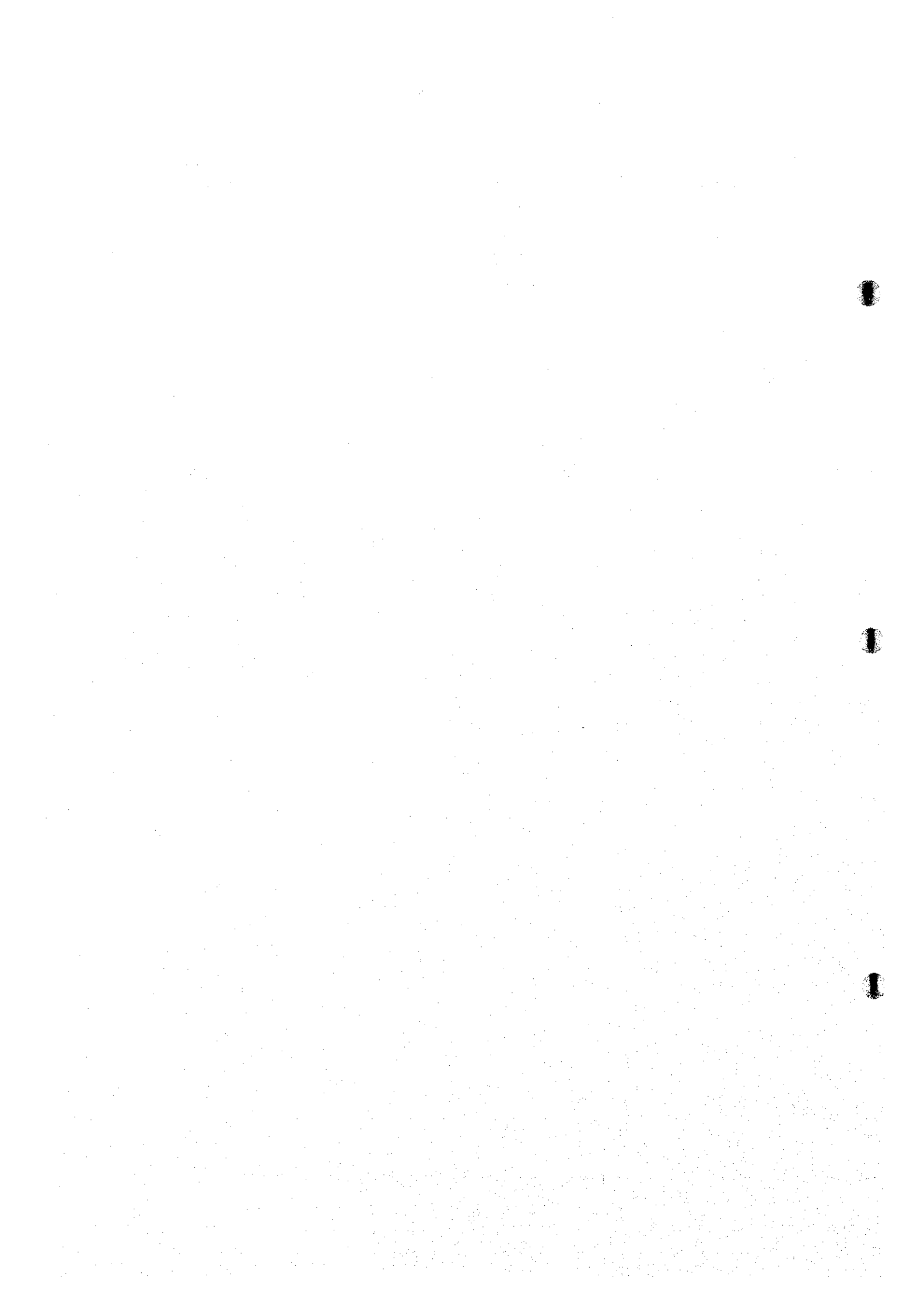
- | | |
|-----------------------------|--|
| Mark Cell Name | Cell name for the features to be grouped |
| Text Elm Search Level | LV number of letters used the features to be grouped |
| Ignore Graphic Group Number | |
| Z Text Width | |
| Z Text Height | |
| Locate Max Distance | The searching distance of letters |

Indication of Coordinates

Setting > Coordinate

Indicates the measuring mark coordinate.





Appendix DDH File Format

- (1) The layered structure of the menu is defined in a file.
- (2) Anything after this “#” are comments. If this sign is the first letter of the statement, anything that comes after the sign would be comments.
- (3) If “\$” is the first letter of the paragraph, this sign refers to a special definition command.

\$MAP_SCALE_FACTOR =

scale denominator (sets the mapping scale.; the scale specified here is the basis for the attach of the cell library and the setting of the type of custom line for each mapping scale (1:500, 1:1000, 1:2500))

\$MASTER = 0 (The statement after this line is a definition of “master deck”; slave numbers are affixed to the order of definition of the key buttons. There are 12 key buttons (number of slaves) in the master deck that can be defined. (The buttons will be expanded to 96 in the future)

\$SLAVE = Slave number (After this statement, this shall be referred to as “slave deck”. Slave numbers shows the order of the definition of the key buttons in the master deck. There are a total of 96 key buttons in 1 slave number.)

(4) Key Button Definitions

- ◆ Blank spaces equivalent to more than 1 character mean field ends. Tabs should never be used.
- ◆ The last field of character of command goes until the end of the statement. Spaces can be used within the line of characters of command. A semicolon is used to indicate the division between commands.
- ◆ Key buttons are indicated the order defined.

Field 1 Key button name (command·title)

Field 2 DM command name (up to 16 characters; the number of characters is optional, however, if not used as a DM command)

Field 3 Bit map·icon·file name (NO ICON is applied when this field is not used for the DM command and when the icon file name to indicate is

not specified)

Field 4 Class of key button functions (Always used as MENU for the master deck)

For the slave deck:

Symbol	for features used for points
LINEAR	for features used for lines
AREA	for features used for surfaces
CONTOUR	for contour lines
TEXT	for annotations
NONE	for others

(To specify either of the above slave deck functions, just type in the first character, i.e. A for AREA. When setting up the function class and selecting the key button, the respective default commands are activated.)

Field 5 Command Characters (Refers to commands activated when selecting the key button. The command is entered in the same manner as the MicroStation key-in command. The command starts running after the default command specified by function class is activated. This field may be omitted.)

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DIGITAL MAP EDITOR
MicroStation
MANUAL

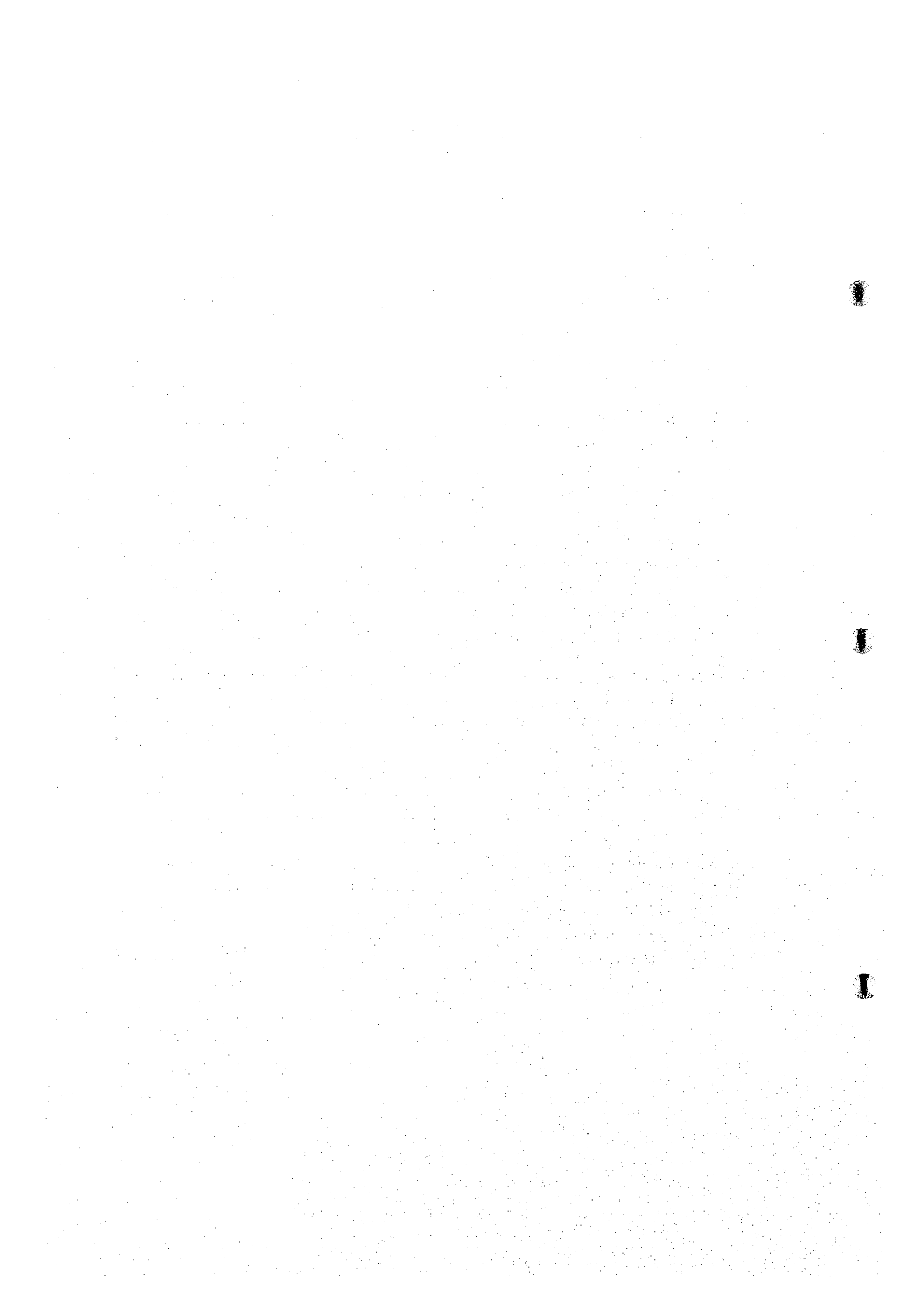
JULY 2000

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1. Introduction

This is a manual on editing digital topographic maps using the 3-D CAD software MicroStation, and one that particularly explains the processes involved in revising 1:50,000-scale digital topographic maps and digitizing existing maps. MicroStation is an all-purpose CAD software offering a great number of functions and allowing processing flexibility. Each function is described in detail in the manual provided by the maker. This manual presumes that the MicroStation: DDM (function key utility) and SYSIMAGE (raster image display) software will be used.

2. Management

2.1 Hardware Management

The PC used for editing work must run on Windows NT 4.0, which is extremely easy to administer. However, as there are 2 CRT monitors in the configuration of equipment, caution is necessary with changing hardware (ex: CRT, graphic board).

2.2 Software Installation

Software malfunctions are rare but can happen. The problem can be improved by reinstalling the software, following the maker's instructions. In this case, DDM and SYSIMAGE, which are applications of MicroStation, must be reinstalled as well. As MicroStation and DDM have preference files, make sure to back these files up when reinstalling (refer to DDM manual).

3. Concerning MicroStation

3.1 Outline of MicroStation

MicroStation is a powerful software for digital map editing. It serves as an all-purpose platform for the production of topographic maps. However, it involves original concepts and operations which are not found in other similar packages, and which must be understood by the operator. The following tasks are fundamental to the operation of MicroStation:

- ◆ Opening files

In MicroStation, only one dgn file can be opened as an active file at any given time. However, it is possible to display several reference files.

- ◆ Saving files
In MicroStation, it is not necessary to run the Save command, as the results of any operation are saved immediately.
- ◆ Defining attributes
The attributes are defined by: Level, Color, Weight and Style. Concerning all the map symbols listed in the topographic map symbol specifications, create an attribute table which assigns unique attributes.
- ◆ Design plane, design space
Design plane is a two-dimensional finite Cartesian coordinate system. In two-dimensional dgn files, data are distributed within the design plane.
Design space is a three-dimensional finite Cartesian coordinate system. In three-dimensional dgn files, data are distributed within the design space.
- ◆ Fence function
This function is used to select data temporarily, and offers great processing versatility when used in conjunction with other functions.

3.2 Reference Guides

Please refer to the User Guide for basic operation. For more advanced operations, such as EdG and data exchange techniques, please refer to the Administration Guide.

4. Handling dgn Files

4.1 Working Unit

The working unit is the unit of length used in each dgn file. When making a new dgn file, first define the working unit.

For a scale of 1:50,000, the settings are as follows: Master Unit: m, Sub-Unit: cm. Set the resolution as follows: Master/Sub: 100, Position Unit: 1.

4.2 Backing up Plotting Data

During plotting, all data are acquired in the form of three-dimensional coordinates. When starting the editing work, set the Z value of all elements to 0m, except for contour lines. Be sure to make a backup file of the three-dimensional plotting data.

4.3 Changing The Element Height to 0

In order to change the height to 0, export all data except contour lines into a two-dimensional dgn file, and then re-export these data into the three-dimensional dgn file.

4.4 Dividing a File

When editing, divide the dgn file into several files by attribute, e.g. contour file, symbol file, road file, etc., in order to improve processing efficiency.

4.5 dgn File Size Limit

The size of the dgn files is limited to 32 MB. When this limit is reached, no more data can be written onto the file. Consequently, make sure to divide the file before it reaches this upper limit.

4.6 Marginal Information File

The dgn file for marginal information must be prepared as a separate file. It can be displayed as a reference file if necessary. Neat lines at the scale of 1:50,000 are distorted, but this is not an error as they follow latitude and longitude. Handle the neat lines with caution. (Select the polygon instead of the block.)

4.7 Handling Three-Dimensional Data

The Z values of three-dimensional dgn files must be handled carefully.

When entering new data, such as symbol distribution, set the Z value of the elements to 0. (Set the active depth to AZ=0.)

When making revisions, using such functions as modify, add, copy elements, etc., make sure that the Z value is not erroneous. (Always beware of the active depth. Perform the operation in top view, but refer to the lateral view.) Except for contour lines, set all the Z values to 0.

4.8 Node Matching

In principle, the nodes of elements must match (such as the beginning and end points of vegetation boundaries, the junctions between roads and bridges, the road links, etc). However, for T-shaped places, it is not necessary to put a node on the receiving element (for example the road part of the node point between a road and a vegetation boundary).

4.9 Types of Elements Used

The main types of elements used during topographic map editing are as follows:

- ◆ Continuous lines
- ◆ Polygons (closed graphics)
- ◆ Arcs
- ◆ Text
- ◆ Construction (draft)

Displayed/hidden element attributes: "Construction" is not a type of element but it must be defined as an attribute of each element.

MicroStation contains elements such as curved lines and curved surfaces, however, these are not used for topographic maps. In case of the exchange of data containing curved lines, these must be converted beforehand into continuous lines.

5. Editing

5.1 Roads

During plotting, roads are acquired by their center lines. For roads that must be represented by a double line, based on the map symbol specifications, generate parallel lines with the specified width.

- ① Center line editing
Adjoin the lines (e.g. between stereomodels, between strips, etc.)
- ② Generation of parallel lines
Generate parallel lines at the specified distance (road width).
- ③ Revision of adjoining points
For very narrow roads, foot paths, etc., represented by single lines, revise the connecting points.

Concerning secondary roads, change one side of the double line to a broken line. (In principle, the line located toward the top or the right of the map is represented as a broken line.)

④ Maintaining center lines

Even after generating the parallel lines, keep the center lines as they are.

5.2 Symbols (Vegetation Symbols)

Refer to the plotting data to place vegetation symbols inside the areas defined by vegetation boundaries, roads, rivers, etc. Input 0 for the Z values of symbols. Apply the following rules for symbol positioning.

- ◆ In case of wide areas, put the symbols in a grid at even intervals.
- ◆ When a vegetation symbol overlaps another feature, move it to a suitable place.
- ◆ In case of a small area, place the symbol at a suitable distance so that the area coverage is represented.
- ◆ Vegetation boundaries are considered as “construction” elements.

When placing symbols on the area, set the grid lock on and control the cursor so that data can only be placed on the grid. Set the grid main unit by defining setting value/design file/grid.

To represent imbricate patterns, run the command copying the element to the matrix twice.

5.3 Contour Lines

As contour lines are three-dimensional, all operations must always take the Z value into account. Match the active height with the height of the element being edited. When necessary, check the data by displaying a lateral view.

- ① Adjoin all the contour lines between models and between strips.
- ② Match contour lines with plane topographic features such as rivers.
- ③ Adjoin all the broken lines other than ① and ②.
- ④ When contour lines intersect roads, cliffs, etc., convert them to “construction” elements.
- ⑤ When moving or inserting an element, make sure that there is no error in the Z value.

5.4 Spot Heights

Spot heights are combinations of reference points and text (or numbers).

- ① Check that spot heights are consistent with contour lines.
- ② Check that the density of spot heights corresponds to an interval of approximately 5cm on a 1:50,000-scale map. In case there are too many spot heights, delete a suitable number of points.
- ③ Normally, place the text at the right of each corresponding reference point. In case the text overlaps another feature or is difficult to represent on the right side, move it to the most suitable place, from the left, top, to bottom in order.

5.5 Water Features

Edit the water features such as hydrographic boundaries and rivers.

- ① Check that water features are consistent with the contour lines.
- ② Edit the data so that rivers follow the valley lines defined by the contour lines. Attach contour data as a reference file, and edit the data so that rivers follow the valley lines defined by the contour lines (in principle, modify the contour lines).
- ③ Adjoin the water features between stereomodels and between strips.

5.6 Buildings

Except for huge ones, buildings are represented by symbols.

- ① Buildings along roads
Move the buildings so that they do not overlap roads.
When a building overlaps a road because the road width has been preserved, move the building.
- ② Densely built areas
When the buildings are so densely located providing no extra space for moving, delete a suitable number of buildings.
- ③ Buildings located on the neat lines
In the case of buildings located on neat lines, move them to either sheet so that they are not broken by the neat lines. When there is no space to place cells, delete a suitable number of buildings.

5.7 Annotations

Enter annotations using the proper font, size and character space as defined in the annotation specifications. When setting the character size, choose the actual size rather than the map size.

The standard position of a row of characters is the middle of the text.

5.8 Patterning

When data editing is finished, generate special lines (e.g. broken lines) in accordance with the map symbol specifications, by pattern processing (i.e. positioning cells on the lines).

Select the line data (e.g. administrative boundary) for creating special lines (except real line as hydrographic boundaries) to process using edit/select by attribute. Generate the special line with Tool/Main/Pattern/Line Pattern.

To edit or modify elements affected by a pattern, first cancel the pattern.

5.9 Plotting

After editing a number of items, make a printout using the inkjet plotter in order to check the results.

- Color ▪ Width of line

Settings using the inkjet plotter (hardware).

Settings using the plotter driver (software).

It is possible to plot using the same color tones as on the monitor.

The color can be set by Level.

Ex: Setting the color using the software (Level)

Assign Levels 1 to 63 to each color pen.

Pen (1) = (1-4, 10-30, 35-37, 39-40, 42, 47-63)	Black
Pen (2) = (5,7)	Navy
Pen (3) = (6,38)	Green
Pen (4) = (34,41)	Red
Pen (5) = (9)	Yellow
Pen (6) = (8,43)	Magenta

Pen (7) = (33)	Orange
Pen (8) = (31,32,44,45,46)	Light blue

Ex: Setting the style of line using the software

Style (1) = (20,20) / no hardware	; style = med dash
Style (2) = (160,40) / no hardware	; style = med dash
Style (3) = (400,80) / no hardware	; style = long dash
Style (4) = (240,40,40,40) / hardware	; style = dot-dash
Style (5) = (400,80,80,80) / hardware	; style = short dash
Style (6) = (240,40,40,40,40,40) / hardware	; dsh-dt-dt
Style (7) = (400,80,40,80,40,80) / hardware	; style = long dsh-shrt dsh

5.10 SYSIMAGE Operation

The digitizing of an existing map is performed by running SYSIMAGE, an application program of MicroStation. The image data of the map are acquired at a resolution ranging between 150 and 200 dpi.

Set the orientation of the acquired data using the sheet coordinates. When the orientation is finished, digitize the map in accordance with the map symbol specifications.

During the work, always keep in mind the output size (scale) to avoid over-magnifying the data on screen in order to maintain an adequate data density.

5.11 dgn File Repair

dgn files may suffer logical damage due to faulty operations. A design file is damaged when:

- ① The fit command does not operate properly.
- ② Some elements may be displayed but not modified.
- ③ The end of file (End of Design) cannot be detected. (When opening a dgn file in MicroStation, the following message will appear: "End of file not found." However, when the message "Repair it?" appears, do not answer "OK".)

Repair the file as follows:

In case of ① above (the fit command does not operate properly), create a new dgn file and copy the contents of the faulty dgn file into the new file. The faulty elements will be excluded during copying.

In case of ② or ③, repair the file using the EdG utility. As this is a powerful dgn file editor, make sure to back the file up before attempting repair.

Use the EdG utility as follows:

- ① Start EdG through the DOS prompt: C:/EdG <file name>.
- ② Carefully enter the commands prompted by the administration guide.
- ③ The "repair whole" command is used for the repair of simple errors. If the dgn file is not very reliable, substantial file damage may be avoided through the frequent use of this command.

It is almost impossible to fully repair a damaged file. To avoid major problems, the best protection is frequent backup.

5.12 Data Exchange

When exchanging data with another CAD software, the most frequently used format is DXF. When exporting a file, use File/Export to set the DXF file name and "layer/color attribute". When importing, select the DXF file using File/Import.

**DIGITAL PLOTTER UTILITY
DiAP AERIAL TRIANGULATION MODULE
(DiAP ATM)
MANUAL**

JULY 2000

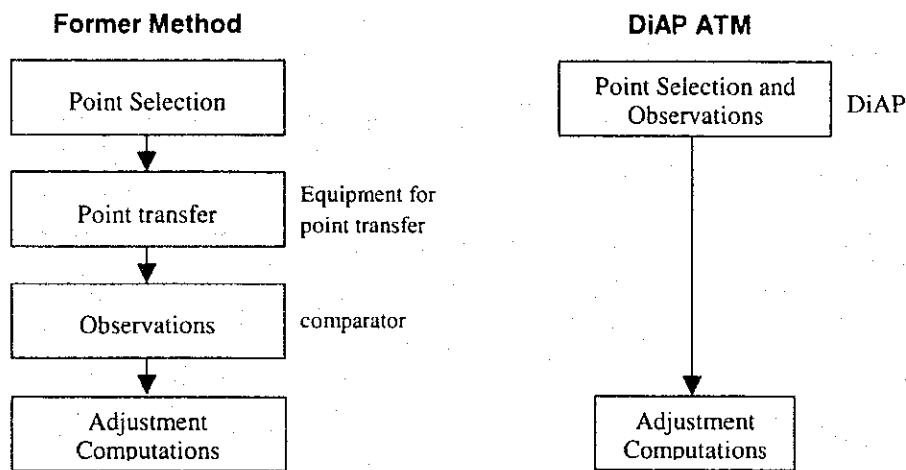
**DINAGECA
JICA STUDY TEAM**

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1. Introduction

In the past, aerial triangulation requires costly equipment and skilled technicians. But with the DiAP ATM, the work became easy and swift to implement. The figure below compares the work flow and equipment adopted using former aerial triangulation methods and aerial triangulation with DiAP. This manual explains about the DiAP ATM and the PATB adjustment calculation program. As for the details on the operation of the MicroStation and DiAP machinery, and the use of the PATB software, refer to the manuals provided by their respective manufacturers.



The following are the advantages that can only be found in DiAP ATM.

- ◆ Ease in the conduct of re-observations.
- ◆ Disuse of point transfer and the ability to minimize discrepancy in adjoining of models.
- ◆ Ease in constructing a stereomodel based on the adjustment results.

2. Preparatory Work

The following types of data should be prepared prior to aerial triangulation using the DiAP ATM:

1. Raster data (sis) ...data on photo images scanned from positive or negative films
2. Control points data (con) ...text file of the aerial triangulation results photo control points that will be used as absolute orientations
3. Camera data(cam) ...focal distance, coordinate of fiducial marks, etc.

4. Design file (dgn) ···dgn file (C:\win32app\ustation\dgn\diap\dpatm.dgn) to be used as a dummy during observations

The camera data can be created after DiAP is started, while the remaining three data shall have to be prepared in advance.

3. MicroStation Startup

Double click on the MicroStation icon and start the MicroStation manager to select the design file (dpatm.dgn) or select the design file from the explorer to start the MicroStation program.

4. DiAP · DiAP ATM Startup

Key-in “MDL L DIAP” in the MicroStation command window. This will access and start DiAP, showing several dialogue boxes on screen.

Key-in “MDL L DIAP_ATM” in the MicroStation command window. This will access and start DiAP ATM, showing several dialogue boxes on screen.

5. Block Setup

DiAP ATM menu



From the DiAP ATM menu click on “Block/Setup” to prompt the block setup dialogue box.

Block setup palette

By clicking on "New opposite/Name" create a new block file. Establish the values for Forward Overlap (60% - standard value) and Side Overlap (30% - standard value), and a number of observation for "Points /Layout". For points, 3 is the norm and refers to "3" pass points per photo (3-Standard value).

Next enter the camera

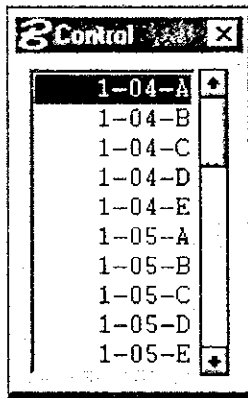
file. (Please refer to the DiAP manual for the creation of the camera file and the control point file.)

ATM Photo Setup Palette

To establish the photos included in the block, click on "Photos" and then "Add" to prompt the ATM Photo Setup dialogue box. Add up the optional ID number (4 digits), photo

data and camera data and register the result in "Photos" under the ATM Block Setup box. Repeat the same process for every photo. By clicking "Next" the input of the ensuing photo number is made easy.

ATM Control palette



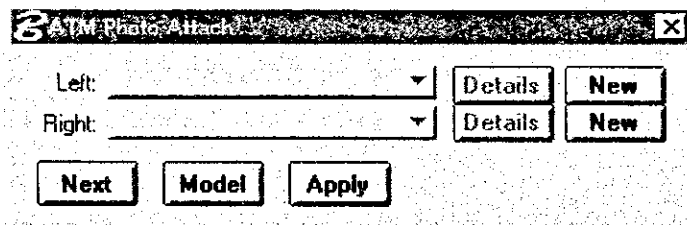
To setup the control points within the block, click on "Points/Add" to prompt the ATM Control dialogue box. Select the required point from the control point file and enter the point by clicking "Apply" in the ATM Orientation Control Point palette. This will record the added data in Points under the ATM Block Setup dialogue box. Repeat the same procedure for every control point.

After all setups are completed, click on "Save" and then "OK". Afterwards, close the ATM Block Setup dialogue box.

6. Pass Point Observation (Primary Model)

Here we regard the tie points within the flight course as pass points. From the ATM main menu click on Photo then Attach to open the photo attach palette.

ATM Photo Attach Palette



Select the stereomodel pair from left to right to be observed. Normally, observation starts on the left side within the course,

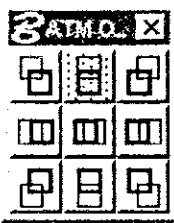
starting from the lowest flight course number. The left side refers to Primary and the right refers to Secondary; none refers to correlation in physical positions.

After the setup of the photos on the Left and Right, click on Apply. This will automatically prompt the interior orientation palette for the left photo. To activate the measuring mark for observations under View 1, click on the MicroStation pan view button. Do not alter the default view settings of the Dgn file.

Carry out the interior orientation for the left photo, adopting almost the same methods used in DiAP. If the images in a block are turned upside down, use the rotate functions. After the orientation of the left photo is completed, orientation of the right photo automatically starts. Interior orientation is carried for the right photos same as for the left.

Whenever necessary, interior orientation shall be automatically set up, even regarding the following procedures:

ATM Orientation palette



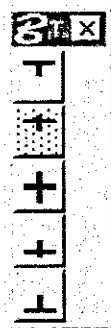
After the left and right interior orientation work is completed, the ATM Orientation palette, the Tie Point palette, and the Control palette are automatically prompted on screen.

To preset the measuring mark on the pass point location, enter "datm op cen 1 2 3 4". Stereo representation will be automatically set up in View 1. After allocating the stereo image to View 2, left image to View 3, and right image to View 4 using the DiAP image palette, activate the measuring mark of each view through the pan view button, if necessary.

For the overview representation of measured data, enter "datm overview left" to prompt the overview window.

The ATM Orientation palette represents the correlation in primary and secondary positions in patterns. Thick frames represent primary positions. At this time, the left image is primary, therefore click on the icon at the center. This will display the images in each view.

Tie Point Palette



Each icon in the tie point palette refers to the pass points of primary images. If the "Points" is set at 3, the observation location covers 3 points: upper tier, center, and lower tier. If set at 5, the observation location will cover a total of 5 points.

In the vicinity of each observation location, eliminate the parallax and observe the pass points using the handle and the No. 3 pedal. After observations, a square mark appears in the overview.

Interchange the secondary and the primary in the ATM Photo Attach palette and then click on [Attach]. For the interchange, click on the middle left icon. Although this procedure will produce a pseudoscopic image there is no cause for concern.

Carry out observations for every pass point and after completion, the observed points will be added and indicated in the overview.

This ends the observations for Model 1.

7. Pass Point Observation (Normal Model)

To move into the observation of the adjacent model to the right, secondary and primary settings will be setup in the ATM Photo Attach palette. The pass point of the right photo of the current model and the pass point of the left photo of adjacent model to the right should be common points, to avoid any alterations in the primary setting and to set up the secondary for the right photo of the adjacent model to the right. After the setup is completed, click on [Apply]. Since the right photo will be measured for the new model, the interior orientation palette will automatically be prompted on screen. Carry out interior orientation and click [Apply].

For the measurement of pass points, set up the secondary and primary settings in the ATM Photo Attach palette. At this time, the right photo (left photo for the previous model) will be subject to the primary setting, therefore, select the center icon.

Care should be given regarding the most important point in the aerial triangulation work. The pass points (excluding the first and last photos in the flight course) will be jointly used for two adjacent models and measurements should be carried out on the same location. In other words, the location of the pass point already measured for the left model will not be changed for the current model, and should be measured.

So as to avoid touching the handles, use the Tie Point palette to specify the measurement location. Observe the MicroStation system status (lower right of the screen) with immense care, and step on the No. 3 pedal to activate "Photo Lock: ON". This will fix the pass point of the right photo which should be used jointly. In this state, use the handle to eliminate the parallax and conduct measurements. Each point shall be measured in a similar manner. After the measurement, the point for the overview will be marked with a thick frame to indicate that with this photo the pass points for the left and right models have been measured.

To measure the pass point for the right model, interchange the secondary and the primary settings in the ATM Photo Attach palette and click "Attach". For the interchange in the ATM Orientation palette click on the left middle icon. Since the next process entails the new measurement of a point, as in the measurement of the pass points for the first model of the course, eliminate the parallax and measure the pass points at the vicinity of every measurement location using the No. 3 pedal. Once the measurements are done this will be indicated in the overview.

The repeated conduct of the items in "7. Pass Point Observation (Normal Model)" would mean the execution of all flight course observations.

8. Tie Point Observations

Tie points refer to the points that adjoin flight courses. Except for some specific areas, the observation method will be basically the same as the one adopted for pass points.

Tie points shall be used as pass points. Transfer the pass point at the lower tier of the higher flight course as a tie point for the lower flight course, and the pass point at the upper tier of the lower flight course as tie point for the upper flight course. For the transfer of the tie point, immense care should be taken just like in the joint use of the pass point, whereby the parallax should be eliminated and measurements carried out without changing the position of the points.

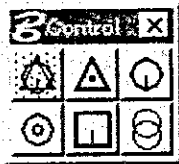
The settings in the ATM Photo Attach palette for the measurement of tie points between flight courses will be the same as in the pass point measurement. The primary setting shall be for the photo where the point to be transferred has already been measured. The secondary setting shall be applied for the photo on the side where point transfer is going to be carried out.

The settings in the ATM Orientation palette will be determined by observing with immense care the relationship between the location of the primary and secondary using the three icons in the upper tier and the three icons in the lower tier. As can be seen from the icon, there are times when a pass point (tie point) is jointly used for a maximum of 4 models (during normal alignment). The tie point palette indicates the position of primary pass points.

9. Control Point Observations

After all pass point and tie point measurements are completed, control point observations are carried out.

Control Palette



Confirm the model with control points using the index map and the control point alignment diagram, and establish the settings in the ATM Photo Attach palette. The upper left of the control palette refers to the XYZ control points, while the upper middle and the upper right refer to XY and Z control points, respectively. Select XYZ for control points and Z for bench mark. From the ATM Control palette select the control point and as in the pass point measurement, measure the control point position after eliminating the parallax. Once measurements are carried out, a square or circle, or both will show in the overview.

All control points should be transferred as much as possible in all photos that are considered to

contain these points.

10. Adjustment Computation

After all measurements are completed, create the photo coordinate data file (*.dat) by clicking on Photos in PATB of the DiAP ATM menu, and the control data file (*.con) by clicking on Control in PATB.

Create the project by starting up PATB. Carry out the substitution of the photo coordinate file and the control point data file, and set up the output data file. Establish the parameters for self-calibration and automatic removal of gross errors.

Start adjustment computations. Once this is completed, confirm the intersection residual of the photo coordinates and the residual of the control points. If these are within the specified limits, the adjustment computation work is concluded. If the σ^0 is less than $10 \mu\text{m}$, this would be taken as proof that there are no gross errors.

If the calculations are abnormally completed, or if gross errors have been confirmed to exist, observations should be carried out again only for the points concerned. If there are no anomalies in the observed points, the resulting control point coordinates should be checked. However, if anomalies are detected, revise the control point data file and carry out adjustment computations again.

11. Creation of Stereomodel

If the calculations are completed without a hitch, substitute the adjustment computation results files of each of the following using the Import in PATB of the DiAP ATM Menu: Bundles (*.ori), Adjusted (*.adj), Control (*.con), Photos (*.dat), Residuals (*.res).

Set the primary and secondary in the ATM Photo Attach palette for the stereomodel. Select the Model button and save the model data file (*.mod). By attaching the model file in DiAP, it is possible to indicate the stereomodel that was subjected to adjustment computations.

12. Others

By clicking on Merge under Block of the DiAP ATM menu, the blocks that have been separately observed can be unified. Select the block file that you want to add to the current block. If additional measurements will be carried out for the pass points and tie points of the

block sections to be adjoined, it will be possible to save this as one block file. Clicking on Merge would join the blocks, allowing adjustment computations for only one block. The advantages this would offer are the ability to reduce control points and raise the compatibility of blocks measured in different time periods.



**SCANNING OF MAP SHEETS
MANUAL**

JULY 2000

**DINAGECA
JICA STUDY TEAM**

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1. Introduction

This is a manual on the use of a scanner for the digital plotting of existing map sheets, and one that particularly explains the gist of obtaining image data for digitizing the existing map sheets. The operation of the equipment for this work shall be as specified in the operation manual produced by the manufacturer. For scanning, Calcomp ScanPlus III is proposed, while ISM Sysimage is the software proposed for digitizing the existing map sheets.

2. Machinery Installation

2.1 Machinery Installation

The scanners are sensitive to environmental influences, e.g. temperature, humidity, etc. It is, therefore, considered very necessary to bear the following points in mind when installing the equipment.

- ◆ Acquisition of a safe and stable electrical voltage. If possible a stable power source shall be used.
- ◆ The scanner shall be installed in a place safe from direct sunlight and significant changes in temperature and humidity.

2.2 Inspection and Control of Machinery

Daily maintenance shall entail the following:

- ◆ Covering of the machinery when not in use to keep it free of dust.
- ◆ Cleaning of the paper feed roller. Chemical solutions should never be used to protect the surface of the machinery.
- ◆ Replacement of the fluorescent lighting when physical changes are detected due to extensive use, to ensure color quality.

2.3 Software Installation

Poor software operation happens every now and then. By reinstalling the software according to the manual provided by the maker, conditions can be rectified.

3. Digitization of Existing Map Sheet

3.1 Determine Data Usage

During the work planning stage, the use of the map image data shall be determined in accordance with the outline of the work. Below are the selected items and the standard settings for digitizing the existing 1:50,000 scale map:

- ◆ Resolution
Although the ideal setting is 250dpi (1 pixel - 100 μ m), resolution shall be set at 150dpi (1 pixel - 170 μ m) . Resolution shall be set with due consideration of the quality of the material and other relevant conditions. A higher resolution shall be adopted if the material, e.g. polyester film, is subject to minimum contraction and is easy to store. However, little can be gained by establishing a high resolution if the material used is for map printing, which is not easy to save.
- ◆ Medium
Polyester positive film. Transparent and non-transparent paper can be used with the ScanPlus III scanner; a paper with a maximum width of 0.85m can be used. Although no limitations on paper length is specified, the length shall be set to a maximum of 2m in consideration of shrinkage.
- ◆ Data Type
Gray scale: 8 bits per pixel. Although the scale for color printing can be adopted (24 bits per pixel), the gray scale shall be applied for plotting.

3.2 Preparation and Inspection of Existing Map Sheets

Existing map sheets shall be collected. If deemed necessary, a polyester positive film shall be made based on the existing map sheet. Prior to scanning, the existing map sheet shall be inspected. The items to be inspected and the countermeasures to be taken are as follows:

- ◆ Lines
The items to be digitized shall be inspected for patchy or faint lines. If necessary, the existing map sheet shall be exchanged for something in better condition.
- ◆ Shrinkage
Inspection shall be carried out to determine any significant differential shrinkage. The length of the diagonal line shall be measured and if the length

exceeds the allowable limit the existing map sheet shall be exchanged for something in better condition. Attention should be given particularly to folds/creases. Corrections that can be carried out with the Affine conversion, however, are assumed to have no problems in terms of accuracy.

- ◆ Dirt (scribbling)
Removed if deemed necessary.

3.3 Tentative Scanning

For picture quality adjustments, randomly select several sheets from the existing map sheets for tentative scanning to adjust the items shown below. The results shall be stored as scanning parameters; there is no need to store the file on image data produced during this work.

- ◆ Size of data to be acquired
The width for scanning shall be determined. The area to be scanned shall cover the neatlines within the map.
- ◆ Threshold
A threshold shall be established to avoid acquiring elements that produce noise, e.g. dust. Default values are usually acceptable.

3.4 Actual Scanning

The image data for digital plotting shall be acquired and particular care should be taken regarding the following.

- ◆ Proper placing of the existing map sheet to minimise tilting. (This is a consideration made to minimise data size.)
- ◆ As a rule, the data file shall be named according to the 4-digit map sheet number (e.g. 1234.tif). To distinguish the file from the aerial photo image data file, devices such as writing a letter "m" (e.g. m1234.tif) before the file name shall be adopted if deemed necessary
- ◆ The data shall be stored in the TIFF format (uncompressed).

4. Correction and Conversion of Image Data

4.1 Correction of Image Data

The image data in TIFF format shall be opened using a software that enables image-retouch (e.g. Adobe Photoshop), to confirm picture quality. If the picture quality is highly likely going to hamper subsequent work, the degree of brightness and contrast shall be readjusted. Filtering and color reduction are also effective means of eliminating noise, e.g. dirt.

4.2 Format Conversion

The image data in TIFF shall be converted into the SDI image format for using SYSIMAGE. (The SDI image format is compatible with the DiAP plotter.) Conversion shall be carried out using the "Batch Script" under the Windows NT. Conversion should be carried out as shown below:

- ◆ Incorporate the folder with the conversion program into the Windows NT path of environmental variables (e.g. if the conversion program and the batch script are in "c:\¥bin", add this directory to the path. The environmental variable path can be changed through the system property.)
- ◆ Execute the Windows NT DOS prompt.
- ◆ Move the current folder to the folder containing the TIFF image data.
- ◆ Enter the data as [t2s *.tif *.sis] and execute the batch script function. As a rule, the extended name for SDI image files shall be "sis".
- ◆ Convert all TIFF files in the folder into SDI image files.

5. Data Saving

5.1 Data Saving

Although the TIFF data file cannot be used in the work, this data file shall be backed up. Reversible compression (e.g. TIFF5.0LZW format for compression) shall be adopted when re-saving the file; the DAT shall be used for backup medium.

**SCANNING OF AERIAL PHOTOS
MANUAL**

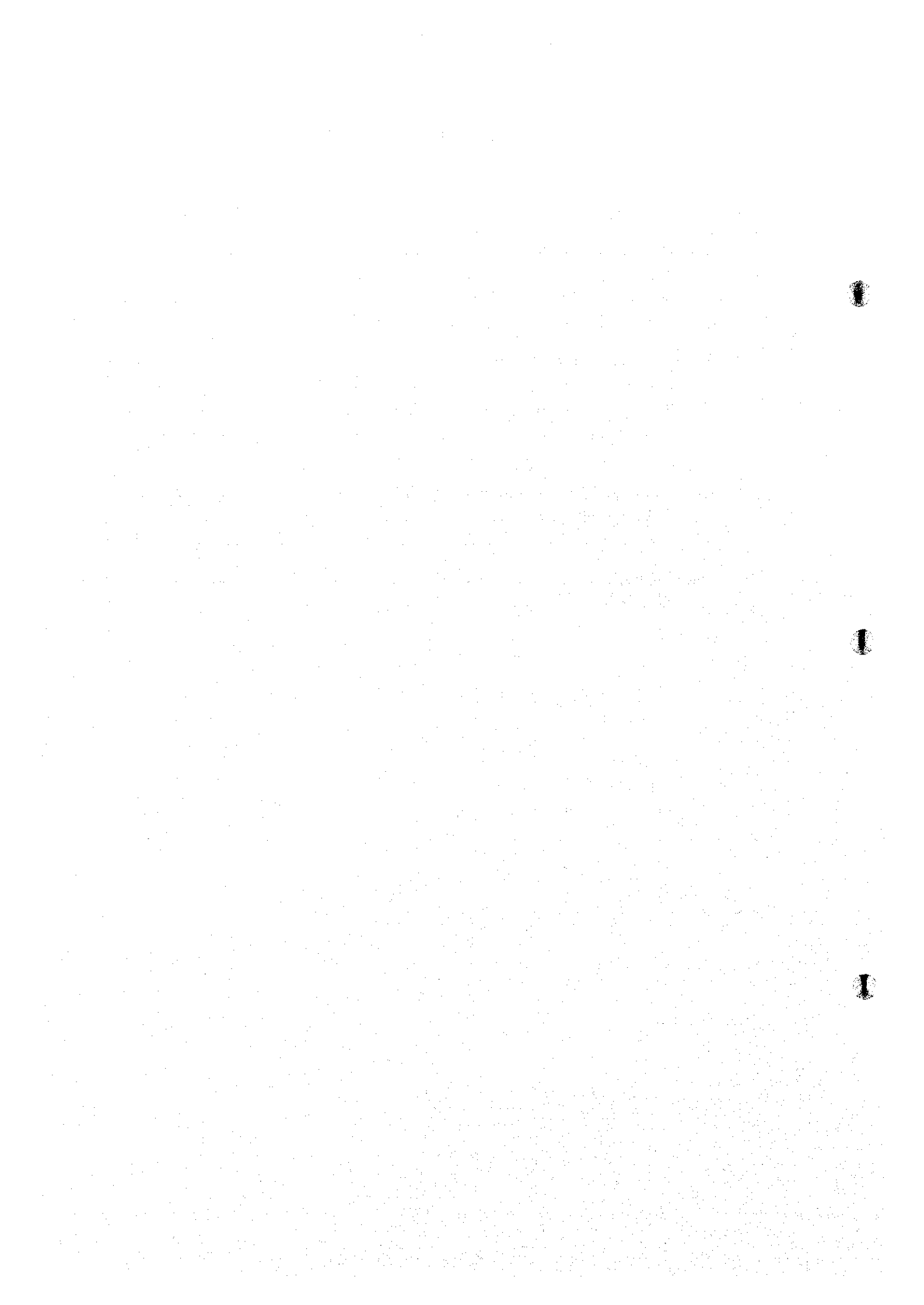
JULY 2000

**DINAGECA
JICA STUDY TEAM**



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1. Introduction

This is a manual on the use of a scanner to digitize aerial photos, and one that particularly explains the gist of obtaining data from aerial photo images for a digital plotter. The operation of the scanner shall be as specified in the operation manual produced by the manufacturer. For scanning, AGFA Duo Scan T2000XL is proposed, while ISM, DiAP is proposed for digital plotting.

2. Machinery Installation

2.1 Machinery Installation

Film scanners are sensitive to environmental influences, e.g. temperature, humidity, etc. It is, therefore, considered very necessary to bear the following points in mind when installing the equipment.

- ◆ Acquisition of a safe and stable electrical voltage. If possible, a stable power source shall be used.
- ◆ The scanner shall be installed in a place safe from direct sunlight and the significant changes in temperature and humidity.
- ◆ The scanner shall be installed horizontally. If possible, use a levelling instrument to install it.

2.2 Inspection and Control of Machinery

Daily maintenance shall entail the following:

- ◆ Covering of the machinery when not in use to keep it free of dust.
- ◆ Cleaning of the pressure glass plate and the base glass plate using an optical cleaning cloth. Chemical solutions should never be used to protect the surface of the machinery.
- ◆ Replacement of the fluorescent lighting when physical changes are detected due to extensive use, to ensure color quality.

2.3 Software Installation

Poor software operation happens every now and then. By reinstalling the software according to

the manual provided by the maker, conditions can be rectified.

3. Digitization of Aerial Photos

3.1 Determine Data Usage

During the work planning stage, the use of the aerial photo image data shall be determined in accordance with the outline of the work. Below are the selected items and the standard settings for the 1:50:000 scale mapping work.

- ◆ Resolution
Although the ideal setting is 1 pixel - 10 μ m (2540dpi) , resolution shall be set at 32 μ m for 1 pixel (800dpi) because the AGFA Duo Scan T2000XL scanner's upper limit for resolution is 800dpi.
- ◆ Medium
Black and white positive film. Since the AGFA Duo Scan T2000XL scanner is for the scanning of prints, the use of negatives, positives or contact prints is possible. To achieve accurate data readings with very little distortion or contraction, negatives should be used first followed by positives and contact prints. The AGFA Duo Scan T2000XL scanner is not equipped to cope with print rolls, therefore, the prints should be scanned one by one.
- ◆ Data Type
Gray scale: 8 bit per pixel. Although the scale for color printing can be adopted (24 bits per pixel), the gray scale shall be applied for plotting.

3.2 Preparation and Inspection of Aerial Photos

If deemed necessary, positive films for scanning shall be prepared instead of the original negatives. Prior to scanning, the documents shall be inspected. The items to be inspected and the countermeasures to be taken are as follows:

- ◆ Scratches
The positives and negatives shall be inspected and reprinted if deemed necessary. Care should be taken to avoid abrasions during printing.
- ◆ Document entry (scribbling)
Soft erasers shall be used for erasable entries.

- ◆ Dust

Cleaning should be carried out with care to avoid generating static electricity.

3.3 Tentative Scanning

For picture quality adjustments, several aerial photo films showing the topographic features shall be selected for tentative scanning to adjust the items shown below. The results shall be stored as scanning parameters; there is no need to store the file on image data produced during this work.

- ◆ Size of data to be acquired

The aerial photo size (approximately 20mm x 220mm) shall be established within the operational area of the scanner. The external perimeters of the glass plate shall be marked to ensure that a aerial photo is always arranged in one place. The index marks at the 4 corners are in the area to be acquired data.

- ◆ Contrast

The degree of contrast shall be determined. For the image data to be plotted, a low contrast is desirable in order to decipher even shaded areas.

- ◆ Brightness

The degree of brightness shall be determined.

- ◆ Gamma

The degree of gamma shall be determined. The middle tone shall be corrected. (Originally involves the revision of the gamma by correcting the disparity between the entry data and the representation of the image.)

Contrast, brightness and gamma are interrelated, and each adjustment should be repeatedly carried out until an overall balance is achieved in the histogram before wrapping up the work. For color images, the degree of brightness, contrast and gamma for each of the 3 RGB bands shall be determined, and the parameters shall be established after minor adjustments.

3.4 Actual Scanning

The image data to be plotted shall be acquired and particular care should be taken regarding the following.

- ◆ Proper placing of the aerial photo to minimize tilting. (This is a consideration made to minimize data size.)

- ◆ As a rule, the data file shall be named according to the photo counter number (e.g. 1234.tif)
- ◆ The data shall be stored in the TIFF format (uncompressed).

4. Correction and Conversion of Image Data

4.1 Correction of Image Data

The image data in TIFF format shall be opened using a software that enables image-retouch (e.g. Adobe Photoshop), to confirm picture quality. If the picture quality is highly likely going to hamper subsequent work, the degree of brightness and contrast shall be readjusted.

4.2 Format Conversion

The image data in TIFF shall be converted into the SDI image format for digital plotting using DiAP. Conversion shall be carried out using the "Batch Script" under the Windows NT. Conversion should be carried out as shown below:

- ◆ Incorporate the folder containing the conversion program into the Windows NT path of environmental variables (e.g. if the conversion program and the batch script are in "c:\ybin", add this directory to the path. The environmental variable path can be changed through the system property.)
- ◆ Execute the Windows NT DOS prompt.
- ◆ Move the current folder to the folder containing the TIFF image data.
- ◆ Enter the data as `[t2s *.tif *.sis]` and execute the batch script function. As a rule, the extended name for SDI image files shall be "sis".
- ◆ Convert all TIFF files in the folder into SDI image files.

5. Data Saving

5.1 Data saving

Although the TIFF data file cannot be used in the work, this data file shall be backed up. Reversible compression (e.g. TIFF5.0LZW format for compression) shall be adopted when re-saving the file; the DAT shall be used for backup medium.

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