APPENDIX

Appendix A

Creating an empty file template without a camera calibration report

If user do not have a camera calibration report for the camera used to take the photographs then user will need to follow this alternative technique to establish an appropriate template coverage so that photographic data is digitized in a form acceptable to PhotoGIS. The principle criteria is that the center of the photograph (intersection of lines drawn through the fiducial marks) is the origin of the coordinate system for the photo data. The other critical criteria is that the units of the photographic data must be the same as the units of the focal length. Hence if the digitizer board measures in inches by default then user must enter the focal length in inches when using PhotoGIS.

The procedure outlined below describes how to digitize the fiducial marks on the photograph as tics and then correct their values so the origin of the coordinate system is at the center of the photo. The technique assumes that the intersection point of the lines through the fiducial marks is at the center of gravity of the fiducial marks which is reasonable for most metric cameras. This technique should be used only when camera calibration coordinates are unavailable for the fiducial marks.

1. Place the photo on the digitizing tablet oriented as shown in Figure A-1.
2. At the 'Arc' prompt, type **ads photo_temp** then press **RETURN** to activate the Arc Digitizing System.

   The messages:

   Editing coverage photo_temp

   Creating photo_temp

   DIGITIZER TRANSFORMATION

   Digitize a minimum of 4 tics

   Signal end of tic input with Tic ID 0

   appears together with the prompt 'Tic-ID'. User can now digitize the four fiducial tics shown on the photograph. From this point, user must

use the digitizer keypad for data entry. Start with tic id 991 and finish with tic id 994. User must ensure digitizing these tics carefully as their coordinates will be used to register all subsequent coverages.

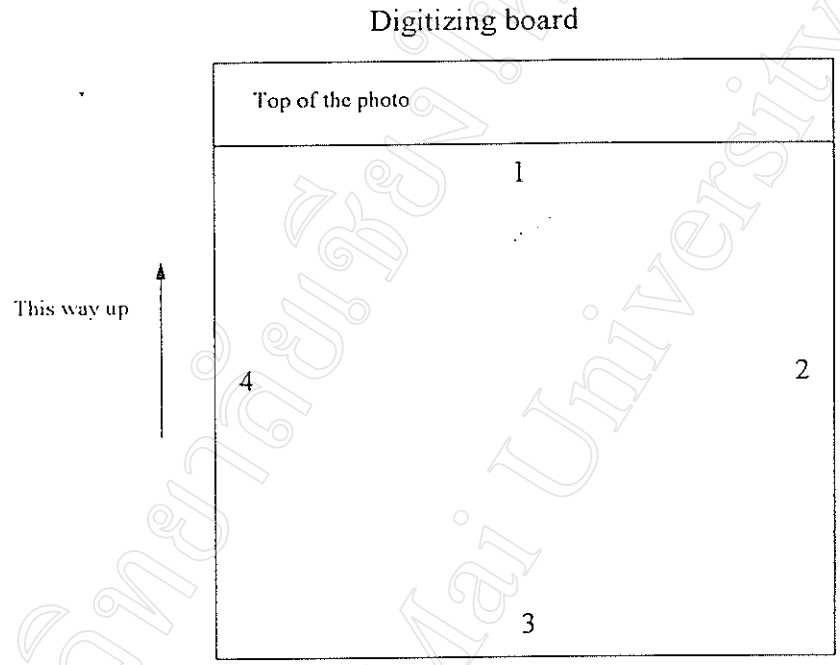

Figure A1 Placing the photo on digitizer tablet.

3. Only add the four fiducial tics to the coverage, digitize the initial boundary and allow duplicate arcs when asked. Do not add arcs or control tics at this stage. Exit from ADS and save by typing 9 twice and then typing Y from the keyboard.
4. The next step will ensure that the origin of the PHOTO_TEMP coverage is at the center of the photo. To do this you will need to subtract the mean x coordinate value from the x coordinates of the tics and the mean y coordinate value from all the y coordinates. To do this type **tables** at the 'Arc' prompt then type RETURN to activate TABLES. The prompt 'ENTER COMMAND' appears.
5. Type **select photo_temp.tic** then press RETURN.

This command selects the file called photo_temp.tic that was created as part of the process of creating the PHOTO_TEMP coverage. User should see the message '4 RECORDS SELECTED' which refer to the four tics that were digitized in ADS above.

6. Type **list** to display the coordinate values of the tics. You should see something like the following.

$RECNO	IDTIC	XTIC	YTIC
1	991	16.497	23.616
2	992	21.740	20.140
3	993	18.264	14.898
4	994	13.022	18.373

7. Determine the average of the TIC values, in the sample above it is 17.381. User should subtract this value from all the XTIC values by typing

calculate xtic = xtic - 17.381 the type RETURN.

8. Determine the average of the YTIC values, in the sample above it is 19.257. You should subtract this value from all the YTIC values by typing

calculate ytic = ytic - 19.257 and press RETURN.

9. List the resulting tic values by typing **list** followed by RETURN. In this example user should see the following:

$RECNO	IDTIC	XTIC	YTIC
1	991	-0.884	4.359
2	992	4.359	0.883
3	993	0.883	-4.359
4	994	-4.359	-0.884

10. It is important that these coordinate values are compatible with to focal length that user use with PhotoGIS. Most digitizing boards will measure coordinate values in inches by default. Judging by the values of the tics above, this assumption would be correct if a 9 inch by 9 inch photo were

used. If these coordinates are to be used then the focal length must be entered in inches when PhotoGIS is implemented. If user wish to use a metric focal length then a suitable scale factor should be applied to the above values. For example to change the photo template to millimeters type the following two commands in TABLES:

calculate xtic = xtic * 25.4 then type RETURN

calculate ytic = ytic * 25.4 then type RETURN

11. Before leaving TABLES user may wish to change the boundary file so that it is compatible with the new tic file. To do this make a note of maximum and minimum X and Y TIC coordinate values and then select the BND file by typing **select photo_temp.bnd** followed by RETURN, then change the values using calculate command as follows:

    calculate xmin = (minimum X value) then type RETURN;

    calculate xmax = (maximum X value) then type RETURN;

    calculate ymin = (minimum Y value) then type RETURN;

    calculate ymax = (maximum Y value) then type RETURN;

12. Type **q stop** to leave TABLES.

Once user have done this, user do not need to do it again for this photo. User can use the CREATE command to create new coverages with these same tics.

Curriculum Vitae

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Publications :

Promburom, P. and M. Ekasingh 1996. *Soil and Soil Suitability Database System Shell: Technical Reference*. Agricultural Technical Report No. 40. Multiple Cropping Center (MCC), Chiang Mai University. 64 p. (in Thai)

Promburom, P. and M. Ekasingh 1996. *Soil and Soil Suitability Database System Shell: Manual*. Agricultural Technical Report No. 41. Multiple Cropping Center (MCC), Chiang Mai University. 24 p. (in Thai)

Ekasingh M., B. Shinawatra, T. Onpraphai and P. Promburom 1995. Role of spatial information in assessing resources of highland communities. p.402-435. In *Montane Mainland Southeast Asian in Transition*. Chiang Mai University. November 12-16, 1995.

Ekasingh, M., T. Onpraphai, C. Sangchyosawat and P. Promburom. 1995. "Integrating Remote Sensing and GIS for Land Use Classification in Highland Watersheds, Northern Thailand". A Paper presented at the Sino-Thai Seminar on "Remote Sensing Investigation and Application of GIS on environmental Problems in Small Watersheds." 20 October 1995, Chiang Mai.

Panya, O., G. W. Lovelace, P. Promburom and P. Saenchai 1988. *Charcoal in Northeast Thailand: Rapid Rural Appraisal of a Wood-based, Small-scale Enterprise*. GCP/RAS/111/NET, Field Document No.9. KKU-FORD Rural Systems Research Project, Khon Kaen University, Khon Kaen, Thailand. 62 p.

Ngamsomsuke, K., P. Promburom, P. Saenchai and B. Suraporn 1987. *Farmers' Attitudes Toward Forest, Plantation and Conservation Farming in Selected Villages of the Phu Wiang Valley, Khon Kaen*. UNDP, FAO, Phu Wiang, Khon Kaen, Thailand. 156 p.

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