

APPENDIX A

**SLIDE SCANNING PROCEDURES
USING THE POLAROID SPRINTSCAN 35/LE
SLIDE SCANNER**

A.1 SCANNING PHOTOGRAPHIC SLIDES

A.1.1 Maintenance and Start-up

Use extreme caution around the Polaroid scanner. Avoid excessive dust, food, or lint particles near the instrument; dust is the leading cause of image imperfections while scanning.

The slide chamber should be kept clean at all times. On a weekly basis before turning on the computer or scanner, lift the front scanner panel and blow canned air into the 35 mm slide chamber. To begin scanning, launch the PolaColor Insight (Version 3.1) software.

A.1.2 Scanner Calibration

The scanner needs to be calibrated each time a new slide set is introduced. All of the settings associated with the calibration/scanning job can be saved to a job file for future access. It may be necessary to calibrate the scanner more than once for large slide sets. When a set covers a wide range of visibility, the exposure will also change substantially from extremely clean (crisp, deep blue skies) to extremely dirty (bright overexposures with milk-colored skies). Each calibration will be associated with a corresponding gray scale slide and scan job file. Scanner calibration includes adjusting the settings, defining a job, creating a file, and scanning a gray scale slide. These procedures are as follows:

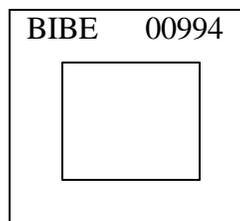
SET THE PROGRAM SETTINGS

Choose **Preferences** from the drop-down “Edit” menu and select the **Scanning** tab. Verify that *default resolution* and *perform auto exposure* are selected.

DEFINE SCAN JOB

Select a slide from the set that represents the overall coloration and exposure/visibility ranges. If the set covers a wide extreme of conditions, select one slide to represent the clean end and one to represent the dirty end.

Air-blow the slide for any dust particles. Insert the chosen slide into the 35 mm slide chamber.



Select the **Preview tab**. Set the scanning “Profile Input” to **Kodachrome** and the “Display” to **Monitor, PC**. Define the calibration (preview) crop box for the image displayed. Select the **Preview button** to cache the image. The slide will enter the chamber and be scanned. Note that there are two types of scans: the Preview scan and the Final scan. Only the Final scan creates a disk file that is used for the contrast calibration process.

Select the **Tone** tab. Deselect the **Split View** box. Select the **Auto Exposure** button. The image will be adjusted to best calibrate the lightness and contrast corrections for scanning. Document the lightness and contrast settings defined. These can be manually adjusted during the calibration (job definition) process. Figure A-1 shows the Polaroid SprintScan software window.

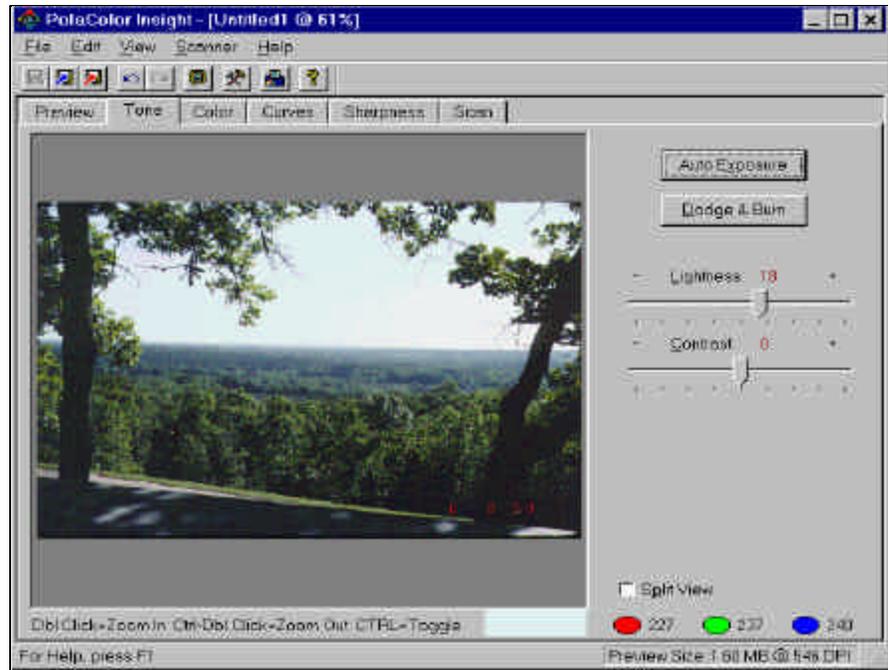


Figure A-1. Polaroid SprintScan Software Window (With Default PolaColor Insight Control Settings).

Select the **Scan** tab. All output formats are defined here. Adjust the crop box around the portion of the image to be scanned. (This should be defined by the project manager prior to scanning).

- Set the image output dimensions. A width of 3" to 4" should be selected to allow for scanning/contrast estimations.
- Select a resolution of **300** dpi. (Width and height dimensions may change slightly).
- Select the **Fixed Size** box.
- Perform a final scan of the auto calibration image. Select the **Scan** button. Save the scanned image to a .TIF file with the following naming convention:

##_0011aut.tif

Where *##* represents the spectrum sequence number, *0011* represents the corresponding slide number, and *aut* denotes the slide as the auto-calibration reference.

Save the file in the site-specific subdirectory that is associated with the spectrum being scanned (e.g., CANY\900\04_0011aut.tif). Document the slide scanned and saved file name on the Slide Scanning Log. Denote "auto" in the comments section of the scanning log.

EXPORT JOB SETTINGS TO A JOB FILE

The auto-calibration described above defines the job settings for the specific site and required scanning output (scanning area). It is necessary to save the defined settings to a file that can be used for future slide scans of the same set.

Turn off the *Auto Exposure* preference to assure that all slide spectrum and gray scale scans for the set will use the same autoexposure setting as the calibration slide.

Choose **Preferences** from the drop-down "Edit" menu and select the **Scanning** tab. Change the selections to **Default Resolution** and **Use Current Tools**.

Choose **Export Settings** from the drop-down "File" menu. Save the job file with the following naming convention:

SITE0011_fff

Where *SITE* represents the spectrum site abbreviation, *0011* represents the corresponding auto-calibration slide number, and *fff* denotes the Julian date the job settings were defined.

Save the file for future reference in the site-specific subdirectory that is associated with the spectrum being scanned (e.g., CANY\900\CANY0011_161.bsf). Document the job name on the Slide Scanning Log.

Exit the PolaColor Insight software.

SELECT AND SCAN GRAY SCALE SLIDE

Every spectrum set and auto-calibration slide must have an associated gray scale slide scanned and archived for future reference measurements.

Select the ARS gray scale slide that will be associated with the spectrum set. Both 24-step and 32-step gray scale slides are available with calibrated transmission measurements. (Direct gray scale transmission measurements must be obtained from a fully calibrated densitometer, such as the ESE Speedmaster located at the CIRA office of the National Park Service).

Launch the PolaColor Insight software. Select **Import Settings** from the drop-down “File” menu, and import the associated job file (e.g., CANY0011_161.bsf) from the site-specific subdirectory.

Select **Preferences** from the drop-down “Edit” menu, to verify that the *Auto Exposure* is off and the scanning setting is set to *Use Current Tools*.

Air-blow and insert the gray scale slide into the 35 mm slide chamber.

Select the **Preview tab** and **Preview button**. The slide will enter the chamber and be scanned. Set the crop box around the entire gray scale image in the preview window.

Select the **Tone** tab. The image will be adjusted to the same lightness and contrast settings as the auto-calibration slide. DO NOT depress the “Auto Exposure” button.

Select the **Scan** tab. Verify that the crop box surrounds the entire gray scale image to be scanned. If necessary, deselect the fixed size box to frame the entire gray scale. You must reselect the fixed size box to hold the new frame dimensions. Scan and save the gray scale file as *g###_0011jjj.tif* in the appropriate site-specific subdirectory. Where *###* represents the ARS gray scale number, *0011* represents the associated auto-calibration slide number, and *jjj* represents the Julian date the job file was created.

(NOTE: full slide scans (i.e., the entire preview screen) create very large .TIF files. It is important to backup data created during the scanning process on a bi-monthly basis).

Denote the saved file name on the Slide Scanning Log and the specific Gray Scale Scanning Log associated with the auto-calibration.

Resetting the crop box and scanning output dimensions will alter the loaded job file. DO NOT save these altered job settings if asked to do so.

A.1.3 Scanning Selected Slides

Scanning complete spectrum sets includes loading the defined job settings (obtained during scanner calibration), performing individual scans, and saving scan files as outlined below:

LOAD JOB SETTINGS

Launch the PolaColor Insight software. Select **Import Settings** from the “File” menu and import the settings of the associated job file (e.g., CANY0011_161.bsf) from the site-specific subdirectory.

SCAN A SLIDE

Select **Preferences** from the “Edit” menu to verify that “Auto Exposure” is off and the “scanning tab” is set to *Use Current Tools*.

Air-blow and insert the chosen slide into the 35 mm slide chamber.

Select the **Preview tab** and **Preview button**. The slide will enter the chamber and be scanned. Verify that the crop box correctly frames the target/vista area defined by the project manager. (Wait while the scanner calibrates for the image).

Select the **Tone** tab. Verify that the image lightness and contrast settings match those of the auto-calibration slide. DO NOT depress the “Auto Exposure” button.

Select the **Scan** tab.

- Verify that the crop box correctly frames the target/vista area defined by the project manager. Changes to the width and height of the crop box are reflected in the “Width and Height” values boxes displayed in the viewing window.
- Select the **Scan** button. Save the scanned image to a .TIF file with the following naming convention:

##_0011.tif

Where ## represents the spectrum sequence number and 0011 represents the corresponding slide number.

SAVE SCANNED FILE

Save the file in the site-specific subdirectory associated with the spectrum being scanned (e.g., CANY\900\05_0235.tif). Document the slide scanned and saved file name on the Slide Scanning Log.

Wait for the scanning process to complete. Remove the slide from the Polaroid SprintScan slide chamber and return the 35 mm slide to its original archive location.

SCAN ADDITIONAL SLIDES

Additional slides may be scanned by inserting a new slide into the scanning chamber and follow the same procedures as outlined above.

A.1.4 Terminating Scanning

To exit the PolaColor Insight Software, select **Exit** from the drop-down “File” menu or select the **X** in the upper-right window. Use caution if asked to change or save the default job settings. DO NOT save any job setting changes unless you are aware that the changes will be appropriately applied to the auto-calibration and gray scale scans. Convert all .TIF formatted files to .TGA files using the Adobe 5.0 Action Macro “tif to tga.”

A.2 OBTAINING PIXEL STATISTICS

Red, green, and blue wavelength pixel statistics are obtained from a digital low resolution scan using ARS' Image Haze Simulation for Windows (OLDHAZE.EXE). The following procedures are used to determine the reported slide spectrum visibility measurements.

A.2.1 Spectrum Image Pixel Statistics

Specific target and sky areas to be measured should be defined by the project manager prior to scanning. Target and sky measurements are obtained as follows:

MEASURE
TARGET AREA

Launch the OLDHAZE (Image Haze Simulation for Windows) software.

Select **Open Image** from the drop-down "File" menu, and open the scanned image (.TGA file) to be measured. Maximize the window size for the best viewing.

Select **Show Pixel Statistics** from the drop-down "Options" menu. Move the pixel statistics window away from the image window.

Using the visible cross-hatch (+), drag and drop a small box over the *identified target area*, as shown in Figure A-2.

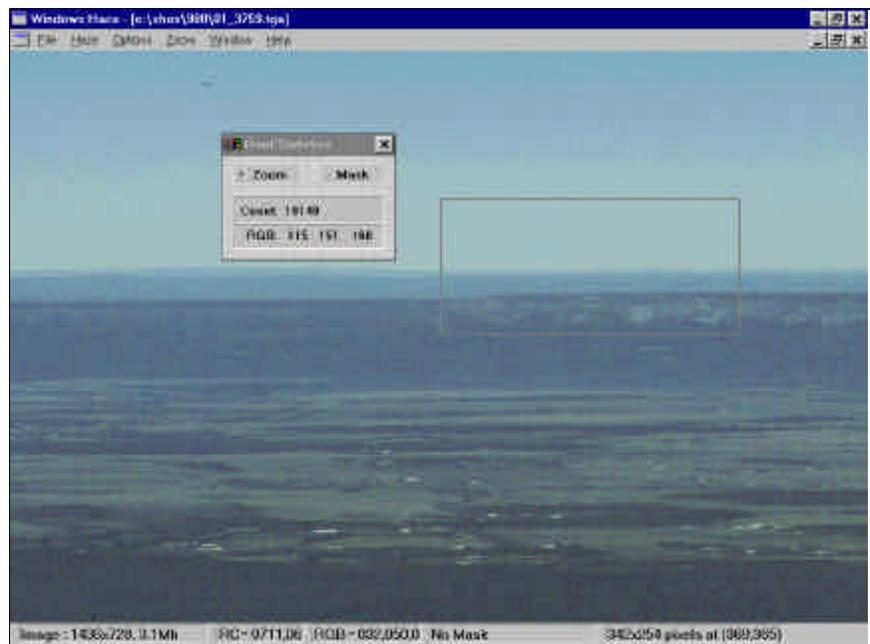


Figure A-2. Image Haze Simulation (OLDHAZE) Window.
Example Display of Pixel Statistics.

Repeat this procedure two to three times to verify that a consistently exposed area is read (e.g., avoid shadowed ridges, cloud banks, etc.).

Document the red, green, and blue numbers displayed in the viewing window in the *target column* of the Slide Spectrum Scanning Log (Figure A-3).

Click the right-mouse button to return to the full scanned image.

MEASURE
SKY AREA

Using the visible cross-hatch (+) drag and drop a small box over the *identified sky area*, as shown in Figure A-2.

Repeat this procedure two to three times to verify that a consistently exposed area is read (e.g., avoid clouds, lens flare, etc.).

Document the red, green, and blue numbers displayed in the viewing window in the *sky column* of the Slide Spectrum Scanning Log (Figure A-3).

Click the **right-mouse** button to return to the full scanned image.

Up to 3 targets may be analyzed for each slide vista. Repeat the above steps for all identified target and sky areas.

A.2.2 Gray Scale Pixel Statistics

Pixel statistics must be obtained for each scanned gray scale associated the spectrum set's calibration. A Gray Scale Scanning Log should have been initiated during the calibration process described in Section A.1.

MEASURE STEP 1

Launch the OLDHAZE (Image Haze Simulation for Windows) software.

Select **Open File** from the drop-down "File" menu, and open the gray scale calibration file associated with the given site-specific spectrum set. Maximize the window size for the best viewing of the entire gray scale image.

Select **Show Pixel Statistics** from the drop-down "Options" menu. Move the pixel statistics window away from the image window.

Using the visible cross-hatch (+), drag and drop a small box over the center section of the upper-left gray scale cube (Step 1).

Document the red, green, and blue numbers shown on the "Step 1" line of the Gray Scale Scanning Log, as shown in Figure A-4.

Click the **right mouse** button to return to the full gray scale frame.

REPEAT FOR STEPS
2 THROUGH 24

Repeat the red, green, and blue measurement for each cube of the gray scale; left to right, top to bottom, Steps 1 through 24 (or 1-32).

Select **Exit** from the drop-down "File" menu to exit the OLDHAZE program.

Slide Spectrum Scanning Log
Polaroid SprintScan 35 Format

Site Name/Time: Shenandoah Dickey Ridge 0900

Pixel Frame Dimensions/Resolution/Lightness Contrast:
4.88 x 2.19 @ 300 dpi

Job Name: SHED0023_254.bsf

Date/Initials: 9/11/99 KS

SLIDE NUMBERS	File Data		Target			Sky			CONTRAST	COMMENTS	
	SLIDE DATE	GRAY SCALE	TARGET #	RED	GREEN	BLUE	RED	GREEN			BLUE
SHED0494		G24A_0	T1	53	66	100	140	162	178	-.875	
		98-24A	T2	43	49	64	152	173	186	-.940	
SHED0023			T1	68	95	121	123	150	166	-.701	auto exp
			T2	48	61	78	131	157	172	-.884	l=14 c=0
											manually changed
SHED0029			T1	72	105	141	119	147	172	-.593	
			T2		65			153		-.858	
SHED0303			T1	85	107	151	119	142	176	-.529	
			T2		68			144		-.817	
SHED0343			T1		134			149		-.247	
			T2		100			146		-.637	
SHED0090			T1		131			138		-.127	
			T2		105			135		-.488	
SHED0082			T2	93	121	147	118	145	166	-.374	
SHED0311		G24A_0	T2	96	120	147	131	152	176	-.472	auto exp
		98-241									l=18 c=0
											manually changed
SHED0279			T2	97	118	156	117	138	171	-.344	
SHED0074			T2		134	?		144	?	-.166	target not visible

Figure A-3. 35 mm Slide Image, Pixel Statistics, and Contrast Estimations (Excel format).

Gray Scale Scanning Log
Red, Green, Blue Pixel Statistics

ARS Gray Scale ID#: 98-24a

Reference Site: SHED

Date Scanned/Gray Scale File: 9/11/99 g24a-0023254

Calibration Slide #: 0023

GRAY SCALE STEPS	RED	GREEN	BLUE
Step: 1	230	237	231
Step: 2	225	234	226
Step: 3		226	
Step: 4		218	
Step: 5		206	
Step: 6		191	
Step: 7	176	185	179
Step: 8		170	
Step: 9		157	
Step: 10	144	144	143
Step: 11		131	
Step: 12		120	
Step: 13		117	
Step: 14		108	
Step: 15		96	
Step: 16		87	
Step: 17	67	74	83
Step: 18		65	
Step: 19		51	
Step: 20		45	
Step: 21		37	
Step: 22		31	
Step: 23	27	27	43
Step: 24		28	

Figure A-4. Example Gray Scale Slide Spectrum Analysis Log (Excel format).

A.3 CALCULATING SLIDE CONTRASTS

All documented slide spectrum image and gray scale pixel statistics (Section A.2) are input into ARS' CONTRAST.EXE software to determine associated slide spectrum contrasts. Each set or subset of spectrum images should have an associated Gray Scale Analysis Log.

CALCULATE CONTRASTS

Launch the CONTRAST.EXE program.

Select the **Reset Calibration Curve** tab.

Enter 10 steps of the gray scale *green pixel values* (Density Numbers) into the contrast calculation window. Note that the steps do not need to be consecutive, just sequential.

Enter the corresponding step gray scale *green density values* from the documented Gray Scale Calibration Form, as shown for ARS gray scale 98-24a in Figure A-5.

Select the **Accept Calibration Curve** tab. Note that an “unacceptable density error may occur following the calibration process. If so, re-evaluate the 10 steps chosen. Verify that the green wavelength numbers do not exceed 255. Exit the program and begin again.

REPEAT FOR EACH SLIDE

For each slide associated with the calibration gray scale continue with the following procedures.

Enter the *sky DN* (density number) pixel statistics documented for the green wavelength on the Slide Spectrum Analysis Log.

Enter the *target DN* (density number) pixel statistics documented for the green wavelength on the Slide Spectrum Analysis Log.

Select the **Calculate Contrast** tab in the contrast viewing window.

Document the resulting target contrast on the Slide Spectrum Analysis Log.

Continue to enter the sky and target density numbers for each target and slide documented on the log.

The calibration curve must be reset for the appropriate gray scale associated with each spectrum. Note that it is often necessary to exit the CONTRAST.EXE program in order to reset the calibration.

24 Step Gray Scale

98 – 24a

Step	Red	Green	Blue	Target
1	0.33	0.27	0.29	0.20
2	0.39	0.29	0.33	0.30
3	0.45	0.36	0.43	0.40
4	0.51	0.43	0.51	0.50
5	0.60	0.52	0.59	0.60
6	0.72	0.63	0.71	0.70
7	0.78	0.67	0.72	0.80
8	0.87	0.77	0.83	0.90
9	0.94	0.88	0.93	1.00
10	1.03	0.98	1.03	1.10
11	1.18	1.10	1.14	1.20
12	1.30	1.18	1.20	1.30
13	1.36	1.22	1.25	1.40
14	1.46	1.30	1.35	1.50
15	1.58	1.43	1.47	1.60
16	1.69	1.53	1.59	1.70
17	1.80	1.63	1.76	1.80
18	1.96	1.77	1.92	1.90
19	2.14	1.97	2.08	2.00
20	2.31	2.05	2.12	2.10
21	2.45	2.16	2.20	2.20
22	2.70	2.41	2.43	2.35
23	2.95	2.76	2.71	2.55
24	3.04	2.99	2.94	2.75

Figure A-5. Example ARS Gray Scale and Values.