

NIH Image Change History

V1.42 (20 December 1991)

- 1) The freehand outlining tool is now somewhat more responsive, particularly when background programs such as Print Monitor are running.
- 2) The binary thinning routine(Skeletonize) was improved.
- 3) A command was added to the Binary submenu to specify the number of adjacent background or foreground pixels necessary before a pixel is removed from or added to the edge of objects during binary erosion and dilation operations.
- 4) A bug was fixed that sometimes caused the 3D Plot command to display a blank window.
- 5) Grayscale images inverted using the Invert LUT command now print correctly.
- 6) A bug was fixed that sometimes caused color TIFF files exported to other applications to have incorrect color palettes.
- 7) The Adjust Areas option in the Options dialog box, which had stopped working, was fixed. This option is used by the gel plotting macros to account for the area under the line used to draw the peaks.
- 8) A bug was fixed that caused Image to crash when using the Start Capturing command(using the QuickCapture card) after a previous attempt to start capturing had resulted in an out of memory message.
- 9) The maximum allowed width for imported 8-bit images was increased to 16000 pixels.
- 10) The Profile Plot Options, Option and Calibrate dialog boxes were redesigned and/or repositioned to fit on the 12" Apple color monitor.
- 11) A bug was fixed that sometimes, when running under System 7, caused the icons in the tool palette to be replaced by letters.
- 12) Stacks are no longer required to be an even width.

13) An Uncalibrated OD option was added to the Calibrate dialog box that causes Image to convert gray values to uncalibrated optical density values using the following function:

$$\text{Uncalibrated OD} = \log_{10}(255 / (255 - \text{Gray Value}))$$

You do not need to measure OD standards or enter known OD values to enable this transformation.

14) A button was added to the Calibrate dialog box that performs the following function on the entered(known) standards:

$$\text{Inverted OD} = -\log_{10}(1.000 - 10^{(-\text{Entered OD})})$$

Optical densities are converted to transmission, subtracted from perfect transmission and converted back to OD yielding the reciprocal density. This function is of use to those who have a positive set of optical density standards but a photographic or other negative image. It is also of use to those who quantitate reflected light images but wish to specify results in terms of transmitted light. This is often the case in anatomical imaging.

15) A problem was fixed that caused multi-image TIFF files imported from DIP Station to have all but the first slice inverted.

16) The number of colors allowed in pseudocolor palettes was increased from 32 to 256.

17) The controls in the Gray Map window(which was renamed Map) now manipulate both pseudocolor and grayscale look-up tables.

18) The Set Number of Colors command now creates new color table entries by interpolating. For example, if the current color table consists of the two colors, white and black, then setting the number of colors to 64 creates a grayscale palette with 64 shades of gray.

19) The magnifying glass tool now automatically enlarges small(less than 320 pixels wide) windows. You can override this behavior by resizing the window before using the magnifying glass.

20) The (straight) line selection tool now works more precisely at higher levels of magnification. It is now possible, for example, to measure the diagonal length(1.41 pixels) of a one pixel square object.

21) A bug was fixed that caused the air brush tool to work incorrectly with magnified images.

22) Image now reads(Open) and writes(Save As)PICS files, a file format used by most Mac animation programs. PICS files are compressed using the same run length encoding scheme used for PICT files. As a result, stacks containing areas of uniform color or gray value saved in PICS format will be smaller than stacks saved in TIFF format.

23) A bug was fixed that sometimes caused the MoveRoi and InsetRoi macro routines to not work correctly.

24) A built-in one-dimensional array(rStdDev) was added to the macro language for accessing standard deviation measurements.

25) There is a new macro(in "Stacks") called "Make Same Size" that makes the width and height of all currently open images the same so the Windows to Stack command(which requires images to be the same size) can be used to convert them into a stack.

26) A bug was fixed that caused the Measure command to count all pixels within the selection, instead of only thresholded pixels, if Include Interior Holes was checked in the Options dialog box.

27) A bug(introduced in V1.40) was fixed that caused the Save All command(Save with Option key) to fail.

28) A bug was fixed that caused the MakeNewStack macro routine to fail if no window was open.

30) The Text menu was replaced by the Stacks menu, and the Font, Size, and Style submenus were moved to the Options menu.

31) Image now supports the Scion Image Video Image 1000 frame grabber card on Mac Ilci's with a NuBus video card. This requires a Video Image 1000 that has upgraded chips installed. All boards shipped since 9/1/91 contain the upgraded chips.

32) Tab-delimited text files using scientific notation can now be imported as images using the Import command.

33) The Reslice command now works with line selections(except for horizontal and vertical selections) that extend beyond the edge of the image. The current background color is used for missing pixel values.

34) The maximum number of slices in a stack was increased from 250 to 256.

35) Two new commands, GetSliceSpacing and SetSliceSpacing, were added to the macro language for getting and setting the slice spacing of image volumes. Two new macros in the file Stacks, Reslice Horizontally and Reslice Vertically, illustrate the use of these new commands.

36) A new command(Project) was added to the Stacks menu that generates an animation sequence by projecting a rotating 3D data set onto a plane. Each frame in the animation sequence is the result of projecting from a different viewing angle. Three projection methods are available: nearest-point, brightest-point, and mean-value. The choice of projection method and the settings of various visualization parameters determine how both surface and interior structures will appear. This routine was written by Michael Castle (mike.castle@med.umich.edu) and Janice Keller of the University of Michigan Mental Health Research Institute (MHRI).

37) A bug was fixed that caused imported 16-images to use twice the expected amount of memory. For example, an imported 1024 x 1024 16-bit image used 2MB instead of 1MB.

V1.43 (6 January 1992)

1) A bug was fixed that sometimes caused Image to crash on the Quadra 700 or 900 while capturing using the Data Translation QuickCapture card and the Camera window was moved or resized .

V1.44 (2 April 1992)

1) The XY coordinates of selections created with the polygon, freehand, line, and wand tools can now be exported to a text file.

2) A bug was fixed that caused PICS files with PICTs that varied in size to be read incorrectly.

- 3) The size of the line buffers used by Image were increased from 2048 to 4096 pixels, allowing many operations(e.g. filters, histogram, profile plots) to operate on wider selections.
- 4) A problem was fixed that sometimes caused color TIFF images imported from little endian(Intel or VAX) systems to be displayed incorrectly.
- 5) A problem was fixed that caused histograms to be incorrectly displayed for images with uniform gray values.
- 6) Custom halftoning options are now saved by Record Preferences.
- 7) A bug was fixed in the Project command that sometimes caused Image to abort when doing volume rendering, particularly when rotating around the z-axis.
- 8) A built-in array(LineBuffer) was added to the macro language to provide access to the internal line buffer used by GetRow, PutRow, GetColumn and PutColumn.
- 9) The spatial scale can now be entered directly into the Scale field of the Set File dialog box. Also, it is no longer necessary to make a line selection before using the Set Scale command.
- 10) The Rodbard fit option was returned to the Calibrate dialog box.
- 11) A bug was fixed in the GetResults macro routine that caused it to return calibrated mean and mode values when it was supposed to return uncalibrated values.
- 12) Selection outlines(except curved line selections and selections that have been edited) can now be saved using Save As and restored using Open.
- 13) A check box(Scale Math) was added to the Paste Control window to specify whether results of image arithmetic operations are scaled to 8-bits or clipped at 0 and 255. This new check box performs the same function as Scale Image Arithmetic in the Preferences dialog box.
- 14) A check box(Update Icons) was added to the Open dialog box for changing the creator type of files created by V1.40 and earlier of Image

from 'IMAG' to 'Imag'. Image will update the creator type of all files in the current folder when you click on Open with Update Icons checked. Files with the new 'Imag' creator type have icons with a white background and launch the latest version of Image when you double-clicking on them.

15) A bug was fixed that sometimes caused an unexpected dialog box to be displayed when using the Convolve command with density sliced images.

16) A bug was fixed that caused printed output to be incorrectly positioned when printing a selection and Black & White was checked in the Print dialog box and Custom Grayscale Halftoning was not checked in Preferences.

17) A bug was fixed that caused odd-width selections exported as raw data to be skewed.

18) Look-up tables can now be rotated using the LUT tool(a feature removed in V1.42) if the option key is held down. This feature is particularly useful with the new Spectrum palette.

19) A bug was fixed that sometimes caused the "time remaining" value displayed in the Project(3D reconstruction) thermometer box to not work properly.

20) A bug was fixed that caused images resulting from projecting around the x-axis of odd-width stacks to be skewed.

21) A bug was fixed that caused data from the last slice in a stack to appear at both the top and bottom of an images reconstructed from that stack using the Reslice command.

22) A black diamond is now displayed in the title bar of spatially calibrated images and a white diamond(◇) for those that are density calibrated.

23) A new check box(Use External Trigger) was added to the Video Options dialog box that enables support for the external trigger feature of the Data Translation QuickCapture card. The StartCapturing, Average Frames, and Make Movie commands now support external triggering. Another new check box("Blind" Movie Capture) disables screen updates

when using the Make Movie command, allowing faster frame capture rates.

24) Average Frames now displays a dialog box that allows the user to enter the number of frames to be averaged and to specify whether the frames are to be summed or averaged. In addition, the number of frames is no longer limited to 128. There is, however, a possibility of overflow when averaging more than 128 frames since frames are summed in a 16-bit signed integer buffer.

25) Commands were added to the macro interpreter for propagating the LUT(PropagateLUT), spatial calibration(PropagateSpatial) and density calibration(PropagateDensity).

26) A command("RequiresVersion(version)") was added to the macro interpreter to allow testing for a required version of Image. For example, a macro containing the statement "Required version(1.44)" will abort if run on a version of Image earlier than 1.44.

27) Two new measurement options(User 1, and User 2) were added to the Options dialog box. These options add two new columns to the results table that can be used by user written macros to record derived results. These two columns can be accessed from within macros using the built-in arrays rUser1 and rUser2. Unlike other results arrays, rUser1 and rUser2 are reserved for use by macros, and are never written to by any of the commands in Image. The column headings used for User1 and User2 can be set from within macros using the routines SetUser1Label('Label') and SetUser2Label('Label'). The macros in "Measurement Macros" have been rewritten to store derived results in User1 and User2.

28) A new macro command(SetOptions) was added to the macro interpreter for specifying variables to be recorded by the Measure and Analyze Particles commands. SetOptions has the form SetOptions(string), where string is a text string containing some combination of 'Area', 'Mean', 'Std. Dev.', 'X-Y Center', 'Mode', 'Perimeter'(or 'Length'), 'Major', 'Minor', 'Angle', 'Int. Den.', 'Min/Max', 'User1', or 'User2'. Any variables not listed will be disabled. For example, the statement "SetOptions('Area, X-Y Center')" causes Measure and Analyze Particles to compute and store area and the X-Y Center, and nothing else.

29) The "Results" window was renamed "Values" and the "Measurements" window was renamed "Results".

30) The eye dropper tool now displays pixel values in RGB form.

31) Selections created with the wand tool are now added to any existing selection if either the Shift or Control keys are held down and are subtracted from any existing selection if the Option key is held down.

32) In addition to the Control key, the Shift key can now be used to extend selections when using the freehand and polygon tools.

33) The “Show 0 for Black, 255 for White” flag in Preferences was renamed “Invert Displayed Pixel Values”.

V1.45 (27-July-1992)

1) A bug was fixed that could cause Image to crash after creating a stack from a set of windows, one of which is the Camera Window.

2) The Rotate Right and Rotate Left commands no longer convert stacks to a single image.

3) A new command(Montage) for creating a composite image from the slices in stack was added to the Stacks menu.

4) A bug was fixed that caused Revert to Saved to invert imported 8-bit images.

5) A bug was fixed that caused macros(e.g. “Measure All”) making density measurements on more than one density calibrated image to generate incorrect results.

6) Image now provides better approximations of the original 16-bit values when importing 16-bit images with Calibrate checked. The approximated values should not vary from the original 16-bit values by more than $(\text{Max}-\text{Min})/254$, where Min and Max are the minimum and maximum 16-bit values.

7) A bug was fixed that prevented saving of outlines when the active window was a stack.

8) A command was added to the macro language for doing background subtraction. It has the form `SubtractBackground('Options', BallRadius)`, where 'Options' is one of the following: '1D Horizontal', '1D Vertical', '2D

Rolling Ball' or '2D Remove Streaks'. Add the keyword 'faster' to the Options string(e.g. '2D Rolling Ball(faster)') for faster operation.

9) A bug was fixed that caused the contrast slide control in the Map window to work incorrectly at either very high or very low brightness settings.

10) A bug was fixed that could cause Analyze Particles to fail when the current background color was not white.

11) A bug was fixed that sometimes caused the results counter to not be reset when using Analyze Particles.

12) The pixels used to generate the profile plot are now highlighted if you hold down the mouse button and drag in the Plot window.

13) PICT files scanned on flatbed scanners at greater than 72dpi resolution now open correctly. For example, a one inch square area scanned at 300dpi now opens as a 300x300 image instead of a 72x72 image.

14) The Get Info command now shows which version of Image created the image.

15) The Enhance Contrast command now works with pseudo-colored images.

16) A macro for creating lookup table gamma functions was added to the LUT Macros file in the Macros folder.

17) The Subtract Background routine now smoothes the image before shrinking it. To shrink by a factor of 8 it uses the lowest pixel value in the 8x8 neighborhood, making it very susceptible to noise unless the image is first smoothed. It was also changed to shrink the image by a factor of 2 or 4 (instead of 4 or 8) when the radius is 15 or less.

18) A bug was fixed in Redo Measurement that caused the Cancel button to work the same as the OK button.

19) The Threshold command now automatically determines the optimum threshold using an Iterative technique first described by Ridler and Calvard in IEEE transactions on Systems, Man and Cybernetics, 1978. This feature is available from macros using the new AutoThreshold command.

20) A command was added to the macro language for specifying what gets exported when using the Export command. It has the form "SetExport('mode')", where 'Mode' is one of the following: 'Raw', 'MCID', 'Text', 'LUT', 'Measurements', 'Plot Values', 'Histogram Values' or 'XY Coordinates'.

21) The SaveAs and Export macro commands now accept a file name argument.

22) Redirected sampling now works with rectangular selections.

23) XY Coordinates of line selections created on zoomed images are now exported correctly.

24) A bug(introduced in V1.44) was fixed that caused the perimeter to be computed incorrectly for zoomed images.

25) Profile plots now start at the point where the mouse is first clicked rather than at the left end of the line selection. A new macro called "Plot Radial Density Profiles" in the file "Measurement Macros" illustrates this new capability.

26) The SetDensitySlice macro command no longer allows the lower threshold to be set less than 0 or the upper threshold to be set to more than 254. Setting the lower threshold to 0 could cause Image to crash when using Analyze Particles.

27) The slice spacing used by the Reslice command is now specified in calibrated units, such as millimeters.

29) Macros(in "Stacks") were written to import GE Signa MRI volumes and to do reslicing(e.g. generate coronals from sagittal slices). The macros assume 256x256 slices with a 240mm field of view.

30) Support was added for the new Scion LG-3 frame grabber card. The LG-3 is similar to the Data Translation QuickCapture card, but has more features and is less expensive. It has analog brightness and contrast control plus a frame buffer that can be expanded up to 64MB using standard Mac SIMMS. These features, however, are currently not supported by Image.

V1.46b36 Beta (never released)

- 1) A bug was fixed that could potentially cause problems when using the Scion LG-3 frame grabber.
- 2) The line selection and profile plotting tools now force the starting and ending coordinates to be within the image boundary. This fixes a problem that sometimes caused the starting or ending profile plot values to be invalid when doing profile plots on zoomed images.
- 3) The "Highlight Saturated Pixels" option in the Video Options dialog box now displays over saturated pixels in red and under saturated pixels in blue.
- 4) The analog video input offset(brightness) and gain(contrast) can now be adjusted in the Video Options dialog box while capturing using the Scion LG-3 frame grabber.
- 5) The Analyze Particles command no longer disables particle labeling when there are more than 200 particles.
- 6) New commands("RGB to 8-bit Color" and "8-bit Color to RGB") were added to the Stacks menu for converting RGB color images(in the form of a three slice stack) to 8-bit indexed color and 8-bit color images into RGB.
- 7) Bugs were fixed that could cause the Make Movie and Capture Frames commands to fail when using the Scion LG-3 frame grabber.
- 8) On multi-monitor systems, windows are no longer limited to the size of the primary monitor .
- 9) A bug was fixed that caused Make Movie and Capture Frames to work incorrectly with selections larger than 552X436 on 13 inch monitors.
- 10) A bug was fixed in the Open and Import macro routines that sometimes caused images to not be displayed.

V1.47 (22 Oct 1992)

- 1) 24-bit RGB color images can now be captured. This requires an RGB color camera with a separate composite sync outlet. When using the Scion

LG-3 frame grabber the optional four channel cable(CRGB-LG3) is required and "Separate Sync" must be checked in Video Control. With the Data Translation QuickCapture, the W5 jumper must be installed and the red, green, blue and sync camera outputs connected to the QuickCapture cables 1, 0, 2 and 4 respectively. Color capture requires System 7 and Image must be allocated at least four megabytes of RAM.

2) 16-bit to 8-bit rescaling(windowing and leveling) of 16-bit imported images is now supported. A new command called Rescale replaces Revert to Saved whenever an imported 16-bit image is active. It linearly scales the 16-bit data(on disk) from the range Min-Max to 1-254, where Min and Max are specified using the controls in the Map window or by using the LUT tool. 16-bit pixels with values less than Min are set to 1 and 16-bit pixels with values greater than Max are set to 254. The computed absolute minimum and maximum pixel values will be used if the LUT has not been altered. Enabling "Highlight Saturated Pixels" in the Preferences dialog box causes pixels that were less than or equal to Min to be blue and pixels that were greater than or equal to Max to be red.

3) A command(InverLUT) was added to the macro language for inverting the video look-up table.

4) Support was added for the 50 Hz(PAL or CCIR) version of the Scion LG-3 frame grabber, which captures 768 X 512 frames.

5) A command was added to the macro interpreter for accessing user written Pascal code in the User.p source code module. It has the form "UserCode(CodeNumber, Param1, Param2, Param3)", where CodeNumber is a positive integer used to specify which code routine is called and Param1, Param2 and Param3 are real input parameters.

6) A bug was fixed that caused the Measure and Analyze Particles commands to compute angles incorrectly for objects at exactly 45 or 135 degree angles.

V1.48b77(never released)

1) The Rotate Right and Rotate left commands are now much faster thanks to a new PutColumn routine contributed by Edward J. Huff.

2) Selections larger than the undo buffer can now be saved in TIFF format and exported as raw data.

3) A bug was fixed that could sometimes cause the spatial scale to change if you clicked in the Scale field of the Set Scale dialog box.

4) The macro interpreter was speeded up and the run-time macro error messages were improved.

5) A bug(introduced in V1.47) was fixed that caused the Measure and Analyze Particles commands to display NAN(Not a Number) for the major and minor axis for perfectly round objects. Note that the Major and minor axis are still incorrect for one pixel wide diagonal objects.

6) The X-Y coordinates of the current selection are now available from within macros using the built-in arrays xCoordinates[n] and yCoordinates[n]. The number of coordinates can be obtained using the macro function nCoordinates. For an example, look at the macro "Plot X-Y Coordinates" in "Measurement Macros".

7) A string data type was added to the macro interpreter. Strings have a maximum length of 255 characters and string comparisons are case insensitive. Three functions were also added:

`str:=GetString('Prompt','default')` - Puts up a dialog box requesting string input. The first argument is the prompting message and the second(optional) argument is the default input string.

`str:=chr(n)` - Converts a positive integer in the range 0..255 to a one character string(e.g. `chr(65) = 'A'`).

`n:=ord(str)` - Returns the ordinal number of the first character in a string(e.g. `ord('A')=65`). Returns -1 if the string is empty.

`str:=concat(str1, str2,...)` - Takes a series of strings and concatenates them.

Example macros illustrating the use of strings are available in the file "Serial I/O and Strings".

8) Three new routines were added to the macro interpreter to support Serial I/O:

OpenSerial('Options') - 'Options' is a string containing '1200 baud', '2400 baud', '9600 baud' or '19200 baud'; 'no parity', 'even parity' or 'odd parity'; 'seven data' or 'eight data'; 'One stop' or 'two stop'. The default is '9600 baud, no parity, eight data, one stop'.

str:=GetSerial - Returns the next available character in the serial(modem) input buffer as a one character string or returns an empty string if the buffer is empty.

PutSerial(str) - Writes 'str' to the modem port. Like the Write routine, PutSerial accepts multiple arguments (e.g. PutSerial('v=',v:1:2)).

Macros could be written using these routines to control a motorized stage or to control a VCR to play back time lapse video. Example macros illustrating serial I/O are available in the file "Serial I/O".

9) An optional second argument was added to the SetPrecision macro command to specify the field width used in the results window.

10) A new macro command was added for changing the cursor. It has the form SetCursor('str'), where 'str' is 'watch', 'cross' or 'arrow'.

11) The macro interpreter's stack size was increased from 100 to 150 variables.

12) The macros in More Macros("AND Mode", "OR Mode", etc) that allow you to easily switch transfer modes while pasting are now working again. They broke in V1.44.

13) Compute bound macros now allow background tasks(e.g. System 7 file sharing or Retrospect Remote) to run.

14) Macros looping within a REPEAT UNTIL statement can now be aborted using Command-Period.

15) The maximum size of macro files was increased from 15,000 to 30,000 bytes.

16) A macro(in "Serial I/O") was written to send commands over the serial port to the Newport PMC200-P programmable 2-axis motion

controller. Instructions on how to connect the PMC200-P to the Mac modem port are contained in a comment at the beginning of the macro.

17) A function(TickCount) was added to the macro language that returns the current number of ticks(sixtieths of a second) since the system last started.

18) Undo now works with palettes that have been edited by double clicking in the LUT window with the eye dropper tool.

19) The angle measurement tool now creates a line selection instead of drawing lines.

20) A bug was fixed that could cause objects to be drawn outside of the image window boundary when opening object oriented PICT files created by drawing programs such as MacDraw.

21) The AverageFrames macro command no longer displays a dialog box.

22) A bug was fixed that, when thresholding, caused pixels with a value equal to the threshold to be displayed in white(background) instead of black.

23) A new command was added to the Stacks menu that creates an image that is the average of all the slices in the current stack.

24) A new command was added to the macro language for setting various Video Control options. It has the form SetVideo('str'), where 'str' is a string containing some combination of 'Invert', 'Highlight', 'Oscillating', 'Trigger', 'Blind' or 'Separate'. Any option not specified is disabled.

25) Several problems that relate to thresholding of pseudo colored images were fixed.

26) Profile plotting now works with irregular line selections.

27) The axis labeling of density profile plots was improved.

28) The Average Frames command can now use the Scion LG-3's on-board memory to capture frames at video rates(25 or 30 frames per second). For example, when averaging 32 frames, the frames are captured in one second instead of 15-25 seconds. It will still take 15-25 seconds,

however, to compute the average. A 4MB LG-3 can capture 8 frames at video rates and one with 16MB can capture 32.

29) The Gel Plotting macros were modified to work with the wider right margin in the in V1.48 Plot window. Also, the macros now display "Uncalibrated" at the top of the "Plots" window for uncalibrated gels.

V1.49(31 March 1993)

1) The preferences item called "Load System LUT when switching" is now recorded when you do a record preferences.

2) Thanks to Edward J. Huff, balloon help is now available in the Tools, Map and LUT windows, and for some of the menu commands.

3) A new function was added to the macro language for converting strings to real numbers. It has the form: `n:=StringToNum(s)`, where `n` is a real number and `s` is a string. It returns zero if the string contains no digits. `StringToNum` can be used to get around the seven digit limit on the precision of numeric constants(they are stored as four byte reals). For example,

```
n1:=123456789;  
n2:=StringToNum('123456789');  
PutMessage(n1,' ',n2);
```

will display '123456792 123456789'.

V1.50(29 July 1993)

1) A new submenu(Acquire) was added to the File menu for using Photoshop compatible acquisition plug-ins. The plug-ins must be stored in a folder named "Plug-ins" located either in the same folder as Image or in the System Folder. Using plug-ins, Image can acquire 8-bit grayscale, 8-bit indexed color, and 24-bit color images. 24-bit color images are stored in three slice stacks and displayed using 8-bit indexed color, similar to the way the Capture Color command works.

The following plug-ins have been reported to work:

Agfa PhotoScan
Computer Eyes /RT Pro
Datacopy 730GS scanner
Ektron 1400 series camera(Eikonix 4096x4096 CCD)
Gaphics Unlimited Kingfisher frame grabber(grayscale only)
LaCie SilverScanner (8-bit grayscale, 8-bit color, 24-bit color)
Kodak DCS-200 digital camera(grayscale and 24-bit color)
Kodak Photo CD Image Browser
Kodak RFS2035 scanner
Microtek Scanmaker
Neotech Image Grabber
Perceptics PixelBuffer frame grabber
Perceptics MegaGrabber frame grabber
Perceptics PixelHR-24 frame grabber
QuickImage 24 plug-in
RasterOps Video Capture V1.3 with 24XLTV card
Scantastic plug-in with Apple Color One scanner
Scion LG-3 frame grabber
Truvel scanner
Voyager decompression plug-in

The LaCie Silver scanner plug-in seems to be the fastest, smoothest and most reliable of the scanner plug-ins tested.

A command was also added to the macro language for supporting acquisition plug-ins. It has the form `Acquire('plug-in name')`. Plug-ins are assumed to reside in a folder named "Plug-ins" located in the same folder as Image or in the System Folder. Full path names such as 'HD400:Plug-ins:Kodak DCS-200' are also supported.

The plug-in support in NIH Image is based on code written by Greg Brown, Steven Gonzalo and Richard Ohlendorf of Ohlendorf Research, Inc. Ohlendorf Research has customized both Image and the Kodak DCS-100 digital camera plug-in to automate uploading of images from the camera.

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2) Several problems with commands in the Binary submenu were fixed. These problems occurred when processing objects along the edge of the image. A related problem was fixed that sometimes caused the Skeletonize routine to never complete.

3) A function(UndoBufferSize) was added to the macro language that returns the current size of the Undo and Clipboard buffers. The Gel Plotting Macros use this function to display an error message when the Plots window needs to be larger than the current buffer size.

4) The Import command can now import 3D data sets such as multi-slice files from medical scanners. An optional fourth argument was also added to the SetCustom macro command to allow the number of slices to be specified. For example, when importing a data set with 128 256x256 slices and no header, use "SetCustom(256,256,0,128)".

5) If opened by the OpenSerial macro command, the serial I/O port is now closed when you quit image.

6) A four element built-in array(Scion) was added to the macro language to allow access to the Scion LG-3's I/O registers. The four elements of the array are defined as follows:

Scion[1]	8-bit DAC(A)	read/write
Scion[2]	8-bit DAC(B)	read/write
Scion[3]	8-bit Control Reg 1	read only
Scion[4]	4 digital out bits	read/write

Macros for setting and reading the LG-3 I/O registers are available in the file "Video".

7) Support was added for the external trigger feature of the Scion LG-3.

8) A new submenu(Filter) was added to the Enhance menu for using Photoshop compatible filter plug-ins. The plug-ins must be stored in a folder named "Plug-ins" located either in the same folder as Image or in the System Folder. A command was also added to the macro language for using filter plug-ins. It has the form Filter('plug-in name'). Plug-ins are assumed to reside in the aforementioned Plug-ins folder.

9) A command was added to the macro language for enabling and disabling "Photo Mode". The command "PhotoMode(true)" erases the screen and

draws the contents of the currently active window. "PhotoMode(false)" restores the screen.

10) A bug(introduced in V1.49) in the macro interpreter was fixed that caused it to fail if the first argument in a procedure call started with a minus sign or a left parenthesis(e.g., "(a+b)/c"). This bug also affected macro commands, such as PutMessage, PutSerial and Write, that accept a variable number of arguments.

11) When using the "Highlight Saturated Pixels" option, the color used to display under saturated pixels is now yellow instead of blue.

12) Image can now open and edit text files up to 32K in size. The following command know how to deal with text windows: New, Open, Close, Save, Save As, Print, Cut, Copy, Paste, Clear, Font, Size, Load Macros(loads the macros contained in the current text window).

13) Images larger than printer page(normally 552 x 730 pixels) are now scaled to fit the page. This feature is only available when "Custom Grayscale Halftoning" is disabled.

14) A command(SurfacePlot) was added to the macro language for generating surface plots. A macro for generating a surface plot movie from a stack is in the macro file "Stacks2".

15) A macro command was added for doing 24-bit to 8-bit color conversion. It has the form "RGBToIndexed(str)", where str contains some combination of 'System LUT', 'Existing LUT', 'Custom LUT' and 'Dither'. Custom LUT and Dither are the defaults. The macro file "Color" contains a macro for doing a color merge of two stacks.

16) 16-bit TIFF files can now be imported. After the file has been imported, use the Rescale(aka Revert to Saved) command to find the optimum 16-bit to 8-bit mapping. Files that represent white as zero open inverted.

17) The AverageFrames macro command now optionally accepts two arguments. The first is a string containing some combination of 'Average', 'Integrate' and 'Video Rate Capture', and the second is the number of frames to average or integrate. For example, to integrate 128 frames, you would use the command AverageFrames('Integrate',128).

- 18) A bug was fixed that caused the X and Y coordinates of the center of the best fitting ellipse(X-Y Center) to always be integers.
- 19) A bug was fixed that caused the creation of freehand or segmented line selections to fail if density slicing was enabled.
- 20) A bug was fixed that caused a pasted image in a second window to disappear when using the Start Capturing command.
- 21) A bug was fixed that could sometimes cause the tools in the Tool window to be displayed incorrectly.
- 22) A command(“SelectWindow('Title')”) was added to the macro language for selecting windows my name.
- 23) A command(“NewTextWindow('Title')”) was added to the macro language for opening a new text window. In addition, the WriteIn macro routine was updated so that it now displays text in the currently active text window.
- 24) A command(CaptureColor) was added to the macro language for capturing 24-bit color images into a three slice stack.
- 25) A command(“GetThresholds(lower,upper)”) was added to the macro language for obtaining the current lower and upper thresholds. In density slicing mode, it returns the lower and upper thresholds. In thresholding mode, lower is the current threshold and upper is set to 255. Both lower and upper are set to zero if neither thresholding or density slicing are enabled. A new macro named “Compute Percent Foreground” in the file “Measurements” uses GetThreshold to compute the percentage of the current selection that has been highlighted by thresholding.
- 26) A Find command was added to the Edit menu. It replaces Fill whenever a text window is active. Type Option-Command-F to repeatedly search for the same string.
- 27) A command(AverageSlices) was added to the macro language to provide access to the Average command in the Stacks Menu..
- 28) A new submenu(Export) was added to the File menu for using Photoshop compatible export plug-ins. Two plug-ins were successfully tested: a plug-in that supports the Scion TV-3 video output card(used to

drive video printers) and the PhaserPrint plug-in for the Tektronix Phaser IIsd dye sublimation printer.

29) Two new macro functions were added to the macro language for doing logical operations on bits. BitAnd(n1,n2) returns n1 AND n2. BitOr(n1,n2) returns n1 OR n2.

30) The Propagate LUT command now copies the “fill” colors needed when using the LUT tool or controls in the Map window to adjust pseudo-color LUTs.

31) The Change Colors command was replaced with a new command named Fix Colors that maps pixels with values of either 0 or 255 to the nearest matching color in the other 254 LUT entries. This usually corrects pseudo-color problems due to the way Image “hard wires” entries 0 and 255 to white and black respectively.

32) The About Box was redesigned.

33) The Surface Plot command now displays a dialog box that allows the user to specify the name and dimension of the plot window.

34) A bug was fixed in the Close and Dispose macro commands that could sometimes cause images with selections to become corrupted.

35) Balloon help was added to the menus lacking help messages and to most dialog boxes.

V1.51(2 August 1993)

1) A bug(introduced in 1.50) was fixed that prevented histogram and plot values from being pasted into spreadsheet programs and other programs that work with text on the Clipboard.

V1.52(9 September 1993)

1) A bug was fixed that could cause Image to crash when opening text files with names containing a semicolon.

- 2) A bug was fixed that caused plug-in filters to not work correctly with rectangular selections.
- 3) Images are now marked as changed when you use a plug-in filter.
- 4) A bug was fixed that would sometimes cause the Windows menu to become messed up when one or more text windows were open.
- 5) The window title bar is now correctly updated after a TIFF file has been saved using a new name.
- 6) The Reduce Noise filter is now four times faster due to some in-line 68000 code contributed by Edward J. Huff at the NYU Chemistry Department.
- 7) A bug was fixed that prevented filter plug-ins from remembering their settings between calls. You can now also pass the string 'Reset' to the Filter macro routine(e.g., Filter('Reset')) to force the next filter called to use its default settings and to display its dialog box, if any.
- 8) A macro("Make Expression Movie" in the file "Animation") was written for generating movies using the Expression plug-in filter. Expression is a freeware program written by Jim Bumgardner(jbum@aol.com) that creates images that change over time according to a mathematical formula. Expression 3.0b, available in the plug-ins directory on zippy.nimh.nih.gov, is required for use with NIH Image.
- 9) A bug was fixed that prevented selection of the right column or bottom row when using the rectangle selection tool.
- 10) Thanks to Edward J. Huff, text files created by NIH Image(e.g., macros and convolution kernels) now have a custom icon.
- 11) A command(SortPalette) that sorts the current look-up table by hue was added to the macro language.
- 12) PidNumber, a new macro function, was added to the macro language. It returns a negative permanent ID number for the current image. SelectPic and ChoosePic were modified to accept these negative values and find the current picNumber automatically if presented with a pid value rather than a picNumber value. A macro package("PidNumbers Demo") demonstrates the various ways that

images can be selected in the macro language. The PidNumber modifications and demo macros were contributed by Edward J. Huff.

13) The line spacing in text windows is now changed when the font size is changed.

14) Text windows now handle update events correctly.

15) Plug-ins in the system folder in a folder named Plug-ins are now found if image is on a different volume than the the system folder.

16) The standard versions of NIH Image no longer requires a floating-point coprocessor(FPU). This change was made because there is no noticeable performance difference between the FPU and non-FPU version of Image and because the LCIII and Centris 610, the most popular new Macs, do not have FPUs. This change also anticipates PowerPC based Macs which will not support emulation of 68000 programs that directly use the FPU.