

DIGITAL DIRECTIONS



Original tiff file at 8 megabytes, uncompressed.



JPEG file at 1.7 megabytes, 5:1 compression, level 1.

TIFF **JPEG COMPRESSION**

8 MEG 1.7 MEG 5:1 1 MEG 8:1 230 K 37:1

Sectional comparison of images (file size represents entire image area).

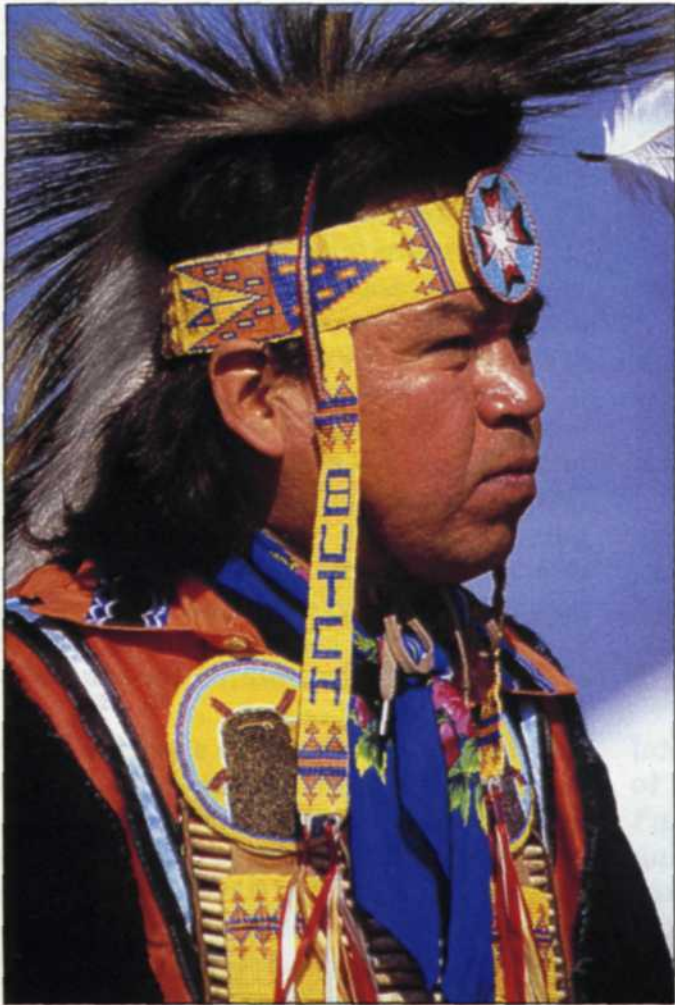
TIFF **JPEG COMPRESSION**

8 MEG 1.7 MEG 5:1 1 MEG 8:1 230 K 37:1

Extreme sectional comparison of images (file size represents entire image area).

JPEG FILE COMPRESSION

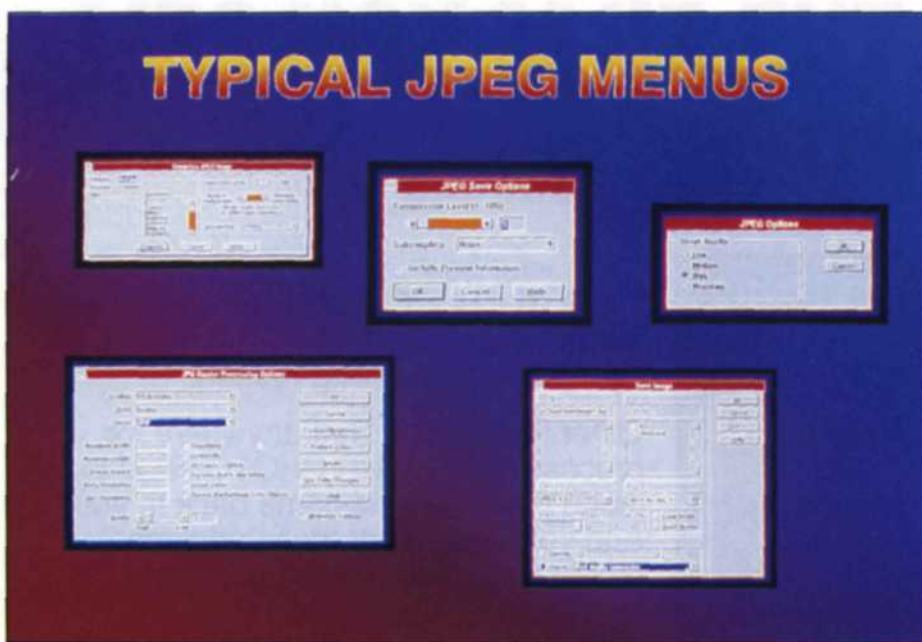
Jack and Sue Drafahl



JPEG file at 1 megabytes, 8:1 compression, level 20.



JPEG file at 230k bytes, 37:1 compression, level 75.



Typical JPEG menus extracted from various software programs.

TIME AND HARD disk space are two things you can never get enough of. It used to be that if you said you had a gigabyte hard drive, you immediately got oh's and ah's from those around you. Now if you say you have a gig drive, they only reply with "how many gig?" We have never met anyone who has had adequate time to accomplish all they wanted in a single day. Not having enough time seems to be the disease of the twentieth century. The ability to use both effectively may make the difference between whether your digital imaging business thrives or just survives. One critical software tool that can help you bring time and space under control is

image compression.

When digital imaging first became popular, much of the imaging was with vector file formats. Computer images with this format were basically created with a "connect the dots" philosophy. These files were fairly small, and image storage was not a problem, even with smaller hard disks. Access time to these files was pretty fast even on the slower machines. Then bitmaps became popular. These images were usually real photographic images that consisted of rows of red, green, and blue pixels to make up the image. These files were much like the scan lines you see on your TV set. The size of these files was much greater than the

vector files and took a long time to load on the slower computers.

As time passed, computers got faster and hard disks became larger. So, the problem was solved, right? No such luck. At the same time, bitmaps got even larger, due to bigger and better input devices such as scanners and digital cameras.

Fortunately, software developers came to the rescue with image compression. With image compression routines, a program scans each row of red, green, and blue pixels looking for similarities. If 10 pixels in a row are all the same, the compressed file would mark a starting and

(Continued on page 24)

JPEG File Compression

(Continued from page 23)

ending point of one color. This information takes less data space, thus compressing the file size. Many of the standard formats such as TIFF LZW and TARGA RLC use this type of compression. In many cases though, the bitmap image would have no similar color values, so almost no compression was possible. With bitmap files exceeding 100 megabytes, a better compression was needed.

Joint Photographic Experts Group or JPEG became the solution to this problem. JPEG uses special mathematical algorithms to compute color trends at the pixel level of a bitmap image and group these color similarities into a compressed format.

For example, let's say that in the corner of a photo the sky changes from dark blue to light blue. JPEG algorithms would look at this section and apply a formula that would give the same tonal gradation, but with less data. If the original image had blue values of 190, 191, 193, 195, 194, 196, 198, 200, the JPEG file would indicate a color curve starting at 190 and ending at 200.

The results would be smoother than the original file and take up less storage space. With another type of algorithm, the pro-

gram would group similar pixels that had one shift in color value. For example, an original bitmap pixel row might read red 190, 191, 190, 190, 191, 200, 201, 200, 200, 201. JPEG might look at this data as five pixels of 190 red followed by five pixels of 200 red. Other JPEG algorithms are more complex but can reduce the file size even more.

When JPEG was first introduced, computer experts were thrilled. They could get more samples onto their software diskettes, and could make their tutorial programs even larger. Photographers were not as happy. The thought of throwing away data in the name of saving space was unacceptable. As soon as photographers heard that JPEG used a "loosey" compression technique they refused to use it in favor of the older compression programs.

Most photographers realized that digital imaging sacrificed quality compared to traditional photography and they didn't want to add to their losses by throwing away data in favor of smaller files. Photographers trying JPEG for the first time didn't understand exactly how it worked and tended to misuse it, resulting in poor image quality.

The key to making JPEG work for you is

properly applying it to your files. You need to know when to use it and how to use it for specific applications. Don't listen to anyone as to whether JPEG is good or bad: You must try it for yourself.

Create a directory on your computer just for the tests, and label each file with information on how the file was made. For example, your uncompressed file might be uncompress.tif, while each JPEG would be labeled with its level of compression, ie, level01.jpg, level20.jpg. Send all the images to your output devices and compare. To critically see the difference, crop sections of each image and enlarge them on your output devices. Then after careful examination, you can decide which level of compression is acceptable for your different lab applications.

In most of our photo lab applications we use the lowest level of compression to keep quality at the maximum. This usually allows compression of 4:1 to 8:1, depending on type of image. We have compared all types and sizes of files and cannot see any difference in image quality between the uncompressed and the JPEG file at level 1. Just to see how the quality is at the other

(Continued on page 28)

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JPEG File Compression

(Continued from page 24)

end of the scale, we ran a battery of tests all the way to maximum compression. We found that from a level 1 to level 75 the change was very gradual and there seems to be no loss up to a level 15. From level 75 to 100 the change was extreme and the image was unacceptable for most photo lab applications.

JPEG programs are found in most graphic programs today and are used as an import-export filter, or in the load-save function. JPEG can also be found in file conversion programs that are specifically designed to convert file formats from one type to another. In our review of JPEG formats, we tested Adobe Photoshop, Corel Draw, Micrographx Picture Publisher, U-Lead Image Pals, Leadview 3.0, and Inset's HiJaak. We found dozens of JPEG variations in these programs and almost all were interchangeable. The Leadview 3.0 file conversion program seemed to be the most versatile of all, supporting 42 different types of JPEG formats. The JPG and JFF are the most common formats with JFF being compatible across the IBM, MAC and UNIX platforms. The JTF is a JPEG-TIFF combination format that is designed to create TIFF 6.0 files using JPEG.

The most obvious advantage of JPEG is storage space. Bitmap files can get very large, and even with CD writers and gigabyte drives, one single job can easily fill up your storage devices. As soon as your job is completed using uncompressed files, use a batch process program to batch JPEG all the files. Once their integrity has been verified, you can delete all the uncompressed versions. The JPEG can then be written to tape, CD or other archive storage device.

If you need to place a large bitmap on a floppy diskette, you may want to re-sample the image before you use the JPEG compression. For example, a client brings in a Photo CD and wants you to edit the photo and give it back to them on a 1.4 meg floppy diskette. In order to reduce the file down from 18 megabytes, you would have to use a level 35 JPEG to fit it on the floppy. A better way would be to use the "re-sample" tool found in most graphics packages and reduce the file from 3072 x 2048 to 2048 x 1365. This new file would be 8 megabytes in size and would fit on a floppy diskette using JPEG at level 1 compression. If you use a CD writer or tape drive, you will find that JPEG will save you a lot of time when you have to bring in

a file for re-imaging or changes.

If you write a large uncompressed file to either of these two devices it will take a very long time to write and read the file back into the system. JPEG on the other hand is a small file, and will write and read into your system much faster.

The key to the speed in uncompressing the JPEG is in your choice of software. In most cases file conversion programs compress and uncompress JPEG files faster than bitmap editing programs. You may find that you will work with an uncompressed file in your editing program, and when the job is done, use the file convert program for archival storage. In our lab we use Photoshop or Picture Publisher for editing and Leadview 3.0 or Image Pals for JPEG conversion.

Think about using JPEG in your business, but don't take our word for it. Conduct your own tests and you be the judge. JPEG can help you overcome your time and space problems.

Jack and Sue Drafahl own and operate a custom lab in Portland, OR. They are also professional photographers, specializing in underwater photography.



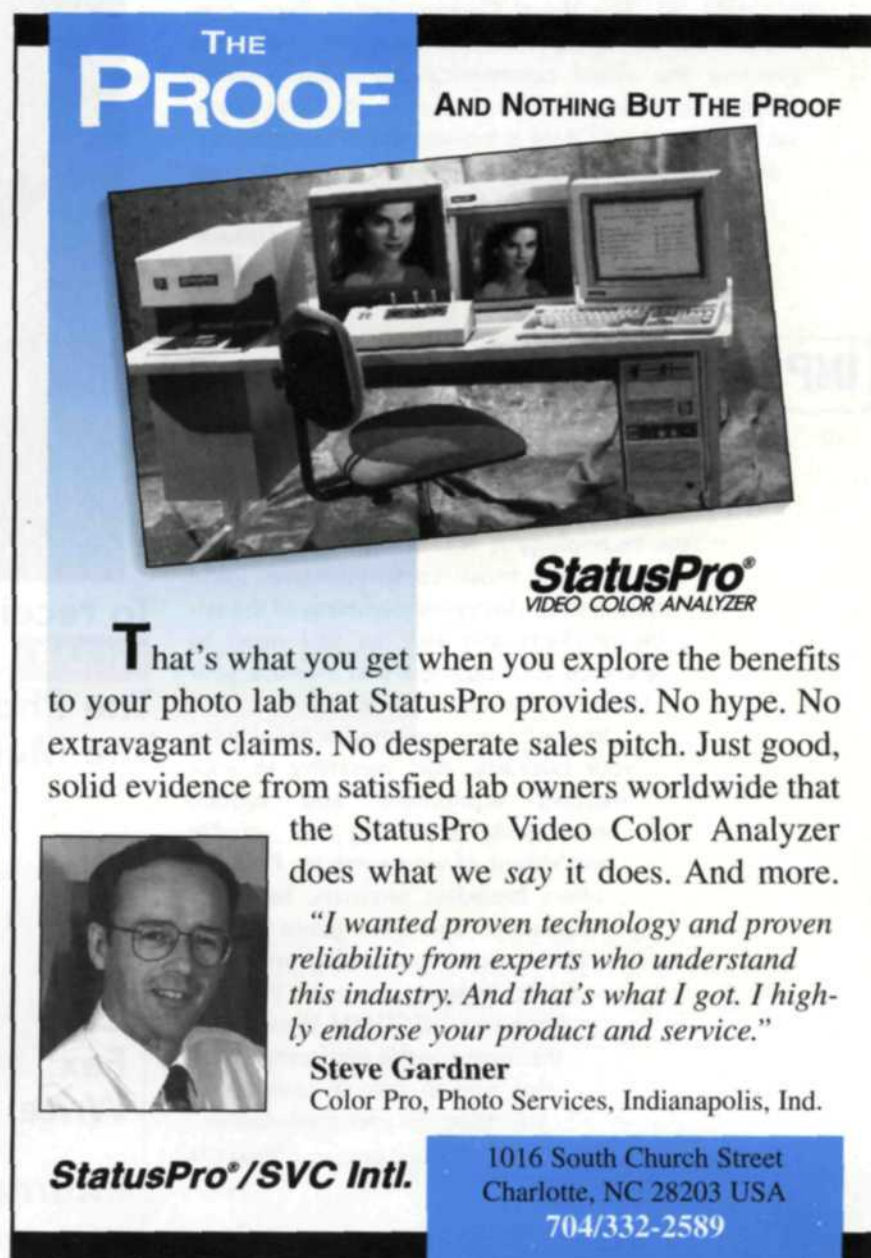
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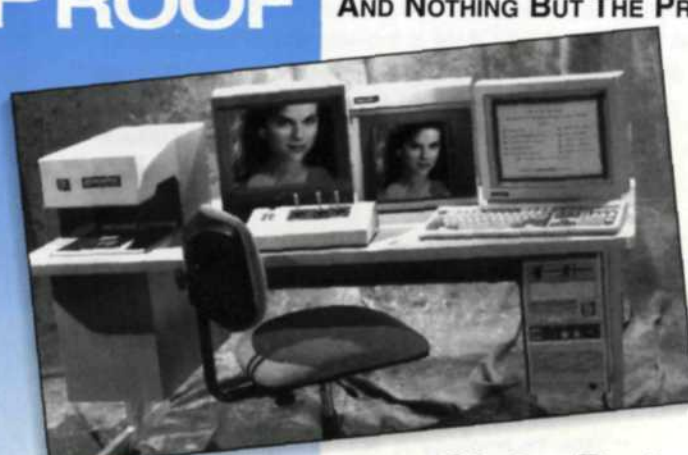


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