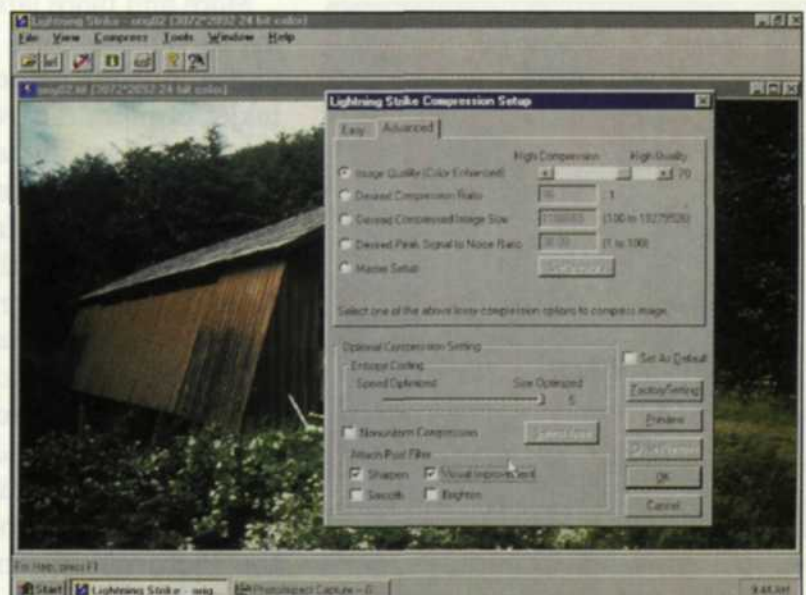


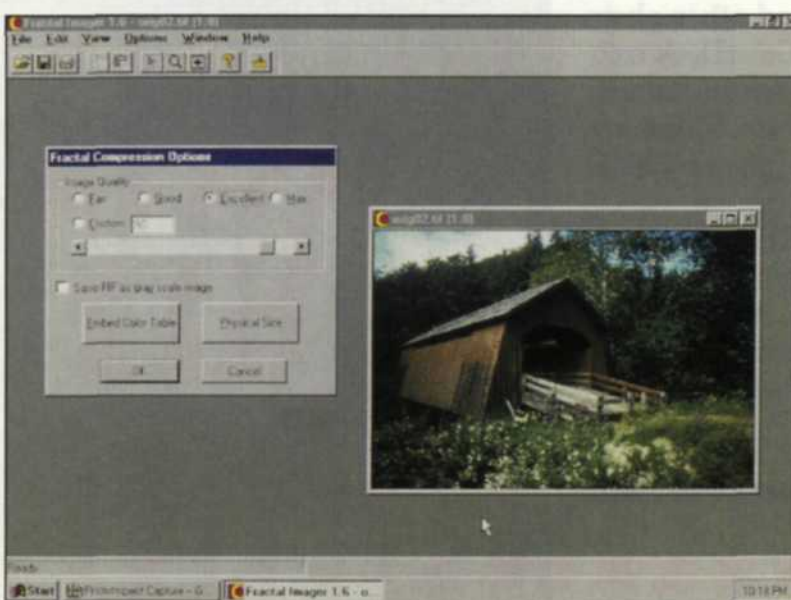
TRANSMITTING DIGITAL FILES:



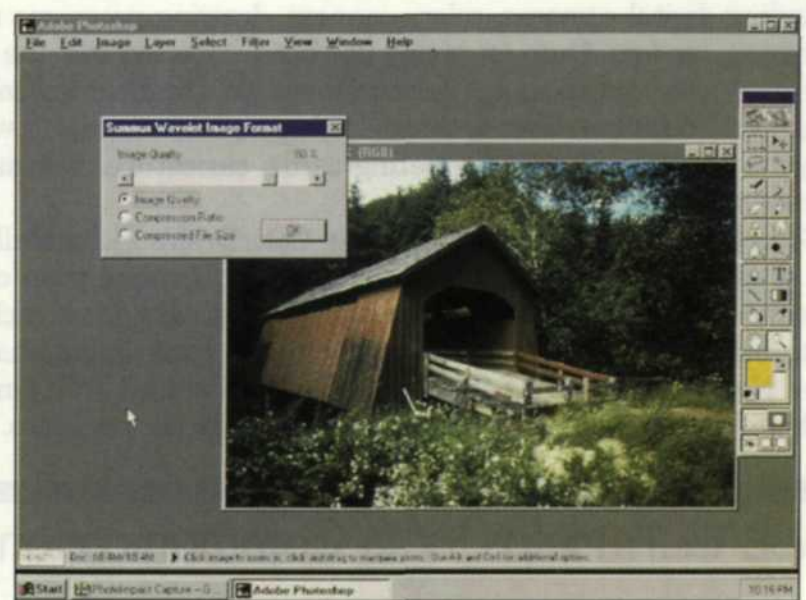
Altameria Group, Fractal Compression, Photoshop plugin



Lighting Strike, Wavelet Compression, batch processor



Iterated, Fractal Compression, batch processor



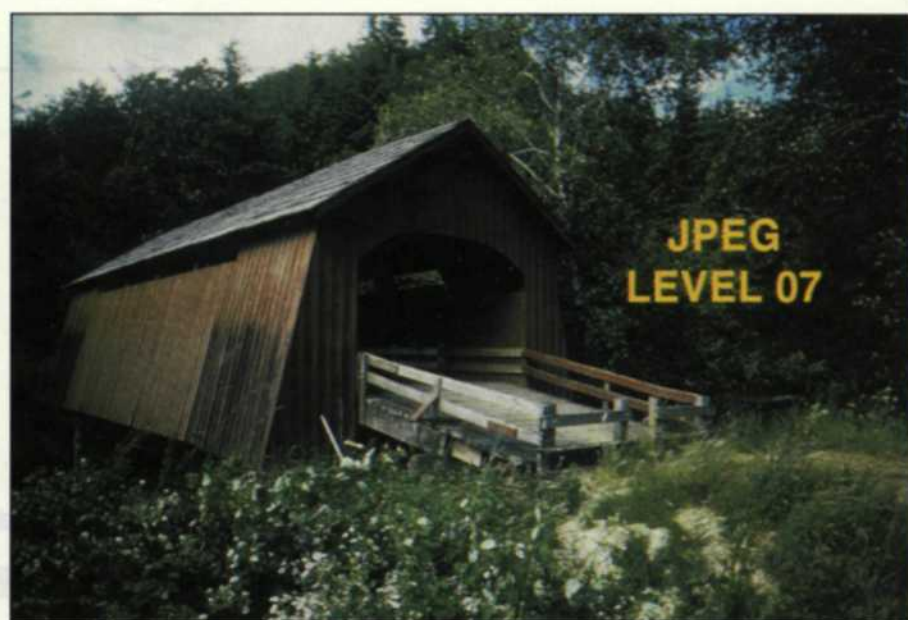
Summas, Wavelet Compression, batch processor

The words "image compression" have had a negative connotation for most traditional photographers. The sentiment is, "If I spend time obtaining the highest quality image on a sheet of film, why should I sacrifice quality to transport the image digitally?" As with everything else in our fast-paced technological world, image compression has also been improved to meet the high standards of true professionals, and quality is priority one.

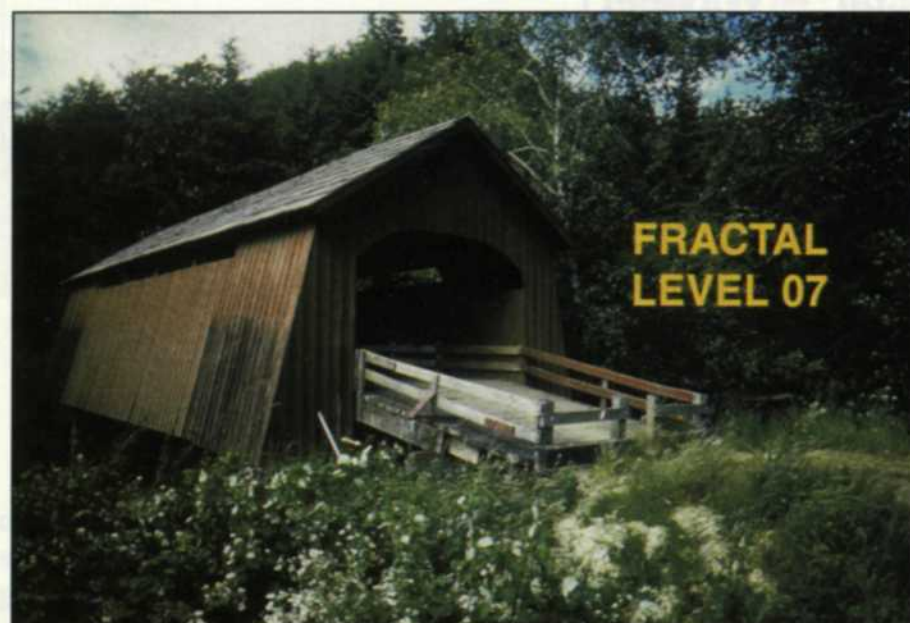
Fundamentals of Image Compression



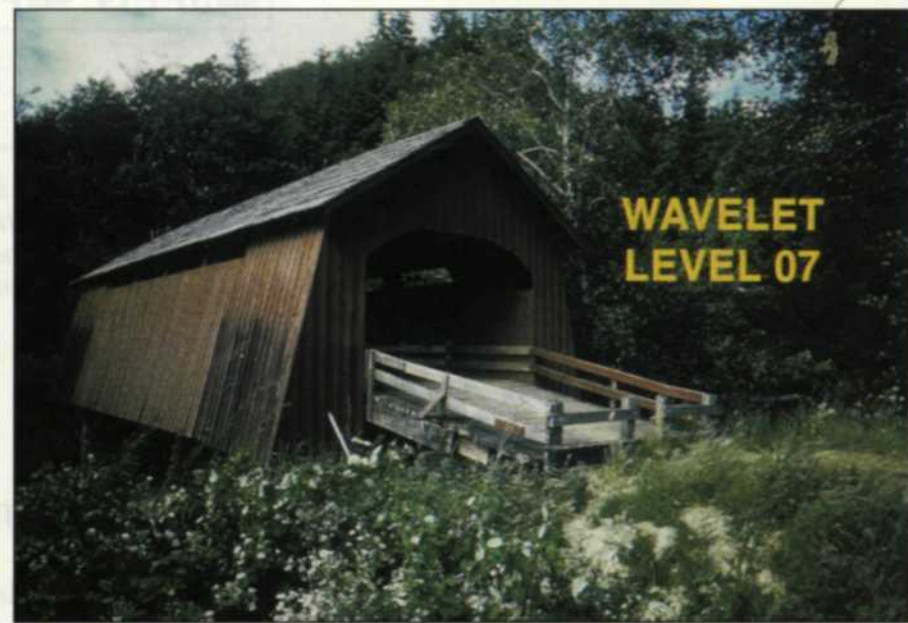
Original TIFF file 18MB, No compression



Original TIFF file 18MB, JPEG Level 07, compressed 1,798KB, compress/ratio 10-1



Original TIFF file 18MB, FRACTAL Level 07, compressed 494KB, compress/ratio 36.4-1



Original TIFF file 18MB, WAVELET Level 07, compressed 596KB, compress/ratio 30.2-1

Jack & Sue Drafahl

THE USE OF digital images is becoming more and more the norm. In order to maintain maximum quality, the size of the scanned images must be large, thus creating problems. One ongoing problem for digital photo labs is how to transport or transmit digital photo images from one location to the next. In order to compact the file size, image compression is often necessary.

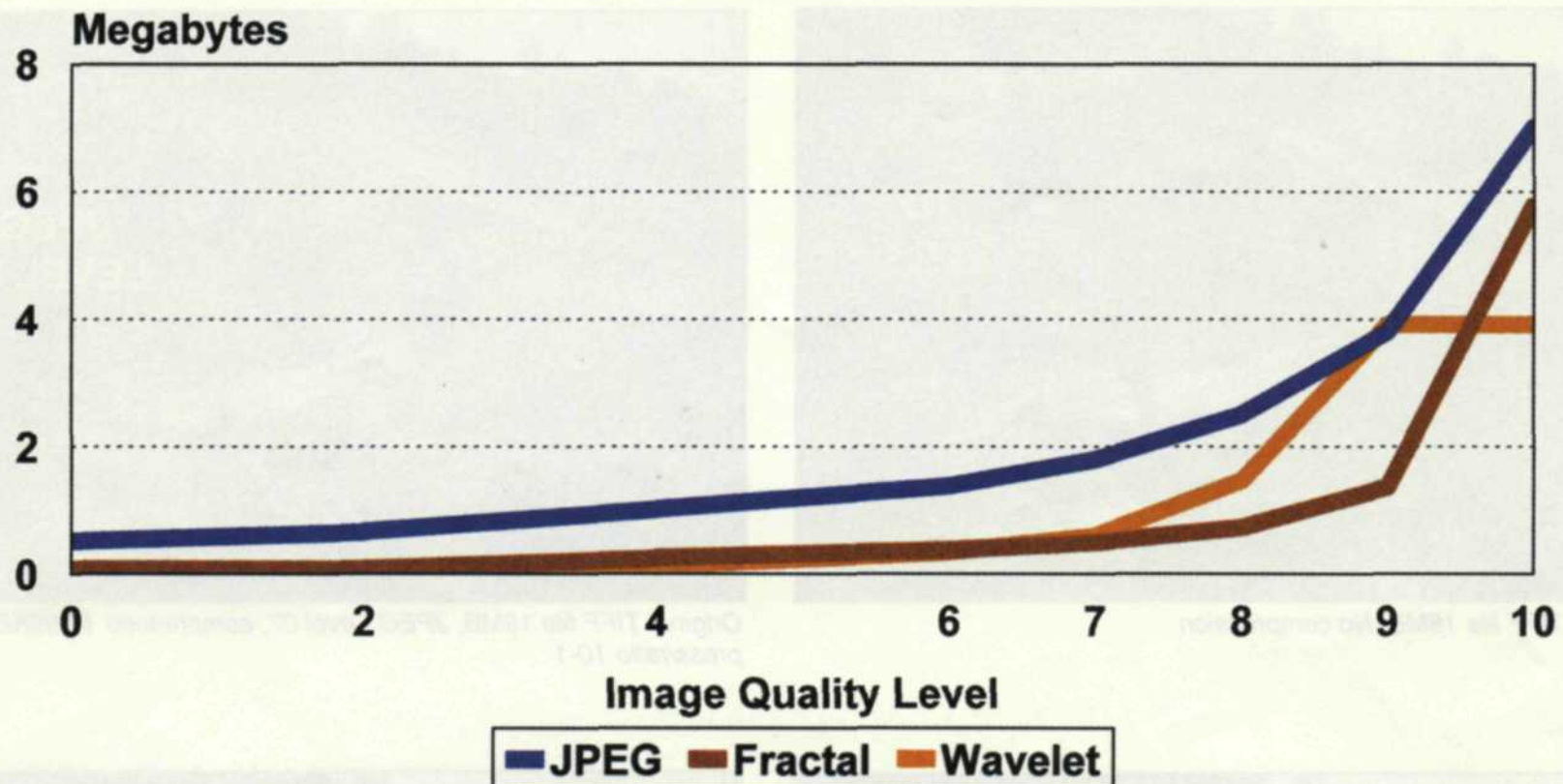
In the photo lab today, the need to trans-

mit bitmaps over phone lines via e-mail or the internet makes it essential that image compression is used to keep transmission times to a minimum. Even with a 56K modem on line, standard image files would take hours to transmit over phone lines. With image compression over 30:1, the same transmission may only take minutes with minimal quality loss. In today's demanding business climate, the trade-off is usually worth it.

For example, a client of ours needed clarification of an image we had sent. We asked him to send a compressed version of the image via e-mail, so we could closely analyze the image. When we accessed the message, it turned out to be an un-compressed 15 megabyte file that took over three hours to download! Keep in mind that it also took the same time to upload the file, so the total time on the line for one file was over six hours. If the file had been compressed prop-

Image Compression

JPEG - Fractal - Wavelet



Original file size = 18 Megabytes

Each editing program uses a different scale to measure the quality of the image. Some are from 0-10, one is from 0-100, and one is from 0-255, but they all reflect the same data. For our tests, we reduced these scales to the 1-10 version. Level 10 is the highest quality rating, and 0 is the lowest rating. We ran two test files. One original was scanned at 18 MB and the other was at 34 MB. We found that level 7 and above was more than acceptable for high quality image transfer, and all levels were acceptable for Internet preview. With both file tests, we found that the JPEG level 4, Fractal level 9 and Wavelet level 8 would all fit on a 1.4 MB floppy disk.

erly, it should have taken no more than four minutes to send each way.

Another use for image compression is if you physically need to transport a file via a portable storage device such as SyQuest or Zip drive. This is one area where hardware manufacturers have gone crazy offering dozens of different types of media storage devices.

When the file size is too large to fit, the solution is to use a file compression level that reduces the image slightly smaller than the media size. In our business it is not uncommon to reduce an 80 MB file so that it fits on an older 44 MB SyQuest, which is still being used. Although if Murphy's Law is true, no matter which storage device you have in your photo lab, your customer will have something else! But that is a totally different problem...

JPEG

The most popular image compression format is JPEG (Joint Photographic Experts Group—pronounced “jay-peg”). It is widely available to the general public as it comes as part of most editing software programs. Photoshop, Painter, Corel Paint, Picture Publisher, PhotoImpact, Hijaak, and most of the vector-based programs use JPEG as an import file format.

JPEG is also being used as a compression format for many of the new digital cameras. Many e-mail programs today recognize JPEG formats, and only require you to attach the file to your message. When the mail comes in, it will drop the JPEG file into your download directory, and leave you a message as to where it placed the file.

JPEG uses compression algorithms to reduce those areas not visible to the human eye. By compressing or removing that data, the file becomes much smaller, yet still maintains the visible quality of the original. When you get ready to save a file in the JPEG format, it will usually ask you the level of quality you desire.

As you increase the effect of removing and compressing data the file becomes smaller. The trick is to find a satisfactory image quality level and corresponding file size that meets your needs. The only way to really see what happens in JPEG is to take an original image and save it out at different levels of JPEG quality. Output each to a high quality device such as a film recorder and look closely at each image.

Keep in mind that JPEG is not a specific format, but a method of compression. Each

**We've
changed our
name...
but not our
commitment to
excellence!**

The photo products division of Houston International, Ltd. has joined Houston Fearless 76, Inc. under the new name of Houston Fearless International.

With our combined resources and products, HFI now offers the most complete line of continuous film and paper processors made in the USA. We are dedicated to being a one-source supplier of high quality photo processing equipment and accessories.

**No matter what format...
No matter what size lab...
Large or small...**

HFI
**has the equipment
to meet your needs!**

For the ultimate in processing results, Houston Fearless Intl. offers dependable performance and unequalled technical sales and service support.

HFI

HOUSTON FEARLESS INTERNATIONAL
655 E. 20th St. Yuma, AZ 85365-2414

1-520-782-3677
Fax 1-520-343-9743

More Info? on Service Card Circle item 183

See us at PMA New Orleans—Booth K207

For Fast Response Circle 671

software manufacturer uses this method in a different way and some cut corners to speed up saving and loading JPEG files. The only way to assess quality is to compare.

Fractal Compression

Fractal compression is a new and upcoming compression format that offers great promise in the world of digital imaging. Patented by Michael Barnsley, founder of Iterated Systems, this compression scheme contains a record of repeated patterns that exist in the image rather than a set of values for every pixel. When the file is saved, the pixel data is replaced by fractal mathematics, so the pattern information is compressed into a very small file.

Since the Fractal Image Format (FIF) file does not record specific pixels, the file can be expanded to any size without any interpolation. When you expand the file, it will ask you what resolution you would like.

Each pattern is then proportionally expanded to create a bitmap in the requested size. In order for you to expand to 400-500 megabytes, you should start with at least an 18 MB file. Fractal compression works best with the Intel Pentium Processor and the MMX technology.

If you want to try this format out, jump onto the Internet and download the trial Fractal Imager program from Iterated Systems. It includes a batch compressor/expander and a 'Net browser plugin. With this plug-in you can look directly at Fractal images created on the 'Net, or download FIF files and look at them in the Fractal Imager.

Iterated Systems is also teaming up with key product providers in the industry such as the Altamira Group which has developed the Genuine Fractal Photoshop Plugin. This software allows you to work with images at a lower resolution and then zoom images to render greater detail at print time. The plugin will encode FIF files from 1.8 MB to 450 MB.

Wavelet Compression

Wavelet Compression is another new high tech compression scheme that is used by some pretty impressive companies such as the Nomad Rover for NASA, missile guidance systems for Hughes Aircraft, Fuji Film, Corel, and others. The technology behind Wavelet is extremely complex and might be best understood by those with advanced knowledge in math and physics.

After boiling down volumes of data, we surmised that Wavelet Compression uses averages and differences of adjoining pixels

at discrete levels. When the difference is close to zero, that data is throw away, and only the averaged data is saved. This compression is usually faster than JPEG or Fractal, and has the ability to embed image enhancements such as sharpening, contrast control, magnification, edge enhancement, denoising, and error resiliency.

We found Wavelet Compression used in three software programs. Corel Draw Paint uses it as part of its file open and save compression programs. Lighting Strike by Infinop, uses Wavelet file compression in a stand-alone program in addition to a 'Net browser plug-in. Summus Ltd. uses Wavelet compression for an Adobe Photoshop Plugin, a Net browser plug-in, and a stand-alone batch processor for compressing and decompressing Wavelet files. Both Lighting Strike and Summas Ltd. have trial programs you can download from the 'Net, so you can take a test drive before you buy the programs.

We found all three compression technologies to be very effective, and would not hesitate to use any one of them to transmit an image to another location. As a test we sent the same file in JPEG, Fractal and Wavelet to our second e-mail address. We opened all three file types directly into Photoshop with no problems. We love some of the added features of the Fractal and Wavelet compressions but find that the overwhelming use of JPEG puts them at somewhat of a disadvantage.

We remember when JPEG was the new kid on the block and was given a skeptical look. We guess that time will tell if the two newer compression types will strongly establish themselves in the digital imaging world. If your lab prides itself on quality, don't shun these new technologies. They work well and will save you time and money if put to good use.

On the 'Net

JPEG

<http://www.cis.ohio-state.edu/hypertext/faq/usenet/jpeg-faq/top.html/>

Fractal

<http://www.iterated.com/>

<http://www.altamira-group.com/>

Wavelet

<http://www.infinop.com/fhtml/entrypt.html/>

<http://www.summus.com/>

Jack and Sue Drafahl own an imaging lab in Portalnd, OR. They are also professional photographers, specializing in underwater photography.