

# A MODEL RAILROADER'S GUIDE TO DIGITAL PHOTOGRAPHY

By Brooks Stover, MMR

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*Crew members talk among themselves as final preparations are made on BC&G #14. The train will soon depart from Widen on a clear summer day in WV.*

# **A MODEL RAILROADER'S GUIDE TO DIGITAL PHOTOGRAPHY**

**By Brooks Stover, MMR**

Photos by the author

## **A. INTRODUCTION**

For many of us, our interest in model railroading started with a toy train set received as a Christmas gift years ago. But even if it started some other way it's likely that our interest was heightened over the years by studying modeling done by others through photographs appearing in modeling magazines. For some modelers, myself included, creating good photos of models and layouts has become a hobby in its own right. Today, with the advent of digital cameras, it is easier than ever to create credible images of our models.

I have been fortunate enough to have had a significant number of photos I've made of my own S gauge Buffalo Creek & Gauley Railroad, as well as layouts by other modelers, published in modeling magazines. Over the course of many years 'honing my skills' I have developed both a basic understanding of what's involved and a set of techniques that have served me well. The techniques require neither particularly complicated nor expensive equipment. The purpose of this article is to describe "how I do what I do" in such a way that those with little or no previous knowledge or experience in photography might feel comfortable giving it a try. I am not a professional photographer and have not had formal training in it. What is presented here is what I've learned by just taking pictures and with a lot of trial and error. There may be other approaches, but what I describe here has proven to work for me and hopefully it will be of value to others interested in getting involved in this fascinating part of model railroading. To the best of my ability, I've tried to get the technical aspects correct both through research and dialog with individuals with knowledge of the subject. Since digital photography is the preferred technology today, this article does not include any specific discussion of film photography although a great deal of the information presented here would be applicable.

### **Why Photograph Your Layout?**

Learning to take good photographs of your layout is like any other aspect of our great hobby in that it takes some commitment and a willingness to develop the necessary knowledge and skills. Therefore, it takes some of your hobby time and, depending on the photographic

equipment you already have on hand, financial resources. These are resources that could be spent on other aspects of the hobby....building or buying more trains, traveling to conventions or researching your prototype. However, adding photography to your skill set as part of this hobby has a number of benefits.

The first and most obvious is that you can create a permanent record of your layout. This could be as simple as a collection of photos displayed in a loose leaf binder to a custom-printed hardbound photo book that you can create inexpensively through one of the web-based resources such as Shutterfly or Snapfish. Besides being able to share your layout with family and friends through such photos, they can also serve as a record of your collection for insurance purposes or if you want to sell items on line.

A second reason for learning to take good photos is that doing so will improve your modeling. Shortfalls in modeling that are sometimes overlooked when viewing a layout in person show up quickly in a photo. A figure that has fallen over, a gap between a structure and the ground, a section of rail that didn't get weathered, or a rock face that is too red relative to the surrounding terrain will all show up in a photo. Photos will also help improve the composition of the scenes on your layout by identifying where additional figures or small details would be helpful. You can literally use photographs to "check your work".

A third reason for photographing your layout is so that you can share it with other modelers. This can be done on line or through publication in one of the modeling magazines. While publication in a magazine may at first seem like an impossible objective, with a little effort and patience it is an achievable goal for most modelers. Once you first see a photo you took of your modeling on the pages of one of the magazines, I guarantee you'll be hooked! After some experience, you can supplement your modeling budget through photography as some of the modeling magazines pay for photos and articles they publish. Having one feature article published in the right magazine can pay for a camera appropriate for layout photography.

Finally, most conventions that hold model contests also hold contests for photographs. This aspect won't appeal to everyone but can be a very satisfying activity and successfully competing can be a realistic and motivating objective, even for those just getting involved in layout photography. Competing in photo contests has an advantage over model competition in that it's much easier to transport photographs than physical models.

Captions under the photos throughout this guide describe the various principles of composition and the techniques for digitally enhancing photos discussed in the text.

## Combining Technology and Art

There are two basic aspects to successful layout photography: technology (camera, lighting and computer) and art (image composition). A basic understanding of each is required, but you do not need to know the intricacies of the physics behind what makes a camera or a computer work nor a degree in fine arts. What you do need is an understanding of how to use a camera and associated software and the basics of what makes a photograph visually appealing, the latter an admittedly subjective topic.



***The B&O's Grafton local is pulling an empty hopper off the trestle at Caruther's Fuel and will replace it with a loaded one. Meanwhile an employee is making certain with the driver that he loads the correct grade of coal into the truck.***

A dramatic but believable view is created with the camera positioned below track level. The two figures in the foreground appear to be conversing and the figure standing in the doorway appears to be watching the railroad action. The two barrels in the foreground were intentionally positioned to add a little color, picking up the red and blue appearing elsewhere in the image as well as to break up the area of bare ground. The camera was focused on the back corner of the truck and the locomotive is far enough in the distance to not be fully in focus. What appears to be a muddy puddle in the lower right is actually the layout fascia that has been partially covered by cloning some of the black soil over it using Photoshop. The original plan was to cover all of the fascia but it became apparent that when just partially covered, the uniform brown color looked like muddy water and so I left it.

## **B. CAMERAS AND LIGHTS**

A key to taking good photographs of layouts is using a camera with the right capabilities. For those interested in the 'why' behind these requirements, see section G. MORE ABOUT CAMERAS, which contains an explanation of some of the principles upon which these recommendations are based.

### **Camera Requirements**

A digital camera for taking layout photos must have the following features or capabilities:

1. Allow manual selection of the aperture (the lens opening or f-stop)
2. Be able to focus within about 4" or less from the end of the lens (the closer the better)
3. An autofocus mechanism that allows manual selection of the focus point
4. A 'delayed release' or remote release feature so you don't have to be touching the camera while a picture is taken
5. Ability to take photos at a minimum of 8 megapixels of resolution
6. A provision for attaching to a tripod

In today's market, most cameras with these capabilities will also have the ability to manually set the white balance and the ability to manually set the ISO (sensitivity to light, see pg 28). Most will also have a lens with an adjustable focal length, although focal lengths from about 25mm-100mm (measured as 35mm camera equivalent, see pg. 23) are all that are typically needed for layout photographs.

There is a large variety of camera styles in a wide variety of sizes and with a wide array of features and prices, all which meet these requirements to some degree or another. In today's market there are at least five commonly used categories of cameras, each which have offerings that are usable for our purposes. The following is a brief description of each category and examples of cameras in each.. I am not recommending any one of these specifically. I would suggest that you research cameras thoroughly at a competent camera store, in professional reviews on line and with other modelers. Fortunately all these cameras can be used for other kinds of photography, including family and travel pictures. In general, cameras in each successive category are more expensive, but as will be shown in section G. MORE ABOUT CAMERAS, that does not necessarily mean better for layout photography.

Pocket Point and Shoot – These small cameras will fit in your pocket and have non-interchangeable lenses. Their close focusing capabilities vary. Not all in this category have the required manual control of aperture, but many do. Most have fixed rear LCD (Liquid Crystal Display) screens for framing the picture.

- Canon S100

Enthusiast Compact – Somewhat larger than Point and Shoot, these cameras won't easily fit in a pocket but are still quite small. They have non-interchangeable lenses. Some have articulated rear LCD screens and most have close-focusing capability.

- Canon G15 and Nikon P7700

Super Zoom – Cameras in this relatively new class look like small DSLRs (Digital Single Lens Reflex) but have non-interchangeable lens. The class is defined by lenses that have a very large focal length range (not needed for layout photography but great for other types of photography). These generally have good close-focusing capability.

- Fujifilm HS30EXR and Panasonic Lumix FZ47

Compact DSLR – These are slightly smaller than DSLRs (below) but are similarly configured and have interchangeable lenses. Many have articulated LCD screens. Close-focusing capability is determined by the lens selected.

- Canon T3i and Nikon P5200

Full Frame DSLR – These are large, “professional grade”, full-featured cameras with the largest sensors available and interchangeable lenses. Close focusing capability is determined by the lens selected.

- Canon EOS 5D and Nikon D7000

Four Thirds – This is a class of a camera that was specifically developed as a digital format. The cameras have many of the characteristics of DSLR cameras, including interchangeable lenses but are smaller and typically have sensors sized between point-and-shoot and compact DSLRs.

Speaking from experience, selecting a camera can be the most difficult part of getting into layout photography because there are so many options. You may already have a camera that meets the requirements. Almost all of the digital photographs that I have had published over the last several years have been taken with a camera from the first category, Pocket Point and Shoot, that I bought years ago and is now out of production. I recently bought a camera in the Super Zoom category that is now available for \$300 and, so far, I am pleased with the results.

At least for photographing the larger scales (O, S and HO) you do not necessarily need to move into upper categories where prices go upward quickly.

## Lighting

The quality of images taken by digital cameras is reduced in dim light, a situation that requires long exposures or high ISO values. As a result, layout photography usually requires auxiliary lighting. Only in the most brightly lit layout room can it be avoided. For a typical layout scene, auxiliary light can be provided with as few as two bright, portable lights. For more expansive scenes, additional lights might be required. Lights for photography need to be positioned as desired either by using clamps or by being mounted on stands or tripods.

The lights can be incandescent, halogen or fluorescent, but it is important that only one type of light is used for any given photo. Digital cameras are very good at compensating for the different 'color' of light from different sources but can't accommodate multiple light types within a single scene. I use two older 500W traditional incandescent "photofloods" originally designed for use with film. For more on this subject, see section H. MORE ABOUT LIGHTS.



***BC&G #14 is climbing up grade through Cressmont en route to the mine at Widen. The two crewmen of the rail bus, parked on the siding, have taken position on either side of the main to inspect the train as it passes.***

This image was taken from a higher than normal level in order to include a clear view of the two structures beyond the tracks. The diagonal of the track draws the viewer in and there is adequate visual interest in the triangular space on the lower left. The orange truck was intentionally selected to add a splash of color. From this distance only the two figures in the foreground are really visible. The locomotive smoke was added and a 'corner' in the painted backdrop was removed in Photoshop.

## C. TAKING A LAYOUT PHOTOGRAPH

In its most basic form, taking a quality layout photo can be thought of as a series of 13 steps. At first it may look like a lengthy sequence, but once you get started, you'll see it is pretty straight forward. These are the steps I go through every time I take a photo of a layout or a photo of model on a table in my "mini-studio". For a detailed explanation of why these are the recommended steps see section G. MORE ABOUT CAMERAS AND LIGHTS.

1. To maximize image quality, set the camera at its lowest ISO setting (pg. 28) and its highest megapixel resolution. If you can select between Fine and Normal image quality, select Fine.
2. Select the image format by selecting "JPEG", or if you plan to do substantial post-shooting manipulation on the computer select "JPEG + RAW" if your camera shoots in RAW.
3. Set the camera for "Aperture Priority" mode and set the aperture at the highest numerical value available (smallest lens opening) for maximum depth of field (pg. 23).
4. Set the camera focal length ( "zoom" ) at the widest setting (least amount of 'zoom') to maximize depth of field (pg. 23).
5. Turn off the flash
6. Attach the camera to a tripod to insure no blurring of the image.
7. Brightly, but uniformly, light the scene avoiding areas of dark shadows or bright spots. This involves placing one light on each side of the camera equal distance from the scene (pg. 30).
8. Set the "White Balance" (pg. 27) using a photographers 18% grey card or white paper (per camera instructions). If a manual setting is not available, set White Balance to "Auto".
9. Compose the scene through the LCD display on the back of the camera.
10. Check the focus point by pressing the shutter release half-way down while looking at the LCD display. An indicator (usually a green or black square) will indicate the point the camera has selected to focus on. If this point is slightly rearward of the nearest point to the camera on the main subject, you're ready to take the photo. If not, use the camera's controls to manually select a focus point that is (pgs 21 and 27).

11. Set the self-timer to control the shutter then press the shutter release button. Don't touch the camera while it automatically counts down and releases the shutter.
12. Review the image on the LCD display and zoom in to confirm that the main subject is sharply focused while the camera is still in position on the tripod. Make adjustments if needed and reshoot.
13. Repeat steps 5-11 for each scene you want to photograph. If the same lights are simply moved to light the next photo, there is no need to recalibrate the White Balance.
14. Download the image(s) to your computer

Following these steps carefully will generally produce digital photographs with the maximum depth of field, clarity and resolution that the camera used is capable of creating.



***The sun is just coming over the ridge as the crew readies BC&G #14 for the day's trip to the mine.***

This eye-level image demonstrates how a low vantage point hides whatever is beyond the main subject and so while providing a realistic perspective may show less of the scene. Also note that the longer focal length lens setting used here slightly 'compresses' the image of the engine. The truck and foliage in the foreground are not sharply focused, a condition even in similar full size photos because the foreground is so close to the lens. The figures and headlight add life to the scene. For this image the photo lights were positioned low to suggest morning sun.

## D. ELEMENTS OF A GOOD PHOTOGRAPH

Of course, knowing how to use a camera to get a correctly exposed and focused image does not, in and of itself, insure that the image will be visually appealing...a 'good shot'. In this section I'll share my thoughts on what makes for an interesting layout photograph. Just as building a layout is an art form, taking photos of a layout is an art form and so there is no right or wrong. There are as many opinions as there are modelers taking photos, and that's great. Volumes have been written about photo composition and some of those principles apply to layout photography, but there are also some elements unique to our task. The following are elements, that if included in a photo, improve the likelihood that it will be visually appealing. You will, no doubt, have others.

**Good Modeling** - It goes without saying that at the foundation of a good layout photo is good modeling. The camera will exaggerate, not hide, any imperfections. While all the elements of the scene don't have to be contest winners, structures must be free of poor joints, rolling stock must be well painted with properly applied decals and scenery must be complete. Before beginning a photo session, it is a good idea to look over the area to be photographed 'with a fine toothed comb' and repair or tune up any area that is not up to the best of your modeling standards. You can be sure that the camera will find any defect you miss.

**A Clear Story** – I try to imagine the caption that will go with a photo while I compose it in the LCD screen on the back of the camera. What is the story that goes with the photo? What is happening, or just happened? In other words, why am I taking this photo? The intent is that when looking at the finished photo, the viewer should see it as if it was taken in the real world by a railfan, not on a layout. Railfans, and especially professional photographers, take photos because they are trying to capture something of interest, something of the essence or drama of railroading and the people who operate it or whom it serves. Some photos might just be "a good train picture", or documentation of a locomotive or structure, but the best photos are more than that.

With a theme or 'purpose' in mind, avoid including elements in the scene that do not reinforce the story or compete with it by introducing "sub-plots" or secondary stories. This includes minimizing distracting elements in the background and foreground or taking such a broad view that the main subject appears too far away.

**Believable Point of View** – Most photos we see of full size railroads are taken by someone standing on the ground, although there are exceptions, of course. It's not surprising, then, that

for the most part photos of layouts look the most realistic when taken from relatively close to the surface of the layout. Unfortunately, this presents a particular challenge for a couple of reasons. First, our cameras can't be reduced to scale size. Depending on the type of camera and the scale of the models, usually even if placed directly on the layout the lens will be higher than scale "eye level". In addition, when the camera is close to the layout surface, it's difficult to get the foreground in focus, because it is so close to the lens. Finally, from lower angles more of what is in the background is blocked by what is in the foreground, often limiting the scope of what can be included in the image.

As a general rule "lower is better" in terms of realism but it is by no means essential to have the camera at scale eye level. Photos that appear to be taken from hillsides or the upper floors of control towers or commercial buildings can be perfectly believable. What should generally be avoided are very high viewpoints, perspectives that suggest the image was taken from an airplane.

**Interesting Composition** – It is commonly recognized that images are more interesting if the main subject is not simply centered in the picture and, in general, a good photograph usually does not have its elements arranged symmetrically. An image divided symmetrically in half, either horizontally or vertically (by a road or the horizon, for example) tends to look more static and therefore less interesting. It is better to create some visual interest by using what is commonly referred to as the "Rule of Thirds" where the main subject is positioned approximately one-third of the way in from the side or one-third of the way down from the top or up from the bottom of the picture, or both.

Strong diagonal elements can draw the viewer into the image and create a more interesting asymmetrical arrangement. This is easy to do in railroad photos as the track often runs diagonally across the photo naturally. Strong diagonals will create a triangular foreground space that may need to include some interesting visual elements itself. Generally, strong horizontal elements that run the width of the image should be broken up with a vertical element such as a water tank or tree.

**Sense of Life** – Our layouts are inanimate objects, but the intent is to make a photograph that appears to have been taken in the real world where life is abundant. The simplest way to bring life to a photo is to include human figures. To be most effective, the figures should be "involved" with each other or something else in the scene in some way. It is particularly effective to have figures talking with each other or appearing in small groups. They can also be involved with a crew member (seen or unseen) on a train. A single individual should appear to

be performing some task (shoveling, loading a truck or rail car, engaging with his/her dog) or clearly looking at something else in the image. For example, a crewman standing on the ground can be inspecting a passing train. It's best to avoid lone figures with no apparent involvement with the scene. Whenever possible, I avoid having the figures looking toward the camera as the faces of model figures often don't look realistic in photos.

It has been my practice to have all the figures on my layout be from a single manufacturer. I use Artista brand. The reason for this is that each manufacturer uses a different artist to sculpt their figures and each artist has his/her own style. Seeing figures of different styles and proportions in the same photo draws attention to the fact they are 'model people'. I make sure that I lightly weather figures before putting them on the layout or using them in a photo so they are completely non-reflective in the final image.

**Visual Texture** – This is a term I use to refer to a myriad of small details that can be placed throughout a photograph to add visual interest and can be used to 'fill in' areas that otherwise look monotonous or unfinished. Sometimes the term "clutter" is used, but I think that is too negative an expression. Visual texture can come from either natural or man-made items. Natural items include things like small clumps of foliage, weeds, variation in ground cover, bare tree branches and loose rocks. Man-made items include all sorts of boxes, barrels, garbage cans, discarded boards, small piles of coal and rocks. Both natural and man-made visual texture appears in the 'real world' and so it adds realism to include appropriate amounts on our layouts.

Using elements of visual texture on a layout or in a photo is a matter of taste, much like using salt in cooking. Some people like more, some like less. But like with salt in food, if there is none, a photo will look bland. I keep a box of figures, barrels, scrap lumber, and other small items on hand specifically for use when taking photos so I can place items exactly where they are needed to complete a scene, adding the items while looking in the LCD to confirm the location. It can be noted that in addition to texture, these items can be used to add points of color (painted barrels, colored foliage, etc.).

**Lights** – Like human figures, lamps and lights bring a layout to life. I make sure that the layout is on whenever I take photos so that any structure lights show up, even if dimly, and any pole lamps are lit (see photos pgs. 31 and 33). These make structures appear occupied and businesses open for customers. With DCC it is possible to have locomotive lights on while the engine is stationary. An illuminated headlight sends the message that the engine is ready to

move or is actually in motion. You may decide to correctly represent the operating rules of your prototype as some did not use headlights in the daylight, but my personal opinion is that 'lights on' helps a photo. It is true that the LEDs often used in today's models appear extremely bright in photos. One way to control this is to turn the light off part way through the exposure.

**Color** – In general, I tend to like stronger colors than some and I like to have a few 'splashes' of color in an image. This is a matter of taste, of course. Black and white and sepia tone photos are also fun.

Besides these basics, there are some additional elements that warrant careful consideration when composing a photo.

**Foregrounds** – The area of the scene between the main subject and the camera often presents a challenge in two regards. First, because this area is the closest to the camera, it is often difficult to get it in focus. One solution is to compose the image in such a way that the composition is good even after the out-of-focus portion of the image is 'cropped off'. A second solution is to adjust the camera position, including raising it slightly so that the foreground comes into focus.

A second situation that often arises is that the fascia of the layout appears in the image. One common solution is to build a small, lightweight scenery module that can be positioned along the front of the layout to hide the fascia from the camera. Typically this module would be made on thin plywood or foam-core and then be scened with simple, generic ground cover of the same coloration as the layout. The intention is that it is usable anywhere around the layout it is needed. Another solution is to use photo enhancing software and 'paint over' the offending fascia with ground cover, earth, or other landscape features using the 'clone' tool (pg. 18).

**Backgrounds** – The challenges presented by the background of the scene are somewhat different. While it may be impossible to get the back of the scene in tight focus, this is often not a problem as softer focus there simply reinforces the sense of distance. What is more likely to be an issue is that unwanted objects will appear in the frame. These can include the ceiling of the room, the top edge of a painted backdrop or distant room walls and windows. Sometimes portable panels painted with sky matching that on the layout backdrop can be positioned to solve the problem. If these distractions can't be removed by reframing the images or the temporary backdrop, about the only fix is through manipulation with photo enhancing software (see section E. DIGITAL ENHANCEMENTS).



This scene was photographed on the display layout of the Southeastern Michigan S Gaugers. Normally including just a small portion of a locomotive is not effective, but here the two locomotives frame the interesting little town and the road draws the viewer into the scene. The autos, a few figures and the splashes of red all enhance the image. I wish I'd moved the distant vehicle closer.



This image was taken on Phil Maaske's HO layout during an operating session, demonstrating that if the room lighting is good, auxiliary lighting is not needed. The loading dock and boxcar nicely fill the triangular space in the lower right. The water tank breaks up the long horizon. A figure working on the dock and perhaps a couple of more items on the dock or on the ground would add interest.



The small size of my point and shoot camera allowed placing it inside a curved trestle, a place not normally visible. The figures add interest, particularly the fellow barely visible in the boxcar. The bare tree was temporarily added for texture and compliments the texture of the trestle. The smoke was added using the 'airbrush' tool in Photoshop.



Drama is created by the yellow glow from by two light bulbs in an otherwise dimly lit evening scene. A lone figure working late adds life and his shirt, the barrels and the truck cab add accents of color. The viewpoint is slightly above eye level but feels right.



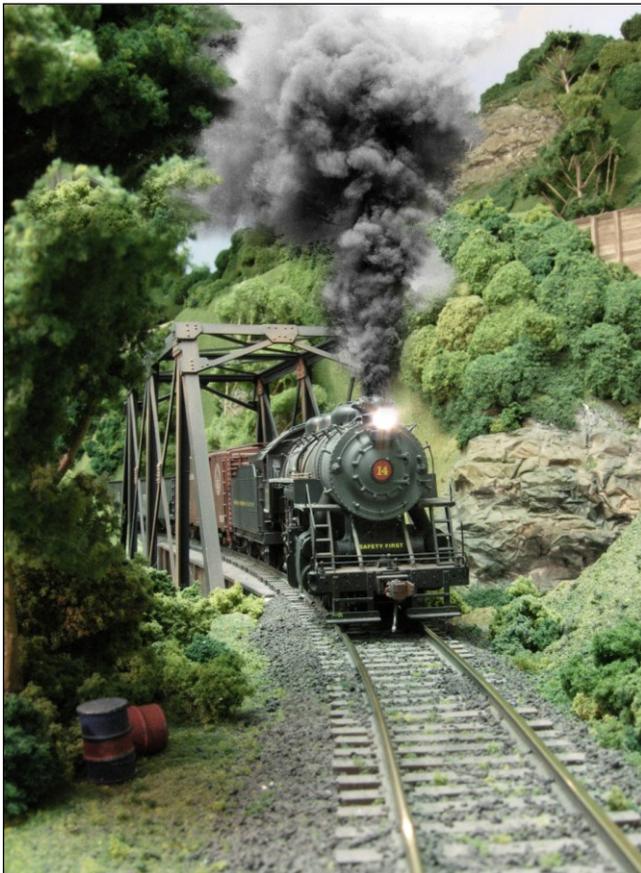
The two crewmen seem to be discussing their next move. The headlight suggests the little diesel is idling and ready to go. There is an abundance of visual interest in the logs, rails and foliage scattered about. The red barrels and yellow tractor add accents. The photo lights were positioned low. It appears that the figure on the ground is actually leaning a little to the right. Oops!



This photo was taken on Jim Clements' HO/HOn3 Sugar Spring Mining Company Railroad. The caboose was included specifically to add color to the scene and the name on it clearly identifies the railroad. The lone crewman brings a little life (and his red neckerchief is nice) although a second figure near the caboose might have been a nice addition. The beautifully modeled felled logs and aspens provide plenty of visual interest.

**Motor Vehicles** – One way to make a set of photos of layout more convincing is to avoid having the same motor vehicles appear repeatedly in them. This is particularly important for a series of photos for a magazine feature. I consciously select vehicles for each photo to avoid repetition but also to use them as ‘splashes of color’. I also try to avoid having vehicles on roadways where it can be seen that they do not have drivers!

**Prototype Photos as Inspiration** - Since we are generally trying to create images that mimic photos taken on full-size railroads, one great source of ideas for convincing layout photos is prototype photos. Find a photo that is appealing to you and then recreate the major elements on your own layout as closely as possible using the composition of the prototype photo as a pattern for your own photo. When modeling a prototype, it is fun to try to duplicate a photo as exactly as possible.



The inspiration for the composition of this layout photo was a prototype photo by John Killoran (right). The trees on the left were temporarily placed in the scene to create the shadowy effect and to hide the edge of the layout. The barrels in the shadows were added for both color and interest. I might have been inclined to crop more of the track out of the foreground but the light reflecting off the rail becomes part of the interest of the image. This photo is good without the smoke but dramatic with it. If you look carefully you can see that the smoke in the layout photo was actually copied and pasted from the prototype picture using Photoshop.

## **E. DIGITAL ENHANCEMENTS**

One of the reasons digital photography has made it so much easier for modelers to get nice images of their layouts is that it is possible to make some modifications to the digital image after it is downloaded from the camera. With film, what you shot is what you got. This is not to say that every effort shouldn't be made while setting up a photograph to make certain it is properly lighted, that all the objects being photographed are correctly placed (no derailments, no figures fallen over, etc.) and that it is well composed with a minimum of distractions included in the image. For fine tuning, however, there are a number of software programs available that allow enhancements. I use Photoshop Elements 8. This is a home version of the professional Adobe Photoshop used commercially and is available for around \$40. There are a couple of newer versions that are not much more expensive. Some appropriate software is available free on line. No attempt is made here to describe exactly how to use any specific software system, but several can make the kinds of enhancements described.

Some may feel that making enhancements is 'unfair' because it misrepresents the modeling. I feel perfectly comfortable enhancing photos as long as the character and quality of the modeling is not altered. It's a matter of choice, I suppose.

**Exposure Adjustments** – Besides cropping, the most common use for this type of software is to adjust the exposure level (brightness) of the image. Photoshop Elements allows adjusting the shadow and the highlight areas separately. This is particularly useful, for example, for bringing out the detail in the shadow areas of a steam locomotive's running gear while not adjusting the lighting of the rest of the scene. It is also possible to darken areas at the front of the photograph that might be brighter because they were nearer the photo lights without darkening the background. The ability to make these adjustments is limited and so, as noted, the lighting has to be correct overall in the original digital image.

**Removing Blemishes** – Photoshop Elements has a "cloning" tool which allows duplicating a small section from one part of the image and placing it in another. This tool is particularly useful for touching up those areas that the camera will find that you didn't! If there is a spot of white plaster on a rock face, for example, it is possible to 'touch it up' by cloning a spot from another part of the rock face over the blemish. Similarly, a light speck in a black road or a small, localized gap between a structure and the ground can be removed. With practice, more significant blemishes can be repaired including such things as removing cracks in a painted backdrop. It is also possible to use the cloning tool to hide the layout fascia that sometimes

unavoidably appears in an image. The full potential of the cloning tool is beyond the scope of this article, but it is considerable.

**Substituting Skies and Backgrounds** – One of the more advanced enhancements is to completely replace a portion of one photo with a portion from another. The most common application I make of this capability is to replace the painted sky backdrop or unwanted walls or windows that appear in the background of an image with either a ‘clean’ photo of my own background or a portion of a photo of a real sky. Again, there isn’t space here to describe exactly how to do this, and the specifics will vary with software, but it involves selecting and copying the desired part of an image and then pasting it over the new sky and/or background.



On the left is the original exposure for the finished photo below. The “copy-and-paste” process was used to replace the wall and door in the background with a photo of another section of painted sky and hills taken just for that purpose. This image was blended in using the cloning tool. Ground cover was cloned to hide the fascia in the lower right corner. Finally, the copy-and-paste process was used to add smoke from the locomotive. The finished photo is true to the actual layout in that the modeling itself was not altered, but the image is much more appealing without the distraction in the background.





The moon was placed in the sky of this photo from Jim Clements' HO/HOn3 layout. The light-colored water tank stands out nicely against the dark sky. A crew member on the tender tells the story that the engine is stopped for service. A couple of barrels or a small pile of rails would be appropriate in the triangular space in the lower left corner. The smoke was 'airbrushed' in.



The fact that the scenery falls below track level here allowed for this eye-level view. The presence of the two crewman show the train is stopped. Some of the foreground water and the reflection of the water tank were added in Photoshop to hide the layout fascia. The weathered pilings and the stone retaining wall add texture as does the variety of vegetation.

**Adding Smoke Effects** – There are two ways to use photo enhancing software to add smoke and steam effects to photos. One is to use a copy-and-paste approach and take the smoke plume from a digital image of a real steam engine and paste on the model photo. Tools allow the edge of the plume to be ‘feathered’ and it’s possible to adjust the color and transparency of the plume to achieve the desired effect. The software also includes an “airbrush tool” with which you literally paint a smoke or steam effect free hand. This takes more practice, but actually works better than the copy-and-paste technique for light plumes such as would be rising gently from an engine at rest (top photo pg. 20 and photo pg. 24). One thing about adding smoke to layout photos is that it is like adding sound to your models. After you’ve seen smoke in a photo, one without it is somehow incomplete!

## **F. SUBMITTING PHOTOS FOR PUBLICATION**

For those who want to submit images to a magazine for publication, it is strongly recommended that you contact the editor and obtain their submission guidelines for photographs. There is some variation between publications. In general, magazines want the highest resolution file type. RAW files are often preferred although TIFF files are usually acceptable. They also prefer that images have some room remaining for cropping without spoiling the image so they have some flexibility when laying out the image on a page. Photos taken with camera resolutions of 6 megapixels or more are generally acceptable for magazine pages and 8 megapixels for cover images. If you do significant cropping, higher initial resolutions are needed.

## **G. MORE ABOUT CAMERAS**

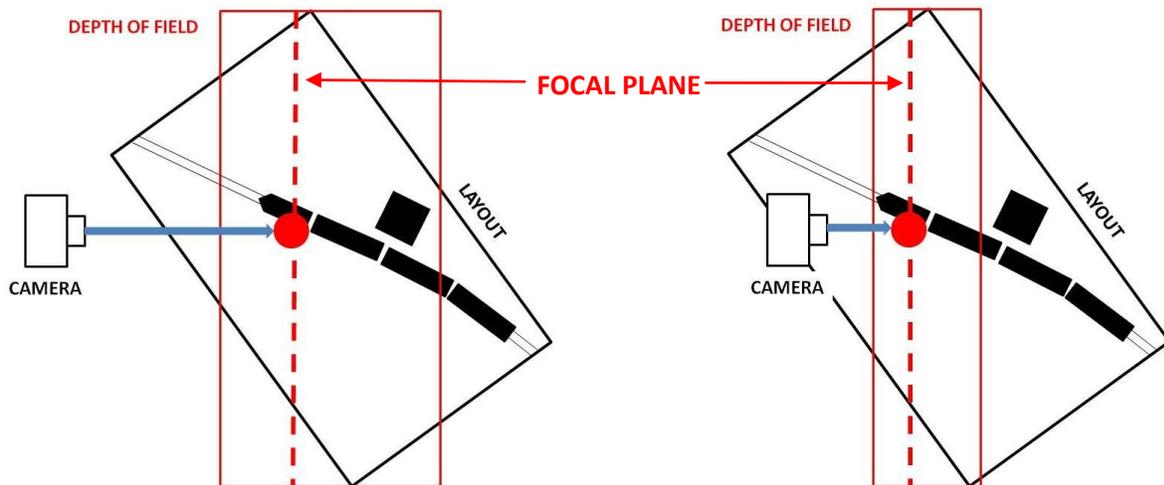
Modelers may be intimidated to try photography because they have the impression that a complex and expensive camera is required and/or that using it to take photos of layouts and models takes some highly specialized knowledge or skill. In the days of taking photos on negative or slide film using incandescent photo flood lights, this might have been somewhat the case, but in today’s world of digital cameras, not so much. Understanding a few principles may eliminate some of that apprehension.

### **Depth of Field (DOF)**

For me the single most important attribute of a successful layout or model photo is that as much of the image as possible is in focus. The amount of the photo in focus is referred to as

the depth-of-field (DOF). Once you have mastered taking photos with maximum depth of field you can experiment with smaller (shallower) DOF. Skilled photographers can use a shallow DOF to emphasize parts of a photo. However, in all of the photos I've had published I have maximized the DOF, not only because in my opinion it makes for the best looking photographs but because it's easier to maximize DOF than try to determine how much of the image to make in sharp focus and exactly how to accomplish it.

Technically speaking, a camera is only in perfect focus along the "focal plane". Objects closer to or farther away from the camera are progressively less in focus. Fortunately, when the photo is printed or viewed on a computer, objects in front of and behind the focal plane may appear "acceptably sharp". The depth-of-field, then, is the total area in front of and behind the focal plane in which objects appear in acceptable focus. The focal plane is about 1/3 of the way into the total depth of field and therefore there is more that appears in focus behind the focal plane than in front.



The layout is represented in black (a locomotive and three cars with a switch tower behind the train). The camera is to the left. The focus point on the locomotive (the main subject) is the red dot and the "focal plane" is represented by the dotted red line. Objects on this line are in perfect focus, but everything inside the solid red box (Depth of Field) is in 'acceptable focus' and will appear to be in focus to the viewer when printed. About 1/3 of the DOF is in front of the focal plane and about 2/3 behind. Notice that when the camera is farther from the point of focus (left diagram) the depth of field is greater than when the camera is closer (right diagram). While the locomotive is in focus in both cases, when the camera is moved closer to the engine, the switch tower will no longer be in focus (not be acceptably sharp) because it will not fall outside of the depth of field.

The diagram is not to scale and in reality the focal plane is a spherical surface, not a flat plane but for our purposes, this is close enough.

### **Aperture (f-stop)**

So what is it about a camera that determines its ability to take a photograph with a deep depth of field? Much has been written on this subject and the actual optical physics are beyond the scope of this discussion. The thing we need to remember is that the biggest single contributor to the depth of field is the size of the opening of the lens (the 'aperture') and that a camera will take photos with the deepest DOF when the camera's lens is set at the smallest aperture available, all else being equal.

The nomenclature for aperture size (called the "f-stop") is a bit confusing in that the larger the f-stop value, the smaller the lens opening size. It's like wire sizes...the bigger the gauge number, the smaller the wire diameter. Apertures available on lenses typically range from f/2 to f/32 depending on the camera type and price. How the numbering system is defined, what the actual numbers mean and the relation of one f-stop value to another are all subjects of interest, but it is not necessary to understand those things to take good photos.

Again, all that needs to be remembered is that the largest numerical f-stop value (the smallest lens opening) will produce the largest depth of field, all else being equal. And being able to insure that the smallest lens opening is being used is why the number one criteria for camera selection is that it have a user-controllable aperture.

### **Focal Length**

A second aspect of camera design that affects the amount of the image that will be in focus is the "focal length" setting of the lens. Almost every digital camera on the market today has an adjustable focal length lens. In common terminology when we talk about the ability of a lens to "zoom" in and out on a distant subject or its "telephoto" capability, we are talking about the range of the adjustment of the focal length. Focal length is specified in millimeters (mm) and the higher the number the more "zoom". Focal lengths of cameras/lenses of the type we're discussing range from around 24 mm to as high as 1000 mm (as measured in "35mm equivalent"\*).

*\*(Because many people are familiar with focal lengths of lenses for traditional 35mm film cameras, the digital camera manufacturers choose to describe the focal length of their cameras*

by reference to the focal length that would produce a similar field of view on a 35mm camera. This is referred to as the “35 mm camera equivalent”.)

Again, as model photographers we don’t need to understand the exact meaning of the number values but what we do need to understand is that the depth of field will be biggest at the lowest focal length, all else being equal, and deteriorate as the focal length setting of the lens (the amount of “zoom”) is increased. So, to get maximum DOF, besides using the smallest aperture (largest numerical f-stop value), we also want to use the smallest focal length setting (widest view) available on the camera.

The fact that smaller focal lengths make for photos with more depth of field is a double win because within limits, layout photos taken with lower focal length values also tend to look more “natural”. Focal lengths in the range of 30-55mm (*35 mm camera equivalent*) encompass a width of view that is similar to what the human eye sees. Longer focal lengths, besides reducing the depth of field, compress the image and can cause objects to appear “squashed” in length. Conversely, smaller focal lengths can produce unnaturally exaggerated perspective.

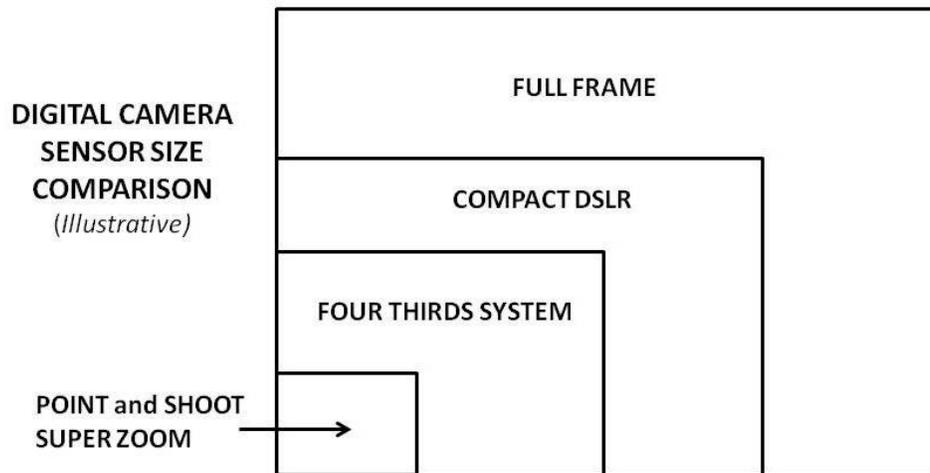


This image was taken with a Super Zoom camera with the focal length set at 24mm, about the minimum before exaggerated perspective appears. The sky, smoke, headlamp and some of the background trees were added in Photoshop. A version of this image appeared on the cover of [Narrow Gauge & Short Line Gazette](#) and it is one of my favorite layout photos.

As shown in the diagrams on page 22, as a camera is positioned closer to what it is focusing on, DOF is reduced. Unfortunately, this works against us when we use wide focal lengths as that generally will result in the camera being placed closer to it to make the subject appear larger in the picture.

## Sensor Size

The sensor is the device in the camera that captures in digital form the image that the lens is pointed at. It is the digital camera's equivalent of film. The sensor size is not adjustable by the user...it's fixed within a given camera. Large cameras have large sensors and small cameras, of course, have smaller sensors (see diagram below). While it's counter intuitive, large sensor cameras are not necessarily better for layout photography. There are three reasons this is so.



This diagram is not to scale but shows the dramatic differences in the relative sizes of the sensor in the five primary camera types. While the larger sensors offer much higher picture quality in many shooting situations, the smaller sensors can produce perfectly acceptable results and offer the advantage of producing competitive depths of field in smaller and less expensive cameras.

First, big sensors have the advantage of capturing more light in a given time and so are better for taking pictures in low light and in capturing fast moving subjects. However, when taking photos of a well-lit layout (plenty of light and a static subject) we have neither of those conditions and so some of the biggest advantages of the larger (and more expensive) camera and sensor are not cost-effective for our application.

Second, as explained above, the maximum DOF is achieved with the smallest aperture available on a given camera. However, when comparing cameras with different sensor sizes, it is not the absolute smallest f-stop value that determines the better DOF, but rather the ratio of the value of the smallest f-stop to the size of the sensor. What this means is that as the sensor gets bigger, the f-stop must get smaller to produce the same DOF. A camera/lens combination with a large sensor costing \$1000 might have a maximum f-stop of f/32, but a less expensive camera with a smaller sensor and a lens with a minimum f-stop of f/8 can create images with as large a depth of field. Pocket-sized cameras have sensors with about 1/16 the area of a DSLR and so while the maximum f-stop on the small camera may be only f/8, it is equivalent to an f/32 (16 times smaller...trust me on this!) on the DSLR in terms of the DOF produced. This combined with the fact that when shooting layouts we are using a camera under nearly ideal conditions as far as the sensor is concerned (good light, static subject, tripod mounted) means that we can get quality photos with a good depth of field even from a relatively inexpensive point and shoot camera with one of the smaller sensors as long as the minimum f-stop is f/8 or smaller. Fortunately, many of today's Point and Shoot and Super Zooms meet this criteria.

A third advantage of a small-sensored camera is the small physical size of the camera itself. It is possible to place a small camera directly on the layout to get the lens closer to what would be 'eye level' for a scale person. It can also be set in among scenery and structures where a larger camera just won't fit. With some practice, this can produce some very realistic layout photos. There are very small tripods available for this purpose and it's easy to configure any number of schemes for holding the camera steady for such photos.



This photo shows the simple tripod I constructed that allows placement of a small point and shoot camera directly on the layout, even where the terrain is irregular. It is made from a small piece of Masonite with internally threaded sleeves installed in the two back corners and the center of the front. The legs are long, threaded carriage bolts that fit in the sleeves. The camera is attached to the unit with a threaded thumb screw. By adjusting the heights of the legs independently, both leveling and precise aiming of the camera is possible.

## **Focusing**

Digital cameras have automatic focusing capability ('auto focus'). The camera can automatically determine what object in the field of view to focus on and then set the focus automatically. This is good because manually focusing a camera can be a tedious process, as anyone who has ever done layout photography using a film camera with manual focus can attest. But there is one possible glitch in using the cameras in full auto focus mode. As discussed earlier, when the camera picks a point to focus on that point will be about 1/3 of the way into the depth of the scene that will be in focus. We need to check to be sure that the point the camera has picked is on the main subject, preferably about 1/3 of the way into that subject, to insure the main subject will be sharply focused. My experience has been that in many cases the camera will automatically do this, especially in the large scales (S, O and larger, and to some extent in HO) but as indicated in Step 10 on page 8, it is best to check to be sure that the auto focus feature did, in fact, pick a point on the main subject. If not, most all digital cameras with the other features we need allow you to manually select a focus point. That feature can be used when the camera tries to select a focus point other than one about 1/3 of the way into the main subject. Once the new focus point is selected the camera will automatically set the focus on that point and there is no need to do any other manual adjustments.

In some cases we might want to focus on a subject closer to the camera than its lens is capable of. Some camera/lenses have a "macro" feature that can be turned on that permits extremely close focusing. This can sometimes solve the focus problem but recall that the closer the focus point is to the camera, the shallower the depth of field. For this reason, images taken with macro lenses tend to have a shallow depth of field.

## **White Balance**

Back in the days of film, careful consideration had to be given to the color, or 'temperature', of the light source and the film selected had to match the lights or else strange color casts would be introduced into the final image. Fortunately, digital cameras are very good at "reading" light and automatically correcting so that objects that are white look white in the finished picture and there is no color cast in the image. Most cameras have an "Auto White Balance" setting which may be adequate, but it is far better to set the white balance to the specific light sources being used. Some cameras require the use of a special photographers 18% gray card (available for about \$10) while some use a simple sheet of white paper. In either case, the camera is aimed at the card or paper while it is being illuminated with the lights used to light the scene

and then the camera automatically makes any color corrections when taking pictures. You can see the corrected colors in the LCD screen once the white balance is set.

### **ISO Setting**

Digital cameras have the unique ability to create photos under a wide range of light intensities. This is accommodated, in part, by changing the sensitivity of the sensor. This sensitivity is called the “ISO” value. The ISO value is adjustable by the user with higher values being more sensitive and therefore higher values are used in lower light conditions. But as with so many things, there are tradeoffs. To take a photo in dim light, you must adjust the ISO setting to a higher value and at higher values there is deterioration in the quality of the image. Fortunately for layout photography, we are providing adequate light both by using supplemental lights and also by mounting the camera on a tripod so that even at long exposures there is no blurring. For this application, then, we always want to select the lowest ISO value that the camera has so that there is minimum degradation of the image quality. Values of 50 to 100 are typically the lowest on most digital cameras.

### **Shutter Speed**

Until now nothing has been said about shutter speed, the time that the shutter is open during the exposure of the picture. That is because when taking pictures as described here, the camera is automatically selecting the shutter speed needed to correctly expose the picture given the aperture we have selected. Frankly, we generally don’t care what shutter speed the camera selects. Because the camera is mounted on a tripod, even if the shutter is open for longer periods, the photo will not be blurred as it would be if you tried to simply hold the camera. That is why a tripod, or similar device for keeping the camera perfectly still, is critical.

### **Exposure Bracketing**

Some, but not all, cameras that have the needed functionality for layout photography also have a feature called “Exposure Bracketing”. With this feature engaged, the camera will take three exposures with one release of the shutter. The first exposure will be at the light level that the camera deems correct, and then two more images will be taken, one with slightly lighter exposure and one with a slightly darker exposure. The exposure changes are done by leaving the shutter open for a slightly longer and then a slightly shorter period. The all-important aperture is not changed. This improves the chance that you’ll get an exposure you like and minimize the need to make adjustments later in the computer.

A passenger train behind SF Warbonnet F units arrives in Hudson on the N scale layout of Rad Jones. N scale presents special challenges for picture taking because the smaller size of the models often requires that the camera be close to the subject. This results in a shallow depth of field. In this image the back of the car in the foreground is not in sharp focus although the rest of the image is acceptably sharp.



## H. MORE ABOUT LIGHTS

As mentioned earlier, supplemental lighting is almost always required when photographing layouts. In the days of film, lights that were exactly matched to the type of film being used were required.

### Types of Lights

Today, because of the white balancing capabilities of digital cameras we have a fair amount of latitude in the lights we use. They can be incandescent, halogen or fluorescent and fortunately all three types are relatively inexpensive. I use two traditional photofloods of 500 watts each mounted in 9 ½ reflectors fitted with diffusers to soften shadows. The reflectors were purchased at a hardware store for about \$10 each. The bulbs, diffusers and tripod stands were purchased at a camera store. The two completed light assemblies probably cost less than \$100.

Fixtures fitted with halogen bulbs designed to be work lights are available at hardware stores. Five-hundred watt sizes are available at a reasonable cost. Halogen lights and their enclosures are generally heavier than incandescent fixtures and may require more substantial stands but are more durable than fragile incandescent bulbs.

Fluorescent lights are commonly used by professional photographers and can best be obtained at camera stores or on line. While I have no personal experience with them, they seem to be available at reasonable prices. One advantage of this technology is that the bulbs tend to generate less heat than incandescent or halogen lights.

### Positioning Lights

There are a number of approaches to lighting a scene, but as with my approaches to most aspects of model railroading, I try to keep it simple. As mentioned, I use two 500 watt lights and usually place one on each side of the camera and at the same elevation above the scene. At high positions the scene appears to be illuminated by daytime sun. As the lights are positioned lower, the lighting looks more like morning or evening. The key is to light the scene as uniformly as possible to avoid areas of dark shadows or harsh highlights. Viewing the scene in the camera's LCD will pretty well show any problems so the lights can be moved before taking the image. For larger scenes, additional lights may be needed to light parts farther from the camera. The light can be bounced off a white ceiling to produce a more diffused effect.



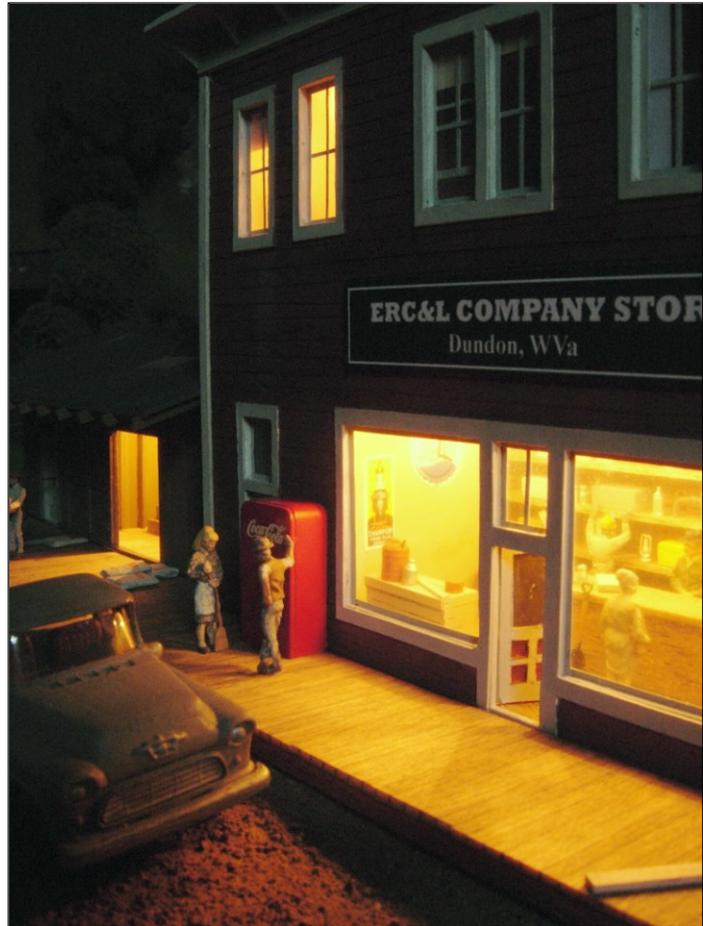
Lighting a layout scene typically requires a minimum of two light sources, one on each side of the camera. I try to get the lighting as uniformly distributed across the scene as possible with the lights positioned high enough to suggest mid-day sun. Inexpensive photo floods and lightweight tripod stands are easy to move around. Be careful to keep the cords from underfoot! A light falling on the layout can do significant damage.

## Use of Flash

Generally speaking there are no circumstances in which a camera's built-in flash can be used to take quality layout photos. The light is too uncontrollable, creates unrealistic dark shadows and harsh highlights.

*A young man stopping for a Coke at the Elk River Coal & Lumber Co. store in Dundon, WV has struck up a conversation with young clerk doing the evening chores.*

This image was created using only the lights inside the structure and a small amount of natural light falling on the front of the structure through a small window in the train room. All the techniques described in this article for setting camera aperture and focus were used.



*It's been a long day and the crew is glad to be putting BC&G #13 away for the night. Dinner is waiting at home.*

The value of having the layout powered up is apparent in this image as the illuminated lamps add interest. A single photo light was placed low to the left to create the appearance of a setting sun. This is a good example of the depth of field possible with a Point-and-Shoot camera when the minimum aperture is used.

## Using A Mini-Studio

Sometimes it is desirable to photograph a model on a 'seamless backdrop' rather than on a layout. Such photos are often used when making illustrations for construction articles for a magazine or simply to record a favorite model with no distracting backgrounds. It's easy to create an appropriate place to take photos. Mine is simply an elevated platform sitting on a table. A piece of linoleum is used to form a seamless surface running from the front of the table and up the wall. I placed the linoleum so the matte-grey bottom surface is up and use a colored piece of 4-ply Strathmore board available at art supply stores when I want to add a little color to the background. The same photofloods that I use for layout photographs are used here, one on each side of the camera. There is nothing fancy about this set up, but it gets the job done.



A home mini-studio can be a very simple affair. All that is needed is some sort of backdrop that runs across a table and up a wall. I use the same lights as for layout photos. The photo on the right was taken on the blue Strathmore backdrop



## A WORD ABOUT PHOTO ETIQUETTE

When visiting the layouts of others, be sure and ask permission before taking photos. Most modelers will be flattered that you want to take images but if you have any intention of distributing the images you take to others, be sure and get specific permission to do so.

## ACKNOWLEDGEMENTS

I would like to acknowledge several fellow modelers who have contributed to this guide. Dave Katona pointed me to several sources that explained the science behind why small cameras can have good depth of field. Dan Lewis, MMR, an N scale modeler who has himself written on the subject of model photography, provided some insights which I have included here. Roger Nulton, MMR, Gaylord Gill and Jay Qualman each generously read the manuscript and made suggestions, many of which have been incorporated. Finally, thanks to Rad Jones, Jim Clements and the members of the Southeastern Michigan S Gaugers (SMSG) for allowing me to use photos of their beautiful and photogenic model railroads.



*Engine #20 is arriving at Starcher on its way back from the woods. The crewman standing next to the office will assist in adding water from the tank to the leaky radiator of the diesel.*

## ABOUT THE AUTHOR

Brooks Stover has been a model railroader for most of his adult life. His interest in S gauge started in childhood with American Flyer and he has modeled exclusively in S. His current 44' x 25' representation of the Buffalo Creek and Gauley RR of West Virginia was begun in 1998. Brooks earned his NMRA Master Model Railroader certificate in 2009. He maintains a website with information about the prototype BC&G as well as his model railroad. The site address is [www.buffalocreekandgauley.com](http://www.buffalocreekandgauley.com).

Brooks has had several articles published in the model railroading press including the following:

“Adding Operations to a Model Railroad.” *Model Railroader Magazine* December 2009: 58-62.

“Steam’s Last Days On A West Virginia Shortline.” *Great Model Railroads 2011*: 26-35.

“Interpreting the Clark Side-Dump Gondola in S Gauge.” *NMRA Magazine* December 2011: 40-45.

“How To Model Tree-Covered Hills.” *Model Railroader Magazine* November 2012: 32-37.

“Two West Virginia Railroads in S Gauge.” *Narrow Gauge and Shortline Gazette* January/February 2013: pgs. 20-26.

“Scratchbuild a Small Factory.” *Model Railroader Magazine* May 2013: 33-37.

He has also published a book about the Elk River Coal & Lumber Company, the company that owned the BC&G, and another book about building his S gauge BC&G layout. Information about these two books is available on his website.

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