Infra-Red

The Options - The Techniques

Black and White Infra-Red - Many years ago I shot some images with black and white Infra-red film, but I never had the success with it that I would have liked. I put that down to the fact that infra-red film wasn't easy to get hold of and there were practical issues in handling it. To get the best from anything in life we need a degree of practice and experience and I think me dabble with infra-red film came at a time when there were just too many other pressures. I didn't really do it justice, but the appeal of a good infra-red image has never left me.

Ways to capture/create an infra-red image

1. Via software plugins or pre-sets

There are many software creators who make plug-in filters for programs like Photoshop and Lightroom. Google Nik software is one, Alien Skin is another, but a search will reveal many more and most of them contain a filter they label infra-red. Often your image editor may already contain an infra-red pre-set and that is certainly the case with Lightroom and Photoshop.

While these are an option, I don't intend to dwell on them. In my experience the results are far too hit and miss, and they always seem to fall well short of the true infra-red effect. Some images can be manipulated close to infra-red, but once again, not consistent enough for my liking

2. Using a Visible Light Blocking Filter on a standard Digital Camera

This option sounds a great option in theory, low cost, so within most photographer's grasp, but in practical use it can be very tedious.

The process is to use a deep filter over the lens to block visible light, allowing infra-red light through.

I have used a Hoya Infra-red R72 deep red filter. Other options include the Cokin P007, Wratten 87, Wratten 87C.

To demonstrate how dark the R72 filter is, if I hold it up to my eye in front of my monitor, I cannot see the monitor at all. So, here we see our first problem to overcome. How do we frame a shot if we can't see through the lens? Obviously, it means we will need a tripod all the time, but in fact we will need that anyway for the exposures. We have to frame and focus our shot before attaching the filter, which entails a lot of handling of the filter with pretty obvious results.

It's going to get finger marks on it, no matter how careful you are. However, the main technical problem is that we need to use long shutter speeds. Any shots we take that contain movement, the leaves of trees in the breeze for example, will be blurred.

Below is an example of a red filtered Raw image taken with a Canon 1Ds Mk3 camera with a Canon 28-135mm zoom set to the 28mm setting. It was taken in bright sunny conditions just before midday, but it required a 15 second exposure @ F8 with an iso of 400. You can see the effect of the breeze even in our small thumbnail below left, but more so when we look closer at part of the frame on the right. This severely affects our creativity by ruling out many potential subjects that contain movement.


The reason we need such lengthy exposures is that the red filter blocks visible light very well, but the in-camera sensor also has an infra-red filter in front of it to stop most of the infra-red light spoiling our normal pictures, so the two filters do a very good job of blocking both types of light.

The images I shot with a red filter above also show a degree of overall softness that just takes the edge off the quality I want to achieve.

Converting a DSLR to shoot Infra-Red

I had always promised myself that if I ever found myself with a spare digital camera, I would consider having that camera converted to shoot Infra-red. How often do we have a spare camera lying around? These days we do trade up from time to time and we are offered so little for our trade in camera that this may be the time when an infra-red conversion is worth some thought. I found myself in this position when my wife downsized from a digital SLR to a more compact camera. So, I was in the fortunate position to have a Canon 5D mk2 camera spare and a couple of lenses. A Canon 16-35 mm and a 28-135 mm Canon Zoom.

So, what does convert a camera entail? A bit or research and reading on the internet took me to Camera Clinic, a Melbourne based company. I discovered that there are degrees of conversion and although I was almost sure what I wanted, I needed the reassurance of talking to someone at Camera Clinic before committing myself. That was very worthwhile and a positive step forward as it just gave me the confidence to send my camera to Camera Clinic for conversion.

The conversion requires a strip down of the camera and is beyond my expertise. It also requires the attachment of an infra-red pass filter over the sensor deep in the camera body. This and the removal of the cameras visible light filter requires a skilled technician. It involves adjusting focus calibration and that often requires the use of proprietary service software available only at service centres.

There are various levels of conversion with some filters allowing more visible light through to the sensor as well as Infra-Red light. This means that you can capture infra-red shots that do have some colour. I took the view that if I wanted colour, I could always add it digitally using Photoshop and I chose a filter around 700nm to give me a more conventional black and white image.

With a conversion done, infra-red photography is much easier. Exposures are short and the camera can be hand held. There is no viewfinder blackout that we see with a R72 red filter. Look at the image samples below shot at the same time as those above using the red filter.

The examples below of a Raw image was taken with an infra-red converted Canon 5D Mk2 camera with a Canon 28-135mm zoom set to the 28mm setting. It was taken at the same time as the one above in bright sunny conditions just before midday. It required 60th of a second exposure @ F8 with an iso of 100. Considerably different to what we experienced with the Hoya R72 filter.

Just looking at these small thumbnails, the difference in quality is pretty obvious and there is none of that overall softness that affected the red filtered images.

The image below was taken hand held with the Canon 5D Mk 2 with a 16-35 mm Canon lens. The image required 125th @f8 with 200 iso.

Lens Issues

Sadly, it does appear that some lenses do not work so well with Infra-Red converted cameras. They can, in some circumstances create a hotspot in the image. The image below shows a graduated hot spot that can take on the shape of the aperture in the camera.

A search on the internet soon throws up a list of lenses which are reported by infra-red users as good or bad. The internet is a very good place to gather information on almost any subject, but there are also a lot of so-called experts who I wouldn't ask how to make a pot of tea.

I was disappointed to read on the Internet that the lens I was preparing to use with the converted camera was listed as suspect. It is the normally superb Canon 16-35mm zoom. As I already owned the lens, I decided to decide for myself, based on practical use. I have to say that for normal photography, the Canon 16-35mm is a great lens and most, if not all my landscapes and seascapes will have been taken with it.

As a fall back I also have a 28-135mm lens which is listed on the Infra-Red web sites as good. A few weeks away travelling in Australia allowed me to put the newly converted I/R camera to a good test along with that 16-35mm lens.

Sadly, my results have confirmed what I read on the Internet, with about 30% of the images being lost due to that hotspot. (see image above) I was keen to use the camera primarily with a wide-angle lens, so I needed to part company with the 16-35mm lens.

The image above has not been edited and you can clearly see the hot spot and the shape of the aperture too. It is not easy to eradicate this hot spot with image editing, but even if we could it would take time and would soon become tedious. Taken with an Infra-red converted Canon 5D Mk2 with a Canon 16-35 mm lens. 60^{Th} @ f8 with 100 iso.

I was fortunate that we had two Canon 16-35mm lenses as a result of my wife's downsizing. So, I decided to keep one 16-35 mm lens for my visible light photography and sell the other and replace it with a Canon 17-40 mm lens.

Why the Canon 17-40 mm? Three reasons, firstly it matches the range of the 16-35mm closely, which is a range I like. Secondly, it is listed on Infra-Red sites as a good lens for converted cameras. Thirdly I have a good friend who has lots of experience with infra-red and he also uses a converted Canon 5D Mk2 with a 17-40 mm lens and he gets great results. By choosing this lens I could be sure that I would not have the same hot spot issues I experienced with the 16-35 mm.

Image below – Converted Canon 5D Mk 2 with a Canon 17-40 mm zoom. 125Th @ F8 with 100 iso. NB: - None of these image examples have been sharpened in any way.

Shooting images with a converted camera

The camera was returned to me the afternoon before we left for a 5-week caravan touring trip down south to Sydney, so I have had plenty of opportunity to get my first experience of shooting images with the converted camera. Here are some of my immediate thoughts and findings.

Generally speaking, when the light is full sun during the day and not quite so good for normal light photography, I have found that it can be perfect for infra-red. This means that our picture taking day can be extended considerably because we are not dependant on the golden hour we always look for in normal light photography.

Infra-red handles contrast extremely well, better in some situations than visible light photography. This opens up new picture taking possibilities that we would avoid normally. We can shoot in sunlit forests and other similar scenes in full sun in the middle of the day. Below you can see another image that demonstrates the point. Taken at 11:59am on a bright sunny day - 90th @ F8 with 100 iso. You can see how well infra-red handles shadow detail as well as those highlights.

Traditionally an infra-red image takes advantage of a blue sky and clouds, because the sky goes very dark, even black sometimes. Also, because clouds are filled with moisture, they reflect infra-red light, therefore retaining shape, detail and interest. The contrast between the clouds and the sky is increased and that often affects the whole impact and appeal of the image. A simple shot like the one below, taken in colour at a time of day when the sun is full and bright, can have little appeal, whereas in infra-red it can be transformed.

As you can see from the image above, the foliage can record a near white, so we need to make

sure we don't over expose that, but generally speaking I have not found it difficult to achieve good exposure with the converted camera. The ghostly white effect on foliage is also another characteristic of infra-red images. The effect will vary during the year because at certain times more infra-red light will be reflected from the leaves.

Image above Canon 1Ds Mk3 with a 16-35 mm lens. 60Th @ F8 with 100 iso

Shooting Raw

It's difficult to imagine anyone choosing to have a camera converted for infra-red photography, and then choosing not to shoot raw images. Shooting infra-red images is not an exact science and all images will all need processing in some way using Adobe Camera Raw, Lightroom, or whatever raw converter is your choice.

In our experience many of the images we capture come across rather flat and this is particularly evident when we have removed all remaining colour in the shot. We need the latitude and flexibility of shooting raw to be able to correct for contrast, while retaining a good quality image.

White Balance

One of the first things we can do especially in our case where the conversion is aimed at the more traditional monochrome image, is to set the white balance in our camera. However, as we are shooting Raw images the setting of the white balance is done more for our convenience. Whether a custom white balance is set at the taking stage or done in an image editor will not impact on our image quality.

Left to its own devices our camera will create a strong magenta cast as you can see from these screen grabs below from Photoshop's bridge. Either a Hoya R72 red filtered image (below left) or the converted camera image (below right)

Whether we take all or most of that colour cast away at the taking stage or later in camera Raw is not vital, but if it helps you to select and evaluate images, then it's worth doing at the taking stage. There will be different ways to set a custom white balance for different camera manufacturers. So, you may need your instruction book the first time you set this up.

One other thing we can do is to set our camera pictures style (if possible) to black and white. Once again there is no great advantage for doing this when we shoot raw images, but it can help to evaluate exposure on the camera's LCD, so that is an option also worth checking out.

Exposure

In a very short time, I became able to predict the exposure in a large number of the infra-red shots I was taking, but I have learned something that is different to what I would do with conventional light photography. Since the early days of digital photography, I began altering my exposure in some cases to cater for the digital medium. I squeeze as much light into the sensor as I possibly can, even when this makes the raw image thumbnails look almost over-exposed. The modern term for this is exposing to the right.

It comes from the fact the right side of the histogram is where we see light tone pixels, so the idea is to increase exposure and squeeze as much light onto the sensor, but without allowing highlights to become burned out and beyond our control. We can darken images in our raw editor far more effectively than lightening them

This does not seem to be the case when shooting infra-red and my initial thoughts are that I should keep my exposures rich and contrasty as I view them on the LCD on the camera. If not, when I get them into an image editor, I find myself having to work a little harder to achieve a good result with the images a little too bright. Image below 125th @ F8 with 200 iso

I said earlier that after a short time I could predict the exposure in the majority of cases. Firstly, I have found that manual exposure works best for me with infra-red, whereas I use aperture priority normally. At 200iso I found most exposures could be made at 125th @ f8 or 250th @ F8. It depends how much infra-red light is being reflected from trees and surrounding area. In the image above there is little foliage around so 125th @ F8 with 200 iso gave a good exposure.

The image below was shot at 250th @ f8 with 200 iso and we can see the reason for that when we look at the content. This image has a lot of foliage in the shot and all over the pond surface, which is reflecting more infra-red light, hence the need for a stop less exposure than the seascape

I have tried to keep my aperture at f8 or higher to ensure a good depth of field and sharp focus, so changing the shutter speed is how I control the exposure. With wide angle lenses a shutter speed down to a 60th of a second should be well within our ability to hand hold.

Image Content

With black and white infra-red photography, we must have that black and white contrast and sparkle to give our images their appeal. So, picking the right content is just as important with infra-red as it is with visible light photography.

One of the appeals of digital infra-red photography is that we can produce a great image in conditions where we may struggle to do the same with visible light photography. This is due to the way infra-red can capture high contrast scenes and record them in a pleasing visual way.

Our image below is one such example being taken in those sunlight through shade conditions that often defeat us with visible light photography due to excessive contrast. 60th @ F8 with 100 iso.

We need to be aware that too much foliage in our shot can leave us with an almost white out. Not that the highlights have lost detail, but there are far too many of them and little else to put some contrast and therefore appeal into the image.

We need something within the shot to create the contrast and the tree trunks generally do that very well. It's surprising how quickly we start to think in an infra-red way once we have shot a few hundred images. It doesn't take too long before we can look at a scene and be pretty sure whether the content will create a good infra-red image or not.

Having said that, experiment with the shooting in all conditions as often we are surprised by the results. Like all photographs we take, we can't win them all, but with a bit of thought we can certainly increase our success rate.

In our shot above, it's the foreground and the tree trunk and branches that provide the contrast with the lighter tones that I have been referring to.

General Black and White Photography

One of the unexpected spin-offs of an infra-red converted camera is that in situations which you would not consider perfect for infra-red, we can still capture some great black and white shots.

If we take the image below as an example it was taken at sunset when the sun was behind clouds and not supplying as much infra-red light at it would have done a few hours earlier. The fact that we needed an exposure of 45th @ F3.5 with 400 iso, indicates the difference between these conditions and those of our other examples. This exposure is considerably less than most of the other examples we show here.

Yet, the image has recorded a reasonable black and white shot, although it is a low key and probably not that surprising given the time of day. It has taken just a little more time and effort in Camera Raw to achieve the result you see here, but no more than any other black and white shot may take from visible light photography. So, shooting with a converted infra-red camera will definitely broaden your creative horizons with the more tradition infra-red effects, plus good quality black and white images in different conditions.

Above taken 5pm in winter 45th @ F3.5 with 400 iso.

Below taken 3pm winter 60th @f5.6 with 200 iso

Conclusions

Black and white infra-red images are not difficult to capture with a converted camera. The manipulations of those raw images using Adobe Camera Raw or Lightroom is also pretty straight forward. This is due to the fact that infra-red handles contrast remarkably well. The raw thumbnails can appear a little flat in tone at times, but that is not a real problem because all the tones we need are there. It's far easier to create the black and white sparkle from a slightly flat image than it is with a contrasty one.

However, this flatness in tone is variable depending on the amount of infra-red light around, so if in doubt take the shots anyway.

In the middle of the day, in bright sunshine you can take your infra-red camera and start shooting, because when the light it bright and harsh for normal light photography it is often perfect for infra-red.

Image below 60th @ f8 with 100 iso

Our Infra-Red Album on Flickr