Aircraft Photography Basics

Contributed by Chris Gee

KiwiFlyer readers who enjoyed our Warbirds Over Wanaka coverage a couple of issues back might recall that the superb photography and editorial that accompanied it was contributed by Chris Gee. Our aviation scene is full of enthusiasts with cameras and there must be more than a few who see some of our published photos and wonder just how the picture was taken and what they could do to improve their own efforts. With that in mind, it is with pleasure that we welcome Chris back as a contributor to a regular page on aviation photography.

Left: A wide angle lens can be useful for capturing formation shots in the air. C-130 + B757, RNZAF Open Day, Whenuapai, 2009: Nikon D200, f11, 1/320s, 30mm, ISO 200. Right: A long telephoto lens is essential for capturing aircraft in flight. The most interesting manoeuvres often occur on the other side of the airfield. Su-27 – MAKS Airshow, Russia, 2007: Nikon D200, f8, 1/640s, 320mm, ISO 200

A slower shutter speed will allow some motion, and good propeller blur, but it can be difficult to keep the fuselage sharp. P51-D, RNZAF Open Day, Whenuapai, 2009: Nikon D200, f11, 1/250, ISO 200.

I HAVE been a keen photographer for a long time, but it was only about four years ago that I decided to point my camera in a new direction... up!

After a lifetime spent admiring photos of aircraft taken by other people, I saved up the money to attend my first big airshow as an adult. Since then I have been privileged to photograph aviation events all over world, including the world's largest airshow, the Royal International Air Tattoo at Fairford, UK in 2007, the MAKS Airshow in Moscow, Russia, also in 2007, the ILA Air Expo in Berlin, Germany, in 2008, and two visits to the Australian International Airshow at Avalon in 2007 and 2009.

In fact you don't even have to leave New Zealand to photograph a great airshow. Aviation here is world famous for its eclectic collection of aircraft and dramatic settings. The Warbirds over Wanaka Airshow in April this year was one of the best I have been to, as was the RNZAF Open day at Whenuapai in 2009. There are also excellent airshows in Omaka, Tauranga, Masterton, and many regional aviation events throughout the year as well. If it weren't for my day-job as an audio engineer I would be at all of them, snapping away like crazy!

I am by no means a full time or 'professional' aviation photographer, but I have learned a lot by trial and error. In the interests of avoiding reinventing the propeller, I will outline some of the problems I have encountered and the ways to overcome them during this series of articles. This first article will focus on the basic equipment and theory required to get you started. More technical and exciting aspects will follow in future issues.

Exposure

There is one word that will become very important to you as you start to explore photography: Exposure. This refers to the process of capturing the light through the lens and onto the camera's sensor. Photos that are over-exposed will appear too bright (highlights will appear as just bright white) and photos that are under-exposed will be too dark. While there is some 'recovery' that can be done on your computer after the fact, brightening an under-exposed image will introduce excess 'noise' or pixelation into the image, and darkening an over-exposed image will not recover the details from the highlighted areas of the image. I think it is just as important to get the exposure 'right first time' today, as it was in the days of film.

Obtaining the correct exposure comes from a combination of three main controls on your camera, and you will need to learn to find and adjust these very quickly: Aperture, Shutter Speed and ISO Sensitivity.

Aperture

The Aperture is the 'iris' inside your lens that widens or narrows to allow more, or less, light into the camera. This also alters the 'Depth of Field' (or DoF) of the image, which is the distance in front of and behind the subject of the photo that will be in focus. The camera's Aperture is measured in the 'f-stop'. When the aperture is larger, the f-stop is lower (eg. f4), and more light is allowed into the camera. This will decrease the DoF (ie. only the part of the subject you are focusing on will be in focus, with the foreground and background blurred). As the iris becomes narrower, less light will be allowed into the camera, and the Aperture will increase (eg. f16), therefore you will get a longer DoF (ie. more of the subject in front and behind the point of focus will be sharp and in focus). Those of you already interested in landscape photography will probably be using f22 regularly. This allows your foreground and distant subjects to be in focus. A large Aperture is useful for making the background behind your subject very out of focus, thereby attracting attention to your in-focus subject. This can be used to great effect for creative shots, especially focusing on details of aircraft in the static display or for portraits of pilots.

Shutter Speed

The Shutter Speed refers to the length of time the camera's shutter will remain open to allow light onto the sensor. Many digital cameras will make a fake 'click' sound when you push the button,

This is one of my favourite photos, Despite inclement weather and very difficult crowd conditions… Russians are crazy! Su-27's + Mig29's – MAKS Airshow, Russia, 2007: Nikon D200 – f8 – 1/800s – 340mm – ISO 400

but don't be fooled! It is only if you have a digital 'SLR' camera that there is actually a physical shutter that opens and closes. This is the main reason you want an SLR, because the shutter will open almost instantly, whereas normal digital cameras can have a delay of up to half a second before the sensor activates to actually take the photo, by which time your aircraft will have moved away, or up, a few hundred feet. The shorter the shutter speed, the less motion or blur you will get in your image, but the less light enters the camera. This is usually what you are trying to achieve with aviation photography, but if your subject is a helicopter or has a propeller, you will need to slow the shutter down enough to allow the propeller to start to blur. This will put some action in your image, instead of a stationary prop or rotor. The longer the shutter speed, the more light will enter the camera, but the more motion blur and camera-shake you may also get.

ISO Sensitivity

The ISO Sensitivity refers to how sensitive the camera's sensor is to the incoming light. With an ISO of 200 the sensor will be half as sensitive to light than if it was set at ISO 400; an ISO of 800 will be twice as sensitive as ISO 400. The higher the ISO the more 'noise' or pixilation will be introduced into the image, so you always want to keep your ISO as low as possible. Only when you start running out of light at the aperture or shutter speed you want should you start increasing your ISO to compensate.

To recap: the exposure is created by allowing the correct amount of light into the camera, via the three controls mentioned above.

This brings us into the main challenge of aviation photography (well, all photography really!)… Light. Is the sun behind you and lighting up the aircraft nicely? Or is it in front of you, meaning your aircraft is in shadow and the sky is bright behind it? Has the sun just gone behind a cloud? Is this aircraft a fast jet where I need a high shutter speed, or a helicopter where I need a slow shutter speed for rotor blur? More on dealing with these in future issues.

Modes of Operation

While the 'auto' mode on your camera may get some good shots, it is important that you have access to, and learn to use the controls available. There are many times you will have to tell your camera to behave differently than it thinks it should in order to get the exposure you are after. This is done either by having your camera in 'manual' mode or by using the 'Shutter priority' or 'Aperture

priority' modes, and then using 'Exposure compensation' to under- or over-expose your image. For example, if your aircraft is a dark colour but the sky is bright, you will need to tell the camera to over-expose a few f-stops, otherwise the aircraft will be too dark. The opposite applies if the sky is dark behind the aircraft. It is important to have a camera where this control is easily accessible.

Camera Bodies

The two main items you will need to invest in are the camera body itself, and the lenses you put on the front of it. The first thing to point out is that you don't need the most expensive gear to take photos that you are happy with. The new entry-level DSLR cameras are now packed full of features that were once out of reach for the average amateur only a few years ago.

There has been much debate about the virtues of digital versus film. These days however, the advancement of digital technology has seen the digital camera become the mainstay of the majority of aviation photographers. The ability to see the results and adjust your exposure and composition immediately, as well as to take hundreds of photos without concern for film and processing cost, has won over even the most dedicated film user. I know of only one aviation photographer who still uses film, but after 30 years of honing his skills he will take about 50 shots a day, and nail the exposure and focus perfectly on every single one of them! He sure taught me a thing or two…

The acronym DSLR means Digital Single Lens Reflex. This means the light from the lens is reflected up into the viewfinder, so that what you see through it is exactly what the sensor sees. Basically it is the same as your trusty old film SLR, except instead of a roll of film behind the shutter, you have a digital sensor. Most modern DLSR cameras offer sensors with at least 10 megapixels in resolution. This is quite important for aviation photography, since often the aircraft will be performing a fair distance away from you, so unless you can afford the real high-end zoom lenses of 500mm zoom or more, you will find it necessary to do some 'cropping' to fill your photo with the subject. Also if you plan on printing (and who doesn't want their aviation photos on the wall!) you will find that your images can start to lose quality once they are enlarged.

Chances are that the camera you can afford will have a 'cropped' sensor as opposed to the 'full-frame' sensors on the top of the line DSLR's. This can work to your advantage in aviation photography, since your zoom lens will gain some extra focal distance on the cropped sensor. For example, my main camera, the Nikon D300S, has a 'DX' sensor with a crop factor of 1.5x, therefore a 200mm zoom lens effectively becomes a 300mm. This is great considering a large 400/500mm lens is currently well out of my price range. Adding on my 1.7x converter to a 200mm lens gives me an effective 510mm. This is a compromise though, and more on that in a later issue too…

Left: A fast shutter speed will freeze the action, and is especially good for jets where you don't have to worry about needing propeller blur. F-111, Avalon Airshow 2009: Nikon D300, f14, 1/1250s, 175mm, ISO 400. Right: A Large Aperture (small f. number) will make the background and foreground start to blur, focusing the attention onto your subject. Kittyhawk – Warbirds over Wanaka 2010: Nikon D300, f4, 1/400, ISO 200.

Lens Selections

There are two basic types of lens you will need: the first is a Telephoto Lens for in-flight action. The second is a general-purpose Wide Angle Lens for aircraft on the ground, the wider formation shots and of course, photos of pilots or your fellow aero-geek friends. Realistically you will find yourself spending as much on each lens as the camera body itself.

Lenses come in two forms: Prime and Zoom. The Prime lens is fixed at one focal length, for example 300mm, and is usually capable of a very large aperture (f4, f2.8 or even f1.8). They usually have higher quality optics, but don't allow the flexibility and ease of composition offered by a Zoom Lens, which have adjustable focal lengths such as 70-300mm. Unless it is a top of the line zoom lens, its maximum aperture will change as you change its focal length. For the example a 70-300 zoom may be capable of f4 @ 70mm, but only f5.6 @ 300mm. But beware! There is a general rule of thumb that your shutter speed must be at least as fast as your focal length is long to avoid camera-shake and blurry images. For example, the 300mm lens on your cropped sensor has a focal length of 450mm, so with your lens at full zoom, you will need to keep your shutter speed over 1/450s to get sharp images. This can be a problem if it's cloudy or late in the day, since this shutter speed won't allow enough light into your camera @ f5.6 to expose properly. There are some very good affordable zoom lenses available, and I would recommend getting at least 300mm of focal length to start off with. Later on we will discuss the virtues of the 80-400 and 50-500mm lenses available, as well as some top of the line options.

This image is 'under-exposed. The camera was fooled by the brightness of the flares, and therefore the sky and aircraft fuselages are too dark. Mig 29's MAKS Airshow , Russia, 2007: Nikon D200, f8, 1/500s, ISO 200, 20mm.

The wide-angle lens is invaluable to catch the action right under your nose, whether it is a pilot next to his aircraft in the static line or a photo of yourself in front of an aircraft. The Telephoto and Zoom lenses are only capable of focusing on subjects a few metres or more away from you, so many photographers carry two camera bodies with a different lens on each to avoid missing anything while switching lens. Your wide-angle lens will also be valuable to fit a large aircraft in your viewfinder without you being so far away that a coffee cart and hundreds of people come between you and your airplane. Many cameras are offered with a 'kit' lens when you buy them, perhaps a 17-50 or 18-70mm zoom lens, and these can be excellent wide-angle lenses to start off and learn with.

Practice makes perfect

There will always be a battle between the equipment you want and the budget you have available, but with prior research you should be able to find a setup that will work for you. The beauty of the DLSR is that you can swap out equipment as your budget and ability grows, so think of each purchase as an investment: if you buy a nice zoom lens, you can still use it when you get a new camera, and vice versa – provided you stay with the same manufacturer. Whichever camera you get, make sure you read your manual thoroughly, and experiment systematically with its various modes and settings, noting the changes in each image as you go.

Practice makes perfect, but you don't need to wait for a big airshow to take photos of aeroplanes! Most regional airports have areas where you can get close to the action, and don't forget that your local aero clubs and rural aerodromes will always have something going on. You might also meet some other like-minded aviation photographers and make some new friends, so get out there and start snapping!