IVO MARLOH

THE DRONE CAMERA HANDBOOK

FOREWORD BY
KEITH PARTRIDGE

A complete step-by-step guide to aerial photography and filmmaking

The manual that should have come in the box

Rise of the drones

In the last few years an altogether different drone trend has taken the tech toy market by storm and it has since revolutionized consumer cinematography and photography.

The consumer drone industry is now positively booming, with an estimated growth of 13 to 18 per cent annually. In most countries, especially in the big consumer markets such as the United States and Europe, the aviation authorities still haven't caught up, meaning that there are not yet any laws that clarify what can and cannot be done with a consumer UAV.

Above: A German police drone from 2012, equiped with camera surveillance for aerial filming and monitoring.

DJI takes the lead

Once the new drone and action-camera technologies were put together, this trend truly exploded and opened up an immense array of new possibilities for photography and cinematography. Most notably, the DJI Phantom 3 – a compact quadcopter capable of flying a GoPro 4k camera – combines the latest technology with affordability in such a successful way that DJI has now taken the lead in the consumer drone market.

DJI Phantom 3

New, bird's-eye views

UAVs in aerial cinematography have been around for a lot longer but these earlier camera-rigged UAVs were always in the realm of dedicated model builders and cinematographers. The true consumer drone revolution happened with camera technology becoming smaller and smaller over the last ten years. Suddenly the world is your oyster – if you can spot an oyster from 120 metres up.

Computerized flight

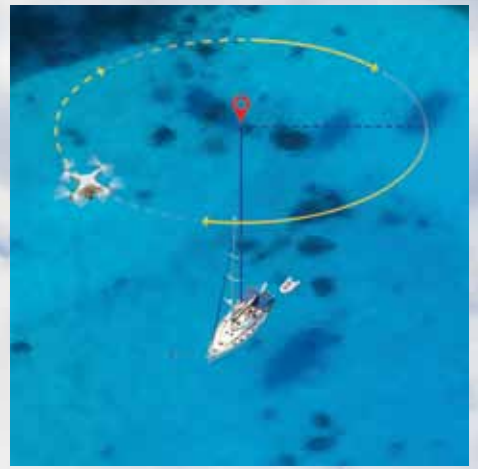
The drone filmmaking trend hit a new breakthrough even more recently with the emergence of computerized flight-control technology and multi-rotor systems, the latter not being possible without the former.

All RC aircraft traditionally required a lot of skill to fly them well and safely, before you even equipped them with a camera. To be able to fly a camera they had to be fairly large, which made them very expensive, too expensive for most.

Way points and flight patterns

Unlike planes and gliders, with multi-rotors there are no rudders or ailerons, just multiple propellers that move independently and at different speeds and directions to steer and propel the aircraft. This requires a computer to control and modulate flight.

Equipped with GPS, optical flow and other guidance systems, it is now possible to fully automize flight, and even have the camera drone follow you down a ski slope – at a preset altitude and distance – to elevate your home-movie experience to a whole new level.



Above: DJI Phantom 4's Point Of Interest (POI) function lets you tap a point on the controller screen to tell the drone to circle it.

Below: A pre-mapped waypoint course around the lake lets you determine speed, altitude and orientation for each waypoint.

Drone categories

We can categorize drones according to price brackets and spec. This is very useful if you're trying to work out what you'll get for your budget, as well as establish what you want to do with your potential drone.

Right: The Hubsan X4 micro RC quadcopter with camera makes for a great practice drone on a tiny budget.

The question of quality/price/spec is an endless semantic debate that all the seriously gadget-obsessed tech-heads like to, well, endlessly obsess about. There are a few exceptions, but we can largely break down UAVs into three categories.

Consumer drones

As this is a book on *camera* drones, we're going to ignore anything that isn't carrying at least some sort of HD device. Consumer drones we're looking at here are also known as starter drones, still in the tech toy bracket, but with the addition of a camera.

The cameras used by most starter drones are mainly for some FPV fun and for showing off to your friends. They do, however, feature in-built cameras that are normally HD quality, mostly integrated in the tip or underside of the quadcopter. The available settings are limited, but they will do a nice job of recording your flight and showing you the neighbourhood from a new angle.

Even though these starter drones all have cameras, they can't stabilize your video without camera gimbals. Therefore they aren't ideal if aerial photography is your main aim with a drone. Speaking from personal experience, there is nothing worse than capturing something with your drone that you know you'll never get to film again, such as wild animals in a reserve, or a friend catching that first big wave, only to then discover that your drone's vibration is so bad that the footage is virtually unusable.

Starter drones, on the whole, don't have GPS or more sophisticated flight systems for autonomous flight and follow-me functions, as these UAVs are mainly geared towards beginners that are looking to actually *fly* their drone, rather than professionals who will be more interested in autopilot functions so they can concentrate on their camera work. These quadcopters often feature USPs such as one-button flips and other acrobatic manoeuvres, and are great starter drones in every sense of the word. You'll learn how to fly a copter and operate a basic camera proficiently without the risk of crashing a sophisticated, expensive flying machine on the first day out.

These starter drones are relatively cheap but some are remarkably solid as well, so you do get a lot of bang for your buck. What these toy drones lack in camera quality, they make up for in sheer flying fun for beginners. They are also invaluable in terms of gaining experience – they won't even mind if you crash them on your roof a few times (*see also page* 26).

Above: The UDI U818A toy-grade RC quadcopter with camera is another great toy drone to practice your skills on before you upgrade to a more sophisticated machine.

Above: The Parrot Bebop 2 camera drone combines adequate flying times, autonomous GPS flying with a nippy performance and great battery life, as well as decent video capabilities.

Above: Aerial footage of dowtown Havana, Cuba, shot on RAW setting on the XiaoMi Yi.

XiaoMi Yi ★★★

GOOD ENTRY LEVEL

Video: 1080p 60fps/720p 120fps/480p 240fps
Photo: 16MP
Memory: Up to 64GB MicroSD
Features: Wi-fi
Battery: Two hours
Waterproof: With special case up to 60m (197ft)

The Xiaomi Yi is a cheap but very capable Chinese action camera. You can't shoot in 4k, but you can shoot 1080p at 60fps, which means you can slow it down to slow-motion in the edit later. Cleverly, the camera is designed to *almost* fit most GoPro mounts, so it's a great cheaper alternative. DJI's Zenmuse gimbal will need a small modification in order to accommodate the Xiaomi Yi's very slightly larger frame. It records on a MicroSD card up to 64GB.

Pros: Low price; fits most GoPro mounts; great image quality
Cons: Lens may need focusing; no 4k

Left: The cheaply-priced XiaoMi Yi 3-axis brushless BL Gimbal works with most quadcopters.

Above: This aerial shot shows the slight fish-eye distortion of the SJ5000 lens.

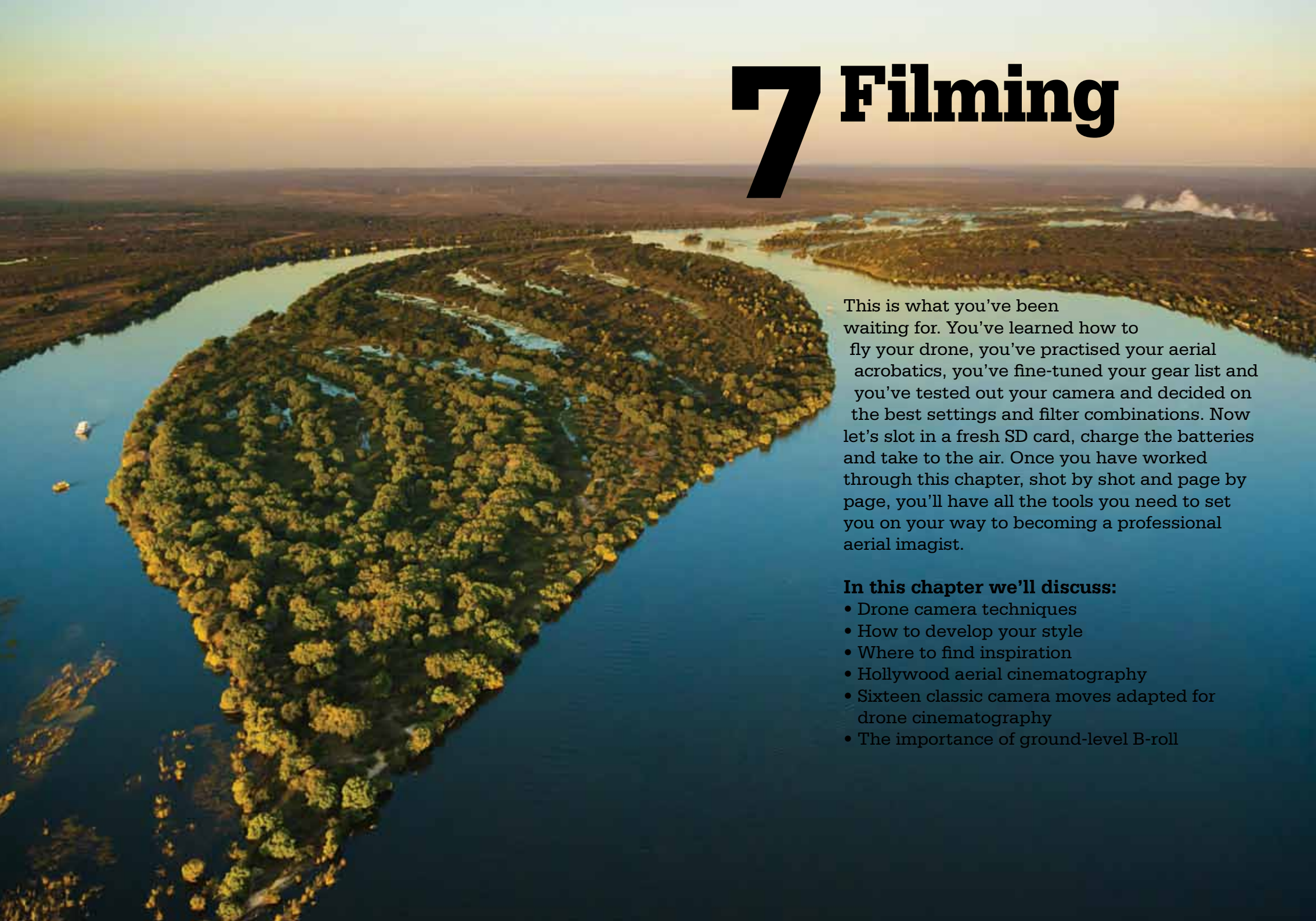
SJCAM SJ5000 Plus HD ★★★★

SOLID MID-RANGE QUALITY

Video: 1080p 60/30fps; 720p 120/60/30fps; 480p 240/120/60/30fps
Photo: 16MP
Memory: Up to 32GB MicroSD
Features: Wi-fi
Battery: 90 minutes
Waterproof: With special case up to 30m (98ft)

The SJ5000 is a slightly more expensive version of the Xiaomi Yi. It has an LCD screen so you can instantly view what you've filmed, which is a boon not to be underestimated. This camera has a wide range of mounts and accessories on the market, including waterproof casings and drone gimbals. It records directly onto a MicroSD card up to 32GB, and the USB port allows you to download your footage and recharge the battery. You can also hook it up straight to your TV via the HDMI cable to instantly view your footage on a big screen.

Pros: Low price; range of accessories and gimbals; great photo quality
Cons: Only capable of 32GB cards; sometimes motion blur



7 Filming

This is what you've been waiting for. You've learned how to fly your drone, you've practised your aerial acrobatics, you've fine-tuned your gear list and you've tested out your camera and decided on the best settings and filter combinations. Now let's slot in a fresh SD card, charge the batteries and take to the air. Once you have worked through this chapter, shot by shot and page by page, you'll have all the tools you need to set you on your way to becoming a professional aerial imagist.

In this chapter we'll discuss:

- Drone camera techniques
- How to develop your style
- Where to find inspiration
- Hollywood aerial cinematography
- Sixteen classic camera moves adapted for drone cinematography
- The importance of ground-level B-roll

Fly-through

Fly-through

These shots are not to be underestimated. They are great to use as reveal shots, coming through tree tops to reveal the landscape behind, for example, or just for the sheer thrill and audacity of flying through gaps. This shot can be distracting because of the risks taken, however, so only use it when strictly necessary – otherwise it can take the audience out of the story.

Uses: Revealing scenery; transition between scenes.
How: Fly your drone straight through a gap, or a hole among obstacles, with your camera pointed forward. FPV is a must for this shot, as you won't be able to judge what you are doing if you're not looking at the obstacle straight on. Keep it as slow as possible for the best cinematic effect. Don't use it if all the shot does is show off the fact that you own a drone!

WARNING!
You must be a competent pilot to attempt this. There's a great risk that you will crash your drone, depending on how large the gap is.

Orbit

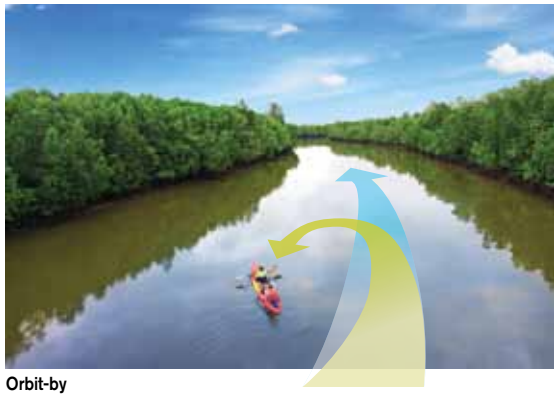
Orbits are great to reveal your subject among the scenery, such as a climber on a rocky spire in Bryce Canyon, or a couple of kids playing on a field as the camera orbits from above. An orbit is also technically the most advanced shot on this list, and takes a lot of practise to get right.

Orbit

Uses: Revealing the subject in an unexpected way; epic, grand-scale transitions.
How: Fly your drone sideways (strafe) left or right, while yawing in the opposite direction. This results in flying in a circle while keeping your camera pointed at the centre of the circle. It is crucial to be very careful with the yaw control, or you'll end up spinning. The larger the circle is, the slower the yaw will be. A good gimbal is essential, as is a constant yaw rate as well as constant adjusting of the forward, backward and sideways motion of the drone.

Orbit-by

Essentially the slower version of a fly-by, the orbit-by is much easier to get right than a full orbit. It has a dynamic, active and sweeping feel to it, and is great to set up and establish characters and their environment before cutting to them on ground level. If you've done your on-the-ground filming and sound recording right (see below) you'll be able to use to the ground-level audio here throughout.



Orbit-by

Uses: Revealing the subject in an unexpected way; epic, grand-scale transitions.
How: Start off towards your subject a little off to one side, making sure the framing is perfect, and as you pass the subject, yaw to keep the subject within frame. As a consequence your drone will make a 180-degree turn, ending by moving out backwards, on the same trajectory as before (blue arrow) away from the subject.

The importance of on-the-ground B-roll footage

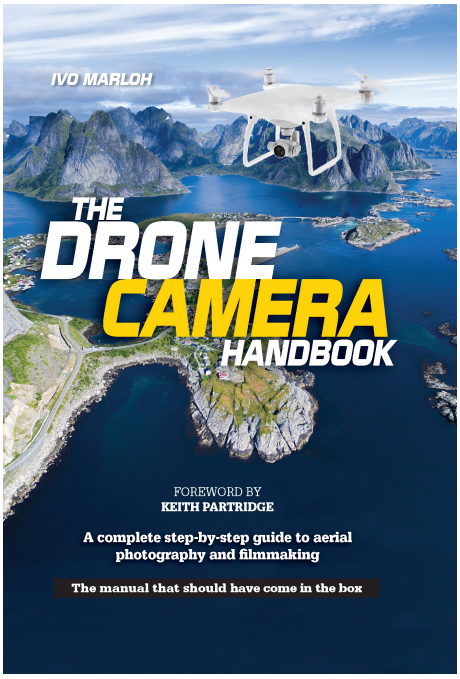
If you're serious about filming your subject properly, you need to think about B-roll footage on the ground, and even more importantly, good sound recording of location sound. The drone cannot capture sound at all, and it's a shame just to use music when you could have real location sound ("wild track" sound).

Second camera – It's a good idea to take a second camera to get ground coverage and some audio of the same subject matter (ideally DSLR or MFT).
Tripod – For the ground camera. Position it in a good vantage point and record the scene from there.
Shotgun microphone – You'll instantly elevate your aerial footage if you record 'wild track' sound and cut it under the aerial footage in the edit. You can't use the drone hum, anyway.
Audio (XLR) cables – For the microphone.
Portable digital audio recorder – To plug your microphone into. Alternatively there are stereo audio recorders such as a Zoom H4N, which will do a great job of recording wild track of your flying environments.
Headphones – To check levels and audio recordings.
Spare batteries – Charged batteries for your camera, microphone and audio recorder.
SD cards – MicroSD cards for the drone camera, second camera and audio recorder as well as back-up cards.
1T external hard drive – If your shoot goes over a few days, you'll need bigger back-up drives. 4k cameras produce a huge amount of data.
Laptop – To copy SD cards to the external hard drive.

DSLR with shotgun microphone

Zoom Hn4 sound recorder

NEW TITLE INFORMATION



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THE DRONE CAMERA HANDBOOK

A COMPLETE STEP-BY-STEP GUIDE TO AERIAL PHOTOGRAPHY AND FILMMAKING - THE MANUAL THAT SHOULD HAVE COME IN THE BOX

By Ivo Marloh, Edited by Michael Sanderson, Foreword by Roger A. Deakins

The first fully illustrated book to focus on drone filmaking and aerial photography Written and edited by a highly experienced and expert team of drone filmmakers and photographers Foreword by Roger A. Deakins - multiple Oscar nominee Great value package for all drone/photography enthusiasts. Also ideal for outdoor/extreme sportsmen and women who want to capture epic images of their adventures

Comp titles

Digital Photography Handbook (Quercus) Doug Harman 9781848667044 2014 £ 9.99 PB TCM 4896

Digital Filmmaking Handbook (Quercus) Mark Brindle 978178087813 2013 £ 9.99 PB TCM 2.5K

Complete Guide to Drones (Ilex) Adam Juniper 9781781573075 2015 (Nov) £ 14.99 PB TCM 194

Aerial Photography and Videography (Pearson Higher Ed) Eric Cheng 9780134122779 $44.99 TP RTD 408

Drones for Dummies (Wiley) Mark Lafay 9781119049784 2015 $24.99 TP RTD 977

Photography drones, quadcopters or unmanned aerial systems (UAS) are currently changing film and photography forever, and amateurs and professionals alike are scrambling to get to grips with this new and fast-evolving technology. This book gives you an in-depth look into what can (a lot) and can' t (very little) be done with the new generation of photography drones, which drone fits your needs and budget, as well as what cameras you can fly with them. Chapters include: 1. Choosing your drone 2. Choosing your camera 3. Monitors, goggles and receivers 4. Learning to fly 5. Filming 6. Photography 7. Flight environments 8. The edit 9. Going live. This is the 'manual-that-should-have-come-in-the box' for all drone/photography enthusiasts. Also ideal for outdoor/extreme sportsmen and women who want to capture epic images of their adventues.

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