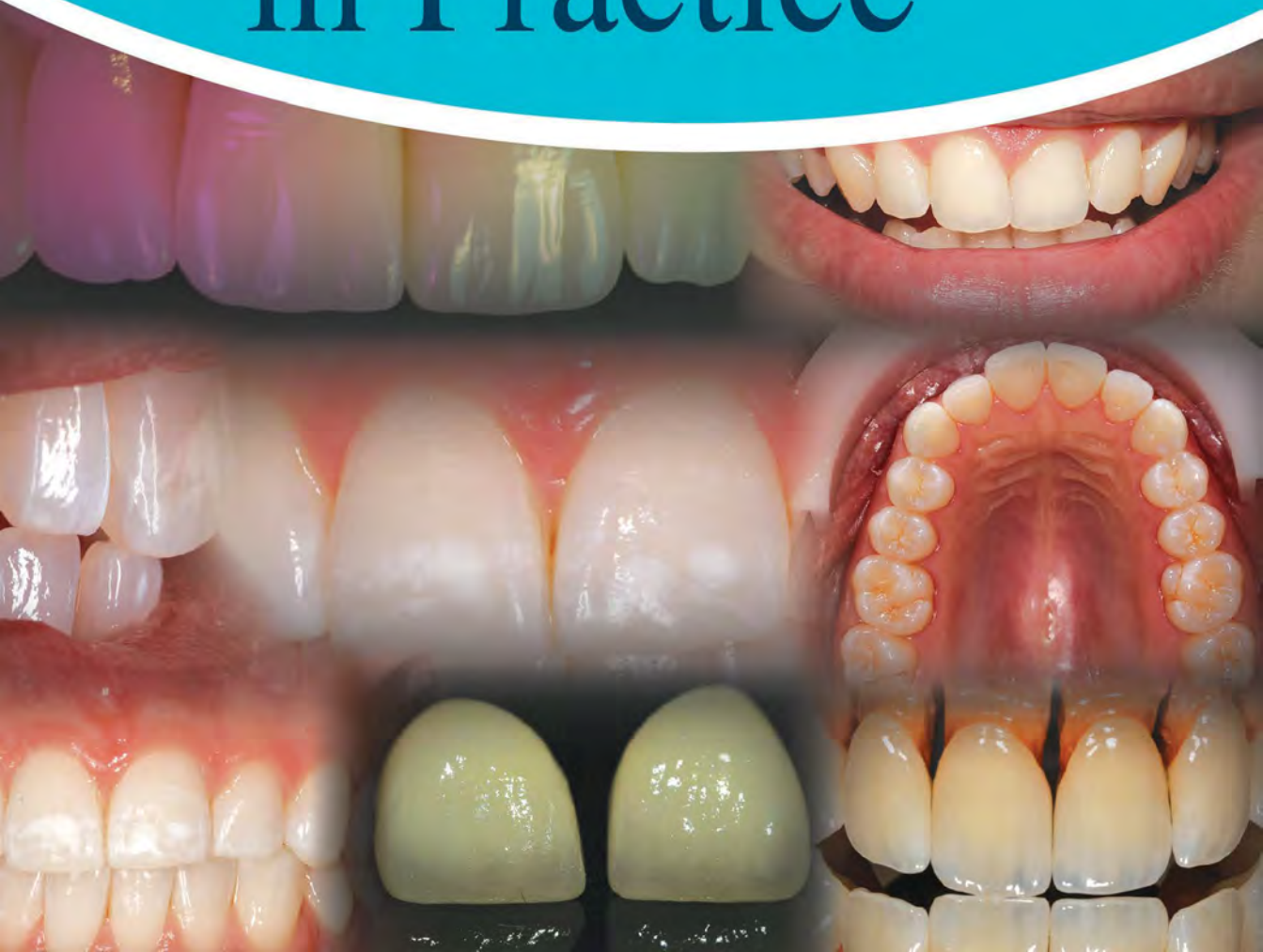
Peter Gordon

DENTAL Photography in Practice



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3 Lighting systems

Introduction

This chapter will cover lighting for intra-/peri-oral situations using both basic and more complex systems. Facial photography will be discussed in Chapter 8. In view of the proximity of camera to subject with intra- and peri-oral photography it is essential that any illumination system is placed either on (axial) or near the lens. Invariably the most satisfactory method is electronic flash which will be discussed here together with some alternative systems.

Axial illumination

There is currently a multitude of systems available with a variety of light sources and extreme price ranges. Those discussed in the text will have been used by the author and/or have full UK support. In the author's experience some comparatively very cheap flash systems have proved unreliable, particularly in the long-term or in heavy usage situations such as orthodontic practices.

Originally, 'on the lens' illumination was provided by a true 'ring flash' with a circular flash tube (see Figure 32 of Chapter 6). Current 'ring flash' systems generally utilise two small flash tubes, the advantage being the ability to vary the output or eliminate one tube to create uneven lighting or reduce shadowing in selected circumstances. One true ring flash is currently produced by Lester Dine in the US (see **Figure 1**); however, it is normally sold as a combination 'ring and point system' (see **Figure 2**).

Compatibility

Manufacturers obviously want you to purchase their own accessories which are generally more expensive than third party 'equivalents,' which except for the Metz 15MS-1, are specific for one make. Canon accessories are only fully compatible with Canon equipment and similarly Nikon with Nikon. Current third-party accessories may not function completely with the latest camera bodies. Note the differences in the hot shoe contacts of the Nikon **Figure 3** and Canon **Figure 4**. In addition, note the difference between the Canon 200D hot shoe **Figure 4** and its current successor the 250D **Figure 5** (August 2019).

The revised configuration renders existing third party flash accessories for Canon partially or totally incompatible with the latest body.



Figure 1 Lester Dine true ring flash.



Figure 2 Lester Dine combination flash.

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Figure 3 Nikon hot shoe.



Figure 4 Typical Canon hot shoe.



Figure 5 Latest Canon hot shoe.

Ring flash

The mainstream 'ring flash' units by Canon, Nissin, Kenro, and Metz all utilise two small flash units in one mount (see **Figures 6a** to **c**). Their major advantage is they are always pointing in the right direction and invariably illuminate the buccal corridor on full arch anterior views. Major disadvantages, some consider the illumination to be on the flat side, the other being harsh reflections on close-up anterior views (see Figures 2 and 3 of Chapter 7).

The lightest 'ring flash' unit with full Through The Lens metering (TTL) function is the Metz 15MS-1 (**Figure 7**) which does not have a separate wired power pack. It utilises two AAA batteries unlike the other flash systems which use four AA cells. Whilst all other 'third party' flash systems are specific to one make; these units can be individually programmed for different manufacturers. As they do not have a power pack with a physical hot shoe connection they rely on a wireless/optical trigger from the 'host' camera's flash; and in order to function fully with TTL metering a compatible body is required. The MS-1 responds to a coded infra-red-light signal emitted from the camera's own flash and utilises a clip-on filter which prevents the camera's flash influencing the exposure. Unfortunately, this automatic metering function is not available with many low-end entry level digital single-lens reflexes (DSLRs) and compatibility must be checked prior to purchase. However, for existing systems the MS-1 can be triggered by purchasing a small compatible flash gun such as the Canon EL 100 (**Figure 8**) to function with Canon cameras or appropriate Metz M400 designated for Nikon or Canon and thus maintain full TTL automatic metering.

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Figure 6 Typical ring flash units with power packs. (a) Canon MR EX II, (b) Nissin MF–18, (c) Kenro KLF 201.



Figure 7 Metz 15MS-1 flash.



Figure 8 Canon EL 100 flash.

When considering purchasing a new body together with a third party flash such as the Metz MS-1, it is far cheaper to purchase a compatible body, the Canon 800D for example, from the outset rather than buying accessories to enable one piece of equipment 'to talk' to another! See **Figures 9** and **10**. When using an accessory flash to trigger the Metz MS-1 it can be pointed away as shown in **Figure 11** or used with the Metz filter as in **Figure 12**.

The MS-1 flash can however be triggered by any built-in camera flash by setting it in 'SERVO' mode. This means that the flash will fire at the manually set power output and correct exposure will need to be determined by experiment. Another option is to purchase a PC cable to

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Figure 9 Canon 800D + Metz MS-1 flash.



Figure 10 Metz filter on camera flash Canon 800D.



Figure 11 Canon 200D + EL 100 flash to trigger Metz MS-1 flash.



Figure 12 Metz Filter on EL 100 flash to trigger Metz MS-1 flash.

connect the flash directly to the camera, this time by setting the flash in 'SYNC' mode, this will also lose the TTL function so that trial shots will be needed to establish the correct aperture/ISO combination. As a rough guide, using the flash at full power, and setting the camera in Manual 'M' mode, an ISO of 100 and using an aperture of f22 for close-ups and f8 for faces will generally give excellent results. This is probably the only 'ring flash' with internal reflectors giving the ability to change the angle of illumination.

There is a significant difference between triggering an 'off camera' flash wirelessly to illuminate the subject whilst maintaining automatic exposure control as above and

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Figure 13 Hot shoe to PC converter for Canon.



Figure 14 Hot shoe to PC converter for nikon.



Figure 15 Rotolight universal PC converter.



Figure 16 PC socket.

triggering a slave flash to eliminate shadows which will be discussed in a later chapter.

Low end or entry level Canon and Nikon cameras do not have a PC socket to link to external flash units, but a hot-shoe adaptor such as TF-321 (**Figure 13**) for Canon, AS-15 for Nikon (**Figure 14**), and universal by Rotolight© (**Figure 15**) will allow a cable connection to the Metz 15MS-1. In fact, the Nikon AS-15 will work with older Canon cameras but may not work with the latest due to the revised hot shoe configuration (**Figures 16** to **19**).

Combination flash

The Lester Dine RING/POINT unit combines a true RING light with circular flash tube and a single POINT source which can be rotated around the lens. The flash units can only be fired individually and are specific for Nikon and Canon cameras only (**Figure 20**).

Twin flash systems

Many colleagues are now seeking systems to achieve more aesthetic lighting and turning to the versatility of twin flash systems using the flash heads on the lens or on other bracket systems such as: The Owl, Axis, Agnos, Molaris, and PhotoMed. There is also an increasing interest in the use of small soft boxes and bouncers to diffuse the light source. These systems will be introduced here but described in detail in later. The Nikon R1C1 system has a lens mount for two or more SB-R200 small flash units which are triggered wirelessly by either a commander unit mounted in the hot shoe or by the camera's built-in flash depending on the model. The Canon T24/26 system is similar in principle, but the flash heads are tethered to a power pack (see **Figures 21** and **22**).

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Figure 17 PC cord.



Figure 18 Metz MS-1 with PC cable connection using TF-321.



Figure 19 Metz MS-1 with PC cable connection using AS-15.



Figure 20 Lester Dine ring/point flash system.

Additionally, there are several small flash systems available to fit on brackets and triggered wirelessly by the camera itself, the camera's own flash, or a camera mounted unit depending on the specification of the body.

The lens mount for the Canon MT 24/26 twin flash unit can be purchased separately and used with two Canon EL 100 flash units (**Figures 23** and **24**). These can be triggered wirelessly on the basic bodies by a third EL 100 in the hot shoe (**Figure 25**) or on higher models such as the 800D, by the inbuilt flash (**Figure 26**). This set-up is cheaper than the Canon MT 26 system and being wireless affords more flexibility, the larger flash units also accept bouncers and soft boxes easily.

However, whilst the Canon EL 100 units will fit into the MT 24/26 mount, other small third party flash units often have slightly larger 'feet' and will not be compatible with Canon 'shoes.'

Nissin produce flash units capable of wireless triggering and with full TTL capability, these units are manufactured specifically for Canon or Nikon and are not interchangeable (**Figure 27**).

If two Nissin i40 flash units are used off camera on brackets they will need a camera mounted trigger such as a third i40 flash or Canon EL 100 which is a cheaper option for Canon.

The larger Nissin i60 can be triggered by Nissin's own wireless trigger (see **Figures 28** to **30**).

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Figure 21 Nikon R 1C1.



Figure 22 Canon MT 24/26 twin flash.



Figure 23 Canon EL 100.

Bracket systems

All the systems mentioned so far can be used for intra-oral, peri-oral, and facial photography successfully, taking up the minimal amount of time and acknowledging there can be minor drawbacks in certain situations.

Bracket systems enable the user to expand lighting techniques without turning the surgery into a photographic studio. Whatever system is chosen there will be a considerable increase in weight and bulk and serious consideration should be given to having two camera systems; one for faces/aesthetics and one for general intra-oral use. However, a single camera lightweight option is described later in this chapter (see **Figure 97**). The most popular brackets are the Axis, Owl, PhotoMed, Agnos, and Molaris. Only the Axis bracket is made of polycarbonate, all the others are metallic.

Axis

The simplest and lightest bracket system is the 'Axis' which places two flash units at 45° to the lens Axis, however, it is specifically designed for use with the Canon MT 24/26 twin system or the Nikon SB-R200 units. The arms are not designed to accept other third party flash units although the author managed to fit Canon EL 100 flash units with slight difficulty. The increased distance and the angle of illumination between flash units and subject reduce the intensity of the highlights (**Figures 31** and **32**).

Agnos, Molinaris, Owl, and PhotoMed

All these brackets offer similar properties relying on friction grip joints to maintain set positions. The Owl bracket has the advantage in having engraved components to record the

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Figure 24 2 EL 100 units on MT 24/26 mount.



Figure 25 EL 100 unit used as trigger on Canon 200D with 2 EL 100 units on MT 24/26 mount.



Figure 26 Canon 800D's inbuilt flash triggering EL 100 flashes on Axis bracket.



Figure 27 Nissin i40.



Figure 28 Nissin i60.

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Figure 29 Nissin 'AIR' wireless trigger.

settings. They are manufactured for use with either Nikon SB-R200 flash units or regular flash systems (**Figures 33** and **34**). The Owl offers more flexibility in flash positioning with ball and socket mounts, but this can add to complications!

Agnos

The Axis, PhotoMed, and Molaris brackets have all been designed predominantly for dental photography. Agnos brackets have been manufactured to cover close-up and macro photography in general and currently three models are available. Each design is produced specifically for either the Nikon SB-R200 units or standard flashes. The Scorpion CLASSIC (**Figure 35**) is the heaviest and can be extended as shown in **Figure 35**. In the author's opinion, forward extension of flash units is probably impractical for clinical dentistry, and the smaller and lighter brackets are more convenient (**Figure 36**).



Figure 30 Size comparison Nissin i60, i40, and Canon EL 100 flash units.



Figure 31 Axis bracket with Canon MT24/26 flash.

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Figure 32 Axis bracket with Canon EL 100 flash units.



Figure 33 Owl bracket with 'Universal' shoes.



Figure 34 PhotoMed bracket with Nikon specific shoes.

The author has noticed that the 'standard' shoes provided with some brackets have not accepted 'standard' flash units easily and recommends purchasing Neewer brackets which are adjustable and accept all flash 'feet' securely (**Figures 37** and **38**).

Molaris bracket

The Molaris bracket is probably the most complex of all and is supplied with shoes for either Nikon, or Canon and other third party flash units (**Figure 39**).

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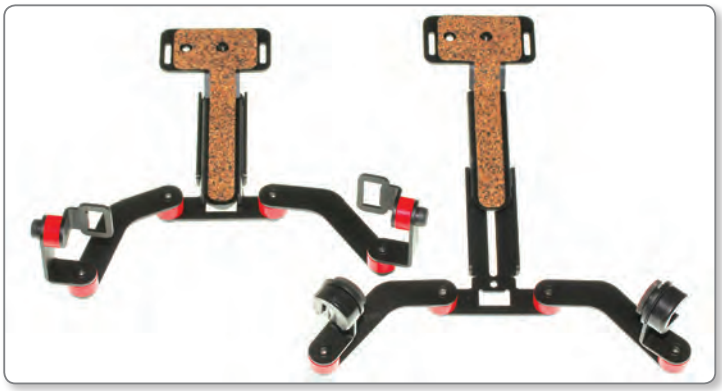

Figure 35 Agnos scorpion classic brackets for Nikon and with 'standard' shoes.



Figure 36 Agnos scorpion light-basic (bottom) and scorpion light-micro (top).



Figure 37 Typical shoe.



Figure 38 Neewer adjustable shoe.



Figure 39 Molaris bracket.

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All the brackets mentioned are bulky and relatively heavy, the Canon EL 100 flash units use 2 AA cells and are considerably lighter than the Nissin i40 and i60 units which use 4 AA cells.

Lighting systems compared

A model with full upper arch restorations, courtesy Knight Dental Design Laboratory, was set-up as the standard subject to be photographed with a variety of lighting systems. The model position was fixed, and the camera was tripod mounted to give as much consistency and stability as possible. Two camera systems were used, Canon & Nikon. Each was set-up at ISO 200, White Balance (WB) for electronic flash, and an aperture of f22. Flash operation was set to TTL automatic exposure. Canon 100 mm macro and Nikon 105 mm macro lenses were used. The exercise was to compare glare from the flash units, and these can best be described as typical in the current situation and would obviously vary slightly in other cases. The readers will note that whilst automatic exposure was constantly accurate the light output from the flash units varied slightly giving rise to slight colour difference in the final images emphasising the necessity for consistency in equipment to ensure consistency in the results. In addition, there were slight colour casts from some flash accessories.

Figures 40 to 42 and **44 to 49** show typical results using standard 'Ring Flash' systems, incorporating two flash tubes placed routinely at 9 and 3 o'clock. These systems can be considered suitable for most clinical work including surgery (**Figures 50** and **51**). **Figure 43** shows that placing the flash tubes in the 12 and 6 o'clock position and blanking or switching



Figure 40 Canon MR EX II flash.



Figure 41 Image taken with MR 14EX II.



Figure 42 Canon MR EX II with top flash switched on only. Blank for illustrative purpose only.



Figure 43 Image taken with flash @ 12 o'clock firing only.

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Dental Photography in Practice

When I was asked by Jaypee Brothers Medical Publishers to produce a book entitled, "*Dental Photography in Practice*" my mind went back over 30 years when together with Dr Phil Wander, I had done it before. In those days, 1987, there was little choice other than a 'single-lens reflex' (SLR) camera but with the correct accessories, and following a simple protocol, high quality repetitive images were easy to attain. Most of those principles still apply today, the major differences are the capabilities of the digital camera body to perform either what was done in a studio or carrying around different films to cope with different conditions. I hope this book takes the mystique out of clinical photography using basic 'digital single-lens reflex' (DSLR) cameras. The book covers all the needs for the beginner and hopefully guide more experienced colleagues into the results using more sophisticated lighting techniques. Apart from the brief loan of two cameras, the M50 and 250D from Canon (UK) and Olympus UK for the OMD mirrorless body and STF-8 twin flash all the equipment described have been purchased by the author to avoid any bias in reporting.

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