Table of Contents

Foreword by David Hobby ..... **xii**

1 Introduction **3**

PART A: GETTING STARTED **7**

2 Getting Started **9**
2.1 A beginner's configuration: Canon Rebel T1i/500D with a 430EX II flash unit 10
2.2 Flash exposure compensation (FEC) 13
2.3 Bounce flash 13
2.4 Daylight fill flash 16
2.5 An advanced configuration: Canon EOS 50D with two 580EX II flash units 17
2.6 A practical example of wireless flash 18
2.7 Dragging the shutter 19
2.8 Getting the flash off the camera 20

3 Top Ten FAQs **23**

4 Terminology **33**

PART B: TECHNOLOGY **37**

5 A Brief History of Flash **39**
5.1 Pyrotechnics 41
5.2 Flash bulbs 42
5.3 Electronic flash 43
5.4 The first challenge: flash synchronization 44
5.5 Open flash 44
5.6 Flash sync 45
5.7 Controlling flash exposure 46
5.8 The second challenge: flash metering 47

6	**Automatic Flash Metering**	**51**
6.1	Enabling internal flash and external Speedlites	52
6.2	Subject and background in flash photography	53
6.3	Ambient light metering versus flash metering	53
6.4	Freezing motion	53
6.5	Normal flash sync	55
6.6	Slow shutter sync	55
6.7	EOS flash and icon modes	57
6.8	CA (creative auto) mode	58
6.9	EOS flash and ambient metering modes	58
6.10	Program (P) mode	59
6.11	Tv (shutter speed priority) mode	60
6.12	Av (aperture priority) mode	60
6.13	M (metered manual) mode	61
6.14	DEP (depth of field), A-DEP (automatic DEP), and B (Bulb) modes	61
6.15	Fill flash	61
6.16	Fill flash ambient light reduction	64
6.17	Flash exposure compensation (FEC)	64
7	**Technical Topics**	**67**
7.1	Canon EOS flash metering	68
7.2	TTL flash metering	68
7.3	A-TTL flash metering	70
7.4	E-TTL flash metering	71
7.5	E-TTL II	74
7.6	Type A and type B cameras	76
7.7	Flash technology availability summary	77
7.8	Metering patterns	78
7.9	Flash metering patterns	81
7.10	How mechanical camera shutters work	84
7.11	Maximum X-sync	85
7.12	High-speed sync (HSS)/FP (focal plane) flash	87
7.13	First and second curtain sync	91
7.14	Inverse square law	94
7.15	Guide numbers	96
7.16	Quantifying flash output	97
7.17	Exposure value (EV)	99
7.18	Color and shades of white	99
7.19	Color filters	106
7.20	Infrared (IR)	112
7.21	EXIF	114
7.22	Safety and physical properties	114

PART C: EQUIPMENT **117**

8 Dedicated Flash Units **119**
8.1 Built-in (popup) flash 120
8.2 Canon Speedlites 123
8.3 Speedlite naming scheme 125
8.4 Older Canon Speedlites 126
8.5 Third-party flash units 126

9 Canon Speedlites **129**
9.1 Hotshoes 130
9.2 Flash heads 132
9.3 LCDs 132
9.4 Swivel and tilt for bounce flash 132
9.5 Zooming flash heads 134
9.6 Flash head diffuser panels 139
9.7 Autofocus (AF) assist light 140
9.8 Redeye 145
9.9 Flash exposure compensation (FEC) 147
9.10 Flash exposure lock (FE lock or FEL) 149
9.11 Fill flash ratios 152
9.12 Auto fill reduction 153
9.13 Flash exposure bracketing (FEB) 153
9.14 High-speed sync (HSS) 154
9.15 Enabling second curtain sync 155
9.16 Manual flash 157
9.17 Enabling wireless E-TTL flash 159
9.18 Integrated Speedlite transmitter, or built-in flash as master 164
9.19 Advanced M (metered manual) ambient metering 166
9.20 Quick Flash/Rapid-fire mode 167
9.21 Stroboscopic (MULTI) flash 168
9.22 Flash exposure confirmation LED 170
9.23 Range warning 170
9.24 Modeling flash 170
9.25 Auto Power Off/Save Energy (SE) mode 171
9.26 Speedlite autoflash/External flash metering 172
9.27 Optical slave triggers 173
9.28 Custom functions (C.Fn) on flash unit 173
9.29 External Speedlite control 174
9.30 Test flash (manual firing) 175
9.31 Rear control dial 175

9.32 Weatherproofing. 175
9.33 Automatic white balance compensation 176
9.34 Live View, silent shooting, and flash. 176
9.35 Cycle time and high voltage ports. 177

10 Manual Flash Metering. 179
10.1 Manual flash metering 181
10.2 Trial and error 181
10.3 Flash meters 184
10.4 Choosing a manual flash unit 186
10.5 Trigger voltages 187
10.6 Incompatible shoes 188
10.7 Autoflash metering 189

11 Off-Camera Flash 191
11.1 The Seven Basic Methods for Off-camera Flash Control 192
11.2 Off-Camera Method 1—Open flash 192
11.3 Off-Camera Methods 2 and 3—Wired cords 193
11.4 Off-Camera Method 2—Wired sync-only: PC cords 193
11.5 Off-Camera Method 3—Wired with automatic metering: Canon flash cords 197
11.6 Off-Camera Methods 4 and 5—Wireless optical control 199
11.7 Off-Camera Method 4—Wireless optical, sync-only: optical slaves 200
11.8 Off-Camera Method 5—Wireless optical with automatic metering: Canon wireless E-TTL. 204
11.9 Off-Camera Methods 6 and 7—Wireless, radio frequency (RF) 214
11.10 Off-Camera Method 6—Radio, sync-only. 217
11.11 Off-Camera Method 3—Radio with automatic metering. 227

12 Flash Accessories. 237
12.1 Flash diffusers 239
12.2 Small diffusers. 239
12.3 Small reflectors 242
12.4 Medium-sized reflectors. 244
12.5 Large portable diffusers 248
12.6 Other flash accessories. 253
12.7 Ringflash adapters 255
12.8 Filter gels 257
12.9 Do it yourself!. 259
12.10 Supports. 260

12.11 Batteries ... 263
12.12 External battery packs ... 267

13 Studio Flash ... 271
13.1 Types of studio lights ... 273
13.2 Basic flash unit features ... 282
13.3 General studio gear ... 285
13.4 Studio light modifiers ... 288
13.5 Hot lights ... 295
13.6 Cheap vs. expensive ... 299

PART D: TECHNIQUE ... 301

14 Basic Technique ... 303
14.1 Direction ... 304
14.2 Intensity ... 308
14.3 Quality ... 310
14.4 Color ... 312
14.5 Basic Speedlite portrait photography ... 314
14.6 Building a studio portrait ... 316
14.7 Experimenting with light ... 318

15 Advanced Techniques ... 325
15.1 Slow shutter sync and motion ... 326
15.2 Hard isn't all bad ... 327
15.3 Narrowing down the light ... 330
15.4 Backlighting and flash in the frame ... 332
15.5 Kill the ambient ... 333
15.6 Cookies ... 335
15.7 Open flash ... 336
15.8 Stroboscopic (MULTI) flash ... 338
15.9 High-speed photography ... 340
15.10 Cross-polarizing ... 344
15.11 Learning from the masters ... 346

Conclusion ... 349

APPENDICES 351

Appendix A: Flash Units for Canon EOS 352

Appendix B: Choosing a Flash Unit 370

Appendix C: Features Table 374

Appendix D: Custom Functions 385

Appendix E: Sequence of Operation 387

Appendix F: Lenses 393

Lenses Without Distance Data 394

Appendix G: Troubleshooting 396

Appendix H: Online Resources 406

Credits and Acknowledgements 408

Chapter Opening Images 413

Index 417