Exploring the Canon EOS 40D

Whether you are a wedding, landscape, nature, or portrait photographer, the Canon EOS 40D is a star performer in virtually all respects. In terms of image resolution and quality, the 10.1-megapixel sensor delivers 16-×-11-inch inkjet print sizes and offers the telephoto advantage of a 1.6x focal length multiplication factor. The new sensor microlens and Canon's new DIGIC III processor with four-channel reading and 14-bit analog-to-digital (AD) conversion combine to offer very fine image detail, finer gradation, far more color information than in previous 12-bit models, and noticeably faster camera performance with improved processing speed and writing to the CompactFlash card.

Standard and basic shooting modes are available on the Mode dial along with three customizable C modes so you can register your most often used modes, exposure, camera, and Custom Function settings. The 40D offers the full complement of metering and drive-mode options that are suitable for a wide range of shooting scenarios. ISO options including ISO expansion cover a broad range of lighting needs, and the noise performance is excellent even at the highest sensitivities. Depending on the ISO, the 40D's dynamic range — the range of dark-to-light values that can be captured by the camera as measured in f-stops — is approximately nine f-stops with both RAW and JPEG shooting, which represents roughly a one f-stop increase over the EOS 30D.

A new autofocus (AF) sensor provides an elliptical distribution of nine cross-type AF points across a bright, optical viewfinder that provides a 95 percent view. The 40D delivers rich, saturated color using any of the seven preset white balance options, plus custom white balance, and the ability to

set a specific color temperature. The 40D supports color-managed workflow with sRGB and Adobe RGB color space options.

This is only a small overview of the new features that the 40D offers. In this chapter, you can study in-depth the 40D functions and controls that you can use to suit your shooting needs and to complement your creative vision. Here you concentrate on the camera controls, menus, file quality, and numbering, as well as shooting modes.

Cross-Reference *Chapter 2 reviews autofocus and exposure options as well as setting ISO and viewing and playing back your images.*

Anatomy of the EOS 40D

Many of the 40D's controls are within a finger's reach for quick adjustment as you're shooting. Less frequently used functions are accessible only via the menus, and others require the simultaneous use of two controls. Regardless, adjustments are easy to master, especially if you understand Canon's functional logic and the grouping of controls.

Camera controls

The 40D groups commonly used functions in three areas on the camera:

✦ **Mode dial.** This dial enables you to switch among shooting modes by lining up the mode you want with the white mark beside the dial. Details on each shooting mode are provided later in this chapter. Setting up C1, C2, and C3 modes is detailed in Chapter 4.

✦ **LCD panel and buttons.** This panel and the buttons on the top of the camera group the most commonly used exposure and drive settings controls, including metering, white balance, focusing mode, drive mode, ISO, and flash exposure. Each button located above the LCD panel has two functions. The first function is controlled using the Main dial and the second function is controlled using the Quick Control dial. For example, if you press the Metering mode-WB button, you can select a metering mode by turning the Main dial, or you can select a white balance (WB) setting by turning the Quick Control dial. Unless you pay attention to which dial sets which function, it's easy to inadvertently set exposure compensation when you really intended to change the ISO. When changing the settings on the LCD panel, you do not need to confirm changes by pressing the Set button.

✦ **Camera menus.** These are accessed by pressing the Menu button on the back of the camera. Nine menu tabs group functions into two Shooting (color-coded red), two Playback (blue), three Set-up (yellow), one Custom Functions (orange), and one My Menu (green) menus. To move among menu tabs, press the Jump button, or tilt the Multi-controller to the left and right. To display submenus, press the Set button located in the center of the Quick Control dial. For expanding menus, use the Quick Control dial to scroll among options, and press the Set button to select and/or confirm an option. Each menu and many of the options are detailed in this chapter.

Top camera controls

The top camera controls provide ease of use so that the thumb and index finger of both the right and left hand control common adjustments quickly and without taking the camera out of shooting position as you hold it. Moving from left to right, here is a look at the top camera controls.

✦ **Mode dial.** Rotate this dial to change the Shooting modes. Shooting modes, detailed in Chapter 2, determine how much control you have over the exposure. The dial is divided between fully automatic Shooting modes such as Portrait, Landscape, and Sports modes, and semiautomatic, fully manual, and customizable modes such as Tv, Av, M, and C modes.

✦ **Hot shoe.** The hot shoe has standard dedicated flash-sync contacts for mounting a Canon EX-series Speedlite or third-party flash unit. The flash sync speed is 1/250 second or slower, or it can be fixed at 1/250 second using C.Fn I-7.

✦ **LCD Panel Illumination button.** Located at the left of the row of buttons above the LCD panel, this button turns on an amber backlight so you can see the panel options in low-light or darkness. Pressing the button once turns the LCD panel light on and pressing it again turns it off. Otherwise, the light remains illuminated for six seconds before turning off automatically. If you are using a Bulb exposure, the light turns off automatically when you press the Shutter button fully.

1.1 40D top camera controls

✦ **LCD Panel and buttons.** Located behind the Shutter button, the LCD panel buttons and the LCD panel control and display frequently used exposure and metering settings and options. Options you change on the LCD panel are displayed only on the LCD panel, except for ISO and Flash Exposure Compensation adjustments which are simultaneously displayed in the viewfinder. The settings you choose remain in effect until you change them, even after turning off the camera.

Table 1.1 shows the LCD panel buttons, options, and the dial that you use to change the settings.

Cross-Reference *See Chapter 4 to set Custom Functions. See Chapter 3 for details on setting the white balance.*

✦ **Main dial.** This dial selects a variety of settings and options. Turn the Main dial to select options after pressing an LCD panel button, to manually select an AF point after pressing the AF-point Selection/Enlarge button, to set the aperture in Av and C modes, the shutter speed in Tv and Manual mode, and to shift the exposure program in P mode. Additionally, you can use the Main dial to scroll among Menu tabs.

✦ **Shutter button.** Pressing the Shutter button halfway sets the point of sharpest focus at the selected AF point in manual AF-point Selection mode, and it simultaneously sets the exposure based on the ISO and selected Shooting mode. Focus remains locked for approximately four seconds, after which time you have to refocus on the subject. Pressing the Shutter completely makes the exposure. In any mode except Direct Printing,

you can also half-press the Shutter button and dismiss camera menus, image playback, and recording to the CF card.

Note *Unless you use AutoExposure Lock or the AF-ON button in Creative Zone modes, focus and exposure are always linked to the selected AF point.*

Cross-Reference *See Chapter 8 for more information on using Canon Speedlites with the 40D.*

Rear camera controls

The back camera controls provide quick access to the menu, various playback and image deletion controls, Picture Styles, and exposure information. They include:

✦ **Menu button.** Press the Menu button to display camera menus. To move among tabs, you can turn the Main dial or tilt the Multi-controller.

✦ **Direct Print button.** When the camera is connected with a PictBridge, Canon CP Direct, or Canon Bubble Jet Direct-enabled printer and the camera is set to Print/PTP, the Direct Print button, in conjunction with the Playback button, displays only JPEG images for cropping, layout, and direct printing.

✦ **Playback button.** Press the Playback button to display the last captured image on the LCD. The default single-image Playback display includes a ribbon of shooting information at the top of the display. Pressing the Index/Reduce button on the top-right back of the camera during playback displays a grid of images you can scroll through using the Quick Control or Main dials. Press the AF-point Selection/Enlarge button to return to single-image display.

Table 1.1
Using the Main and Quick Control Dials for LCD Panel Settings

Button	Main Dial	Quick Control Dial
Metering/WB (Metering mode/White Balance)	Metering Modes • Evaluative (35-zone TTL full-aperture metering) • Partial (9 percent at center frame) • Spot (3.8 percent at center frame) • Center-weighted Average	White Balance • Auto (3000-7000 K) • Daylight (5200 K) • Shade (7000 K) • Cloudy (6000 K) • Tungsten (3200 K) • White Fluorescent (4000 K) • Flash (6000 K) • Custom (2000-10,000 K) • K (Kelvin Temperature, 2500-10,000 K)
AF-Drive (Autofocus mode/Drive mode)	Autofocus Mode • One-shot (locks focus with a half-press of the Shutter button) • AI Focus AF (half-pressing the shutter initiates AF subject movement tracking using the center AF point) • AI Focus AF (monitors subject movement and switches to AI Servo if the camera detects subject movement)	Drive Modes • Single-shot • High-speed Continuous (6.5 fps) • Low-speed Continuous (3 fps) • Self-Timer (10 and 2 second)
ISO-Flash Exposure Compensation	ISO Options • Auto • 100 • 125 • 160 • 200 • 250 • 320 • 400 • 500 • 640 • 800 • 1000 • 1250 • 1600 • H: 3200 (with C.Fn I-3 Expansion turned on)	Flash Compensation Plus/minus 2 stops (EV) in 1/3 or 1/2-stop increments (chosen using C.Fn I-1)

Menu button
Print/Share button
Multi-controller
AF-ON button
Viewfinder
Eyecup
AE Lock/FE Lock/ Index/Reduce button
Mode dial
AF-Point Selection/ Enlarge button

LCD monitor
Playback button
Jump button
Picture Style button
Set button
Access lamp
Quick Control dial

Erase button
Info button
Power/Quick Control dial switch

1.2 40D rear camera controls

✦ **Erase button.** Press the Erase button to display options for deleting the current or all checked images.

Cross-Reference *Checkmarking images for batch erasure is covered in Chapter 2.*

✦ **Jump button.** When the camera menu is displayed, pressing the Jump button scrolls through menu tabs. In Playback mode, pressing this button enables jumping by 1, 10, or 100 images at a time; by screen; or by shot date. When jumping by multiple images, the camera overlays a scroll bar on the LCD image to show relative progress through the images stored on the CF card.

✦ **Info button.** Press the Info button one or more times to change the display of images on the LCD during Playback mode. You also use the Info button to activate Picture Style parameter controls to make adjustments.

✦ **Picture Style button.** Press the Picture Style button to display the Picture Styles menu where you can change the picture style, modify the sharpness, contrast, saturation, and color tone of an existing style, or create and register up to three user-defined styles.

✦ **On/Off switch.** There are three positions on the On/Off switch. Off turns the camera off. In the first On position, the Quick Control dial has limited functionality. In the topmost On position, the Quick Control dial is fully functional.

✦ **Quick Control dial/Set button/access lamp.** Turning the Quick Control dial selects shooting-related settings on the LCD panel and scrolls among menu options. Inset within this dial is the Set button that you use to select menu options and to confirm menu selections. On the lower-right side of the Quick Control dial is an access light that glows red while images are being read to or erased from the CF card.

✦ **Multi-controller.** Above the Quick Control dial is the eight-way Multi-controller that functions as a button when pressed and as a joystick when tilted in any direction. You can use the Multi-controller to manually select an AF point after pressing the AF-point Selection/Enlarge button, select White Balance correction, scroll around an enlarged image in Playback mode, or move the trim frame when printing directly from the camera. You can use the Multi-controller to select camera menu tabs by tilting it left and right, and to move through menu options by tilting it up or down. When using the Multi-controller to manually select an AF point, you can tilt the controller in one direction and tilt again to shift to automatic AF-Point Selection mode.

✦ **AF-ON.** In Creative Zone shooting modes such as Tv, Av, and so on, pressing the AF-ON button initiates autofocusing and serves as an alternative to half-pressing the Shutter button. In Live View shooting, pressing the AF-ON button pauses Live View and drops down the reflex mirror to autofocus provided that C.Fn III-6 is enabled. Releasing the AF-ON button resumes Live View.

Cross-Reference *C.Fn is Canon's abbreviation for Custom Functions, as detailed in Chapter 4. For details on shooting in Live View, see Chapter 5.*

✦ **AE Lock/FE Lock/Index/Reduce button.** Pressing this button sets Auto Exposure (AE) or Flash Exposure (FE) lock, display Index mode during image playback, or reduces the size of an enlarged LCD image during image playback.

✦ **AF-Point Selection/Enlarge button.** Pressing this button activates the AF points in the viewfinder and on the LCD panel so you can manually select one or all AF points. During image playback pressing this button enlarges the image. Both this button and the AE Lock button are press-and-hold buttons that are used in conjunction with the Main, Quick Control, or Multi-controller dials.

✦ **Dioptric adjustment knob.** Located beside the viewfinder, turn this knob to adjust the sharpness of the scene in the viewfinder to suit your eyesight. The range of dioptric adjustment is -3 to +1 diopters. A white mark in the center of the knob shows the movement within the range. If you wear eyeglasses when shooting, be sure to wear them when you set the dioptric adjustment. To set the dioptric adjustment, focus the lens by pressing the Shutter button halfway, and then turn the knob until the image in the viewfinder is sharp.

Front camera controls

The front of the camera is one view of the camera that photographers seldom see. But there are lamps and connections that you'll use often. The buttons and lamps, from left to right side, include the following:

Red-eye Reduction/Self-Timer lamp   EF Lens mount index

Shutter button

Flash button

EOS 40D

Lens Release button

Grip →

Depth of Field Preview button

DC coupler cord hole   Mirror   Contacts   Lens lock pin

Lens mount

1.3 40D front camera controls

✦ **DC coupler cord hole.** Lift up this rubber flap to access connectors including to connect the camera to household power using the optional ACK-E2 AC adapter kit, which provides a coupling unit that inserts into the battery compartment. This power option comes in handy for extended studio shooting or in the unlikely event of battery failure.

✦ **Self-Timer lamp.** This red lamp flashes to count down the seconds to shutter release when the camera is set to either of the two Self-Timer modes.

> **Cross-Reference** *For more details on the Self-Timer modes, see Chapter 2.*

✦ **Depth of Field Preview button.** Press this button to stop down the lens diaphragm to the current aperture to preview the depth of field in the viewfinder. The larger the area of darkness in the viewfinder, the more extensive the depth of field will be. At the lens's maximum aperture, the Depth-of-Field Preview button cannot be depressed because the diaphragm is fully open. The aperture cannot be changed as long as the Depth-of-Field Preview button is depressed. You can also preview depth of field when using the Live View function.
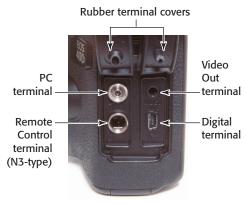
✦ **Lens Release button.** Press this button to disengage the lens from the lens mount, and then turn the lens to the right to remove it.

> **Cross-Reference** *The 40D uses the Canon EF lens mount and is compatible with all EF, EF-S, TS-E, and MP-E lenses. For details on Canon EF lenses, see Chapter 6.*

Camera terminals

On the side of the 40D are a set of terminals under two rubber covers. Each cover is embossed with icons that identify the terminals underneath, which include:

1.4 Camera terminals

✦ **PC terminal.** This threaded terminal is under the first cover closest to the front of the camera body. The terminal connects a flash unit that uses a flash sync cord. The maximum sync speed with non-Canon flash units is 1/250 second. This type of flash unit can be used in concert with a Speedlite attached to the camera's hot shoe. Use the PC Terminal to sync with a studio lighting system.

✦ **Remote Control terminal.** This N3-type terminal, also located under the first cover, connects with a remote control switch to fire the camera to avoid camera shake with long lenses or for macro shooting, or for Bulb exposures. The optional Remote Switch RS-80N3 replicates Shutter button functionality providing both half- and full depression of the shutter as well as a Shutter-release lock.

✦ **Video Out terminal.** The Video Out terminal enables you to connect the camera to a television set using the video cable supplied in the 40D box.

✦ **Digital terminal.** The Digital terminal connects the camera to a compatible printer or directly to a computer to download images. The cable for direct printing comes with the printer and must support PictBridge, PictBridge and CP Direct, PictBridge and Bubble Jet Direct, CP Direct only, or Bubble Jet Direct only.

Side and bottom camera features

On the opposite side of the terminals is the CF card slot and CF card eject button with standard insertion and ejection functionality. The bottom of the camera includes the release latch for the battery compartment, tripod socket, and the cover for the CR2016 lithium date and time battery. The estimated life of the date and time battery is five years. In addition, the bottom of the camera has an Extension system terminal used in conjunction with Canon's Wireless File Transmitter, which is sold separately.

Lens controls

All Canon lenses provide both autofocus and manual focusing functionality via the AF/MF (Autofocus/Manual Focus) switch on the side of the lens. If you choose MF, the 40D provides focus assist, shown in the viewfinder, to confirm sharp focus. When sharp focus is achieved, the Focus confirmation light in the viewfinder burns steadily and the camera emits a focus confirmation beep.

Extension system terminal

Tripod socket

Battery compartment cover

1.5 Bottom camera covers, compartments, and sockets

Filter mounting thread

Focusing ring

Distance scale

Focusing distance range selection switch

Zoom ring

Focus mode switch

Image stabilizer switch

Image stabilizer mode switch

Tripod mount

Orientation locking knob

Lens mounting index

1.6 Lens controls

Depending on the lens, additional controls may include the following:

✦ **Focusing distance range selection switch.** This switch determines and limits the range that the lens uses when seeking focus to speed up autofocusing. The focusing distance range options vary by lens.

✦ **Image stabilizer switch.** This switch turns optical image stabilization on or off. Optical Image Stabilization (IS) corrects vibrations at any angle when handholding the camera and lens. IS lenses typically allow sharp handheld images up to two or more f-stops over the lens's maximum aperture.

✦ **Image stabilizer mode switch.** Offered on some telephoto lenses, this switch has two modes: one mode for standard shooting and one mode for vibration correction when panning at right angles to the camera's panning movement.

✦ **Focusing ring and zoom ring.** The lens focusing ring can be used at any time regardless of focusing mode. On zoom lenses, the zoom ring zooms the lens in or out to the focal lengths marked on the ring.

✦ **Distance scale and infinity compensation mark.** This shows the lens's minimum focusing distance to infinity. The infinity compensation mark compensates for shifting the infinity focus point resulting from changes in temperature. You can set the distance scale slightly past the infinity mark to compensate.

Viewfinder display

The 40D offers an eye-level pentaprism viewfinder that displays approximately 95 percent of the vertical and horizontal coverage. Etched into the viewfinder are nine AF points. When you manually change AF points, the viewfinder highlights each AF point in red after you press the AF-point Selection/Enlarge button, and then tilt the Multi-controller or turn the Main or Quick Control dial. When you press the Shutter button halfway down to focus, the selected AF point is shown in red in the viewfinder. The spot metering circle, which is approximately 3.8 percent of the viewfinder at center, is also etched in the center of the focusing screen.
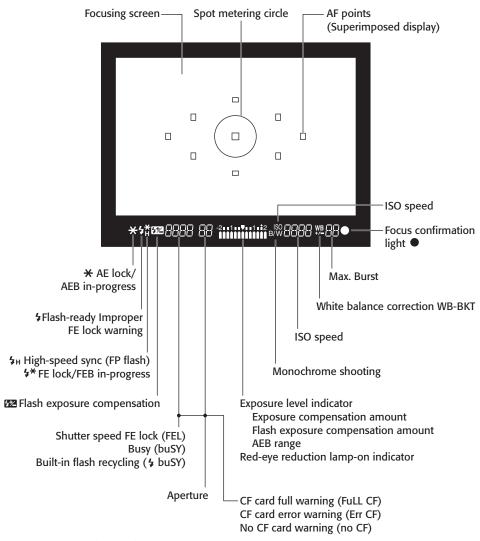
The viewfinder displays exposure information, as shown in figure 1.7. The amount of information shown in the viewfinder depends on the current camera settings. For example, if you are not using the flash, then the Flash-ready icon isn't seen in the viewfinder.

Camera menus

While the LCD panel and the controls on the body of the 40D provide much of the functionality for standard shooting, other important functions are offered in the camera menus. For quick reference, Table 1.2 shows the menus and the options for each camera menu.

The camera menus change based on the Shooting mode that you choose. In Basic Zone modes such as Portrait, Landscape, Sports, and so on, not all of the menus are available. In Creative Zone modes such as P, Tv, Av, M, and A-DEP, the full menus shown in Table 1.2 are available.

Focusing screen — Spot metering circle — AF points (Superimposed display)

ISO speed

Focus confirmation light ●

✶ AE lock/ AEB in-progress

⚡Flash-ready Improper FE lock warning

⚡H High-speed sync (FP flash)
⚡✶ FE lock/FEB in-progress

Flash exposure compensation

Max. Burst

White balance correction WB-BKT

ISO speed

Monochrome shooting

Exposure level indicator
    Exposure compensation amount
    Flash exposure compensation amount
    AEB range
Red-eye reduction lamp-on indicator

Shutter speed FE lock (FEL)
Busy (buSY)
Built-in flash recycling (⚡ buSY)

Aperture

CF card full warning (FuLL CF)
CF card error warning (Err CF)
No CF card warning (no CF)

1.7 40D viewfinder display

Cross-Reference
When you begin using the 40D, the camera is set to the factory default settings shown in Table 2.4 in Chapter 2. As you use and reset the camera and shooting settings, most settings are retained until you change them. If you want to quickly return to the camera defaults, you can restore settings as detailed in Chapter 2. For details on customizing the 40D, see Chapter 4.

Table 1.2
Camera Menus

Menu	Commands	Options
Shooting 1 menu (Red)	Quality	Large /Fine, Large /Normal, Medium /Fine, Medium /Normal, Small /Fine, Small /Normal, RAW, sRAW, sRAW and any of the JPEG image quality settings, or RAW + any one of the JPEG image quality settings
	Red-eye On/Off	Off/On
	Beep	On/Off
	Shoot without a card	On/Off
	Review time	Off, 2 sec., 4 sec., 8 sec., Hold
Shooting 2 menu (Red)	AEB (Auto Exposure Bracketing)	1/3-stop increments by default, up to plus/minus 2 stops
	White balance	Auto (AWB), Daylight, Shade, Cloudy, Tungsten, White Fluorescent, Flash, Custom (2000 to 10000K), Color Temperature (2500 to 10000K)
	Custom WB	Sets a manual white balance
	WB SHIFT/BKT (White Balance shift/bracketing)	White balance correction using Blue/Amber (B/A) or Magenta/Green (M/G) color bias; white-balance bracketing using B/A and M/G bias, available at plus/minus 3 levels in one-level increments
	Color space	sRGB, Adobe RGB
	Picture Style	Standard, Portrait, Landscape, Neutral, Faithful, Monochrome, User Defined 1, 2, and 3
	Dust Delete Data	Locates and records dust on the image sensor so you can use the data in Canon's Digital Photo Professional program to erase dust spots on images
Playback 1 Menu (Blue)	Protect images	Protect images from being deleted
	Rotate	Rotate vertical image from horizontal to vertical orientation only during image playback
	Erase Images	Delete images one-by-one or deletes all check-marked images as a group
	Print Order	Select images to be printed (Digital Print Order Format or DPOF)

Table 1.2 *(continued)*

Menu	Commands	Options
	Transfer order	Select images to download to a computer as a group
	External media backup	Available when the wireless transmitter accessory (WFT-E3A) Wireless Transmitter is used along with external media such as a storage device or computer. Allows images to be stored on external media
Playback 2 Menu (Blue)	Highlight alert	Disabled/Enable. When enabled, overexposed highlights blink in all image-playback displays
	AF-point disp.	Disabled/Enable. Superimposes the AF point that achieved focus on the image during playback
	Histogram	Brightness, RGB. Brightness displays a tonal distribution histogram. RGB displays separate Red, Green, and Blue color channel histograms
	Auto play	Hands-free slide-show playback of images on the LCD
Set-up 1 Menu (Yellow)	Auto power off	1, 2, 4, 8, 15, 30 minutes, Off
	File numbering	Continuous, Auto reset, Manual reset
	Auto Rotate	On for camera and computer, On for camera only, Off. Turns vertical images to upright orientation for the camera's LCD and computer display, or only for the camera's LCD display
	Info button	Normal disp., Camera set, Shoot func. Normal displays the all camera settings. Camera set. displays only exposure settings. Shoot func. enables you to press and change any of the buttons above the LCD panel and set the AF point while watching the large-text LCD
	Format	Initializes and erases images on CF card
	WFT Settings	Displays the wireless file transfer settings when an accessory Canon WFT-E3A is in use
	Recording func.+ media select	Displayed when external recording media such as a portable hard drive is used and the accessory Canon WFT-E3A attached to the camera
Set-up 2 Menu (Yellow)	LCD brightness	Seven adjustable levels of brightness
	Date/Time	Set the date (year/month/day) and time (hour/minute/second)

Menu	Commands	Options
	Language	Choose from 18 language options
	Video system	NTSC/PAL
	Sensor Cleaning	Auto cleaning, Clean now, Clean manually
	Live View function settings	[Live View shoot] Disable/Enable
		[Grid display] On, Off
		[Silent shoot.] Mode 1, Mode 2, Disable
		[Metering timer] 4, 16, 30 sec., 1, 10, 30 min.
	Flash control	Flash firing, Built-in flash func. setting, External flash func. setting, External flash C.Fn setting, Clear ext. flash C.Fn set
Set-up 3 Menu (Yellow)	Camera user setting	Save current camera settings to C1, C2, or C3, and recall them by selecting that C mode on the Mode dial
	Clear all camera settings	Restores the camera's default settings. Does not restore Custom Function to their original default settings
	Firmware Ver. (Firmware Version)	Displays the existing firmware version number, and enables you to update the firmware
Custom Functions Menu (Orange)	C.Fn I: Exposure	Displays Custom Functions related to exposure such as exposure level increments, ISO, bracketing sequence, ISO expansion to 3200, safety shift, and flash sync speed in Av mode
	C.Fn II: Image	Displays Custom Functions related to the image noise and tone including long exposure noise reduction, high ISO speed noise reduction, and highlight tone priority
	C.Fn III: Autofocus/ Drive	Displays Custom Functions related to autofocus and drive operation including lens drive when AF is impossible, lens AF Stop button function, AF-point Selection method, superimposed display, AF-assist beam, AF during Live View shooting, and mirror lockup
	C.Fn IV: Operation/ Others	Displays Custom Functions related to camera controls including Shutter button/AF-ON button, AF-ON/AE lock button switch, Set button during shooting, setting the dial direction for Tv and Av modes, changing to a different focusing screen, adding original data decision data, and Live View exposure simulation

Table 1.2 *(continued)*		
Menu	**Commands**	**Options**
	Clear all Custom Func. (C.Fn)	Restores all of the camera's default Custom Function settings
My Menu (Green)	My Menu settings	Save frequently used menus and Custom Functions

Setting the Date and Time

While setting the date and time seems like a basic task that photographers would do first when setting up the 40D, I include it here for those who want to begin setting up a standard workflow. If you're new to digital photography, you may have heard the term *workflow* and wondered why it's important. As the term suggests, workflow means setting up and sequencing your work so that consistent standards are applied and so that all steps from shooting, through editing, printing, and archiving are as efficient and consistent as possible. Workflow consists of many interrelated processes and setting the date and time impacts your workflow in numerous ways. The image date and time

figures into everything from file naming and file sorting on the computer, to file storage and backup schemes. Ensuring that the date and time are set correctly goes a long way toward maintaining a smooth and consistent workflow.

To set the date and time on the 40D, follow these steps:

1. **Press the Menu button on the back of the camera, and then press the Jump button until the Set-up 2 (yellow) menu appears.**

2. **Turn the Quick Control dial to highlight Date/Time, and then press the Set button.** The camera displays the date and time options with the month option highlighted.

Using Image Dates in the Workflow

When you set the date and time that data travels with each image file as part of the *metadata*. Metadata is a collection of all the information about an image that includes the filename, date created, size, resolution, color mode, camera make and model, exposure time, ISO, f-stop, shutter speed, lens data, and white balance setting. Metadata and *EXIF*, which is a particular form of metadata, are terms that are often used interchangeably.

Because you have access to the metadata in Adobe Bridge, Photoshop, Canon Digital Photo Professional, and other editing programs, you can batch rename files to include the date in the filename. File-naming strategies vary by photographer, but most strategies incorporate the date in both folder and file naming.

3. **Press the Set button, and then turn the Quick Control dial to change the month.** Turning the Quick Control dial clockwise moves to a higher number, and vice versa.

4. **Press the Set button to confirm the change.**

5. **Turn the Quick Control dial to highlight the Day option, and then press the Set button.**

6. **Turn the Quick Control dial to change the day, and then press the Set button to confirm the change.** Repeat Step 5 to change the year, minute, second, and date/time format options, and then press the Set button after each change. You can also choose to show the date as mm/dd/yy, dd/mm/yy, or yy/mm/dd by turning the Quick Control dial to select mm/dd/yy, and then pressing the Set button. Turn the Quick Control dial to scroll through the date/time options, and then press the Set button after selecting the option you want.

7. **When all options are set, turn the Quick Control dial to select OK, and press the Set button.**

Note *If you travel to different time zones, you may want to change the date and time to reflect those of the area where you are shooting.*

Choose the File Format and Quality

The file format you choose determines whether images are stored as JPEGs, in RAW, in sRAW, in both RAW and JPEG format, or as sRAW and JPEG. And the quality level you choose determines not only the number of images you can store on the media card but also the overall quality of the images, and the sizes at which you can enlarge and print images.

RAW versus JPEG format

If you are new to digital photography, or if you're familiar with digital photography but have always shot JPEG images, it's worthwhile to summarize the differences between JPEG and RAW capture.

Note *RAW and JPEG images are saved using the same file number in the same folder. They are distinguished by the file extension.*

JPEG capture

JPEG, which stands for Joint Photographic Experts Group, is a *lossy* file format, meaning that it discards some image data during the process of compressing image data to save space on the media card. In addition, when you edit JPEG images on the computer, each time you save the file during editing, some image data is discarded. As the compression ratio increases, more of the original image data is discarded and the image quality degrades accordingly. On the 40D, compression ratios are denoted by Fine and Normal settings. For example, Large/Fine means a low compression ratio where less data is discarded, but the file size on the CF card is larger. Large/Normal denotes a higher compression ratio where more image data is discarded, but the file size on the CF card is smaller. The difference between the Fine and Normal settings cuts the file size almost in half. The Normal option with higher compression enables you to get more images on the card, but it also means that more image data is being discarded during compression.

In addition, when you shoot in JPEG mode, images are converted from 14-bit files with 16,384 colors per channel to 8-bit files that offer a scant 256 colors per channel. Plus JPEG images are processed — essentially pre-edited — inside the camera before they are stored on the media card. As a result of the low bit depth and the preprocessing, you have far less latitude in editing JPEG images on the computer should you want to make edits. However, the JPEG format enjoys universal acceptance, which means that the images can be displayed on any computer, opened in any image-editing program, and can be printed directly from the camera or the computer.

Note

In Basic Zone modes, only JPEG image-recording quality options are offered. RAW and sRAW image-recording options are available only in Creative Zone modes (P, Tv, Av, M, and A-DEP).

RAW capture

RAW files are in a proprietary format that does not discard image data to save space on the CF card. Because the images are a proprietary format, they can be viewed only in programs and on operating systems that support the file format. Unlike JPEG images, RAW capture saves the data that comes off the image sensor with minimal internal camera processing. Many of the camera settings have been noted but not applied to

What Is Bit-Depth and Should You Care?

A digital picture is made up of many pixels. Each pixel is made up of a group of bits. A bit is the smallest unit of information that a computer can handle. In digital images, each bit stores information that when aggregated with other pixels and color information, provides an accurate representation of the picture.

Since digital images are based on the Red, Green, Blue (RGB) color model, an 8-bit digital image has eight bits of color information for red, eight bits for green, and eight bits for blue. This gives a total of 24 bits of data per pixel (8 bits x 3 color channels). Because each bit can be one of two values, either 0 or 1, the total number of possible values is 2 to the 8th power, or 256 per color channel.

In the RGB color model, the range of colors is represented on a continuum from 0 (black) to 255 (white). On this continuum, an area of an image that is white (with no image detail) is represented by 255R, 255G, and 255B. An area of the image that is black (with no detail) is represented by 0R, 0G, 0B.

An 8-bit file offers 256 possible colors per channel. A 14-bit file, offered with 40D RAW capture, provides 16,384 colors per channel. And then if you save the 14-bit RAW file as a 16-bit file during RAW conversion, the image provides 65,000 colors per channel.

This is important because the higher the bit depth in the file, the finer the detail, the smoother the transition between tones, and the higher the dynamic range (the ability of the camera to hold detail in both highlight and shadow areas) in the final converted and edited image. High-bit-depth images also provide much more latitude in editing images.

the data in the camera, so you have the opportunity to make changes to key settings such as exposure, white balance, contrast, and saturation after the capture is made. The only camera settings that are applied to RAW files in the camera are ISO, shutter speed, and aperture.
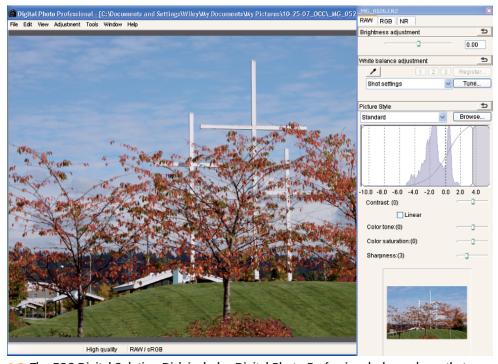
This means that during RAW image conversion, you can make significant adjustments to the image data. Plus, you take full advantage of the 40D's new 14-bit images by processing and saving images as 16-bit-per-channel TIFFs in conversion programs such as Canon's Digital Photo Professional or Adobe Camera Raw.

Essentially, when you choose RAW capture, you postpone the processing of image data, and you retain the ability to decide for yourself whether to preserve or discard tonal levels that may be discarded with JPEG capture.

sRAW capture

The 40D also includes an sRAW image-recording quality option. sRAW is an apt abbreviation for Small RAW. These files, which are slightly larger than half the size of a standard RAW file, are approximately 7.1 MB while a full-resolution RAW file is 12.4MB. But sRAW files offer all the conversion advantages that standard RAW files offer including the ability to change key settings such as adjusting brightness, white balance, contrast, and saturation. You can also choose to shoot sRAW along with any of the JPEG image-recording quality options.

1.8 The EOS Digital Solution Disk includes Digital Photo Professional, shown here, that enables you to process RAW images and adjust brightness, contrast, saturation, and even to change the Picture Style after the image is captured.

The choice of format is yours, of course, and your decision will doubtless include factors such as convenience, image quality, the number of images you need in Burst mode, and the ability to make changes after capturing the image.

Cross-Reference *If you want to learn more about shooting and converting RAW images, read Chapter 10.*

Table 1.3 shows the file format and quality options that you can choose and the effect on images shot in Burst mode.

1.9 This and the next image show some of the differences between JPEG and RAW capture. This is a JPEG image with the camera set to Full Auto mode which uses automatic white balance (AWB). The color is characteristically cool and the image contrast is high.

1.10 By contrast, this image was taken in RAW capture. Using Canon's Digital Photo Professional, I was able to set the white balance by clicking on the white background so that the color accurately reflects the actual light in the scene and the overall image brightness.

Table 1.3
40D File Quality and Burst Rate

Image Quality	Approximate File Sizes	Approx. Number of Shots (1GB card)	Maximum Burst High-Speed	Low-Speed
L (Large/Fine)	3.5	274	75	205
L (Large/Normal)	1.8	523	171	523
M (Medium/Fine)	2.1	454	140	454
M (Medium/Normal)	1.1	854	303	854
S (Small/Fine)	1.2	779	271	779
S (Small/Normal)	0.7	1451	625	1451

Image Quality		Approximate File Sizes	Approx. Number of Shots (1GB card)	Maximum Burst High-Speed	Low-Speed
RAW	**12.4**	1.1	76	17	20
RAW +	**L (Large/Fine)**	12.4+3.5=15.9	59	14	16
	L (Large/Normal)	12.4+1.8=14.2	66	14	16
	M (Medium/Fine)	12.4+2.1=14.5	65	14	16
	M (Medium/ Normal)	12.4+1.1=13.5	70	14	16
	S (Small/Fine)	12.4+1.2=13.6	69	14	16
	S (Small/Normal)	12.4+0.7=13.1	72	20	16
sRAW		7.1	135	17	34
sRAW +	**L (Large/Fine)**	7.1+3.5=10.6	90	17	21
	L (Large/Normal)	7.1+1.8=8.9	107	17	22
	M (Medium/Fine)	7.1+2.1=9.2	103	17	22
	M (Medium/ Normal)	7.1+1.1=8.2	116	17	23
	S (Small/Fine)	7.1+1.2=8.3	115	17	24
	S (Small/Normal)	7.1+0.7=7.8	124	17	25

Note *Fine and Normal denote different levels of compression for JPEG images. A lower rate of compression is applied to Fine than to Normal. The lower the compression rate, the better the image quality and also the larger the file size.*

Note *If you're shooting in Monochrome Picture Style, image file sizes are smaller than indicated in this table.*

Setting File Numbering

Many photographers use the Default option of continuous file numbering offered on the 40D. Like the date and time, continuous file numbers become an integral part of the image-naming scheme for filing, sorting, and archiving images and help prevent having duplicate filenames of the same file type on the computer. If, however, you prefer another naming scheme, the 40D enables you to reset file numbering automatically or manually.

File numbering is assigned from 0001 to 9999. File names begin with the designation IMG_ followed by the image number and file extension: .jpg for JPEG files; or _MG_ followed by the image number and file extension .CR2 for RAW and sRAW images.

Continuous numbering

With Continuous numbering, the default option on the 40D, images are numbered sequentially using a unique four-digit number from 0001 to 9999. Unique filenames make managing and organizing images on the computer easy because it ensures that images of the same file format do not have duplicate filenames.

If you insert a CF card into the camera that already has images on it taken with the 40D, then the camera usually starts numbering with the highest image number that is either stored on the card or that was captured last. To ensure that file numbering remains continuous when you insert a CF card, it's best to ensure that the CF card is empty or has been formatted.

In addition to fitting nicely with my overall file-numbering scheme, I prefer continuous file numbering for two additional reasons: the unique filenames lessen the likelihood of having duplicate filenames on the computer, which makes folder management on the computer easier; and it tracks the number of images up to 9999 per folder, provided that a clean CF card is inserted each time.

> **Note** *The 40D shutter is rated at approximately 100,000 actuations or cycles. This rating provided by Canon is an indication of the life expectancy of the shutter mechanism of the camera.*

Auto Reset

If you like to organize images by media card, Auto Reset may be a useful option. With Auto Reset, file numbering restarts each time you insert a newly formatted CF card. Folder numbers begin with 100, and file numbering begins with 0001, unless the CF card contains a previous image, in which case, numbering begins with the highest file number in the highest numbered folder on the CF card. However, with the Auto Reset option, multiple images will have the same filename. Because of duplicate filenames, you must use scrupulous folder management on the computer to avoid overwriting images with the same name.

Manual Reset

The third option is to manually reset file numbering. With this option, a new folder is automatically created with the next higher folder number than the last, and file numbering restarts with 0001. Subsequent images are saved in the new folder. After the manual reset, whichever file-numbering method you previously used (Continuous or Auto Reset) takes effect when begin shooting again.

Unlike other EOS cameras, the 40D does not offer a direct way to create multiple folders on the CF card. In the case of Manual Reset for file numbering, the camera automatically creates a new folder. You could use this option simply to force the creation of new folders on the CF card. If you do this, the folders are numbered sequentially with three digits beginning with 100 and continuing through 999. Otherwise, the camera uses a single folder to store images.

To change the file numbering method on the 40D, follow these steps:

The 999 and 9,999 Error Message

The maximum number for folders is 999, and the maximum number for images within a single folder is 9,999. This means that if the camera gets to folder number 999, or if image file numbers within any folder reach 9,999, you get an error message on the camera, and you cannot continue shooting.

Getting this error message may sound innocuous, but it brings shooting to a standstill. Recently, I was shooting a live event with another EOS camera. The camera reached the 9,999 image file number minutes after I had inserted an empty CF card into the camera. At image number 9,999, the camera stopped shooting. The last thing on my mind at that moment was the maximum file number. All I could think was that there was almost 2GB of space on a perfectly good CF card. As shots passed by, I finally remembered the numbering limit and replaced the card. I hope that you'll keep this experience in mind so that when you reach image number 9,999, you'll quickly remember to replace the CF card.

1. **Press the Menu button, and then press the Jump button until the Set-up 1 (yellow) menu appears.**

2. **Turn the Quick Control dial to highlight File numbering, and then press the Set button.** The camera displays the File numbering options with Continuous highlighted as the default setting.

3. **Turn the Quick Control dial to highlight the option you want.**

4. **Press the Set button.** Except for Manual Reset, the option you set remains in effect until you change it.

Shooting Modes

Central to using the 40D is understanding the shooting modes offered on the Mode dial. The 40D offers both the basic point-and-shoot modes, referred to as Basic Zone modes, as well as the traditional shooting semiautomatic and manual modes, referred

to as Creative Zone modes In addition, the 40D features three customizable Camera User setting modes, denoted as C1, C2, and C3 on the Mode dial.

Cross-Reference *Camera User Setting modes, or C modes, are detailed in Chapter 4.*

✦ **Basic Zone modes.** These modes set all exposure settings, the drive mode, the AF point(s), and the built-in flash fires automatically for quick, point-and-shoot type photography. Basic Zone modes are Full Auto, Portrait, Landscape, Close-up, Sports, Night Portrait, and Flash Off. Each mode is represented by a pictorial icon on the Mode dial except for Full Auto, which is denoted by a green rectangle.

✦ **Creative Zone modes.** These modes offer either semiautomatic or fully manual camera control so that you control one or all of the exposure settings. In these modes, you can control the drive mode,

choose either automatic AF point or manual AF point selection, and control the use of the built-in flash. The Creative Zone modes are: Program AE (P), Shutter-priority AE (Tv), Aperture-priority AE (Av), Manual exposure (M), and Automatic Depth of Field AE (A-DEP).

✦ **Camera User settings**. Camera User settings are denoted as C1, C2, and C3 on the Mode dial. In each of these Mode dial positions, you can set, register, and recall your favorite camera settings to one or more of these modes. C modes provide unprecedented ability to save camera settings for specific shooting venues such as a sports arena, a specific wedding chapel, or a studio.

Cross-Reference *Chapter 4 details how to program the Camera User setting modes.*

Note *Throughout the book, I refer to shooting modes using the designations Basic Zone and Creative Zone modes.*

To switch to any of the shooting modes, turn the Mode dial to line up the mode you want with the white mark on the camera body next to the dial. Unless you've registered camera settings for C1, C2, and C3, these modes are programmed with the camera's default setting for image quality, metering, automatic ISO, and so on. To use these modes effectively, you must first register your favorite camera settings.

Basic Zone modes

The Basic Zone modes are designed to be quick and easy to use by choosing the type scene that you're shooting. For example, if you're photographing a landscape, the Landscape mode automatically sets classic exposure settings for this type of scene. The advantage of these modes is that you don't have to understand exposure or set any controls except the Mode dial. The downside is that the camera takes full control, which means that you can't set the focus point where you want, you cannot change any exposure settings, and the camera automatically fires the flash in some modes. These modes are a handy way to get started using the 40D and get classic photographic looks.

For example, if you want a softly blurred background for a portrait, select Portrait mode. The camera sets a wide aperture (f-stop) to blur the background, selects the Portrait Picture style to enhance skin tones, and fires the flash automatically if it detects low light, among other settings.

In all Basic Zone modes, the camera automatically sets the image quality to JPEG, although you can select the level of JPEG quality. The camera also automatically selects the following:

✦ ISO

✦ sRGB color space

✦ Automatic AF point selection

✦ White balance

✦ Evaluative metering

✦ Automatic flash depending on the ambient light

Live View shooting is not available in any of the Basic Zone modes.
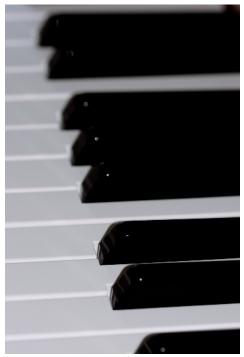
Cross-Reference *Live View shooting is detailed in Chapter 5.*

Full Auto mode

In Full Auto mode, the camera automatically sets the aperture, shutter speed, ISO, drive mode, autofocus mode, white balance, and Picture Style. In short, Full Auto mode provides point-and-shoot functionality.

Because the camera sets everything, this appears to be a good mode for quick snapshots. However, the camera defaults to using the flash, even in scenes where you may not want it. In addition, the camera too often sets an unnecessarily aggressive ISO, usually starting at ISO 400, even in bright light.

1.11 This image was taken in Full Auto mode. The camera fired the flash automatically and set the AF points putting the point of sharpest focus toward the bottom of the keyboard. The camera's automatic exposure was ISO 400, f/4.0, 1/60 sec. using an EF 100mm f/2.8 USM lens.

Also in Full Auto mode, the camera automatically selects the Automatic AF point(s). It may choose a single AF point—typically set on an area of the subject that is closest to the lens and that has readable contrast. Or it may select two or more AF points. The camera displays the selected AF points in red in the viewfinder so that you can see where the camera will set the point of sharpest focus. If the subject-to-camera distance changes, the camera automatically switches to AI Servo AF mode which maintains focus by tracking subject movement.

> **Tip** *If the camera doesn't set the point of sharpest focus where you want, you can try to force it to choose a different AF point by moving the camera position slightly one or more times. If you want to control where the point of sharpest focus is set in the image, then it is better to switch to a Creative Zone mode and set the AF point manually.*

In Full Auto mode, the camera also sets Single-shot drive mode and Standard Picture Style. You can choose to use the 10-second Self-Timer drive mode.

> **Cross-Reference** *Chapter 3 details the preset Picture Styles as well as your options for customizing Picture Styles.*

Portrait mode

In Portrait mode, the 40D sets a wide aperture that makes the subject stand out against a softly blurred background. The 40D also switches to Portrait Picture Style to enhance the subject's skin tones. This mode works well for quick portraits in good light. In low-light scenes, the camera automatically fires the flash, which may or may not be the effect you want in the portrait. While flash can create an unnatural and hard look for portraits, the flash performance on the

40D is much improved over previous EOS models. The flash output typically balances nicely with the ambient light to create a fill-flash look rather than flooding the subject with too much artificial-looking light. You can optionally turn on Red-eye reduction. In Portrait mode, the camera automatically selects Low-speed continuous drive mode at 3 fps. You can choose to use the 10-second Self-Timer drive mode.

1.12 This image was taken in Portrait mode. The camera's automatic exposure was ISO 400, f/4.5, 1/750 sec.

As with other programmed modes, you can use scene modes for a variety of other types of subjects. For example, Portrait mode works well for nature and still-life photos indoors and outdoors.

In Portrait mode, the camera automatically selects the AF point(s). When the camera chooses the AF point, it looks for several things such as points where lines are well defined, the object that is closest to the lens, and the point of strongest contrast. However, the subject's eyes are where the point of sharpest focus should be in a portrait and eyes often do not fit these criteria. If you can't force the camera to refocus on the eyes, choose a Creative Zone mode instead, such as Av, set a wide aperture, and then manually select the AF point that is over the subject's eyes.

Landscape mode

In Landscape mode, the 40D chooses a narrow aperture to ensure that background and foreground elements are acceptably sharp and that the fastest shutter speed possible, depending on the amount of light in the scene, is used. This mode works well not only for landscapes but also cityscapes, and for portraits of large groups of people.

In lower light, the camera uses slower shutter speeds to maintain a narrow aperture for good depth of field and increases the ISO. As the light fades, watch the viewfinder or LCD panel to monitor the shutter speed. If the shutter speed is 1/30 second or slower, and if you're using a telephoto lens, steady the camera on a solid surface or use a tripod. In Landscape mode, the camera automatically sets One-shot autofocus with automatic autofocus point (AF) selection, Single-shot drive mode, Flash-off mode, and Landscape Picture Style. You can choose to use the 10-second Self-Timer drive mode.

1.13 This image was taken in Landscape mode using the Landscape Picture Style. The camera's automatic exposure was ISO 100, f/5.6 at 1/125 sec. using an EF 24-70mm f/2.8L USM lens.

Close-up mode

In Close-up mode, the 40D allows a close focusing distance and sets a wide aperture. It chooses One-shot drive mode and the Standard Picture Style. You can enhance the close-up effect of a close-up image further by using a macro lens. If you're using a zoom lens, zoom to the telephoto end of the lens when shooting in this mode. For the best images, focus at the lens's minimum focusing distance. The easiest way to determine the minimum focusing distance is to listen for the beep that confirms sharp focus or watch for the focus confirmation light in the viewfinder. If you don't get confirmation, move back slightly, refocus, listen for the beep and watch for the focus confirmation light. Repeat this process until the camera confirms that focus has been achieved.

In Close-up mode, the camera automatically sets One-shot autofocus with automatic autofocus point (AF) selection, Single-shot drive mode, Automatic flash with the option to turn on red-eye reduction, and Standard Picture Style and Automatic White Balance. In this mode, you can choose to use the 10-second Self-Timer drive mode.

Sports mode

In Sports mode, the 40D freezes subject motion by setting as fast a shutter speed as the ambient light allows. While this mode is designed for action and sports photography, you can use it in any scene where you want to freeze subject motion, such as the motion of a moving child or a pet. This can be a useful mode for shooting events and receptions.

1.14 This image was taken in Close-up mode with the Standard Picture Style. The camera's automatic settings were ISO 400, f/5.6 at 1/160 sec. using an EF 24-70mm f/2.8L IS USM lens.

1.15 This image was taken in Sports mode using the Standard Picture Style. The camera's automatic settings were ISO 400, f/4.0 at 1/500 sec. using an EF 24-70mm f/2.8L USM lens.

In this mode, the 40D automatically focuses on the subject and tracks the subject's movement until good focus is achieved, which is confirmed with a low beep. If you continue to hold the Shutter button down, the camera maintains focus for continuous shooting. In Sports mode, the camera automatically sets AI Servo AF mode with automatic autofocus point (AF) selection, High-speed continuous drive mode at 6.5 fps, Flash off, and Standard Picture Style. You can choose to use the 10-second Self-Timer drive mode.

Night Portrait mode

In Night Portrait mode, the 40D combines the flash to correctly expose the person with a slow sync speed to correctly expose the background. Because this mode uses a longer exposure, the subject should remain still during the entire exposure to avoid blur. Be sure to use a tripod to take night portraits.

This mode is best used when people are in the picture rather than for general night shots because the camera sets a wide aperture that softly blurs the background. In Night Portrait mode, the camera automatically sets One-shot autofocus with automatic autofocus point (AF) selection, Single-shot drive mode, automatic flash with the ability to turn on Red-eye reduction, and Standard Picture Style. You can choose to use the 10-second Self-Timer drive mode.

Flash Off mode

In Flash Off mode, the 40D does not fire the built-in flash or an external Canon Speedlite regardless of how low the scene light is. When you are using Flash-off mode in low-light scenes, be sure to use a tripod. This is the mode to use in scenes where flash is prohibited and when the subject is out of range of flash coverage. In Flash Off mode, the camera automatically sets AI Focus AF with automatic autofocus point (AF) selection, and Single-shot drive mode. You can choose to use the 10-second Self-Timer drive mode.

Creative Zone modes

Creative Zone modes offer semiautomatic or manual control over some or all exposure settings. This zone includes two modes, Program AE and A-DEP, which offer a higher degree of automation without sacrificing complete control of the camera as Basic Zone modes do. The other three Creative Zone modes, Aperture-priority AE, Tv Shutter-priority AE, and Manual exposure mode, put full or partial creative control in your hands.

Live View shooting, detailed in Chapter 5, is available in all Creative Zone modes.

Program AE

Program AE mode, denoted as P on the Mode dial, is an automatic but shiftable mode. Shifting means that you can change the aperture by turning the Main dial, and the camera automatically sets the shutter speed to an equivalent exposure. For example, if the camera initially sets the exposure at f/2.8 at 1/30 second, and you turn the Main dial one click to the left to shift the program, the exposure shifts to f/3.2 at 1/20 second. Turning the Main dial to the right results in a shift to f/4.0 at 1/15 second, and so on.

An advantage of P mode is the ability to control the depth of field and/or shutter speed with a minimum of manual exposure adjustments. When you shift the exposure and make the picture, the camera then automatically reverts back to the automatic settings for the next image. Program AE can't be used with the flash.

In Program AE mode, you can set the image quality, color space, ISO, White Balance, and the Drive, Metering, and autofocus modes.

P mode is the mode that makes sense for grab shots at a wedding, event, and for personal family snapshots. P mode offers the advantage of semi-automated shooting and/or quickly shifting to a more desirable aperture. Plus, this mode supports RAW or sRAW images, and your preferred color space.

1.16 This image was taken in P mode using a Canon EF 85mm f/1.2L II USM lens with an extension tube. I wanted to capture the cross with a gentle blur, which is relatively easy using a super-wide aperture. Exposure: ISO 100, f/1.8 at 1/160 second with one stop of exposure compensation to compensate for the extension tube.

1.17 Using P mode allowed me to quickly get an equivalent exposure at f/5.0 to increase the depth of field slightly. Exposure: ISO 100, f/5.0, 1/25 sec. with one stop of exposure compensation. This image was made using primarily north light (with a bit of east light) that provides a singular glow and clarity to the subject.

Shutter-Priority AE

Shutter-Priority AE mode, denoted as Tv on the Mode dial, is the semiautomatic mode that enables you to set the shutter speed while the camera automatically sets the aperture. And with the 40D's mechanical, focal-plane shutter and electronic shutter speed control, you can choose from 1/8000 to 30 seconds and Bulb. (Bulb keeps the shutter open as long as the Shutter button is depressed.)

In Tv mode, you set the shutter speed by turning the Main dial. When you press the Shutter button halfway, the camera calculates the required aperture based on the shutter speed, ISO, the light meter reading.

If the exposure falls outside of the 40D's exposure range, the aperture value blinks in the viewfinder and on the LCD panel letting you know to set a different shutter speed to avoid overexposure or underexposure. If the lens's maximum aperture blinks, the image will be underexposed. Set a slower shutter speed by turning the Main dial. If the lens's minimum aperture blinks, the image will be overexposed. Set a faster shutter speed. You can also set a higher or lower ISO setting, respectively. The 40D displays the shutter speed in the viewfinder and on the LCD panel.

In Shutter-Priority AE mode, you have full control over the camera's exposure controls, Picture Style, and the built-in or accessory flash use and settings.

Shutter speed increments can be changed from the default 1/3-stop to 1/2-stop increments using C.Fn I-1. Flash sync speed is 1/250 second or slower.

Cross-Reference *For details on setting Custom Functions, see Chapter 4.*

In the default 1/3-stop increments, shutter speeds are: 1/8000, 1/6400, 1/5000, 1/4000, 1/3200, 1/2500, 1/2000, 1/1600, 1/1250, 1/1000, 1/800, 1/640, 1/500, 1/400, 1/320, 1/250, 1/200, 1/160, 1/125, 1/100, 1/80, 1/60, 1/50, 1/40, 1/30, 1/25, 1/20, 1/15, 1/13, 1/10, 1/8, 1/6, 1/5, 1/4, 0.3, 0.4, 0.5, 0.6, 0.8, 1, 1.3, 1.6, 2, 2.5, 3.2, 4, 5, 6, 8, 10, 13, 15, 20, 25, 30 sec.

1.18 To show the motion of the water as a blur, I used Tv mode and set the shutter speed to 1/13 sec. Exposure: ISO 100, f/22, using a Canon EF 25-105mm, f/2.8L IS USM lens.

> **Note** *For both Tv and Av modes, you can set C.Fn I-6 to enable a safety shift in exposure. The shift comes into play if the lighting on the subject changes enough to make the current shutter speed or aperture unsuitable. Enabling this function causes the camera to automatically shift to a suitable exposure.*

Shutter designations in the viewfinder and LCD panel are shown with the number representing the denominator of the fractional value. For example, 8000 indicates 1/8000.

When shutter speeds are shown using a zero, a double-quote mark, and a number, the quote mark designates a decimal point. So 0"3 is 0.3 seconds while 15" indicates 15.0 seconds.

> **Note** *You can also select Bulb, which keeps the shutter open as long as the Shutter button is depressed. While Bulb is related to shutter speed, it cannot be accessed using Tv mode. Instead you have to switch to Manual mode to select Bulb.*

Aperture-Priority AE

Aperture-Priority AE mode, denoted as Av on the Mode dial, is the semiautomatic mode that offers control over the aperture. In this mode, you control the aperture by turning the Main dial, and the camera automatically calculates the appropriate shutter speed based on the light meter reading, the metering mode, and the ISO.

If the exposure is outside the camera's exposure range, the shutter speed value blinks in the viewfinder and on the LCD panel. If "8000" blinks, the image will be overexposed. If "30" blinks, the image will be underexposed. In either case, adjust to a smaller or larger aperture, respectively, until the blinking stops or set a lower or higher ISO setting. The 40D displays the selected aperture in the viewfinder and on the LCD panel.

> **Note** *You can preview the depth of field by pressing the Depth-of-Field Preview button on the front of the camera. When you press this button, the lens diaphragm stops down to the highlighted aperture so that you can preview the range of acceptable focus.*

The range of available apertures depends on the lens you're using. Aperture increments can be set in the default 1/3 -stop or 1/2-stop values by changing the setting for C.Fn I-1.

1.19 Av mode controls the rendering of the background in this Christian music concert image. I wanted the front vocalist to be in sharp focus with the other vocalist slightly blurred in the background so I chose f/2.8 to get a shallow depth of field. Exposure: ISO 400, f/2.8, 1/40 sec., using an EF 24-70mm, f/2.8L IS USM lens.

In 1/3-stop increments, and depending on the lens you use, available apertures are as follows: f/1.0, 1.1, 1.2,1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.5, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11, 13, 14, 16, 18, 20, 22, 25, 29, 32, 36, 40, 45, 51, 57, 64, 72, 81, and 91.

Practically speaking, however, the narrowest minimum aperture is f/45 on the Canon EF 75-300 f/4-5.6 lenses.

In Aperture-Priority AE mode, you have full control over the camera's exposure settings, Picture Style, and the built-in or accessory flash use and settings.

> **Cross-Reference** *For more information on Canon lenses, see Chapter 6.*

Manual mode

Manual mode, denoted as M on the Mode dial, gives you full manual control. You set both the aperture and shutter speed based on the exposure level meter shown in the viewfinder and on the LCD panel. This mode is useful in a variety of shooting scenarios including shooting fireworks, astral photography, for some studio shooting, when you want to intentionally underexpose or overexpose the scene, or when you want a consistent exposure across a series of photos such as for a panoramic series.

In Manual mode, you set the exposure by turning the Main dial to select the shutter speed and the Quick Control dial to select the aperture.

Pressing the Shutter button halfway, initiates the metering. The camera's ideal exposure is indicated when the tick mark is at the center of the exposure level indicator shown in the viewfinder.

1.20 Manual mode is great for shots such as this image of the moon where I know in advance what exposure settings would work best. Exposure: ISO 100, f/3.5, 1/40 sec. using an EF 70-200mm f/2.8L IS USM lens.

The exposure level meter also displays the amount of overexposure or underexposure from the camera's ideal exposure. If the amount of under- or overexposure is +/- 2 Exposure Values (EV), the exposure level indicator bar blinks to show the amount of plus or minus EV in the viewfinder and on the LCD panel. You can then adjust either the aperture or shutter speed until the exposure level you want is displayed.

In Manual mode, you have full control over the camera's exposure controls, Picture Style, and the built-in or accessory flash use and settings.

Bulb

Bulb keeps the shutter open as long as the Shutter button is fully depressed—up to 2.5 hours on a fully charged battery. To ensure stability during Bulb exposures, you can use the Remote Switch RS-80N3 or Timer Remote Controller TC-80N3 to keep the shutter open.

Bulb is handy for low-light and night shooting, fireworks, celestial shots, and other creative long-exposure renderings. Bulb is accessible only in Manual mode. Because long exposures introduce digital noise and increase the appearance of grain, consider using the Long Exposure Noise Reduction option that is available with C.Fn II-1.

To select Bulb, follow these steps:

1. **Set the Mode dial to M (Manual).**

2. **Turn the Main dial counterclockwise to select Bulb (the setting past the 30-second option).**

3. **Turn the Quick Control dial to set the aperture.** You can use the accessory Timer Remote Switch RS-80N3 or Timer Remote Controller TC-80N3 to set the exposure time, or you can watch the elapsed time on the LCD panel for the length of exposure time that you want. In addition, you can use Mirror lockup (C.Fn III-7) to prevent vibration from the reflex mirror during long exposures.

1.21 You can use either Bulb or Manual mode for fireworks shots. Exposure: ISO 100, f/11, 1/7 sec. using an EF 70-200mm, f/2.8L IS USM lens.