Digital Camera D7000
PC Mode Specifications

Rev. 1.00

Nikon Corporation
Imaging Company
Development Department

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1. OUTLINE

These specifications define the PC mode as the situation in which the digital camera D7000 (hereinafter referred to as the camera) and the PC are connected by the USB and the USB communication has been established.

Although USB is also used for the connection with the wireless transmitter or the printer that supports PictBridge, this situation is not included in the PC mode.

The following protocol is adopted when connecting with the host in PC mode.

- PTP/MTP (Image Interface)

For the detailed specifications of the protocols, refer to the specifications below.

- PTP/MTP: D7000 USB Still Image Capture Device Media Transfer Protocol (MTP) Specifications

2. PROCESS FLOW

This chapter describes the process when the camera is connected with the PC using USB.

2.1. USB Signal Lines

USB has the following signal lines.

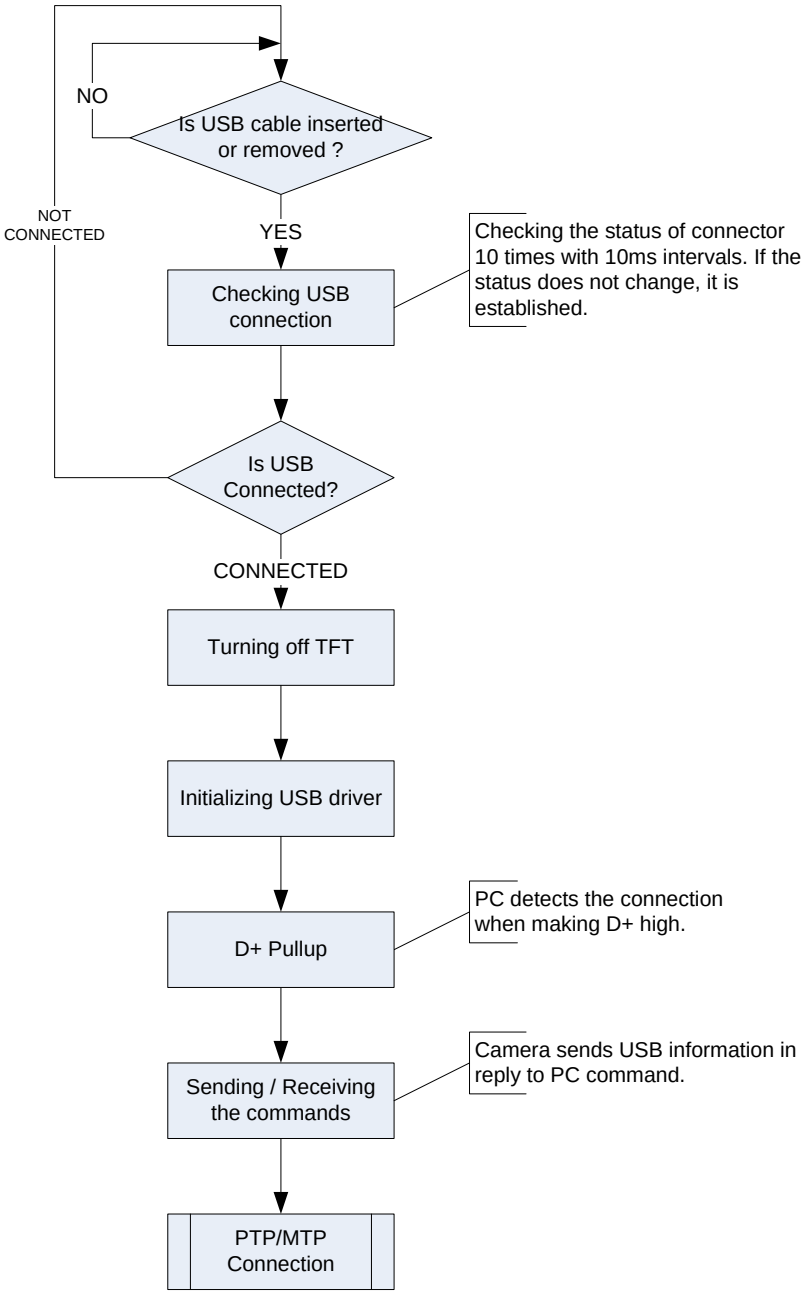
1) V BUS
2) D+
3) D-
4) GND

- The condition for the camera to detect USB connection
  5V current is supplied on V BUS line of the camera.

- The condition for the PC to detect USB connection
  D+ line of the PC is pulled up.

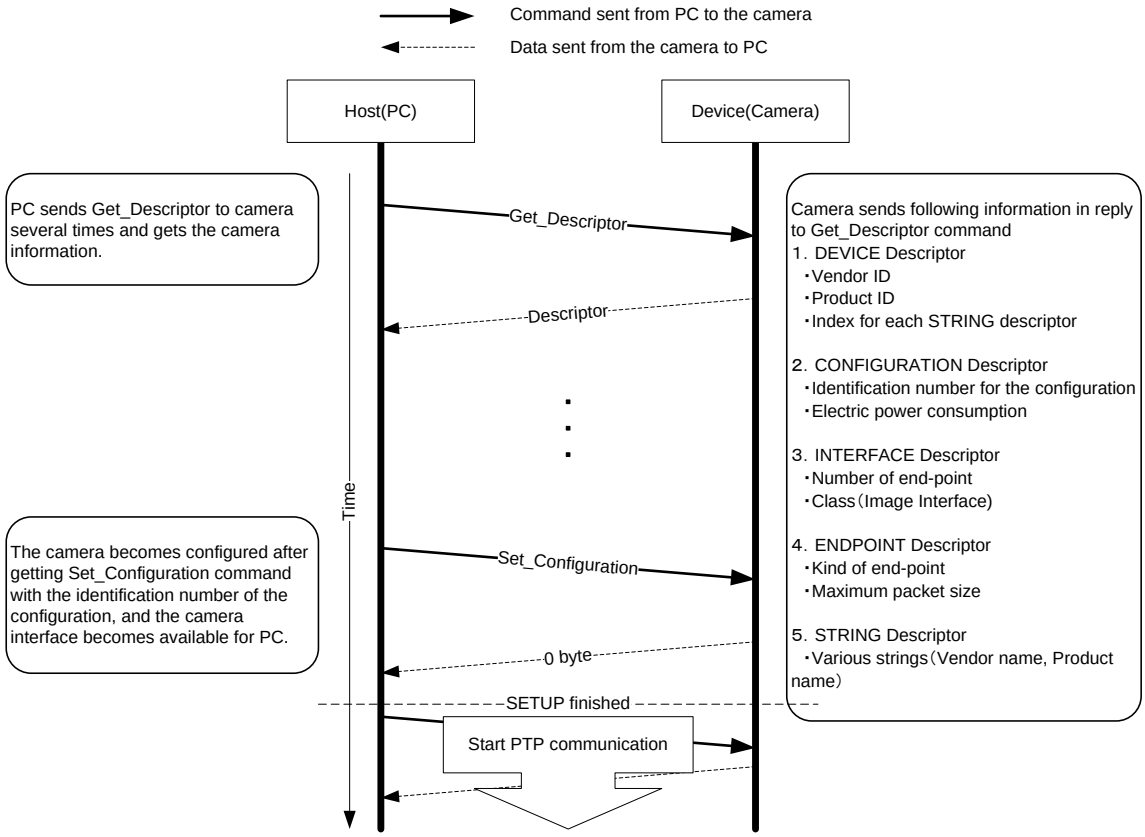
2.2. Finding USB

In this section, the flowchart of the process on the camera is described when the camera finds USB.



2.3. PTP / MTP

The flowchart of the process when the camera is connected in the PTP/MTP mode is shown below.



3. PC MODE

When the camera is connected to the PC with the USB cable, the camera automatically enters the PC mode.
When the USB cable is released, the PC mode is also released automatically.
The timing when shifting to the PC mode changes depending on the status of the camera.

Shifts to the PC mode after the processing is completed in the case below
- During shooting (AF operation, release operation)
- During formatting
- During image recording to the card
- During access to the card
- During the preview operation

Aborts the processing and then shifts to the PC mode in the case below
- During the self-timer operation
- Two-button-formatting waiting status
- Preset release waiting status
- Dust reference release waiting status
- During the TFT display (menu display / playback display)
- Mirror-up shooting waiting status (during the mirror-up)
- During multi-exposure operation
- During Live view (including the movie shooting)
- Cleaning mirror-up operation waiting status

The camera does not shift to the PC mode in the cases below.
- While the cleaning mirror-up operation is being performed
- While the interval-timer shooting
- During the firmware updating
- Battery level “Operation disabled status”
- During the power interruption (during the power SW-OFF status in the camera)
- During HDMI-CEC

3.1. PC Camera Mode / PC Host Mode

During PC mode, the camera supports PC camera mode (targeted for the camera operation) and PC host mode (targeted for the PC operation), because the available functions on the camera vary depending on the status of use.
- PC camera mode : This mode is used for the operation by the camera.
- PC host mode : This mode is used for the operation by the PC.

3.1.1. PC camera mode

This is the default mode during the PTP/MTP connection.
During camera mode, the operation on the camera becomes valid and shooting by the shutter-release button of the camera is enabled (whether the captured image data is recorded to the card or transferred to the PC is described later).
The PC has no control of the operation section on the camera but the acquisition of the status is possible.
The control other than the operation section of the camera (such as the menu items) can be operated by the PC as well.
When the operation section is controlled by the PC in the PC host mode and the mode is switched to the PC camera mode, the control on the operation section made by the PC during host mode is canceled and the information of the buttons/dials on the camera is used.

The camera is switched to the application mode by the request of the PC.
When the camera is switched to the application mode, the function of the playback button and part of the playback menu in the camera can be used.

3.1.2. PC host mode

When the host mode switching request from the PC is made or the command processing from the PC is executed during the PTP/MTP connection, the mode is switched to the PC host mode automatically.

For the automatic switching by the command processing, the mode is switched to the PC camera mode automatically after the processing is completed.

In the PC host mode, the operation of the buttons/dials (except the power switch) or menu of the camera becomes invalid and the operation from the PC becomes valid.

4. OPERATION ON THE CAMERA

The camera operation differs depending on the PC mode state.

The available operations in the PC camera mode and PC host mode are shown below.

4.1. Validity of Operation of Buttons/Dials

Whether the operation of the buttons/dials is valid or not is shown below.

PC mode		Camera mode		Host mode
Application mode		OFF	ON	--
Name of the operation section	Power switch	Valid	Valid	Valid
	Shutter-release button	Valid	Valid	Invalid
	Exposure mode button / Two-button reset button	Valid	Valid	Invalid
	Metering mode button / Format button	Valid (*1)	Valid	Invalid
	Release mode dial	Valid	Valid	Invalid
	Operation mode dial	Valid	Valid	Invalid
	Flash mode button / Flash compensation button	Valid	Valid	Invalid
	Auto-bracketing button	Valid	Valid	Invalid
	AFmode button	Valid	Valid	Invalid
	Focus-mode selector	Valid	Valid	Valid
	Playback button	Invalid	Valid	Invalid
	Delete button / Format button	Invalid	Valid	Invalid
	Menu button	Valid	Valid	Invalid
	Help button / Protect button / White balance button	Valid	Valid	Invalid
	Playback zoom-out button / Thumbnail button / ISO Sensitivity button	Valid	Valid	Invalid
	Playback zoom-in button / Image quality mode button / Image size button / Two-button reset button	Valid	Valid	Invalid
	AE/AF lock button	Valid	Valid	Invalid
	Live view button	Invalid	Invalid	Invalid
	Movie button	Invalid	Invalid	Invalid
	Multi selector	Valid	Valid	Invalid
	OKbutton	Valid	Valid	Invalid
	Focus selector lock	Valid	Valid	Invalid
	Information button	Valid	Valid	Invalid
	Main command dial	Valid	Valid	Invalid
	Sub command dial	Valid	Valid	Invalid
	Function button	Valid	Valid	Invalid
	Preview button	Valid	Valid	Invalid

*1) Format function is invalid when camera mode is selected and application mode is OFF.

4.2. Possibility of Menu Item Setting

Whether the menu item can be set from the camera is described below.

4.2.1. Playback menu

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

PC mode		Camera mode		Host mode
Application mode		OFF	ON	--
Menu item	Delete	No	Yes	No
	Playback folder	No	Yes	No
	Hide image	No	Yes	No
	Display mode	Yes	Yes	No
	Copy image	No	No	No
	Image review	No	Yes	No
	After delete	Yes	Yes	No
	Rotate tall	Yes	Yes	No
	Slide show	No	No	No
	Print set (DPOF)	No	No	No

4.2.2. Shooting menu

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

PC mode		Camera mode		Host mode
Application mode		OFF	ON	--
Menu item	Reset shooting menu	Yes	Yes	No
	Sub slot function	Yes	Yes	No
	Set Picture Control	Yes	Yes	No
	Manage Picture Control	C (*1)	C (*1)	No
	Image quality	Yes	Yes	No
	Image size	Yes	Yes	No
	JPEG compression	Yes	Yes	No
	NEF (RAW) recording	Yes	Yes	No
	White balance	Yes	Yes	No
	ISO sensitivity settings	Yes	Yes	No
	Active D-Lighting	Yes	Yes	No
	Color space	Yes	Yes	No
	Auto distortion	Yes	Yes	No
	Long exp. NR	Yes	Yes	No
	High ISO NR	Yes	Yes	No
	Active folder	No	Yes	No
	File naming	Yes	Yes	No
	Multiple exposure	No	No	No
	Movie setting	Yes	Yes	No
	Interval timer shooting	No	No	No
	Remote control mode setting	Yes	Yes	No

*1. “Load/save” cannot be operated.

4.2.3. Custom menu

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

PC mode	Camera mode		Host mode
Application mode	OFF	ON	--

Menu item	Custom menu (all items)	Yes	Yes	No

4.2.4. Setup menu

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

PC mode		Camera mode		Host mode
Application mode		OFF	ON	--
Menu item	Format memory card	No	C (*3)	No
	LCD brightness	Yes	Yes	No
	Clean image sensor	Yes	Yes	No
	Lock mirror up for cleaning	No	No	No
	Video mode	Yes	Yes	No
	HDMI	Yes	Yes	No
	World time	Yes	Yes	No
	Language	Yes	Yes	No
	Image comment	Yes	Yes	No
	Auto image rotation	Yes	Yes	No
	Dust off ref photo	Yes	Yes	No
	Battery info	Yes	Yes	No
	Wireless transmitter	No	Yes	No
	Copyright information	Yes	Yes	No
	Save/load settings	C (*1)	C (*1)	No
	GPS	Yes	Yes	No
	Display level	Yes	Yes	No
	Non-CPU lens data	Yes	Yes	No
	AF fine tune	Yes	Yes	No
	Eye-Fi function	Yes	Yes	No
	Firmware version	C (*2)	C (*2)	No
	Set user setting	Yes	Yes	No
	Reset user setting	Yes	Yes	No

*1. “Load camera setting” is disabled.
*2. The firmware version upgrade is disabled.
*3. This function is available when CameraControlPro2 is connecting and the memory card is included in image recording media

4.2.5. Image editing menu

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

PC mode		Camera mode		Host mode
Application mode		OFF	ON	--
Menu item	Image editing menu (all items)	No	Yes	No

4.2.6. My menu

This is consistent with the each menu item.

4.3. Available Operations for Functions

Available operations on the camera are shown below.

(Yes: Operation is enabled. C: Some limitation exists. No: Operation is disabled.)

			Operation on camera			Operation on PC		
PC mode			Camera mode		Host mode	Camera mode		Host mode
PC application mode			OFF	ON	—	OFF	ON	—
Function	Shooting operation	Single frame shooting	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
		Continuous shooting	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
		Self-timer shooting	Yes	Yes	No	C(*1)	C(*1)	C
		Mirror-up shooting	Yes	Yes	No	C(*1)	C(*1)	C
		Quiet mode shooting	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
		Bulb shooting	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
		Interval timer shooting	No	No	No	No	No	No
		Preset data acquisition	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
		Image dust off data acquisition	Yes	Yes	No	Yes(*1)	Yes(*1)	Yes
	AF operation		Yes	Yes	No	C(*1)	C(*1)	Yes
	Live view		No	No	No	Yes(*1)	Yes(*1)	Yes
	Two-button reset		Yes	Yes	No	No	No	No
	Two-button format		No	Yes	No	No	No	No
	Card operation	Playback of image	No	Yes	No	C(*1)	C(*1)	Yes
		Deletion of image	No	Yes	No	Yes(*1)	Yes(*1)	Yes
		Card formatting	No	Yes	No	Yes(*1)	Yes(*1)	Yes

*1 The mode is changed to the PC host mode temporarily.

4.3.1. Shooting operation

The shooting operations in the PC mode are shown below.

4.3.1.1. Image data recording destination

The images captured by the shutter button of the camera are recorded according to the destination setting.
The recording destination setting can be changed by the MTP (PTP) command.

When the PC captures the image, the destination setting is ignored and the recording destination is decided by the MTP (PTP) command that the PC uses.

Recording destination	Release button	MTP(PTP) standard	Vendor definition
Card	Records on the card	Records on the card	Transfers to the PC
PC	Transfers to the PC	Records on the card	Transfers to the PC
Card&PC	Records on the card and transfers to the PC	Records on the card	Records on the card, or transfers to the PC, or records on the card and transfers to the PC

4.3.1.2. Single frame shooting

The operation from the PC is the same as the operation from the camera.

4.3.1.3. Continuous shooting (Low speed/High speed)

When the operation is performed from the PC, the number of maximum continuous release is specified by the PC.

The number of maximum continuous release can be changed by PTP/MTP command.

4.3.1.4. Self-timer / mirror-up / remote control shooting

When the operation is performed from the PC, shooting mode is switched to single frame shooting.

4.3.1.5. Quiet shooting

The timing of mirror-down after release cannot be controlled because the “keep pressing the shutter-release button” situation cannot be reproduced by the command operation from the PC. The mirror-down operation after release is automatically performed by the camera.

4.3.1.6. Bulb shooting

The bulb shooting is disabled because the “keep pressing the shutter button” situation cannot be reproduced by the command operation from the PC.
However, because the shutter button of the camera is valid in the camera mode, the bulb setting is also possible for the shutter speed setting.

4.3.1.7. Interval-timer shooting

The interval-timer shooting is disabled in the PC mode.

4.3.1.8. Preset data acquisition

If the operation is performed by the camera and it fails to acquire the preset data, the operation continues. However, if the operation is performed by the PC and it fails to acquire the preset data, the operation is terminated.
In addition, when the operation is performed by the PC, the preset data can be acquired even if the white balance is set to other than the preset manual.

4.3.1.9. Image dust off data acquisition

If the operation is performed by the camera and it fails to acquire the image dust off data, the operation continues. However, if the operation is performed by the PC and it fails to acquire the image dust off data, the operation is terminated.

4.3.2. AF operation

The operation from the PC is the same as the operation from the camera.

4.3.3. Live view

Live view display on the PC is supported, but that on the camera is prohibited.

4.3.4. Two-button reset

This is not supported for the PC operation.

4.3.5. Two-button formatting

Refer to 4.3.6 Card operation.

4.3.6. Card operation (playback / deleting images / formatting)

Card operation from the PC is supported.
Card operation on the camera is prohibited when application mode is OFF.

4.4. Display Section of the Camera

The display conditions of the display in the finder/the top control panel change depending on the connection mode and the recording destination setting.
Each display condition is shown below.

Connection mode	Recording destination	In the finder	Top control panel
PC camera mode	Card	Normal display	Normal display
	PC	The number of images that can be captured: PC display Others: Normal display	The number of images that can be captured: PC display Others: Normal display
	Card & PC	Normal display	Normal display
PC host mode	Card	PC display only	PC display only
	PC	PC display only	PC display only
	Card & PC	PC display only	PC display only

4.5. Auto meter-off delay

The Auto meter-off delay is set to “No limit” in the PC mode.

If the images remain in the camera buffer and the PC mode is released by disconnecting the USB cable when the recording destination is the PC, the Auto meter-off delay is left unlimited while those images remain in the camera buffer.

5. SUPPLEMENTARY MATTERS

The supplementary matters are described below.

5.1. Battery Voltage Drop during Continuous Shooting

When the camera is operated by using the battery and the continuous shooting is invoked by the PC, there is a possibility that the battery voltage may drop and become on the shooting prohibition level during continuous shooting.
In this case, shooting is terminated when the voltage drop is detected even if the number of captured images does not reach the specified number of images.
When the recording destination is the PC, the image data is transferred to the PC. However, the connection with the USB may not be established depending on the battery voltage drop level.
In this case, the image data is not transferred because the PC mode is released.