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Canon SPEEDLITE 166A

INSTRUCTIONS



English Edition

The Canon Speedlite 166A is an automatic electronic, direct contact flash designed especially for Canon A-series SLR cameras such as AL-1 or AE-1 PROGRAM, and New Canon F-1. It mounts into the accessory shoe of the camera where it couples directly with the camera.

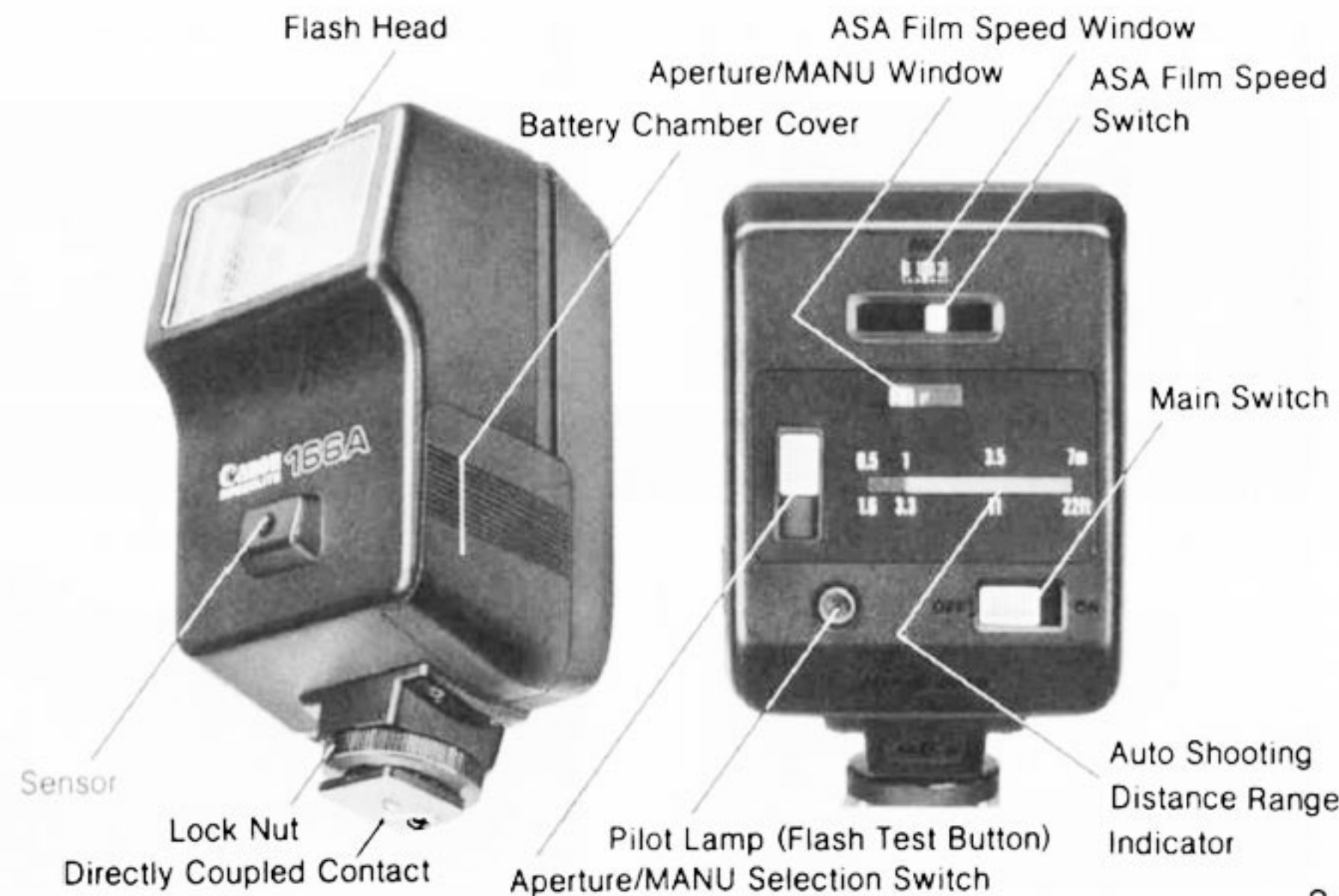
With the above-mentioned cameras it permits as easy flash photography as normal shooting.

The Speedlite 166A functions as a normal automatic flash on other cameras with a direct contact as well.

- * An automatic exposure flash has a sensor which measures the light reflected back from the subject and cuts off flash emission automatically when the subject has received the proper amount of light.

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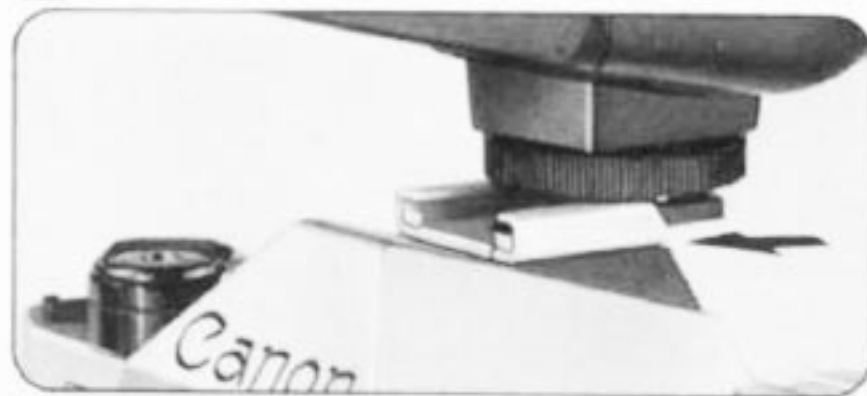
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1 Load the batteries correctly.



2 Mount the 166A on the camera.



3 Set the ASA film speed.

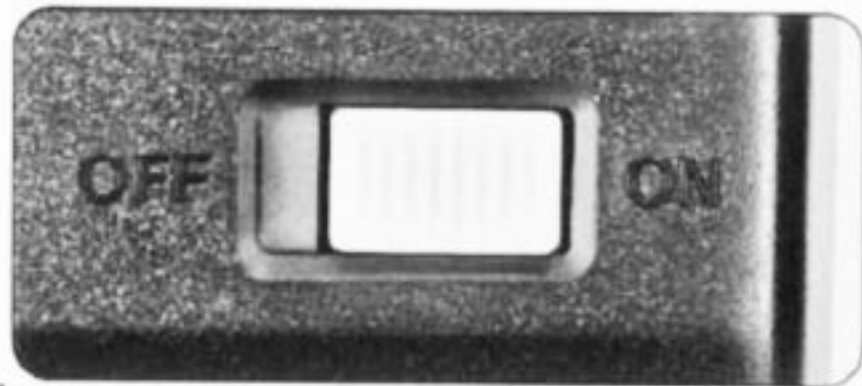


4 Focus on the subject and select an aperture.

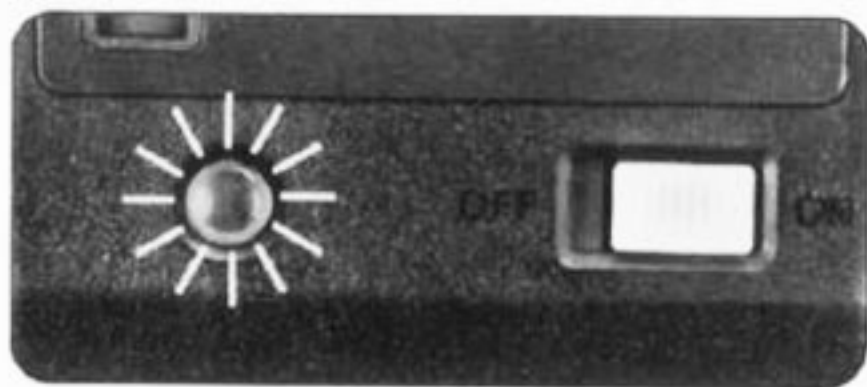


Summary for Use of the 166A

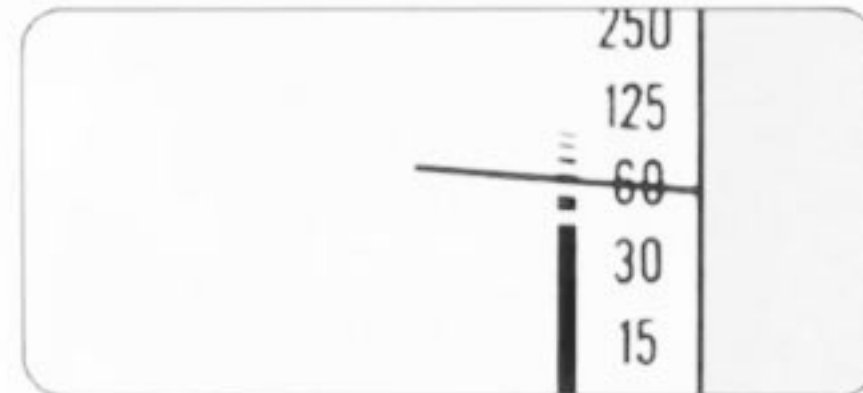
5 Set the 166A's main switch to ON.



6 Wait for the pilot lamp to glow.



7 Check viewfinder information, and press the shutter button.



Loading the Batteries

1. Use four new size AA alkaline-manganese (LR6/AM-3) or Ni-Cd batteries. Carbon-zinc batteries may also be used, but their battery life is shorter. Before loading the batteries, wipe their contacts and the flash contacts with a clean, dry cloth to prevent dirt from

- causing poor contact.
2. Press and slide the battery chamber cover off in the direction of the arrow in the photo.
 3. Load the batteries so that their contacts are in the directions indicated by the diagram inside the battery chamber. For proper function of the flash, it is very important that their contacts be facing in the correct directions.



4. Once the batteries are loaded, slide the battery chamber cover back on while pressing the batteries down. Make sure the cover's tab fits into the corresponding groove on the flash body.
- Remove the batteries if you do not expect to use the 166A for about three weeks or longer.
 - Set the main switch to OFF when flash photography is finished.
 - When the batteries become exhausted, replace all four at the same time with four new ones of the same brand.
 - Since battery performance deteriorates in low temperatures, keep the batteries warm until just before use. Keep a set of spare batteries warm and alternate them with the loaded ones so that warm batteries are always in use.
 - In temperatures below 0°C (32°F), the

use of fully-charged Ni-Cd batteries is recommended.

- Each brand of Ni-Cd batteries has its own terminals system. Be sure to use a type which is suitable for this flash.
- When recharging Ni-Cd batteries, follow the instructions of the battery manufacturer.

Mounting the 166A on the Camera

1. Turn OFF the 166A's main switch.
2. Loosen the lock nut and insert the Speedlite into the camera's accessory shoe. For correct electrical contact, make sure it is pushed in all the way.
3. Retighten the lock nut.



Setting the ASA Film Speed

To set the film speed, slide the ASA film speed switch until the ASA value of your film is aligned with the orange index. At this time, the aperture displayed in the Aperture/MANU window will also change. Because the guide number of the flash varies with the sensitivity of the film in use, be sure to set the ASA film speed correctly.



- Make sure that the camera is set to the correct ASA film speed. It is possible to set the following ASA film speeds. Numbers in parentheses are intermediate film speeds indicated by the dots on the scale.

	(32)	(40)		(64)	(80)		(125)	(160)
ASA25	·	·	50	·	·	100	·	·
	(250)	(320)			(500)	(640)		
200	·	·	400	·	·	800		



Choosing an Aperture and Reading its Value

There is a choice of two apertures for automatic flash photography. To select an aperture, set the Aperture/MANU selection switch to the upper or middle position; the aperture value will appear in the Aperture/MANU window. The aperture will change depending on the setting of the



ASA film speed. When ASA 100 film is used, for instance, the upper position is f/2.8 and the middle position is f/5.6.

When the Aperture/MANU selection switch is set on the lowest position, "MANU" appears in the window. As this indicates manual flash photography, automatic flash photography is impossible on this setting.

* In automatic flash photography, if the ASA film speed is set between graduations, such as 64 or 80, the aperture value indicated is between click-stops on the aperture ring. In the case of the AL-1, AV-1, AT-1 or New F-1, set the lens' aperture ring to the click-stop of the larger aperture.

Reading the Auto Shooting Distance Range

Once you have selected an aperture by setting the Aperture/MANU selection switch to the upper or middle position, there is only a certain range of shooting distances which will give correct exposure. On the 166A, the correct shooting distance is indicated by the red and green lines in



accordance with the selection of the aperture.

Effective Shooting Distance Range	
Green Line	Red Line
0.5-3.5m; 1.6-11 ft.	1-7m; 3.3-22 ft.

After focusing, confirm the shooting distance on the lens' distance scale. Remember that correct exposure is impossible if the shooting distance is not within the effective shooting range.

Both depth of field and the shooting distance are factors to consider when selecting an aperture on the 166A. When the subject distance is between 1~3.5m (3.3~11ft.), use the following as guides:

Upper position: For isolating the subject (red line) from its surroundings by blurring the foreground and background.

Middle position: For the widest range of (green line) good focus in front of and behind the subject.

* Note that the auto shooting distance ranges remain the same regardless of the film speed.

Shutter Speed and Aperture (with an FD lens)

Automatic Shutter Speed Setting and Aperture Setting


1. On the A-series cameras and New F-1, once the pilot lamp lights up (which means the flash is charged), the shutter speed switches to X-sync. (on the

A-series cameras to 1/60 sec. and on the New F-1 to 1/90 sec.) automatically except when the camera is set to "B." Setting the shutter speed is, therefore, unnecessary.

2. When using an FD lens set on "A," once the pilot lamp glows the aperture of the A-1, AE-1 PROGRAM, AE-1, or New F-1 (Shutter Priority AE Mode) is set automatically to the same aperture

Camera	Shutter Speed Setting	Aperture Setting
A-1, AE-1 PROGRAM, AE-1, New F-1 (Shutter Priority AE mode)	Automatic (X-sync.)	Automatic (FD lens... A mark)
AL-1, AV-1, AT-1, New F-1 (Aperture Priority AE or Manual Mode)	Automatic (X-sync.)	Manual
F-1 or other cameras	Manual (X-sync.)	Manual

chosen on the 166A with the Aperture/MANU selection switch. In the case of the AL-1, AV-1, AT-1, and New F-1 (Aperture Priority AE or Manual Mode), turn the lens' aperture ring to the same aperture which is set on the 166A.

- When using the 166A with the F-1 or other cameras, or lenses other than FD lenses, both shutter speed (X-sync.) and aperture must be set manually.
- When using New F-1 without a battery, set the shutter dial to the  mark and the aperture manually.

Main Switch and Pilot Lamp

Turn the main switch ON. The pilot lamp lights up when the flash is charged, telling you that it is ready to shoot.

The A-1 and AE-1 PROGRAM have special viewfinder displays which make it possible to confirm that the flash is charged. See pp. 18 ~ 20 for details.



Test Firing

To test the flash for proper function, press the pilot lamp after it glows. If the flash fires, it is in proper working order.

Confirming Exposure and Shooting

After focusing, check the lens' distance scale to make sure the shooting distance is within the auto distance range indicated by the red or green line on the flash. If it is not, either move closer to or farther away from the subject as required, or set the Aperture/MANU selection switch to a more appropriate position.

After the pilot lamp lights up, press the shutter button halfway and confirm ex-

posure information in the viewfinder. The indication varies depending on the camera (see pp.18 ~ 22). If everything is correct, confirm focusing and press the shutter button all the way for shutter release.

AE Automatic Switch

Depending on the output of the previous flash, the pilot lamp may remain lit, indicating that the flash is ready for the next exposure. When the pilot lamp does not glow after the exposure (and the AE camera is in the AE mode), the camera will go into the normal AE mode operation until the pilot lamp lights up. (Except when the camera is set to "B")

When the pilot lamp glows, the camera automatically switches back to flash photo-

graphy.

This special feature is called AE Automatic Switch.

- * Make sure that the aperture or shutter speed to which the camera is actually set for normal AE photography is appropriate for correct exposure.
- * There is an extremely rare possibility that the pilot lamp will glow again while the shutter is in operation for a normal AE shot. If this happens, exposure for that shot will be incorrect.
- * Since the viewfinder displays of the A-1 and AE-1 PROGRAM each indicate when the flash is charged, it is possible to confirm when the AE automatic switch feature is in operation. When the shutter button is pressed halfway and the "F" (A-1) or the "[F]" mark (AE-1 PROGRAM) is not displayed in the viewfinder, the camera is in the normal

AE mode.

Switch OFF

Once flash is no longer necessary, be sure to turn OFF the 166A's main switch to prevent battery drain. With the main switch OFF, the circuit between the camera and flash is disconnected and it is possible to shoot normally even while the flash is attached to the camera.

**Use with the A-1,
AE-1 PROGRAM, AE-1,
AL-1, AV-1, AT-1 and
New Canon F-1**

The shooting modes are:

1. Full autoflash mode;
2. Automatic shutter setting autoflash mode; and
3. Manual flash mode.

Mode	A-1, AE-1 PROGRAM, AE-1, New F-1*	AL-1, AV-1, AT-1, New F-1**
Full Autoflash	Yes. Main Mode.	No.
Automatic Shutter Setting Autoflash	Yes.	Yes. Main Mode.
Manual Flash	Yes.	Yes.

New F-1 *: Shutter Priority AE Mode

** : Manual or Aperture Priority AE Mode

Full Autoflash Photography

This is possible only on the A-1, AE-1 PROGRAM, AE-1 or New F-1 (in Shutter Priority AE mode) with an FD lens set on "A." Both the shutter speed and aperture are automatically set on the camera when the pilot lamp glows. (Except when the camera is set to "B")

Automatic Shutter Setting Autoflash Photography

With the AL-1, AV-1, AT-1 or New F-1 (in Aperture Priority AE or Manual mode), al-

though the shutter speed is set automatically, manually set the aperture which has been selected on the flash.

Because the aperture is set manually, this mode is especially useful when exposure correction is desired.

- * With the A-1, AE-1 PROGRAM or AE-1, manual aperture setting is possible when using an FD lens. In this mode, the shutter speed is still switched automatically to 1/60 sec.

- * If you turn the lens' aperture ring to the same aperture which was chosen on the flash, the result will be the same as if the aperture ring had remained on "A."
- * When this flash mode is used on the A-1, AE-1 PROGRAM, AE-1 or New F-1 (Shutter Priority AE Mode), AE automatic switch (p.14) is not possible. It is possible on the AL-1, AV-1 or New F-1 (Aperture Priority AE Mode). It is never possible on the AT-1.

Automatic Shutter Setting Autoflash with an FL Lens on the A-1, AE-1 PROGRAM, AE-1, AL-1, AV-1, AT-1 or New F-1

FL lenses do not have the signal pin for full aperture metering and the aperture cannot be set automatically. The shutter speed, however, is switched automatically



to X-sync. Turn the lens' aperture ring to the same aperture which is set on the flash.

Viewfinder Information and Warnings

After the pilot lamp lights up, press the shutter button halfway to activate the viewfinder information display. Viewfinder information and exposure warnings vary with the cameras.

- * If the aperture selected on the flash is larger than the lens' maximum aperture you cannot take a correct exposure. On the A-1, the lens' maximum aperture will flash on and off to indicate underexposure. On the AE-1 PROGRAM, the preselected aperture on the flash will

flash on and off. On the AE-1, the underexposure lamp blinks. On the New F-1 (Shutter Priority AE Mode), the meter needle points to the underexposure mark or below. In this case, set the Aperture/MANU selection switch to a smaller one.

A-1 Display

Full Autoflash Mode: FD lens on "A" and AT dial not on "B."

- "E0" means the shutter speed is set to 1/60 sec., the "F" signal indicates the camera is ready for flash, and the aperture set on the flash will be displayed in the viewfinder.
- When the shutter speed is set on "B," "bu" will be displayed instead of "E0."

E0 F 2.8

Automatic Shutter Setting Autoflash Mode: FD lens off "A" and AT dial not on "B," or FL lens.

- In addition to the above-mentioned displays in automatic shutter setting autoflash mode, "M," reminding you that you have taken the aperture ring off "A," is displayed. Set the aperture as displayed in the viewfinder by hand.
- * With the FL lens, the viewfinder display is not always reliable and should be switched OFF.

E0 F 2.8 M

[Error in Display]

The aperture displayed may be one-half f/stop off the one selected on the flash. This is because the aperture display is in one-half f/stop increments; it has no effect on actual exposure. The aperture display may also flash on and off if the flash-selected aperture is the same as the lens' maximum aperture. In this case, exposure will be correct, but it is advisable to check the flash-selected aperture to make sure it is not larger than the lens' maximum aperture.

AE-1 PROGRAM Display

Full Autoflash Mode: FD lens on "A" and shutter speed selector dial not on "B."

- The aperture selected on the flash and the "⚡" mark indicating the flash is charged will be displayed. After the shutter is released, the "⚡" mark will flash on and off for two seconds provided you continue to press the shutter button halfway and the subject was within the auto shooting distance range.

2.8



Automatic Shutter Setting Autoflash Mode: FD lens off "A" or FL lens.

- "M" glows in addition to the above-mentioned displays. If, however, the auto-exposure confirmation mark flashes on and off in this mode, it does not confirm auto-exposure and should be disregarded.

Note: The aperture display may flash on and off in both modes if the flash-selected aperture is the same as the lens' maximum aperture. In this case, exposure will be correct.

AE-1 Display

Full Autoflash Mode: FD lens on "A" and Shutter dial not on "B."

- The meter needle swings to the aperture pre-selected on the 166A to assure correct exposure.

Automatic Shutter Setting Autoflash Mode: FD lens off "A" or FL lens.

The aperture selected on the 166A and "M" (for manual aperture control) flashing on and off are displayed.

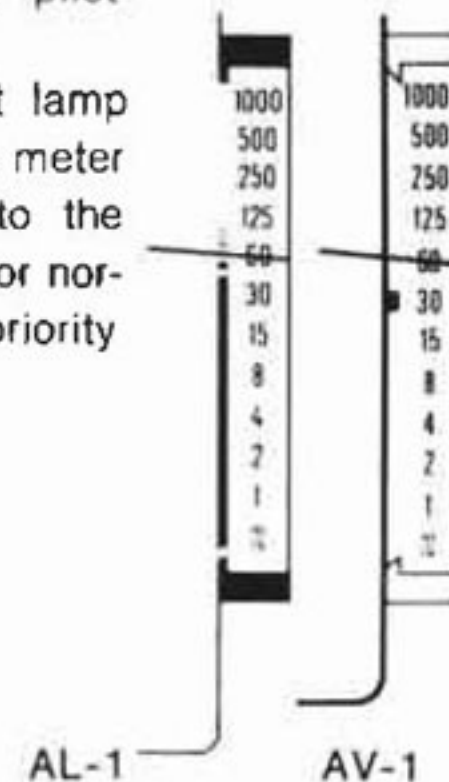


AL-1 and AV-1 Display

Automatic Shutter Setting Autoflash Mode: Selector dial not on "B."

- The meter needle swings to the shutter speed of 1/60 sec. once the pilot lamp glows.

When the pilot lamp goes out, the meter needle points to the shutter speed for normal aperture-priority AE.



AT-1 Display

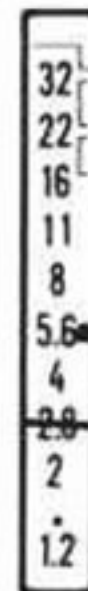
Automatic Shutter Setting Autoflash Mode: Shutter dial not on "B."

- No viewfinder flash information.

New F-1 Display

Full Autoflash Mode: Shutter Priority AE Mode — With AE Motor Drive FN or AE Power Winder FN, FD lens on "A" and shutter dial not on "B."

- The meter needle points to the aperture pre-selected on the 166A.
- Shutter speed indicator shows the setting on the shutter speed dial, but shut-



ter speed is automatically changed to X-sync. of 1/90 sec.

Automatic Shutter Setting Autoflash Mode: Aperture Priority AE or Manual Mode.

Manual Mode: shutter dial not on "B."

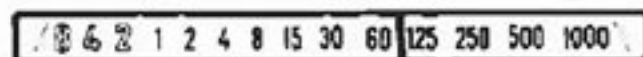
- In addition to the above-mentioned displays the aperture needle points to the aperture set on the aperture ring of the lens. Turn the lens' aperture ring to the same aperture set on the flash.



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Aperture Priority AE Mode: With AE Finder FN, shutter dial on "A."

- The camera switches automatically to the X-sync. speed of 1/90 sec. and the meter needle points to the right of 1/60 sec.



5.6

Precautions in Automatic Flash Modes

- In some cases, automatic flash may not be suited to your subject. If, for instance, your main subject is small with a dark or distant background or if the subject's surroundings are bright white with strong reflections, automatic flash exposure may be affected by a contrasting background, causing under- or overexposure of the subject. This can be avoided by switching to manual flash (see pp. 24 ~ 26).
- In delayed flash with the camera's self-timer, do not press the shutter release button until the pilot lamp glows.
- When the shooting distance is less than one meter, flash distribution may be somewhat uneven.
- Since it is possible for viewfinder information in the AE-1, AL-1, AV-1, AT-1 or New F-1 to be the same in flash photography as in normal AE photography, be sure that the pilot lamp is glowing before shooting.
- Confirmation of auto-exposure flash is possible only when the 166A is used with AE-1 PROGRAM in the full autoflash mode.
- The auto-exposure confirmation signal tells you whether you are close enough to your subject but not

whether you are far enough away. If you think you may be too close to your subject, check the lens' distance scale and the auto shooting distance range on the flash.

Manual Flash Photography

Setting the Aperture/MANU selection switch to the lowest position places the 166A in the manual flash mode. The auto-



matic flash circuit is cut off, and both flash and camera are switched to regular synchronized flash photography. In this mode, the shutter speed of each A-series camera is still switched automatically to the X-synchronization speed of 1/60 sec. and the shutter speed of the New F-1 to 1/90 sec. (unless the shutter speed is set on "B") when the pilot lamp glows. The aperture, however, must be calculated for each change in shooting distance using the guide number formula, and then set manually on the lens' aperture ring. The procedure for manual flash photography is as follows:

1. Set the 166A's Aperture/MANU selection switch to the lowest position. "MANU" will appear in the Aperture/MANU window.
2. Make sure that the proper ASA film speed is set on the flash.

3. Focus the subject.
4. Read the shooting distance from the lens' distance scale.
5. Calculate the aperture using the following guide number formula:

$$\text{Aperture} = \frac{\text{guide number}}{\text{shooting distance}}$$

6. Set the aperture on the lens.
 7. Turn the main switch ON.
 8. Do not press the shutter button until the pilot lamp glows.
- The 166A's guide number is 20 (ASA 100, m) or 33 (ASA 25, ft.)
 - Make sure that both the guide number and shooting distance are in the same unit, whether meters or feet.
 - The guide number changes with film speed. Attach the guide number table onto the 166A for convenient use.
 - If it is necessary to shoot immediately after the pilot lamp glows, open the

lens 1/2 to one full f/stop. This correction is necessary because the flash is not yet fully charged when the pilot lamp glows.

Viewfinder Information on Manual Flash

A-1

Shutter speed of 1/60 sec. (or "bu" when set to "B"), the "F" flash signal, and "M" for manual aperture control will be displayed. There is no aperture display.

AE-1 PROGRAM

The "⬇" mark indicating the flash is charged and "M" for manual aperture control will be displayed. There is no aperture display.

AE-1

The only information will be the flashing

"M" signal to indicate manual aperture control. The meter needle will swing to its upper limit.

AL-1 and AV-1

The meter needle will swing to the shutter speed of 1/60 sec. (unless selector dial is on "B").

AT-1

There is no viewfinder indication in the AT-1.

New F-1

Shutter speed indicator shows the setting on the shutter speed dial, but the shutter speed is automatically changed to X-sync. of 1/90 sec. The meter needle will swing to its upper limit. The aperture needle points to the aperture set on the lens. In Aperture Priority AE Mode the meter needle points to the right of the 1/60 sec.

Use of the 166A on Other Cameras

The Speedlite 166A can be used on other cameras which have a hot shoe in either the automatic flash mode or the manual flash mode. In either case, set the shutter speed to the camera's X-synchronization speed; the aperture also must be set manually. Refer to the camera's instruction book for further details.

1. In regular automatic flash photography, set the Aperture/MANU selection switch so that the red or green line appears in the window of the shooting distance range. Set the aperture on the lens. Provided the focused distance is

within the auto shooting distance range, exposure will be correct.

2. In the case of manual flash photography, the procedure for calculating aperture value using the guide number formula is the same as for manual flash with A-series cameras or New F-1 (see p.25).
3. When the 166A is used on a lens-shutter camera with built-in flash automation (such as the Canonet G-III 17), the 166A's Aperture/MANU selection switch must be set to the lowest position so that "MANU" appears in the Aperture/MANU window. Follow the camera's instructions for setting the camera.

The Speedlite 166A cannot be used as a multiple flash.

A slave unit cannot be used with the 166A.



Care of the Flash

1. Remove the batteries if the flash will not be used for about three weeks or longer. During prolonged storage, occasionally load the batteries and make several test flashes to maintain proper function of the capacitor.
2. Since a high voltage circuit is built into the flash, it would be dangerous to try to take it apart by yourself. If repair is necessary, take it to the nearest authorized Canon service facility.
3. Do not drop the flash in water. If it is exposed to rain or snow, wipe it off with a dry cloth.
4. Do not leave the flash in direct sunlight or in hot, humid places.

Specifications

Type:

Electronic computer flash unit with a series control system.

Contact:

Clip-on type with direct contact and lock.

Guide Number:

20 (ASA 100, m) or 33 (ASA 25, ft).
Reaches full charge 30 sec. after pilot lamp glows, with new batteries.

Flash Coverage Angle:

Covers the field of a 35mm lens on the 35mm format.

Recycling Time:

(Interval between firing of flash and re-lighting of pilot lamp with new or fully-charged batteries):

Battery Type	Auto	Manual
Alkaline-manganese	Approx. 0.5~7 sec.	Approx. 7 sec.
Ni-Cd	Approx. 0.5~5 sec.	Approx. 5 sec.

Number of Flashes:

(When the flash is fired in 30 sec. intervals with new or fully-charged batteries):

Battery Type	Auto	Manual
Alkaline manganese	Approx. 250~2,500 times	Approx. 250 times
Ni-Cd	Approx. 80~800 times	Approx. 80 times

Color Temperature:

Same as daylight. Correction by special colored diffusion screen.

Flash Duration:

1/1000 sec.~1/50000 sec.

Automatic Flash Control System:

Light reflected back from the subject is measured and the series control system saves unneeded energy. Averaged light measuring sensitivity distribution.

Aperture/MANU Selection Switch:

Three positions: Upper (red) and middle (green) auto positions and lower "MANU" (manual) position. With ASA 100 film, upper setting corresponds to f/2.8, middle setting to f/5.6.

Auto Shooting Distance Range:

Red Setting: 1.0~7.0m
Green Setting: 0.5~3.5m

ASA Film Speed Scale:

ASA 25 to ASA 800

Aperture Scale:

f/1.4~f/16.

Distance Scale:

0.5~7m (1.6~22 ft.)

Power Source:

Four Penlight (AA) alkaline-manganese (AM-3, LR6) or Ni-Cd batteries.

Pilot Lamp:

Comes on when unit is sufficiently charged and affects automatic switch-over of camera to flash mode. No flash is fired if pilot lamp does not glow. Extinguishes when main switch is OFF. Also functions as flash test button.

Auto-exposure Confirmation with AE-1 PROGRAM (Full Autoflash Mode):

By the "F" mark flashing on and off in the camera's viewfinder for two seconds after shutter release. Confirms that the flash was close enough to the subject for correct exposure.

Dimensions:

66mm(W) x 49.5mm(L) x 98mm(H)
(2-5/8" x 1-15/16" x 3-7/8")

Weight:

260g (9-3/16 ozs.) including batteries.

Accessories:

Soft Case

Subject to change without notice.