

**Canon**  
**Non-Mydriatic Retinal Camera**  
**CR - 45UAF (120V)**  
**Operation Manual**

For a full understanding of the CR — 45UAF, please read this operation manual carefully before using the equipment.  
Retain this manual for future reference.

***Canon will not be held responsible for any damage or accident caused by the failure of the user to accurately adhere to the instructions in this manual.***

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# ***Safety Information***

In case of trouble (ex. smoke, odd smell, noise), disconnect the plug from the outlet.

To disconnect the plug at any time, free from any obstacles close to the outlet.

## **For U.S.A.**

### **FCC Regulations**

Do not make any changes or modifications to the equipment unless otherwise specified in the manual. In such changes or modifications should be made, you could be required to stop operation of the equipment.

Note : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Use of shielded cable is required to comply with class A limits in Subpart B of Part 15 of FCC Rules.

## **For Canada**

### **DOC Regulations**

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in Radio Interference Regulations of the Canadian Department of Communications.

## *Precautions*

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### *On Safety*

- Be sure to turn off the power before connecting cables.
- Do not disassemble, charge or dispose of the battery used for 35mm film camera into a fire as it is dangerous.
- Unplug the power supply cable and wait until lamp is completely cool before replacing the lamp.

### *On Installation*

- Handle the CR-45UAF carefully, as preadjustment may be altered if the instrument receives a strong shock.
- Do not install the CR-45UAF in a dusty or humid room as it is a highly precise optical instrument.

### *Before Use*

- Battery voltage of 35mm film camera must be checked before turning on the power whenever the CR-45UAF is going to be used with a 35mm film camera.  
If the battery is extended, CR-45UAF will not operate normally.
- Be sure to check and clean the objective lens before taking a photograph, as any stains or scratches on it will be printed on film as white spots.

### *On Cleaning*

- Never use alcohol, thinner, benzine, or any other cleaning agents, since they may harm the coating of the instrument.

### *On Moving the Instrument*

- Support the instrument by holding the sides at the base.  
Do not hold the attached camera, objective lens, eye fixation lever, chin rest or face rest poles as they may come off.  
When the instrument is going to be transported by automobile, etc., contact Canon representative or distributor for advice on the procedure for packing it.

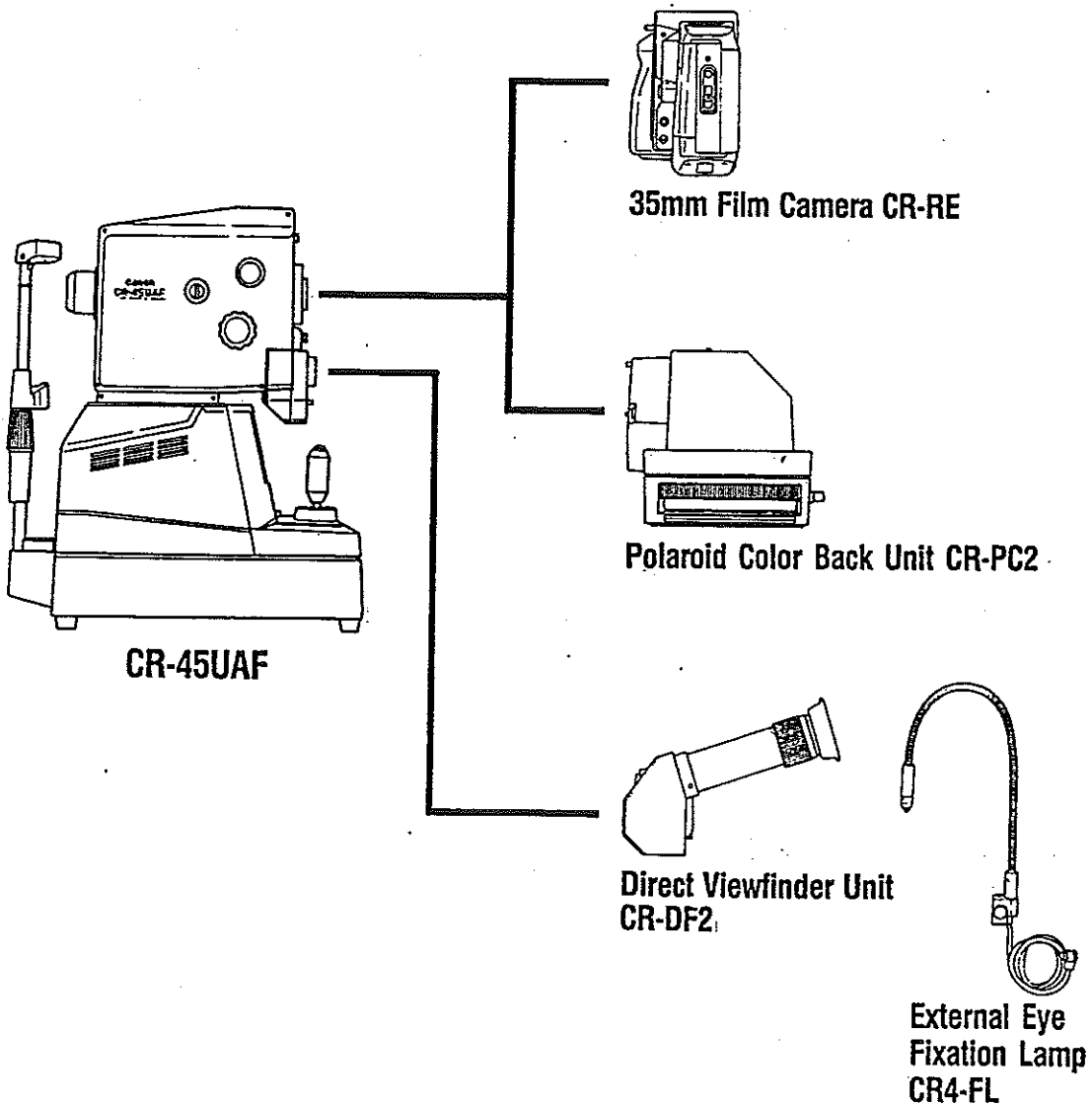
# 1. Introduction

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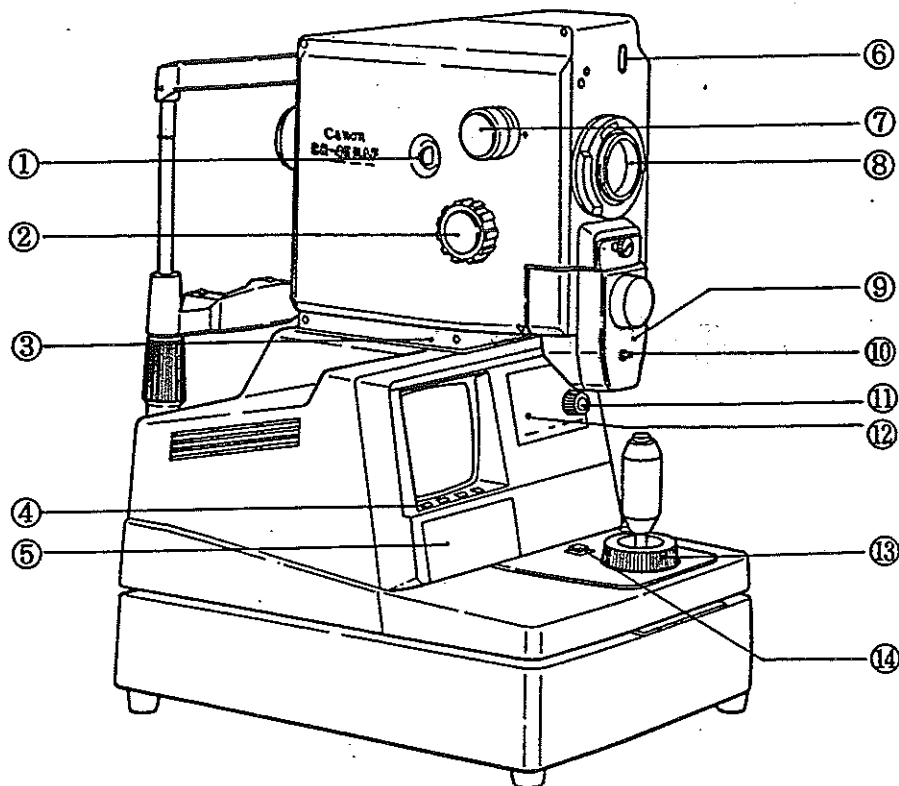
The CR-45UAF is capable of performing non-mydratic retinal photography by either 35mm Film Camera CR-RE or Polaroid\* Color Back Unit CR-PC2 attached to the main unit.

It is also capable of observing the retina in visible light by using our Direct Viewfinder Unit CR-DF2.

*\* Polaroid is a trade mark of Polaroid Corporation*



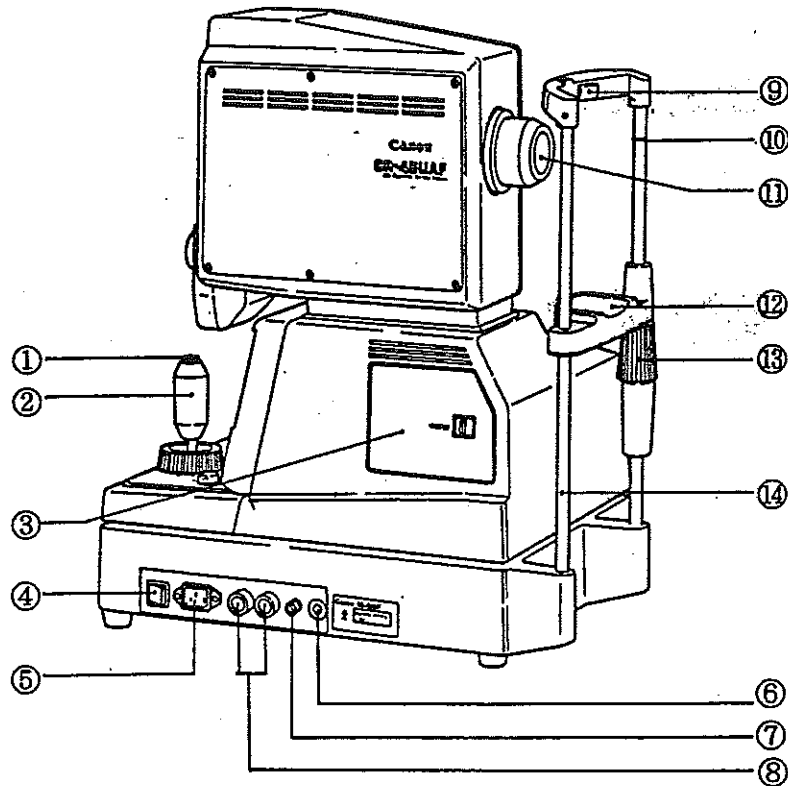
## 2. Description and Function



NAME	FUNCTION
① Diopter Compensating Slider	To be pulled when diopter of examinee's eye is out of -12 -- + 15D or when external eye is going to be photographed.
② Focus Knob	This knob is used for focusing on examinee's eye.
③ Split Lamp Housing Cover	To be removed for replacing the split lamp.
④ Display Buttons	Buttons for performing various settings.
⑤ Monitor Knob Cover	Behind this cover, there are knobs for adjusting contrast, brightness and synchronization of monitor.
⑥ Data Card Slot	Slot to insert data card.
⑦ Field Angle Selection Knob	Knob for selecting field angle from 45° and 20° .
⑧ Camera Mount	Mount for attaching either 35mm film camera or Polaroid color back unit.
⑨ Lamp Box	Eye fixation lamp is in this box.
⑩ Eye Fixation Lever	To be used for inducing the eye to be photographed to move to required position.
⑪ LAMP Knob	Used for adjusting brightness in the field of view for observation.
⑫ READY Lamp	Lights while the power is on and blinks while the power saving system is operating.
⑬ Height Adjustment Ring	Turn ring to adjust height of main unit.
⑭ ALIGNMENT Switch	When this is ON, external eye image will be displayed on the monitor.



## 2. Description and Function



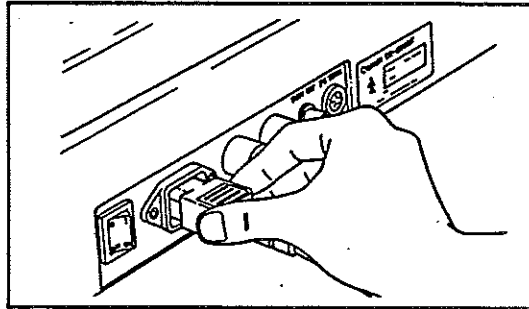
NAME	FUNCTION
① Shutter Release Button	
② Operation Lever	By inclining the lever to forward and backward, left and right, main unit can be moved.
③ Lamp Housing Cover	To be removed for replacing lamp for observation.
④ Power Switch	Turns ON when "I" side is pressed and OFF when "0" is pressed.
⑤ Connector for Power Cable	
⑥ Connector for Eye Fixation Lamp	
⑦ Connector for Video	
⑧ Fuse Holder	
⑨ Forehead Rest	
⑩ Height Adjustment Mark	Mark to align the height of examinee's eye.
⑪ Objective Lens	
⑫ Chin Rest	
⑬ Chin Rest Height Adjusting Ring	Used for adjusting height of chin rest.
⑭ Face Rest Pole	

## **3. Installation and Preparation**

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### **3 – 1 Connection of Cable**

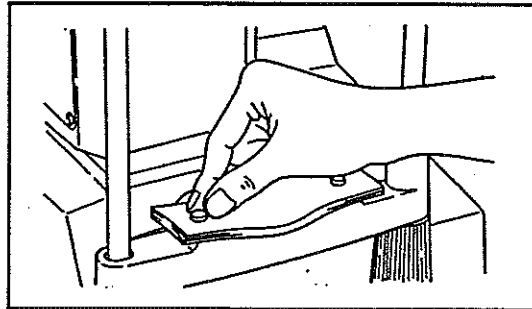
- (1) Place the CR-45UAF on a table.
- (2) Connect power supply cable to the main unit.



- (3) Ensure that the power switch of the instrument is turned off and connect power supply cable to an AC outlet.

### **3 – 2 Attachment of Chin Rest Paper**

- (1) Pull out the two pins on the chin rest.
- (2) Insert the pins into the holes in the chin rest paper and replace them in the chin rest.



### **3 – 3 Attachment of Camera**

Attach the required camera by referring to the attachment procedures for respective cameras on page 27 or page 32.

### **3 – 4 Settings**

Various settings for photography (autofocus, auto exposure, split lines, flash intensity) and setting of data (counter number, date, time) can be performed by pressing the four buttons under the monitor.

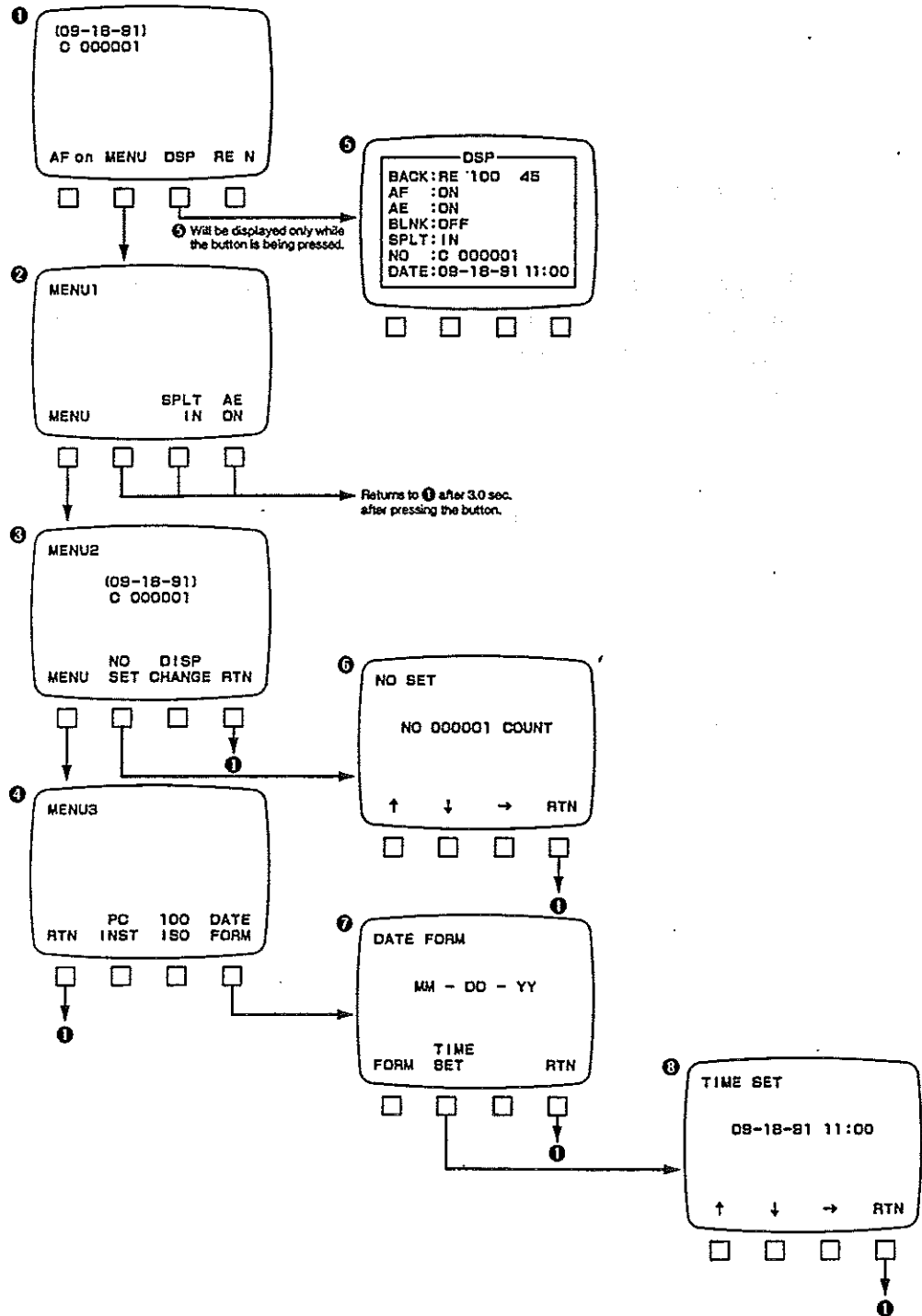
The function of the four buttons changes according to the display you are in.

#### **1) Flow of Display**

Flow of display is indicated on the next page.

*Example:* If you press the button under "MENU" in initial display ①, display changes to display ②.

If you press button under "DSP" instead, you will enter display ⑤.



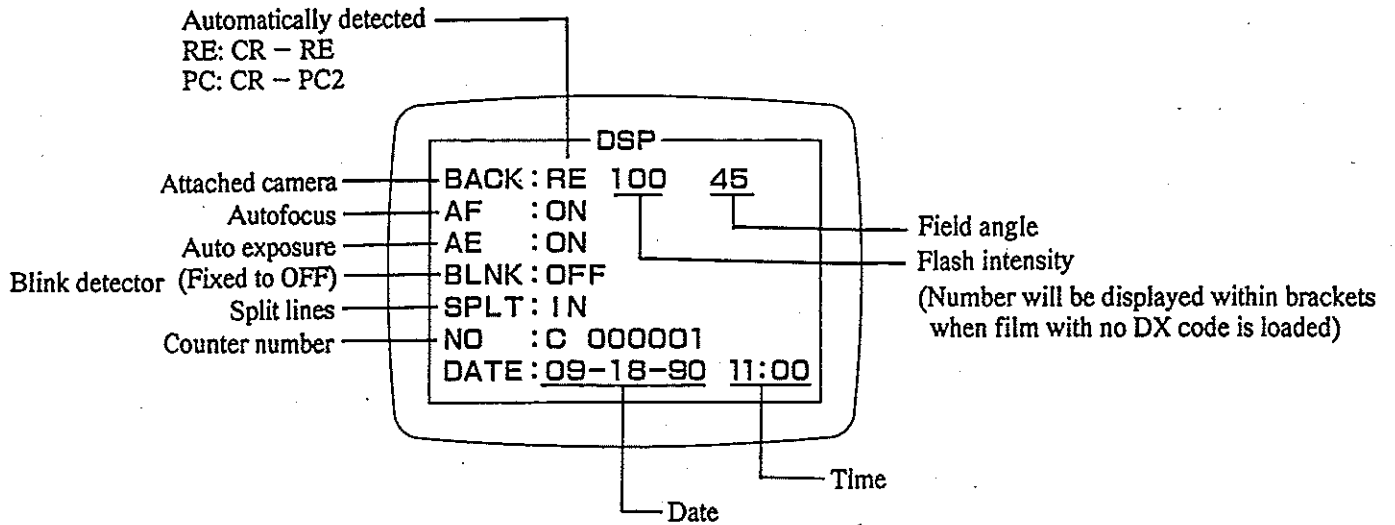
## 2) Setting

Turn on the power.

See "1) Flow of Display" on the previous page for the procedure for entering each display.

### A. In order to see all the settings already made:

Enter display ⑤. ⑤ will be displayed only while the button under "DSP" in display ① is being pressed.

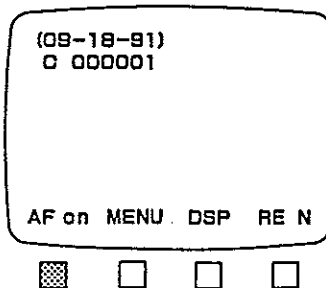


### B. Autofocus

Focusing will automatically be performed if AF is ON, provided that split lines are displayed on the monitor. It does not function when diopter compensating slider is pulled out or when direct viewfinder is used.

In display ①, press the button under "AF".

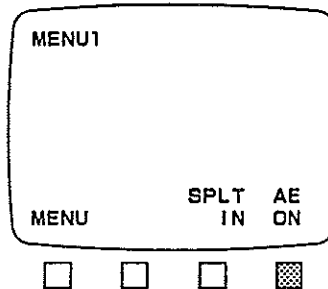
On/off changes each time the button is pressed.



### C. Auto Exposure (Only for 35mm photography)

When film with DX code is loaded, flash intensity is automatically adjusted according to the ISO sensitivity of film and brightness of examinee's eye if AE is ON. This function will not operate properly if sensitivity of film is not within ISO 64 - 400.

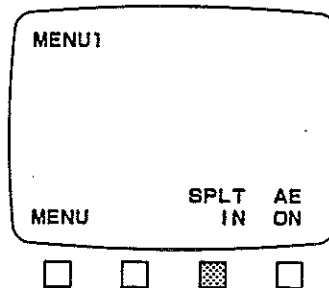
Enter display ② and press the button under "AE".  
ON/OFF changes .



### D. Split Lines

Split lines which are used for focusing appear or disappear from the monitor according to the setting (IN/OUT) of SPLT.

Enter display ② and press the button under "SPLT".  
IN/OUT changes .

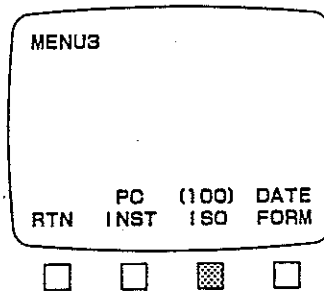


### E. Flash Intensity (Only for 35mm photography)

Flash intensity is automatically set according to the ISO sensitivity of 35mm film loaded if it has DX code. However, flash intensity must be manually set when film with no DX code is loaded. Flash intensity of Polaroid color back unit is automatically set to ISO 600 when the unit is attached.

Enter display ④ and press the button under "ISO".  
Number, which is the flash intensity, changes each time it is pressed.

64 → 100 → 200 → 400  
↑



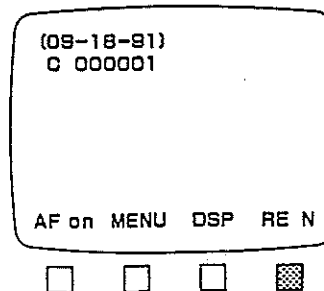
### F. Flash Intensity Compensation

Flash intensity can be compensated by selecting either normal, + or - .

In display ① or whenever "RE" or "PC" is displayed on monitor, press the button under "RE" or "PC".

The character (either N, or +, or -) on the right-hand side changes each time the button is pressed.

N (normal) → + → -  
↑



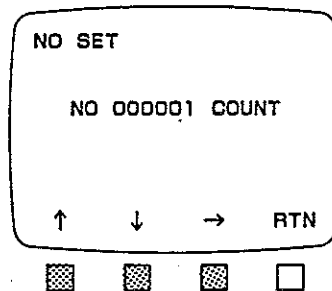
**G. Counter Number (Only for 35mm photography)**

Counter number is displayed only on the monitor for 35mm photography. It increases every time photography is performed when COUNT is selected. Select HOLD if number that has been set is required to stay unchanged.

Enter display ⑥.

Press the button under ↑ to increase the number, ↓ to decrease and → to move to the next digit or to COUNT/HOLD.

COUNT, HOLD changes each time button under ↑ or ↓ is pressed.

**H. Date Order (Only for 35mm photography)**

Order of displaying year, month and day for 35mm photography can be changed.

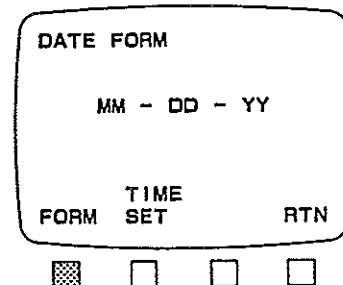
Enter display ⑦. Press the button under "FORM".

Order of date changes each time the button is pressed.

YY-MM-DD → MM-DD-YY → DD-MM-YY



Y: Year M:Month D:Day





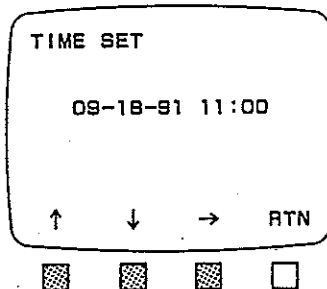
### I. Date and Time (Only for 35mm photography)

Year, month, day and time can be entered to be printed on 35mm film.  
Time is indicated in 24-hour clock system.

Enter display ⑧.

Enter the date in the order set in "H. Date Order" and the time.

Press button under ↑ to increase the number, ↓ to decrease and → to move to the next item.



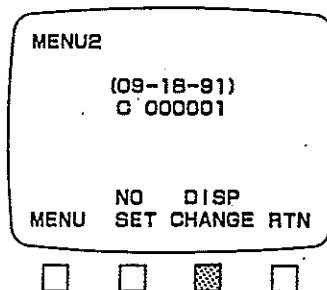
### J. Position of Counter Number and Date (Only for 35mm photography)

Position of counter number and date to be printed on 35mm film can be switched.

Enter display ③ and press the button under "DISP CHANGE".

Data on top and bottom switches each time the button is pressed.

If data card is inserted, counter number or date, which ever is on the bottom, will be printed out with the data on card.



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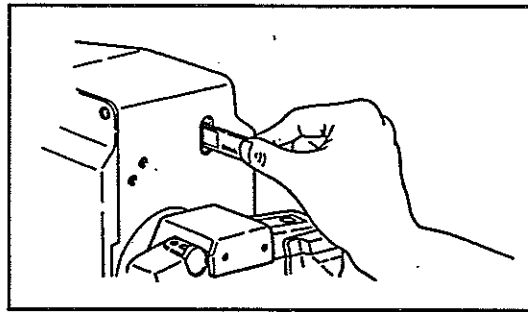
### 3 — 5 Data Card (Only for 35mm photography)

Write data on the data card with a dark pencil or with felt pen filled with water-soluble ink.

Insert the card into data card slot with the inscribed side facing left.

Either set of data on card and counter or data on card and date will be printed on 35mm film. This can be selected by switching the position of counter number and date.

See "J. Position of Counter Number and Date".



## 4. Photography

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When any operation has been interrupted for more than 10 minutes with the power turned ON, power-saving system of the CR-45UAF operates and turns lamps and display off to prevent unnecessary use of lamps and other expendable items.

While this system is operating, READY lamp blinks.

Press either shutter release button, ALIGNMENT switch or any one of the four buttons below the monitor in order to restore the function.

### 4 - 1 Retinal Photography

(1) **Battery Check** (Only when 35mm film camera is used)

See page 26.

(2) **Power ON**

Press the "I" side of power switch.

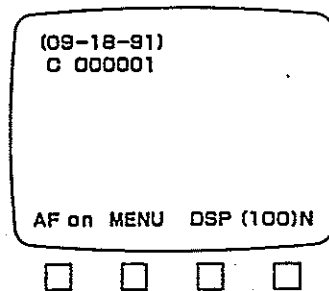
"↑↑↑" will be displayed on the monitor indicating the instrument is charging up.

Normally it takes about 1 minute to charge up. However, it may be longer if the supply voltage is lower than required.

(3) **Confirmation of Flash Intensity** (Only for 35mm photography)

When film with no DX code is loaded, flash intensity indicated within brackets will be displayed on the monitor.

If the required intensity is not displayed, change it by referring to "E. Flash Intensity" on page 10.



(4) **Darkening of Room**

Darken the room to a level where a newspaper can barely be read. (= about 5 luxes)

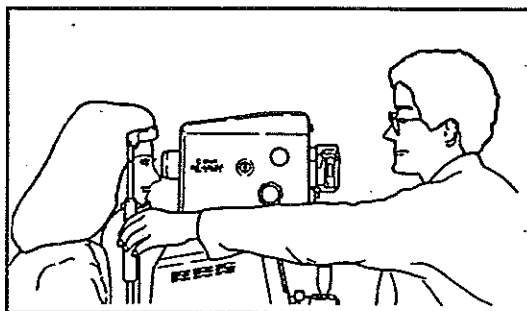
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**(5) Adjustment of Eye's Height**

Confirm that the examinee is not wearing spectacles or contact lenses.

Have the examinee place his/her chin and forehead against the chin rest and forehead rest.

Adjust the height of chin rest by rotating the chin rest height adjusting ring so the eye of the examinee is aligned with the height adjusting mark.

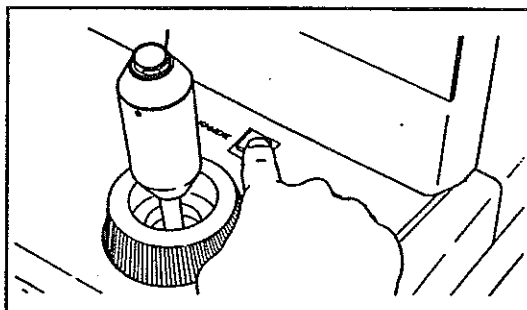


**(6) Sliding of Main Unit**

Slide the main unit to the eye to be photographed.

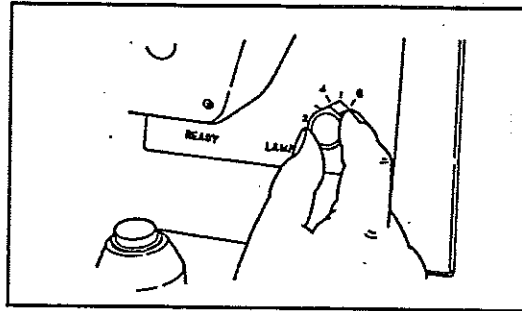
**(7) Displaying of External Eye Image**

Press ALIGNMENT switch to turn it ON and instruct the examinee to look straight ahead.

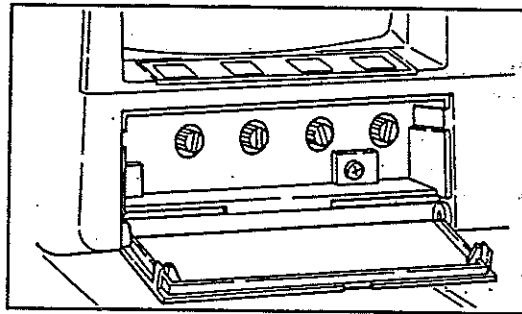


### (8) Adjustment of Observation Light

Looking at the monitor, adjust the brightness by turning the LAMP knob.



If the image is hard to see, adjust the brightness, contrast, and horizontal and vertical synchronizations by turning the respective knobs below the monitor.

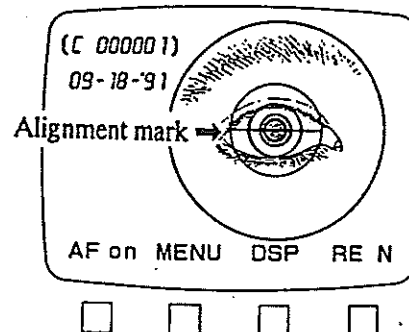
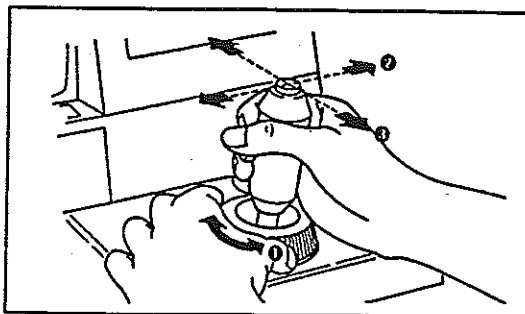


### (9) Alignment of Pupil

Adjust the position of CR-45UAF and align the marks.

Turn height adjusting ring to adjust the height ①, incline the operation lever to right and left in order to adjust side directions ② and incline the lever back and forth to align the pupil alignment marks ③.

*Note: When the pupil is smaller than the inside ring of the pupil alignment marks, it indicates mydriasis is insufficient.*



## (10) Displaying of Retinal Image

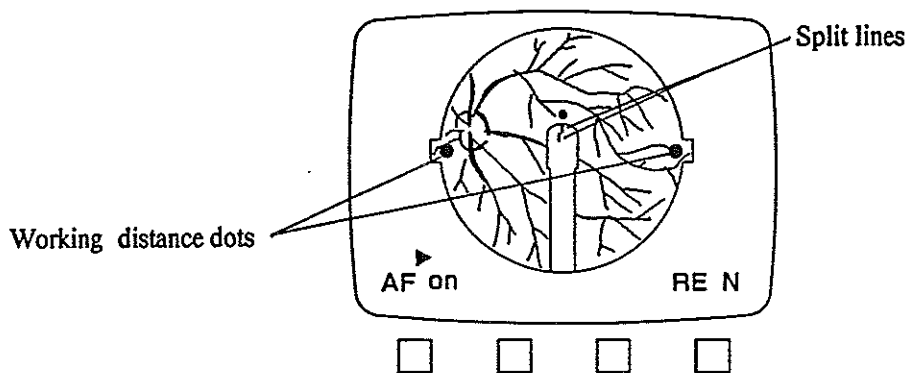
Turn ALIGNMENT switch off.

If no split lines are seen, height and side directions adjustments are incorrect.

If no working distance dots are seen, the forward/backward adjustment is incorrect.

If the retinal image cannot be seen well, light intensity is insufficient for observation.

In this case, adjust light intensity by rotating the LAMP knob.



- When AF is ON

Split lines will automatically be aligned.

While autofocusing is being performed, "▶" is displayed, and "||" is displayed when completed.

⇒ Proceed to step (13).

**Note 1:** Do not touch the focus knob while autofocusing is performed.

**2: If examinee moves after "||" mark is displayed:**

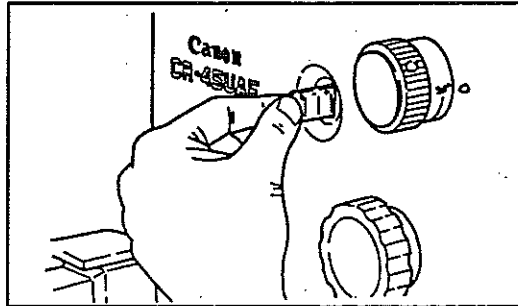
Press the button under "AF ON" so autofocusing will be performed again, or turn the focus knob by hand to align the split lines.

**3: When "AF OFF" mark is blinking after blinking of "\*\*\*" mark on monitor:**

- Split lines are set to OUT.

Set SPLIT to "IN" (see page 9) and press the button under blinking display "AF OFF" in order to perform autofocusing.

- *Split lines are not clear because the examinee has a cataract or other disorder or because the pupil is smaller than required. In this case, focusing must be performed manually. Pull out the diopter compensating slider so split lines disappear and then proceed to step (11).*



- 4: When "AF OFF" mark is blinking after "◀▶" mark on monitor:  
*This means the diopter of the eye is outside measurement range of - 10 to +13D.  
In this case, focusing must be performed manually.  
Pull out the diopter compensating slider so split lines disappear and then proceed to step (11).*
- 5: When AF cannot be performed although split lines are displayed:  
*Lamp box screw may be loose. If so, securely tighten it.*

**When split lines cannot be seen:**

<i>Cause</i>	<i>Remedy</i>
<ul style="list-style-type: none"> <li>• <i>Dilation of pupil is insufficient.</i></li> </ul>	<p><i>Dilate the pupil more by making room darker.</i></p>
<ul style="list-style-type: none"> <li>• <i>Center of pupil is not aligned with the optical axis of the CR-45UAF.</i></li> </ul>	<p><i>Repeat steps from (6).</i></p>
<ul style="list-style-type: none"> <li>• <i>Lines are eclipsed by eye lashes or eyelid.</i></li> </ul>	<p><i>Instruct the examinee to open his/her eye wider.</i></p>
<ul style="list-style-type: none"> <li>• <i>SPLT (split lines) is set to OUT.</i></li> </ul>	<p><i>Enter MENU 1 and set SPLT to "IN". See page 9.</i></p>
<ul style="list-style-type: none"> <li>• <i>Diopter compensating slider is pulled out.</i></li> </ul>	<p><i>Push in the slider.</i></p>
<ul style="list-style-type: none"> <li>• <i>Split lamp is burned out.</i></li> </ul>	<p><i>Replace the lamp. See page 38.</i></p>

**(11) Precise Positioning of Retinal Image**

Incline the operation lever to forward and backward or right and left so that both working distance dots are most clearly seen.

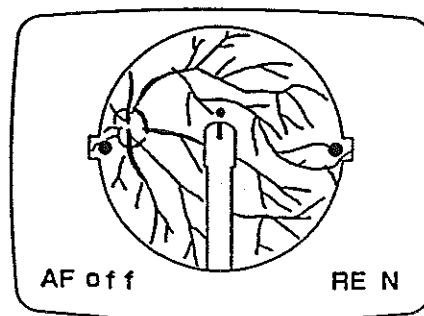
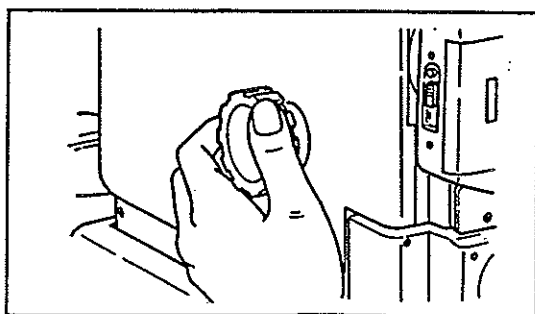
**(12) Focusing the Retinal Image (Alignment of Split Lines)**

Rotate the focus knob so split lines align on the monitor.

Split lines cannot be aligned when the diopter of examinee's eye exceeds the range of - 12 to +15D.

In this case, pull out the diopter compensating slider so split lines disappear.

Focus on the retinal image by rotating the focus knob.

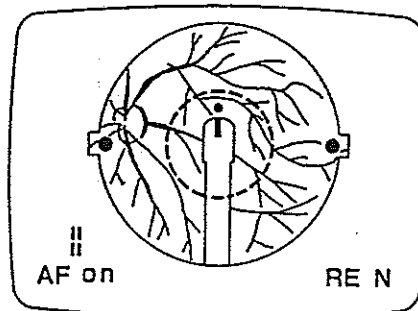
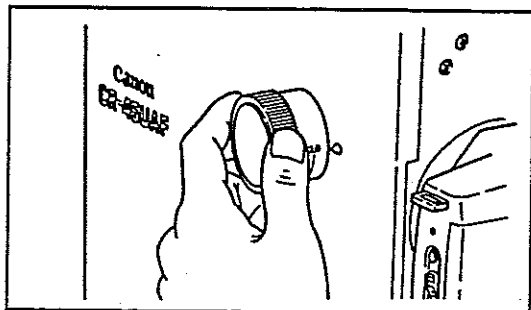




### (13) Selection of Field Angle

Set field angle selection knob to the desired angle.

When 20° is selected, the range that will be photographed will be indicated by dotted circle on the monitor.

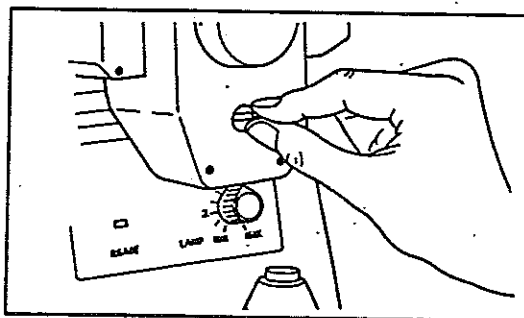


When 20° is selected and SPLIT is set to "IN":

- Split lines may be eclipsed.  
In this case, incline the operation lever a little to right or left until split lines can be clearly seen.
- Split lines may not be able to be seen as they are overlapped with papilla.  
In this case, move the eye fixation lever a little and induce the examinee's eye to move so split lines will be able to be seen.

### (14) Determination of Photographing Area

Move the eye fixation lever and determine the area to be photographed by inducing examinee's eye to move by having him or her look at the eye fixation lamp.

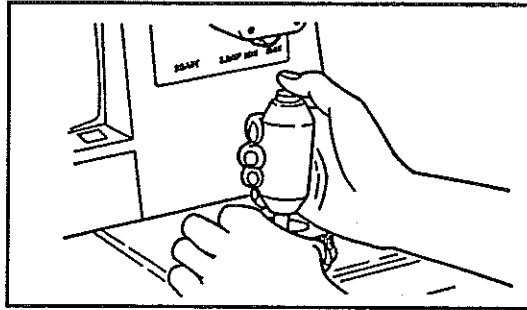


If flares are seen or the working distance dots are not seen, adjust the height, forward/backward and left/right positions once more.

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### (15) Photography

After confirming there is no flare and split lines are aligned, press shutter release button.



- When 35mm film camera is used:
  - Film will automatically wound up and counter number on monitor will increase by one if COUNT is selected.
- When Polaroid color back unit is used:
  - Photograph automatically comes out.
  - No data will be printed.
  - Note 1: Do not forcibly pull out the photograph or prevent it from coming out.*
  - Note 2: If data is required, write it on the space on film.*

Frame counter on the unit will decrease by one every time a picture is taken. .  
If there is no film remaining in the film pack, "CHECK FILM BACK" will be displayed on the monitor after shutter release button is pressed.

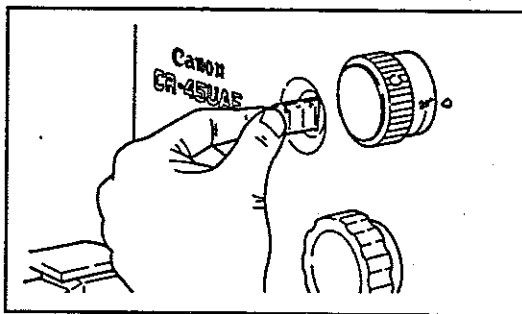
Photography cannot be performed while the instrument is charging up, i.e. just after attachment of camera or just after photography.

Approximately 20 seconds is required for charge up to be completed.

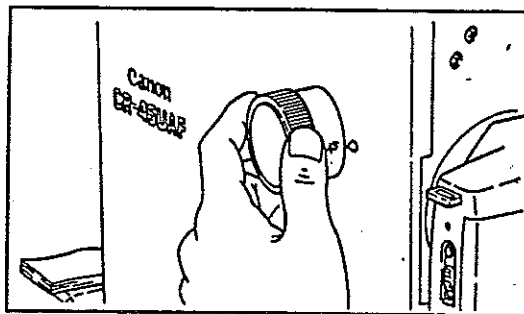
During the charge up, arrows "↑↑↑↑" will be displayed on the monitor.

## 4 - 2 External Eye Photography

- (1) If 35mm film camera is used, check the battery voltage. (See page 26)
- (2) Turn on the power.
- (3) Pull the main unit fully toward the examiner with the operation lever.
- (4) Set the diopter compensating slider to "+" (plus).

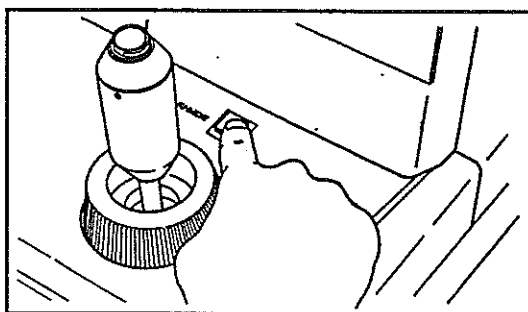


- (5) Set the magnification selection knob to 45° .



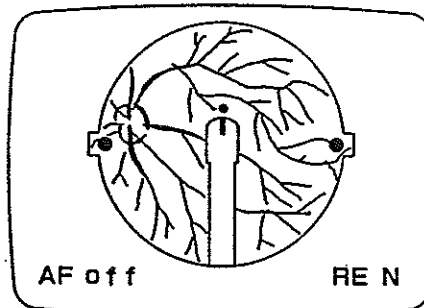
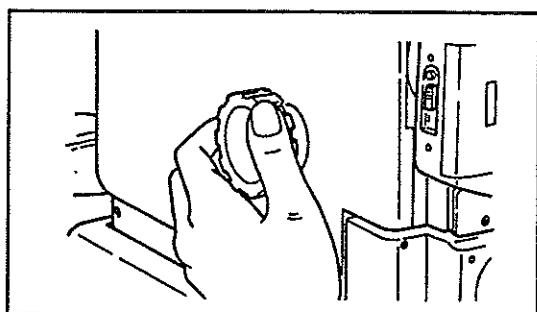
- (6) Turn the AF function off. See page 8.

(7) Turn ALIGNMENT switch off.



(8) Compensate the flash intensity as required. See page 10.

(9) Manually adjust the focusing by rotating the focus knob so split lines align on the monitor.

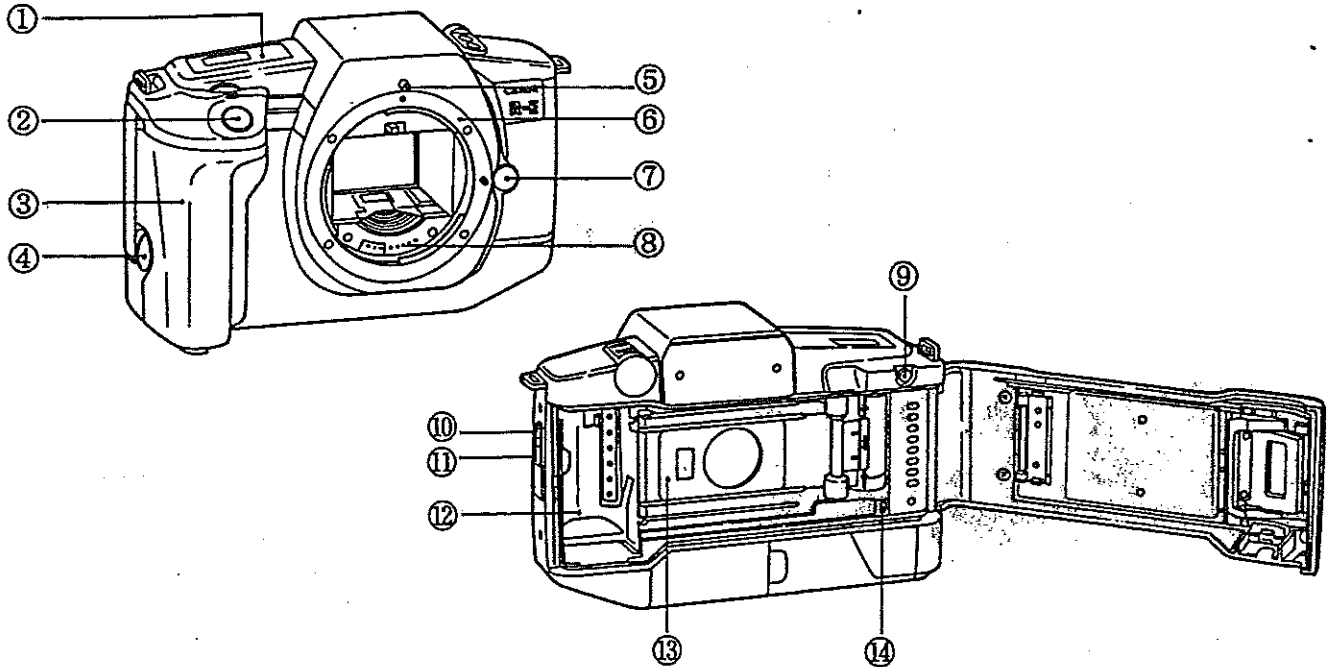


(10) Press shutter release button.

In order to take the photograph of retina after performing external eye photography, push the main unit toward the examinee, push in the diopter compensating slider and press ALIGNMENT switch.

# 5. 35mm Film Camera CR - RE

## 5 - 1 Description



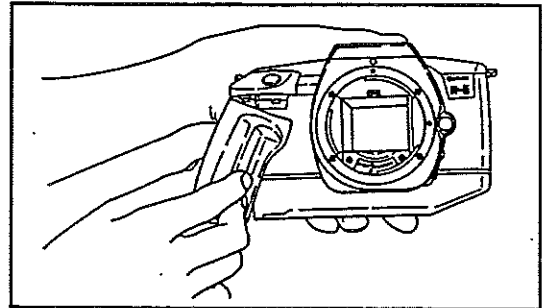
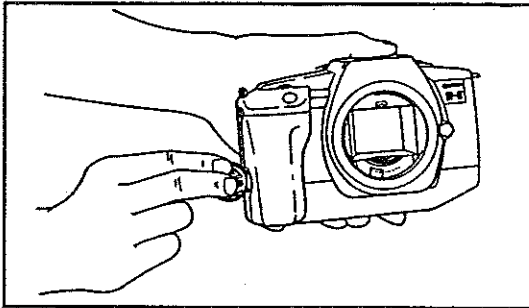
NAME	FUNCTION
① Display Panel	Displays film mark, film feed mark, number of frames, battery check mark, etc.
② Film Feed Button	To be pressed for feeding film when film camera is detached from main unit.
③ Grip	Cover for film chamber.
④ Grip Fixing Screw	
⑤ Positioning Pin	Used for positioning the 35mm film camera when it is going to be attached to the main unit.
⑥ Mount	Mount for attaching to main unit.
⑦ Lock Release Button	To be pressed to detach the camera from the main unit.
⑧ Electronic Contacts	
⑨ Battery Check Button	To be pressed for checking voltage of battery.
⑩ Back Cover Lock Button	To be pressed in order to release the lock of back cover.
⑪ Back Cover Latch	To be slid down in order to open the back cover.
⑫ Film Chamber	Place to insert film cartridge.
⑬ Aperture Mask	
⑭ Orange Index	Film must be pulled out until its tip is aligned with this index when film is going to be loaded.

## 5 – 2 Loading of Battery and Battery Check

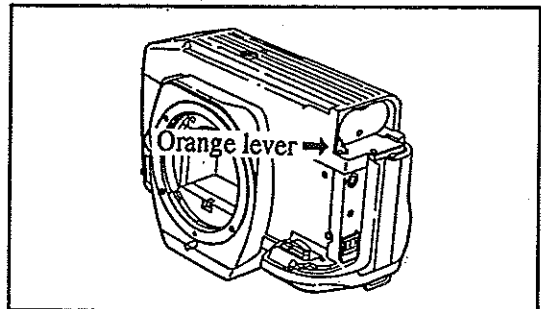
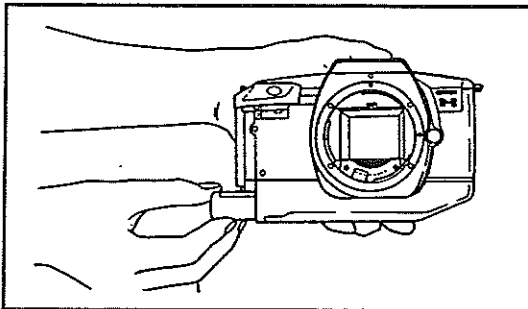
### 1) Loading of Battery

This 35mm film camera uses one, six-volt lithium battery pack (2CR5).

(1) Turn grip fixing screw with a coin or similar object and remove the grip.



(2) Load the battery so that its terminals face in the direction of the camera.  
Push in the battery until it is locked in place by the orange lever.



(3) Attach the grip and fully tighten the fixing screw.

**Note 1 :** *Fingerprints or stains on contact will cause contact failure.*

**Note 2 :** *Take out the battery when the camera is not going to be used for a long time.*

Film camera must be detached from the main unit when the battery is going to be taken out.

Push the orange lever upward to remove the dead battery.

## 2) Battery Check

Battery voltage of 35mm film camera must be checked before turning on the power whenever the CR-45UAF is going to be used.

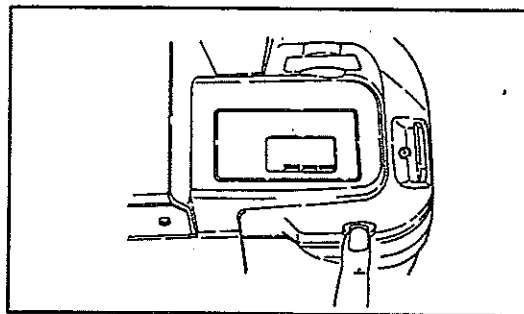
Battery can be checked either with film camera mounted to or dismounted from the main unit. However, when it is mounted, power of the CR-45UAF must be turned off.

### *Procedure*

Press battery check button.

Battery check mark will be displayed on the panel.

- |         |        |                              |
|---------|--------|------------------------------|
| ---     | 3 bars | Battery power sufficient     |
| --      | 2 bars | Have a new battery handy     |
| -       | 1 bar  | } Replace with a new battery |
| No mark |        |                              |



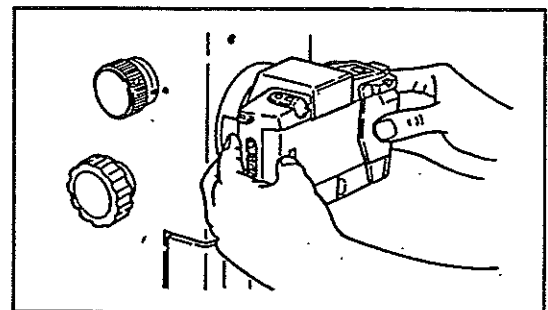
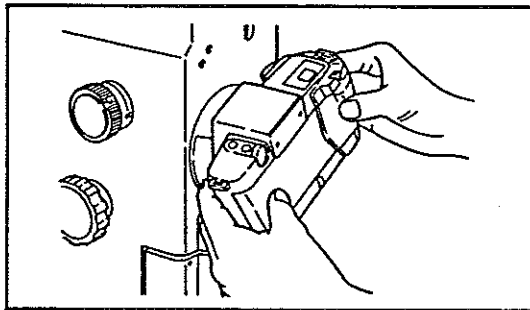
## 5 - 3 Attachment/Detachment

### 1) Attachment

**Note: Dust or grease on electronic contact of main unit and camera may cause contact failure.**

**Be sure to clean them with blower brush or lens cleaning paper before attachment.**

- (1) Turn off the power of CR-45UAF.
- (2) Insert the positioning pin of camera to the positioning hole on the main unit.
- (3) Press the camera against the main unit and turn the camera approximately  $60^\circ$  in clockwise direction until it stops.



### 2) Detachment

**Note: Dust will enter the film camera and main unit when 35mm film camera is detached.**

**Be sure to attach the dust caps on both mounts.**

**Remove the battery from the camera and put the camera in a vinyl bag or the like when it is not going to be used for a long time.**

- (1) Turn off the power of CR-45UAF.
- (2) Press the lock release button of the camera and turn the camera in counterclockwise direction.

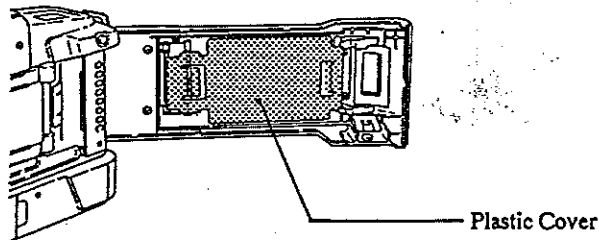


## 5 - 4 Loading of Film

Film can be loaded with film camera either attached to or detached from main unit. However, loading of film with film camera detached will fasten the consumption of lithium battery in the film camera.

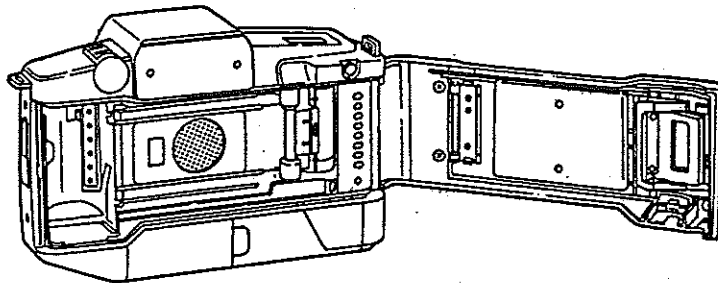
Therefore, it is recommended that this operation be performed with the camera attached to the main unit and its power turned ON.

*When film is going to be loaded onto the camera for the first time, remove the plastic cover on the back of cover.*

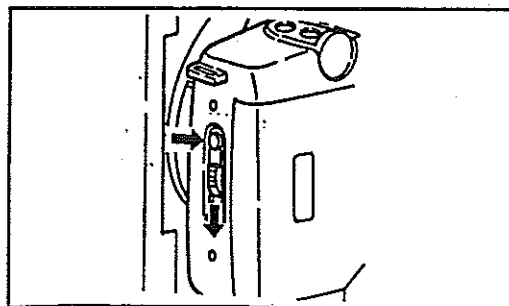


### **CAUTION**

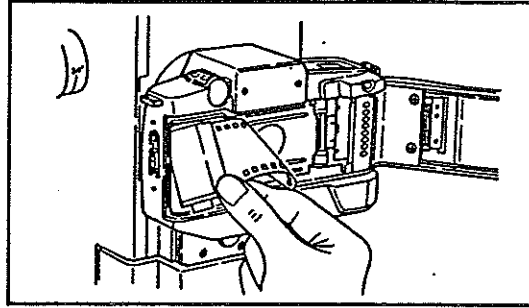
*Never touch the shutter curtain. Its high-precision design makes it sensitive to pressure. Also, when loading the film, be careful that the film leader does not touch the shutter curtain.*



- (1) Push the back cover latch down while pressing the back cover lock button to open the back cover.

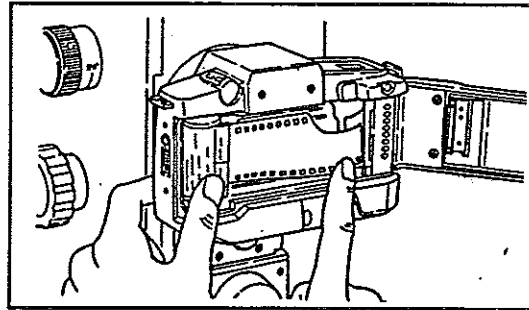


- (2) Insert the film cartridge into the film chamber.

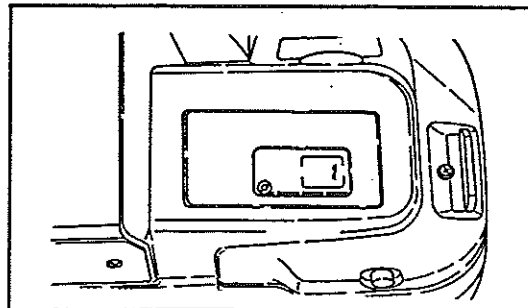


- (3) Pull the film leader across the shutter curtain until its tip is aligned with the orange index.  
There must be no slack.

*Note : If film is pulled out too much, adjust the length by rewinding the excess film back into the cartridge.*



- (4) After confirming that the perforations of film are engaged with the sprocket teeth, close the back cover.
- Film will be automatically wound on.
  - Film feed mark and “1” will be displayed on the panel of camera.  
If “1” is not displayed, feed several frames of film or check the battery voltage and check the display again.



*Note: Blinking “CHECK FILM BACK” on monitor or blinking film feed mark on panel of camera indicates film is not loaded properly. Reload the film.*

## 5 - 5 Film Rewind

### 1) Automatic Film Rewind

The film automatically rewinds at the end of the roll.

- (1) During rewind, the film transport bars move in sequence from right to left to indicate the function in progress while the frame counter counts in descending order.
- (2) Film rewind stops automatically when the film has been completely rewound.  
Open the back cover when the film-load check mark ( ⊙ ) blinks.
- (3) Open the back cover and take out the film cartridge.

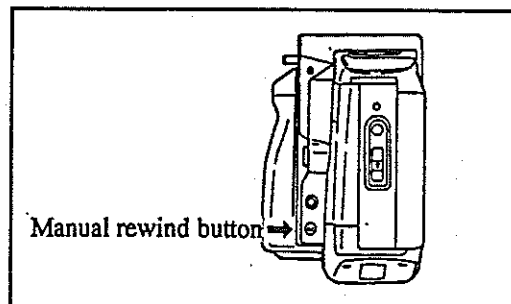
### 2) Manual Film Rewind

Press the manual rewind button for more than two seconds in order to rewind before the roll ends.

The function begins immediately.

*Note: Rewinding of film with power of the CR-45UAF turned off will fasten the consumption of lithium battery in the film camera.*

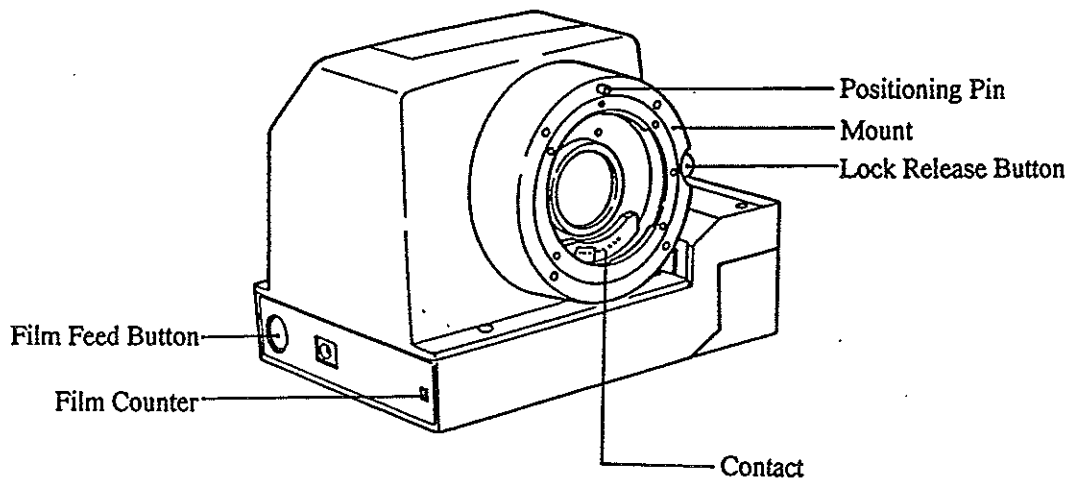
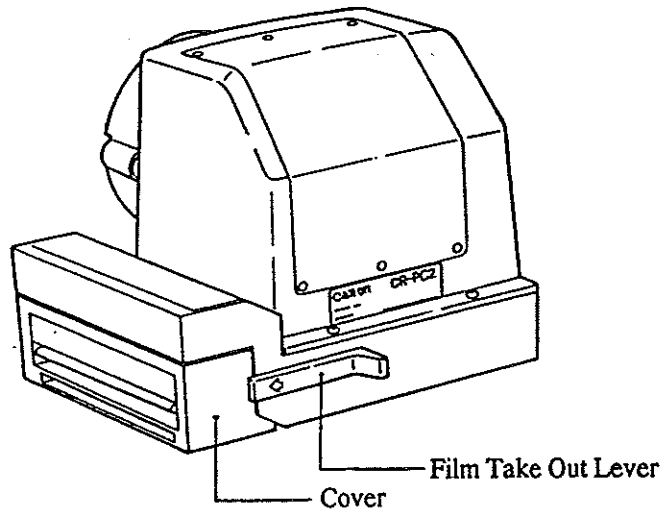
*It is recommended that this operation be performed with the camera attached to the CR-45UAF and its power turned ON.*



# 6. Polaroid Color Back Unit CR - PC2

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## 6 - 1 Description



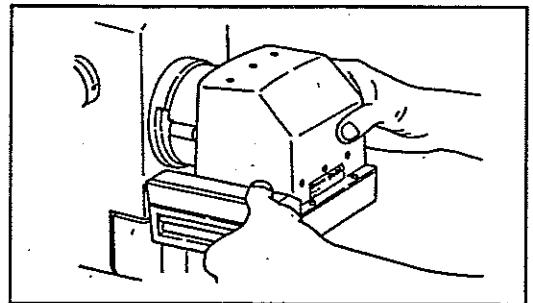
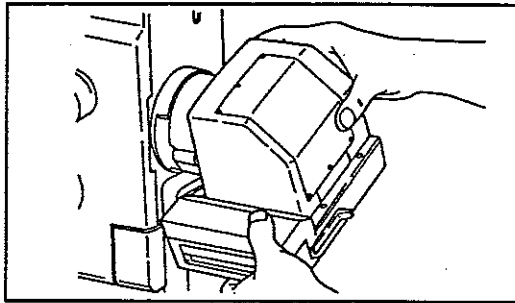
## 6 - 2 Attachment/Detachment

### 1) Attachment

**Note:** *Dust or grease on electronic contact of main unit and CR-PC2 may cause contact failure.*

**Be sure to clean them with blower brush or lens cleaning paper before attachment.**

- (1) Turn off the power of CR-45UAF.
- (2) Insert the positioning pin of the CR-PC2 to the positioning hole on the main unit.
- (3) Press the camera against the main unit and turn the camera approximately 30° in clockwise direction until it stops.



### 2) Detachment

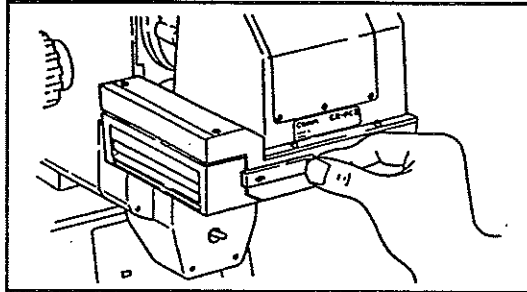
**Note:** *Dust will enter the CR-PC2 and main unit when the CR-PC2 is detached.*

**Be sure to attach the dust caps on both mounts and put the CR-PC2 in a vinyl bag or the like when it is not going to be used for a long time.**

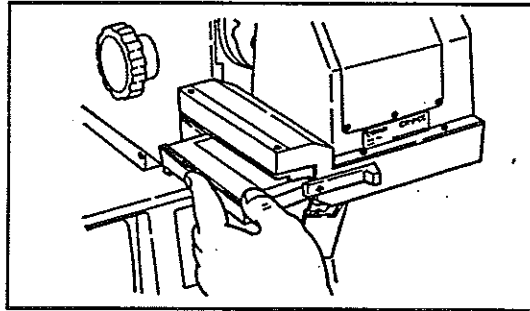
- (1) Turn off the power of CR-45UAF.
- (2) Press the lock release button and turn the CR-PC2 in counterclockwise direction.

## 6 – 3 Loading of Film and Replacement of Film Pack

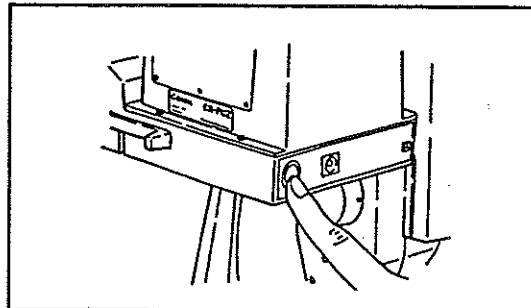
- (1) Turn on the power of the CR-45UAF.
- (2) Move the film take out lever to the position indicated by the arrow to open the film pack insertion slot.



- (3) With film cover (light shielding cover) facing downwards, insert the film pack fully until the narrow plastic strip on the front of the pack is pushed down.

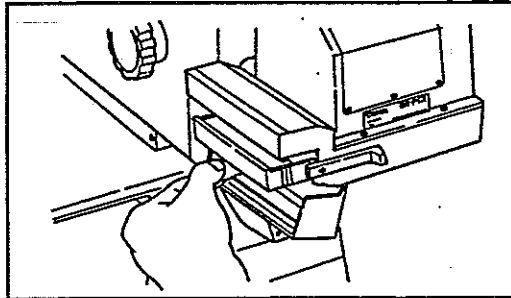


- (4) Close the film insertion slot cover.
- (5) Press film feed button (green) or the shutter release button of CR-45UAF to remove the film cover. Counter on Polaroid camera will be "10".



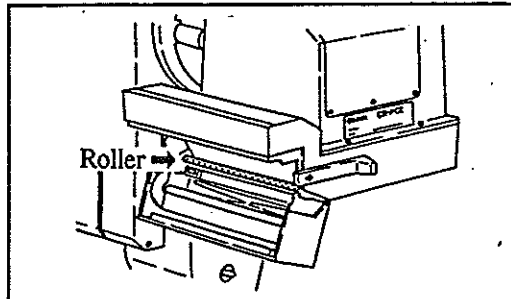
(6) After all the films are used up, move the film take out lever fully in the direction indicated by the arrow.

(7) Pull the pull out tab to take out the empty pack.



**Note 1 :** *If roller is not clean, black spots may appear on the picture, or darkness may be uneven.*

*In this case, clean the roller with cotton swab.*



**Note 2 :** *See the instructions on the film pack for handling the film.*

## 7. Before Calling Serviceman

Whenever trouble occurs or when there is mistake in operation, error will be indicated by message on monitor, electronic sounds and special phenomenon.

In this case, take the countermeasures indicated below according to the cause.

If function is still not restored, contact a Canon representative or distributor.

Phenomenon			Cause	Remedy
Display on Monitor	Electronic Sound *	Others		
"LAMP EX-CHANGE" blinks.		Shutter cannot be released.	Lamp housing cover is detached.	Attach the lamp housing cover.
"FILM BACK ERROR" blinks.			Contact failure of the attached camera.	Detach the camera and clean the contact. See page 27 or 32.
"CHECK FILM BACK" blinks.		Shutter cannot be released.	35mm film loading failure	Reload the film.
			35mm film rewinding failure	Detach the camera and remove the cartridge in a dark room.
			35mm film that has already been rewound is still in the camera.	Remove the old cartridge and load a new film.
			Film in Polaroid color back unit is used up.	Remove the empty pack and load a new pack
			Polaroid film is not loaded.	Load a new pack of film.
			Polaroid film cover is not removed.	Press film feed button or shutter release button to remove the cover.
			Camera is not mounted.	Mount the camera.
	○		Film is not loaded onto 35mm film camera.	Load film.
			Back of 35mm film camera is opened.	Close the back cover.
			Sounds when Polaroid film cover is removed by pressing shutter release button.	
No display on monitor although power is turned on.		READY lamp blinks.	Power saving system is operating.	Press either shutter release button, ALIGNMENT switch or any of the four buttons below the monitor.

\* Sounds when shutter release button is pressed.



7. Before Calling Serviceman

Phenomenon			Cause	Remedy
Display on Monitor	Electronic Sound *	Others		
Split lines cannot be seen although it is set to "IN".			Split lamp is burned out.	Replace the split lamp. See page 38.
			See page 19 for other causes.	See page 19.
Monitor is dark even when knob is set to the brightest.			Lamp for observation is burned out.	Replace the lamp. See page 37.
"SYSTEM ERROR" blinks		Any switch does not function.		Contact Canon representative or distributor.

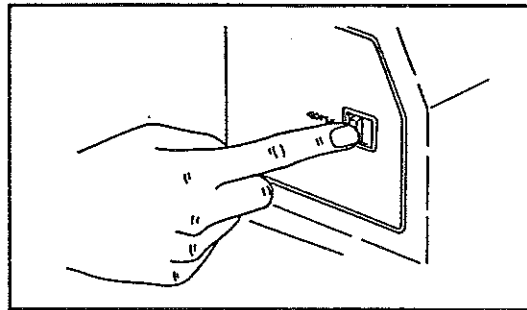
## 8. Replacement of Lamps and Fuse

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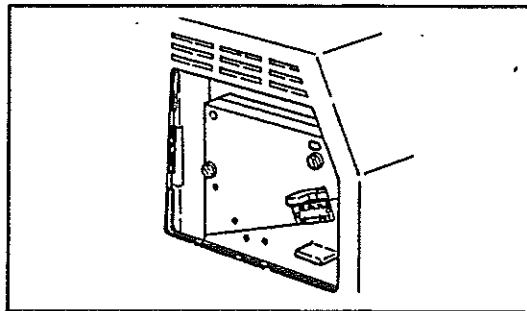
*Caution! Because the lamp immediately after being turned off is very hot, wait for about 5 minutes for it to cool.*

### 8 – 1 Lamp for Observation

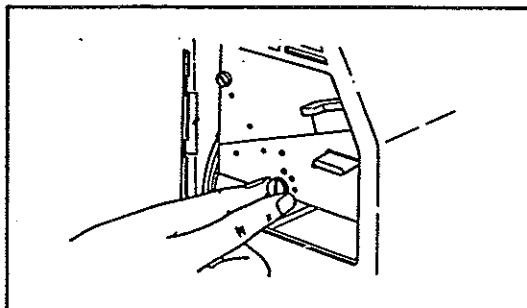
- (1) Turn off the power and unplug the power cable from AC outlet.
- (2) Depress the handle as indicated by arrow and detach the lamp housing cover.  
While this cover is detached, "LAMP EXCHANGE" is displayed on the monitor.



- (3) If the screw is lowered, turn the height adjusting ring to raise it.



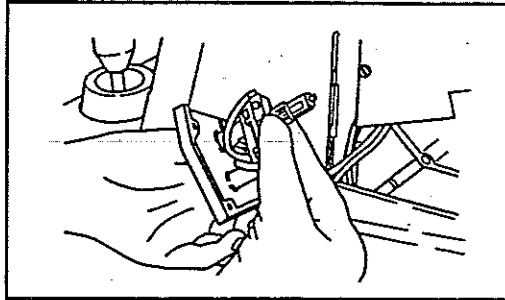
- (4) Loosen the setscrew and pull out the inner cover.  
Remove the lamp from the socket on the cover.



## 8. Replacement of Lamps and Fuse

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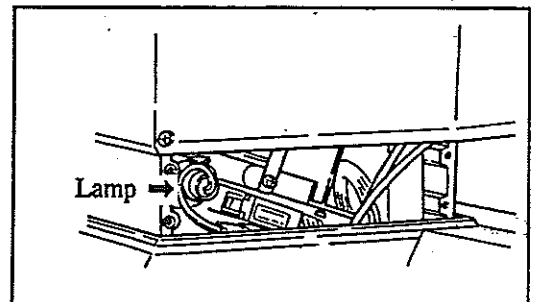
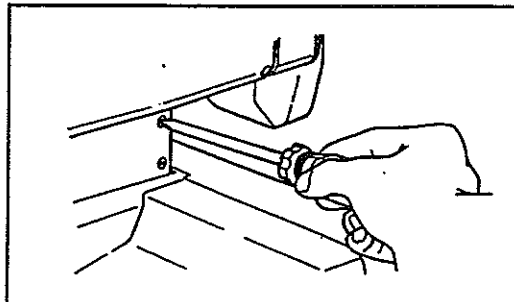
- (4) Wear gloves in order to prevent staining of the new lamp and fully push in the new lamp.



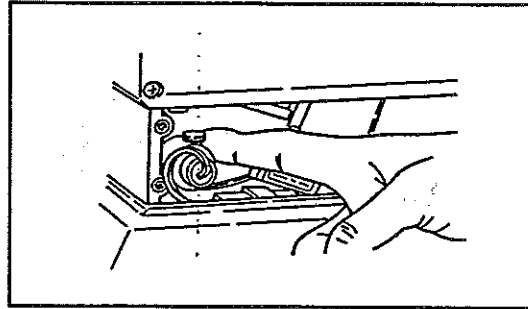
- (5) Return the inner cover and fix it with the setscrew.
- (6) Return the lamp housing cover by engaging the left end with the main unit and then attaching the right side with the handle pressed as indicated by the arrow.

## 8 - 2 Split Lamp

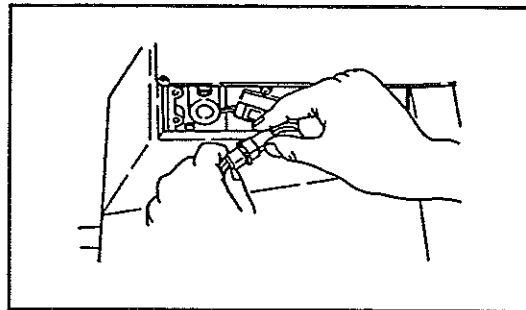
- (1) Turn off the power and unplug the power cable from AC outlet.
- (2) Turn the height adjusting ring so the main unit rises to its utmost.
- (3) Loosen the four screws on the cover to detach it.  
If the lamp is raised, turn the focus knob to lower it.



- (4) Loosen the split lamp thumb screw.



- (5) Gently pull out the lamp socket.  
The cord and the square connector will come out together.  
Pull the two sections apart at the connector.



- (6) Insert the connector of the new lamp into the square socket.
- (7) Insert the lamp into the lens barrel until it stops. Do not push it in further.
- Turn on the power to switch on the lamp.  
Observe the inside of the main unit through the objective lens.  
Turn the lamp up slightly within a half-turn to find the position where the split lines are most clearly visible, with the same brightness and the same length.  
In that position, tighten the split lamp thumb screw and fix the lamp in place.

*Note: If the position of lamp is not correct, autofocus will not operate properly.*

- (8) Close the cover and tighten the screws. At this time, be careful not to catch the cable in the cover.

*Note: If autofocus does not function normally after replacement of lamp, contact a Canon representative or distributor.*

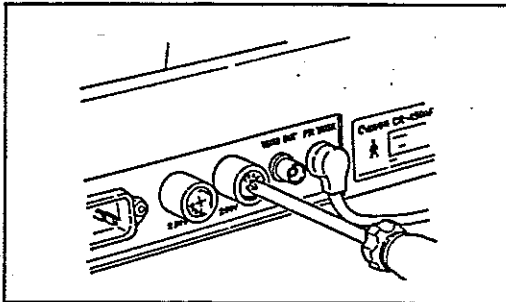
## 8 – 3 Replacement of Fuse

If READY lamp does not light even when power is turned ON, fuse may be blown, power supply plug may be disconnected or cord may be snapped.

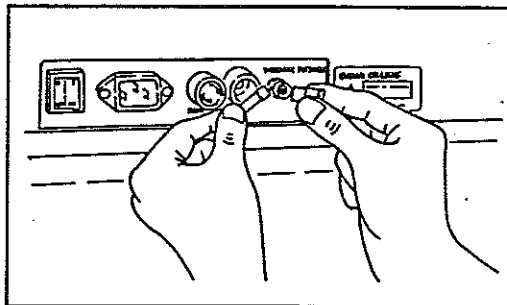
The procedure for replacing the fuse will be described in this section.

**NOTE: If the fuse blows again immediately after replacement, contact a Canon representative or distributor.**

- (1) Turn off the power.
- (2) Loosen the cap of fuse holder with a Phillips screwdriver.



- (3) Pull the cap. Cap will be removed with the fuse.
- (4) Remove the old fuse and replace with a new one.



- (5) Insert the cap with the new fuse into the holder.  
Turn the cap fully in clockwise direction while pressing it with the screwdriver.

## **9. Others**

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### **9 – 1 Precautions when Moving the Instrument**

- (1) Be sure to turn off the power switch.
- (2) Disconnect the power cable from the main unit and the AC outlet.
- (3) Support the instrument by holding the sides at the base. Do not hold the attached camera, objective lens, eye fixation lever, chin rest or face rest poles as they may come off. Also, be careful when carrying the instrument as the stage will slide.

NOTE: When the instrument is going to be transported by automobile, etc., contact Canon representative or distributor for advice on the procedure for packing it.

### **9 – 2 Handling the Unit under Cold Conditions**

Sudden heating of the room in cold areas will cause condensation to form on the lenses. In this case, leave the unit for at least 40 minutes after heating is turned on. Wait until condensation disappears before performing measurement.

## 9 – 3 Cleaning of Objective Lens

Dust or dirt on the surface of the objective lens can be easily seen by retracting the infrared filter from the optical path.

Turn off the power and slide the IR filter lever to “OUT” side.

Attach the cover and turn on the power.

After cleaning is completed, turn off the power, slide the lever to “IN” side in order to return the filter into the optical path.

(1) When covered with dust or dirt :

Wipe the lens surface lightly with a blower brush.

Do not touch the brush, as grease from the skin will stain the glass.

(2) When stained by fingerprints or grease :

Brush off the dust or dirt on the lens surface, and wipe the surface lightly with clean gauze or lens cleaning paper soaked in a mixed solution of 2 parts of absolute alcohol to 8 parts of ether.

*Note 1 : If the lens surface is rubbed too strongly or when dust or dirt still remains, it will be scratched.*

*Also, if the lens is soaked excessively with cleaning solution, the surface will be stained.*

*Note 2 : Do not wipe the objective lens with disinfecting alcohol, since it contains a high proportion of water and will damage the surface.*

Other than the solution specified above, information on effective and easy-to-use commercial solutions can be obtained by contacting a Canon representative or distributor.

# 10. Specifications

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Type	Non-mydratic type
Field angle	Variable between 45° and 20°
Image magnification on 35mm film	1.8 × (45° ), 3.8 × (20° )
Actual image size	22mm in diameter (on 35mm film) 74mm in diameter (on Polaroid film)
Minimum diameter of pupil required	4.0mm in diameter (at 45° , 20° )
Working distance	45mm (from surface of objective lens to surface of cornea)
Working distance adjustment	Using corneal reflection (working distance dots)
Pupil positioning	External eye image (50mm in diameter) can be observed on monitor. 20mm in diameter at the center is split to be aligned.
Focusing	Performed by automatic or manual alignment of split lines or focusing on retinal image with focus knob
Examinee's diopter compensation range	Autofocus: - 10 - +13D Manual focus: Without compensation lens (split line usable range) ..... - 12 - +15D With minus compensation lens .... - 7 - - 33D With plus compensation lens .... +11 - +35D
Flash intensity	Automatically adjusted or manually set.
Camera back	35mm film camera CR-RE or Polaroid color back unit CR-PC2
Film	For CR-RE ..... 35mm film (ISO64 - 400) For CR-PC2.... Polaroid color film 600 (ISO600) or 779 (ISO640)



10. Specifications

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Light source	For observation .... 12V 75W halogen lamp For photography ... Max. 300W rating strobe tube
Eye fixation lamp	Inner lamp in optical path. Light can be seen on monitor. External eye fixation lamp can also be attached.
Data to be printed	Hand-written data on plastic data card, number of exposures or date
TV camera, monitor	Built-in CCD camera, 5" TV monitor
Working range	Vertical : 34mm Forward/backward : 40mm Right/left : 100mm Face rest (vertically) : 70mm
Power Supply	120V AC, 60Hz, 175VA
Dimensions	Main unit 324(W) × 476(L) × 550(H)mm (Approx. 13" × 19" × 21½" )  <i>Option</i> 35mm film camera CR-RE 148(W) × 67.5(L) × 96(H)mm (Approx. 6" × 2½" × 4" ) Polaroid color back unit CR-PC2 158(W) × 127(L) × 120(H) (Approx. 6" × 5" × 5" )
Weight	Main unit Approx. 30.0kg (Approx. 57 lbs.)  <i>Option</i> 35mm film camera CR-RE Approx. 0.6kg (Approx. 1 lb. 5 oz.) Polaroid color back unit CR-PC2 Approx. 1.1kg (Approx. 2 lbs. 4 oz.)

# 11. Components

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CR — 45UAF Main Unit .....	1
Power Cables .....	1
Fixation Target Box .....	1
Spare Lamps .....	1 set
Spare Fuse .....	2
Data Card .....	5
Cap for Objective Lens .....	1
Cap for Camera Mount .....	1
Chin Rest Paper .....	100 sheets
Blower Brush .....	1
Dust Cover .....	1

*The cathode-ray tube, strobe tube and the lamps are expendable items.*

## Optional Accessories

35mm Film Camera CR — RE
Polaroid Color Back Unit CR — PC2
Direct Viewfinder Unit CR — DF2
External Eye Fixation Lamp CR4 — FL
Motorized Table CO — MT
Motorized Chair O — C
Data Card CR4 — DC (100 pieces)
Chin rest paper (500 sheets)

*Polaroid is a trademark of Polaroid Corporation.*

## **12. Service Information**

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For details concerning the service such as overhaul, contact a Canon representative or distributor.

# Canon

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