Canon CR4-45NM Non-Mydriatic Retinal Camera
Operation Manual

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Thank you very much for your purchase of our product. Please
read this operation manual thoroughly to fully understand the
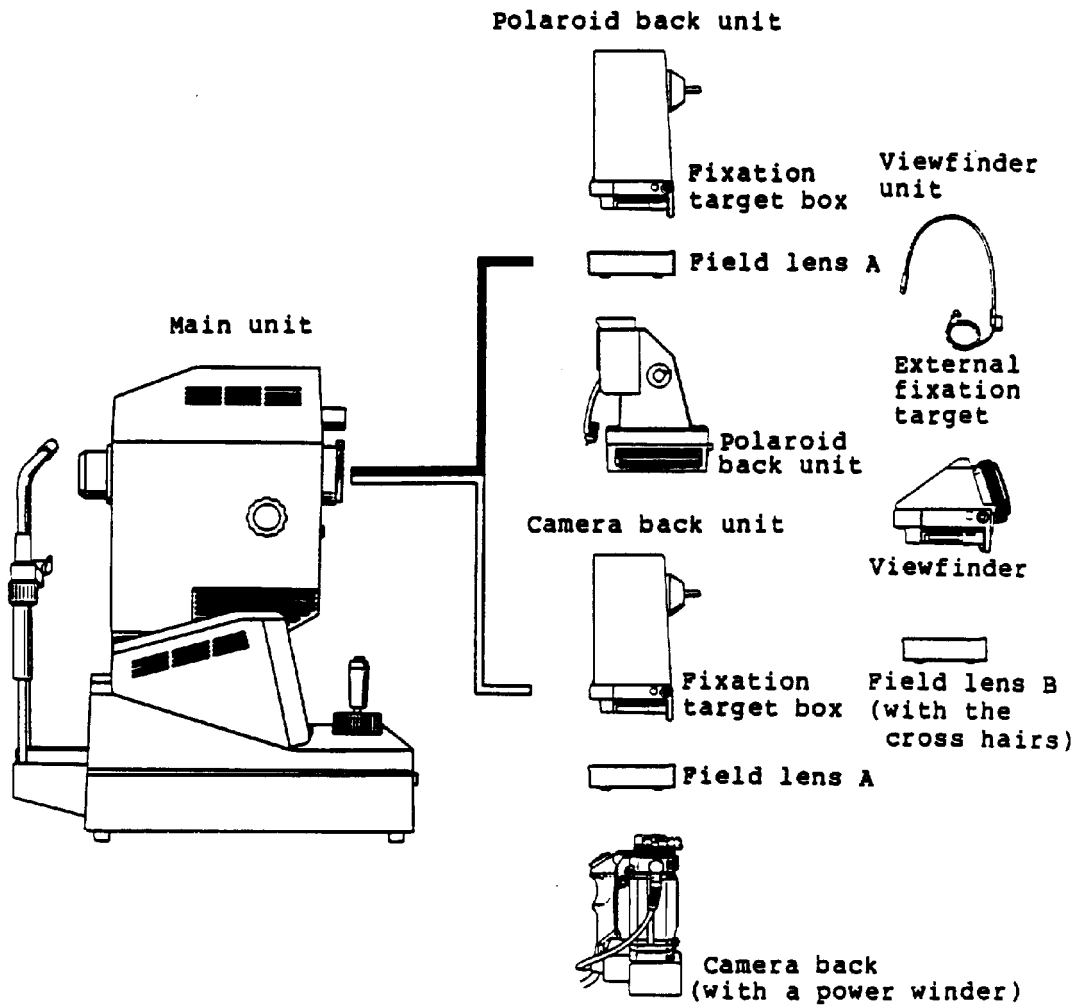functions of this product for ensuring proper use.

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1. INTRODUCTION

The CR4-45NM is capable of performing non-mydriatric retinal photography when the main unit is combined with the Polaroid back unit or camera back unit and in addition, is capable of performing the retinal observation through visible light when combined with the viewfinder unit.

Polaroid back unit

Main unit

Fixation target box

Viewfinder unit

Field lens A

Polaroid back unit

External fixation target

Camera back unit

Viewfinder

Fixation target box

Field lens B (with the cross hairs)

Field lens A

Camera back (with a power winder)

How to Read Operation Manual

This manual is divided into three sections: (1) Photography by Polaroid back unit, (2) Photography by camera back unit, and (3) Retinal observation by viewfinder unit.

Please refer to the description applicable to the combination of products you have purchased.

Precautions for Use

1. Since a strong shock might cause preadjustment disorder, please handle the unit carefully.

2. Be sure to check that there are no stains or scratches on the objective lens before photography, since they may appear on the print as white dots. After photography, place the cap over the lens.

3. This unit is a precision instrument. Avoid high humidity or temperature, and dusty conditions.

4. Be sure not to handle this unit in other manners than those described in this manual.

Installation

1. Install the instrument where it is possible to control the brightness to the degree a newspaper can be barely read (about 5 luxes).

2. Place the instrument on a table.

3. Insert one end of the power cable into the instrument.

4. After confirming that the cables are connected properly, insert the power plug for the main unit into the power source.

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5. Whenever carrying the instrument, turn off the power. Fix the stage unit by rotating the stage lock knob and move the instrument by holding the stage unit.

2. DESCRIPTION OF MAIN UNIT

CR4-45NM Main Unit

CCD camera lens
Mounting lever
Camera mount
Focusing knob
Back unit receptacle
Data card insertion slot
Lamp house opening/closing screw
TV monitor
Monitor function button
Monitor knob cover
Shutter release button
Joy stick
Height adjusting ring
External eye/retinal image selector (ALIGNMENT switch)
Stage lock knob

Diopter compensating slider
Forehead rest
Objective lens
Height adjusting mark
IR filter knob
Lamp house
Chin rest height adjusting ring
Light intensity adjusting knob
Face rest pole
Power switch
Power cord receptacle
External fixation target receptacle

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3. POLAROID PHOTOGRAPHY

Polaroid Back Unit
CR4-PC

Fixation target lever

Fixation target cord

Warning lamp

Film pack
take-out lever

Clamping screw
Plug
(to main unit)
Film counter
Film cover take-out button

Detachment button

Mounting groove

Shutter knob

Lid
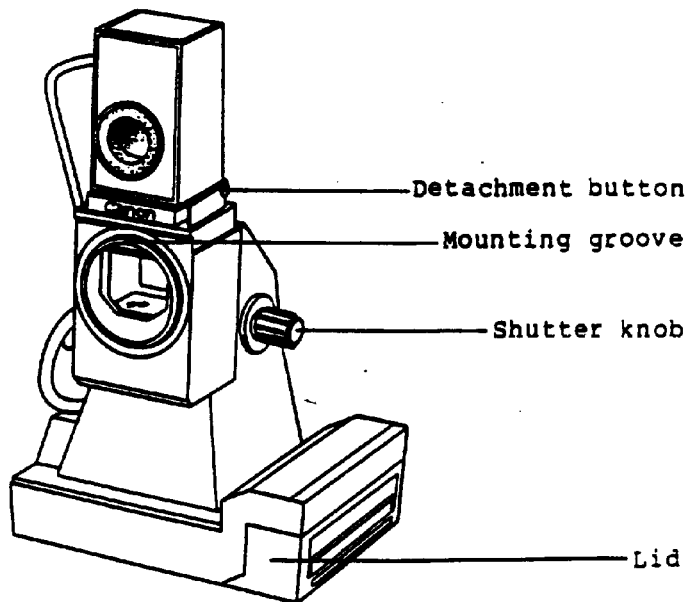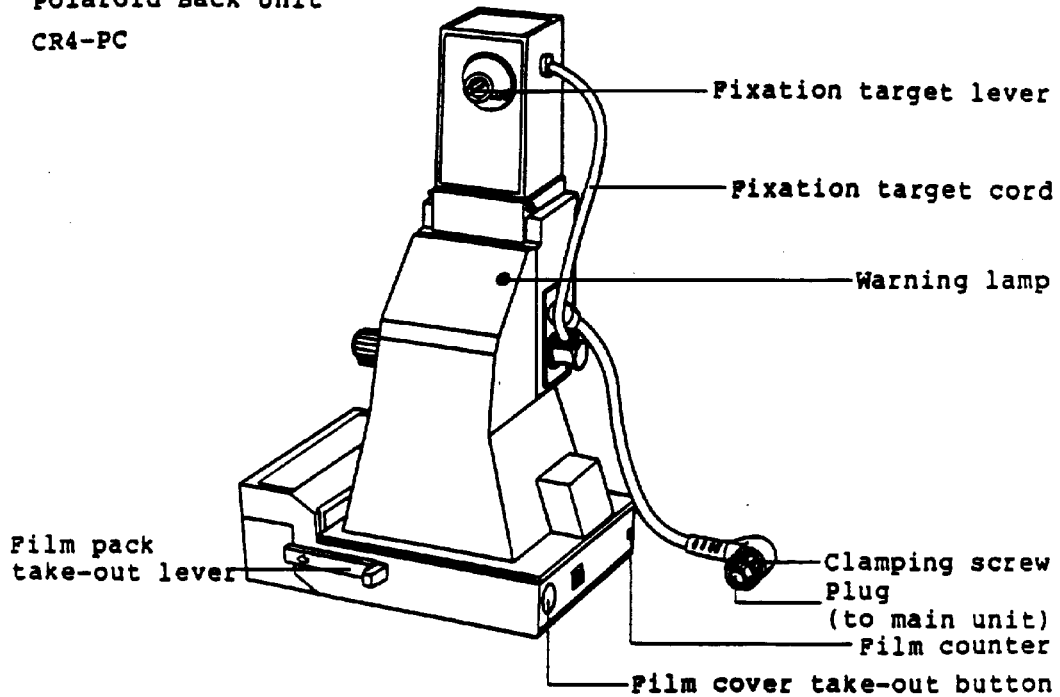
Attachment/Detachment to/from Main Unit

Follow the procedure below to attach the Polaroid back unit to or detach it from the main unit.
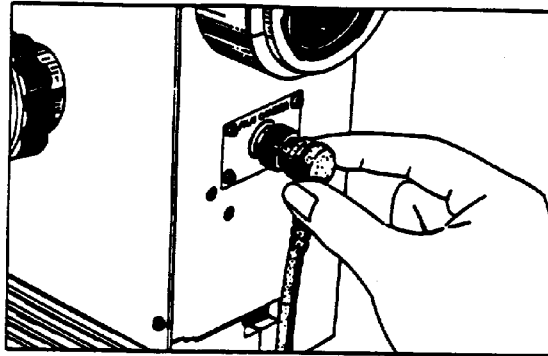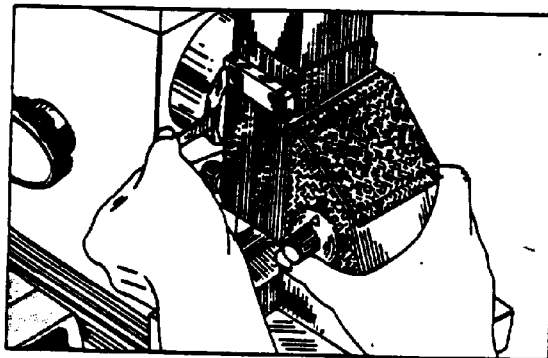
1. Turn off the power.

2. Insert the Polaroid back unit plug into the back unit receptacle on the main unit, and tighten the clamping screw by fully turning it clockwise.

3. With the mount groove of the Polaroid back unit aligned to the positioning pin of the main unit, push the Polaroid back unit against the main unit and push the lever down.

4. Detach the Polaroid back unit in the reverse order of the attachment.

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Precautions after Detachment

Dust may enter into the Polaroid back unit and the main unit if the Polaroid back unit is left as it is after detached. Place the supplied caps over both mounts.

Film Loading

The usable film is Polaroid High Speed Land Film 600 or Type 779. Each film pack includes 10 films. Since the Polaroid back unit does not operate if detached from the main unit, a film pack should be loaded in the state with the Polaroid back unit attached to the main unit. Refer to the previous item to attach/detach the Polaroid back unit.

1. Turn on the power.

2. Open the film pack insertion slot.

   ● Push the film take-out lever in the direction of the arrow.
   ● The lever returns to the original position naturally when the finger is released.
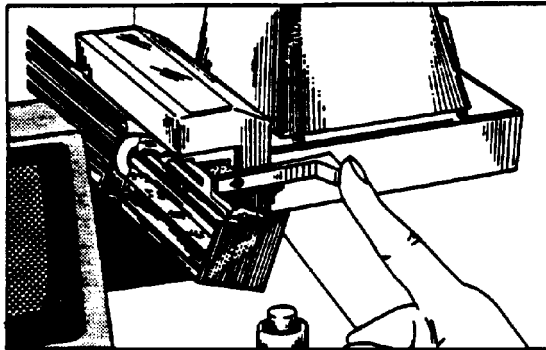
3. Insert the film pack into the Polaroid back unit.

   ● The film cover (dark slide) should face upwards.
   ● The film tab should face the operator.
   ● Insert the film pack fully until the narrow strip portion opens.

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4. Close the film insertion slot cover.
    ● Push the cover upward from the lower side.

5. Press the film cover take-out button (green) to remove
    the film cover.

Chin Rest Paper Attachment

When attaching the chin rest paper, follow the procedure
below:

1. Pull up 2 retaining pins.

2. Insert the retaining pins into the left and right holes
    on the chin rest papers.

3. Push the retaining pins with chin rest papers down into 2
   holes on the chin rest.

Photography Procedure

Be careful so that the examinee's pupil does not become small
because of the influence caused by the examiner's clothes,
the sitting position, and the direction of the monitor.

1. Set the shutter knob to 0.

2. Determine light intensity for observation.

    ● Set the light intensity adjusting knob to 4. (Standard
      intensity)

3. Turn on the power.

    ● The following screen is displayed on the monitor.
    ● If no photography or switch operations are performed
      for more than 5 min., the power saving system will work.
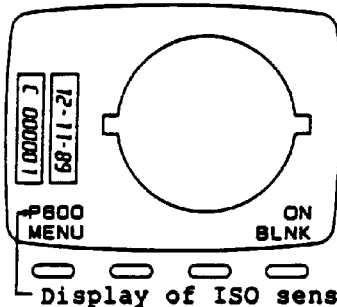
    └ Display of ISO sensitivity

Note 1:   When the monitor does not display the screen
          normally, turn off the power once and after
          about 5 sec., turn on the power again.

     2:   If the Polaroid back unit is detached from the
          main unit during the operation and attached
          again, the following screen will be displayed.
          Press the button below POLA.
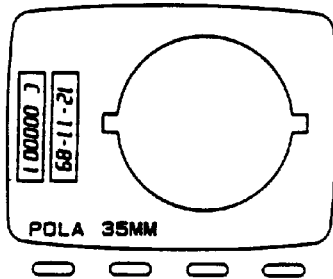
4. Confirm the flash intensity.

    ● See the screen when the power is first turned on (Step
      3, above) to confirm that P600 is displayed at the
      lower left.

    [To compensate flash intensity]

      ① Press the button below MENU.

          ● The following screen is displayed on the monitor.
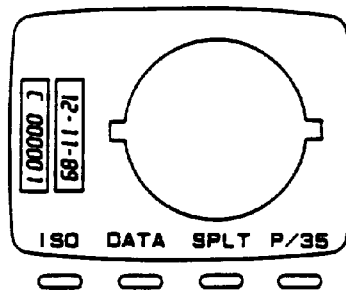
      ② Press the button below ISO.

          ● The following screen is displayed on the monitor
            and "P600" blinks.
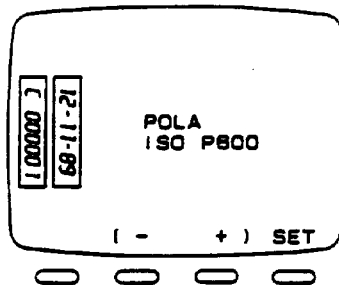
          ● Press the button below "-" to decrease the
            intensity and the button below "+" to increase
            the intensity.
          ● In the respective cases "P600⁻" or "P600⁺"
            blinks.

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③ After setting the flash intensity, press the button below "SET".

- The monitor displays the screen, which appears when the power is turned on, and "P600", "P600$^-$" or "P600$^+$" blinks at the lower left.
- While the display blinks, the power is being charged. When it lights continuously, then it becomes possible to perform photography.

[In the case P600 is not displayed on monitor although power is turned on]

Follow the procedure below:

① Press the button below MENU.

② Press the button below P/35.

③ Press the button below POLA.

5. Darken the room to a level where a newspaper can be read anyhow (about 5 luxes) or darker.

6. Have an examinee sit.

- When the examinee is in a dark room, the examinee's pupils dilate naturally.

Note: If the examinee puts on spectacles or contact lenses, have him take them off.

7. Adjust height of the chin rest.

- Adjust height of the chin rest by rotating the chin rest height adjusting ring so that the eye to be examined is aligned with the height adjusting mark.

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8. Release the lock of the stage.

   ● Rotate the stage lock knob counterclockwise.

9. Move the main unit to the eye to be photographed.

   ● Grasping the joy stick, move it to the left or right.

10. By pressing the ALIGNMENT switch, display the external eye image on the monitor.

    ● Instruct the examinee to look straight ahead.
    ● The external eye image and pupil alignment mark (◎ mark) is displayed on the monitor.
    ● Whenever pressing the switch, the external eye image and the retinal image are displayed alternately.

11. Observe the external eye image on the TV monitor, focus the pupil alignment mark, and align the split images with the mark.

    ● Left/right and height adjustment:
      Left/right adjustment .. Adjust the left/right position by tilting the joy stick to the left/right.
      Height adjustment ...... Adjust the height by rotating the height adjusting ring. If not adjustable sufficiently, rotate the chin rest height adjusting ring.

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● Forward/backward adjustment:
  To align the pupil image which is split into the upper
  and lower parts .. Tilt the joy stick forward/backward.

Pupil alignment mark

         Not aligned   Aligned
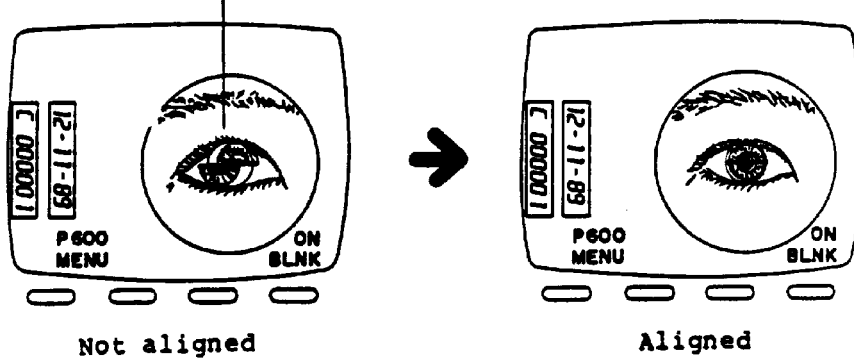
Note: When the pupil is smaller than the inside ring of
       the pupil alignment mark, it indicates
       insufficient mydriasis.

12. By pressing the ALIGNMENT switch, display the retinal
    image on the monitor.

    ● The retinal image, split lines, fixation target, and
      corneal reflection dots are displayed on the monitor.
    ● If no split lines are seen, the height or left/right
      adjustment is improper and if no corneal reflection
      dots are seen, the forward/backward adjustment is
      improper.

    ● If the retinal image cannot be seen well, light
      intensity is insufficient for observation. In this
      case, adjust light intensity by rotating the light
      intensity adjusting knob.

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13. Precisely adjust the positioning of the retinal image on the monitor so that the entire retinal image is clearly seen.

   ● Tilt the joy stick forward/backward or left/right so that the left and right flickering corneal reflection dots are most clearly seen.
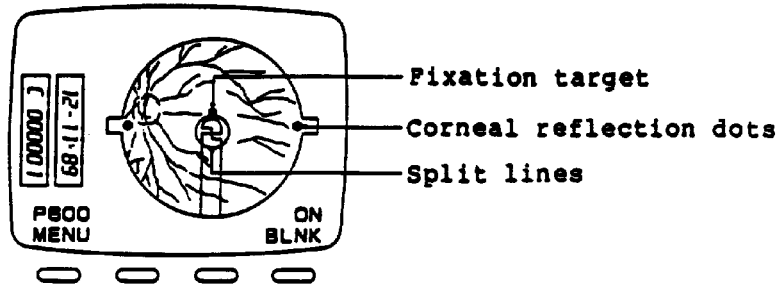
14. Focus the retinal image.

   ● By rotating the focusing knob, make the split lines aligned on the monitor.

   Causes for unseen split lines

   ① Insufficient pupil dilation: Dilate the pupil more in a darker room.

   ② Center of the pupil not aligned with the optical axis of the retinal camera } Repeat steps after Step 8.

   ③ Eclipse of illuminating light by the eyelashes or eyelid } Instruct the examinee to open his eye wider.

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④ Split lines are OFF: Turn on the split lines by
displaying the above screen
for step 4 and by pressing
the button below SPLIT.

Push the diopter compensating
slider if it is out.

If the split lines cannot be aligned even when the
focusing knob is fully rotated and the split function
is on, pull out the diopter compensating slider. (The
diopter of the eye to be tested is outside the
measurement range of -12 to +15D)

- The split lines disappear.
- In this case, adjust the focusing by rotating the
  focusing knob so that the retinal image is clearly
  seen on the monitor.

When the left line is up:
2 steps
When the right line is up:
1 step
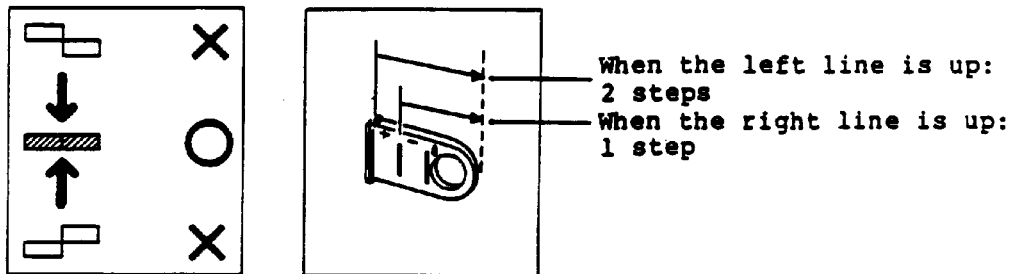
15. Determine the area to be photographed.

- Have the examine look at the fixation target, move the
  fixation target lever and determine the retinal image
  area to be photographed on the TV monitor.
- If flares are seen or the corneal reflection dots at.
  the left and right are not seen, adjust the height,
  forward/backward and left/right positions of the main
  unit once more.

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● If the split lines become misaligned, align them again.
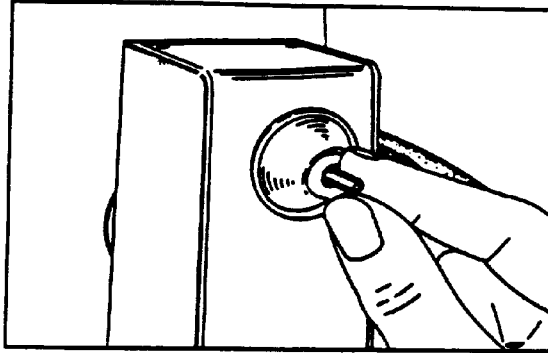
16. Press the shutter release button.

   ● The flash lamp lights and an exposed picture will come
     out automatically.
   ● As neither data nor counter number is printed,
     describe necessary information onto the available
     space on the Polaroid picture.

> Note 1: While "P600" blinks, the power is being charged
>   and no photography can be made.
>
>   2:   Be careful not to take the film out forcefully
>   or to block film movement during film
>   advancement.

17. When the photography is completed, turn off the power.

   ● Place the cap over the objective lens.

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Film Pack Replacement

When the film is used up, the film counter indicates 0,
"CHECK FILM BACK" is displayed on the monitor, and the
warning lamp blinks if the ALIGNMENT switch is set for the
retinal image. Take out the empty film pack by following the
procedure below.

1. Push the film take-out lever fully in the direction of
    the arrow.

2. Pull the tab and take out the empty film pack.

3. Load a new film pack by following the procedure for film
    loading.

Various Display Function

Alarm Display

In the following conditions, "CHECK FILM BACK" is displayed
on the monitor, and the warning lamp blinks if the ALIGNMENT
switch is set for the retinal image. In these cases, the
flash lamp does not light and no picture will come out.

① When the Polaroid film is used up:
     Exchange the film pack with a new one.

② When a film pack is loaded and the film cover (dark
   slide) is not removed:
     Press the film cover take-out button (green).

③ When the shutter knob is set to "C":
     Set it to "O".

④ When the shutter release button is pressed without the
camera plug (Polaroid back unit, camera back unit) being
connected to the receptacle on the main unit.
   Connect the plug to the receptacle.

Note: If the alarm is still displayed on the monitor
      although the above problems are solved, contact a
      Canon representative or distributor.

Normally, when the above problems are solved, the monitor
will display the screen when the power is turned on or
the previous screen before "CHECK FILM BACK" is displayed.
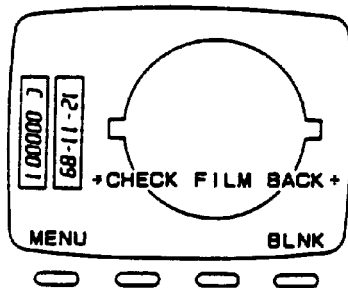
Power Saving System

If photography and switch operation are suspended for more
than 5 minutes, the power saving system will work. The
monitor turns to the screen below, and "SLEEP" blinks.

● To restore the power, press one of the buttons indicated by
  the arrow.
● After the buzzer sounds, the monitor displays the screen,
  which appears when the power is first turned on.

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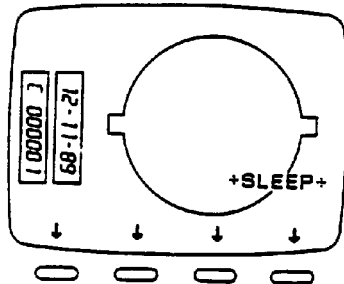
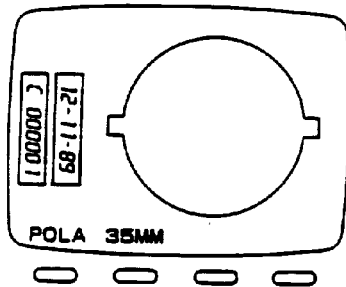### Selection of Photography Camera

When the Polaroid back unit is detached and replaced with the camera back unit during photography, the following screen is displayed on the monitor. In this case, press the button below either name of back units to be used.

Blink Detection Function

This function is to prevent photography error by suspending photography if an examinee blinks at the moment the shutter release button is pressed. When this function works, the following performance will ensue.

① The flash lamp does not light.

② The "BLINK" is displayed at the lower left on the monitor and it blinks for about 3 seconds. At the same time, the buzzer sounds.

③ The film counter does not advance and no exposed pictures come out.

To switch on or off this function, display the following screen on the monitor and press the button below "BLNK".

● The "ON" and "OFF" are displayed alternately every time when the button is pressed.

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● Normally, it is recommended to keep this function on.
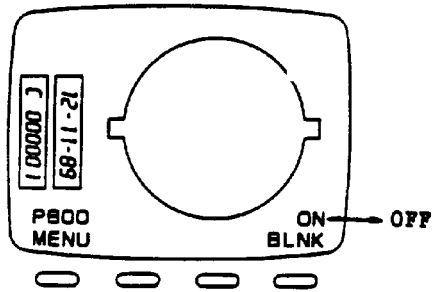
Split Function

This function should be off to disappear the split lines and the pole to support them from the monitor in the case of retinal observation through visible light.

Follow the procedure below to switch off this function.

1. Display the screen, which appears when the power is first turned on, (see the above screen) and press the button below "MENU".

    ● The monitor displays the following screen.
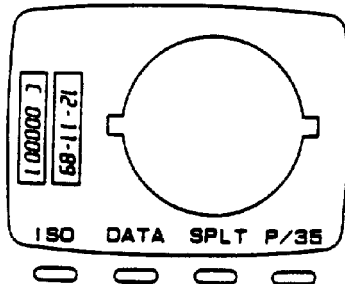
2. Press the button below "SPLT".

    ● To restore the function, follow the same procedure as above. When a compensation lens is inserted (the diopter compensating slider is pulled), the split function will be off automatically.

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4. 35mm PHOTOGRAPHY

Description
Camera Back Unit CR4-FR

Rewind set lever——————————
Frame counter——————
Winder shutter
release button————

Back lid————
②Mode selector——————

Rewind crank
Rewind knob
Back lid
releasing
button

Synchro-cord
Connection
cord

Clamping screw
Plug (to Main Unit)

Fixation target
lever

Aperture
mask
Cartridge
chamber

Fixation target cord
①Shutter release button
Winding lever
Sprocket
Take-up spool
Film insertion slot

③Release lock lever
Alarm lamp
Frame counter set gear
Frame counter——————
Frame counter reset button

Note: Parts which are not described in the above do not
function as the components of the retinal camera and
it is therefore not required to operate them.
Further, normally the parts numbered from ① to ③
below should be set as shown when used.

①	Shutter release button	Set to A	L .... The shutter release button is locked. S .... Self-timer
②	Mode selector	Set to S	OFF .. The winder does not operate. C .... When the winder shutter release button is pressed, the film advances continuously.
③	Release lock dial	Set to L	A .... Controlled by the mode selector set-ting, this button functions as shutter release button.

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Camera Back Attachment/Detachment

Follow the procedure below to attach the camera back to the main unit.

1. Turn off the power.

2. Insert the plug of the camera back into the receptacle on the main unit and turn the clamping screw fully clockwise.

3. Align the main unit positioning pin with the mount groove of the camera back, push the camera back against the main unit and lower the mounting lever.

4. To detach the camera back, reverse the procedure above.

Cautions after Detachment

1. If the detached camera back is left uncovered, dust and dirt may get inside the camera back as well as the main unit. Be sure to place the supplied dust cover over both mounts.

2. The mirror inside the camera back is longer than that of an ordinary camera. If a lens is attached to the camera back and the shutter release button is pressed, the mirror installed in the camera back will break. Do not try so.

Film Loading

The usable film is the 35mm film with ISO sensitivity (ASA) 64 - 400. Since the camera back does not work if detached from the main unit, load a film with the camera back attached to the main unit. For the film loading method, refer to the previous item.

1. Turn on the power.

2. Open the back lid of the camera back.

   - While pressing the back lid releasing button, pull up the rewind knob.
   - Pull up the rewind crank to make operation easy.

3. Insert a film cartridge into the cartridge chamber.

   - Press down the rewind knob so that its spindle is inserted into the cartridge.
   - If the rewind knob cannot be pressed down, lightly rotate the rewind knob clockwise or counterclockwise.

4. Put the film around the film take-up spool.

   - Insert the film end into the film insertion slot securely.
   - Press the shutter release button to wind the film one around.
   - Check that the film performations are engaged on the sprocket and spool tooth.

5. Remove the film slack.

   - Slowly turn the rewind crank clockwise.
   - Lay down the rewind crank.
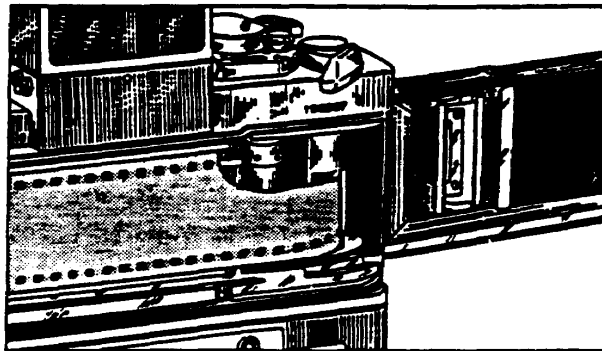
```
Note 1:  Do not press the aperture mask as it is easily
         deformed.

     2:  When the mode selector is set to off, the film
         can be wound by the winding lever.

     3:  If the film tries to be wound by pressing the
         shutter release button on the main unit the
         flash lamp will light.  Do not press it during
         the film loading.
```

6. Press the shutter release button on the camera back to
    confirm that the film is properly wound up, and close the
    back lid.

    ● The back lid is automatically shut locked.

```
Note 1:  When the film is advanced properly, the rewind
         knob turns counterclockwise.  If not, load the
         film again from the beginning.

     2:  If film tries to be reloaded, take care that
         film leader is not rolled in.  If this happens,
         the film cannot be loaded again.
```
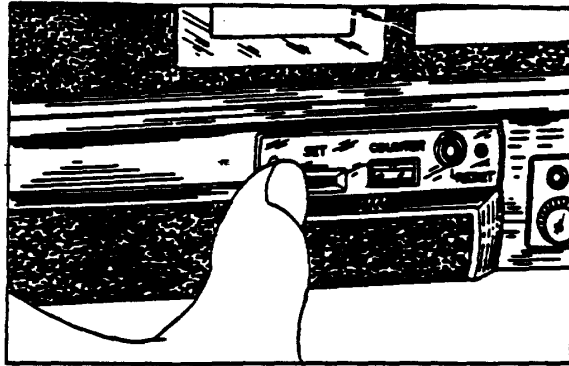
7. Press the shutter release button on the camera back until
    "1" is shown on the frame counter.

8. When "1" is shown, set the frame counter to "S".

    ● Press the frame counter reset button.

9. Set the frame counter to number of frames (12, 24 or 36)
    of the film to be used.

    ● Turn the frame counter set gear in the direction of the
      arrow while pushing it.

```
Note 1:  If the frame counter is set to a larger number
         than the number of film frames actually used,
         the film may be severed.  Therefore, the counter
         should be set accurately.

     2:  If the counter number is set wrongly, first, set
         the counter to "S".  Then, set it to a correct
         number.

     3:  The number of the counter on the camera back
         increases and that on the winder decreases.
```

Photography Procedure

Since the basic operation for 35mm photography is the same as that for Polaroid photography, refer to the "Polaroid Photography" procedure.

1. Follow the procedure for "Polaroid photography", steps 2 and 3.

   ● Set the light intensity adjusting knob to 4. (Standard intensity)

● When the power is turned on, the screen at the left is displayed on the monitor.

┗Display of ISO sensitivity
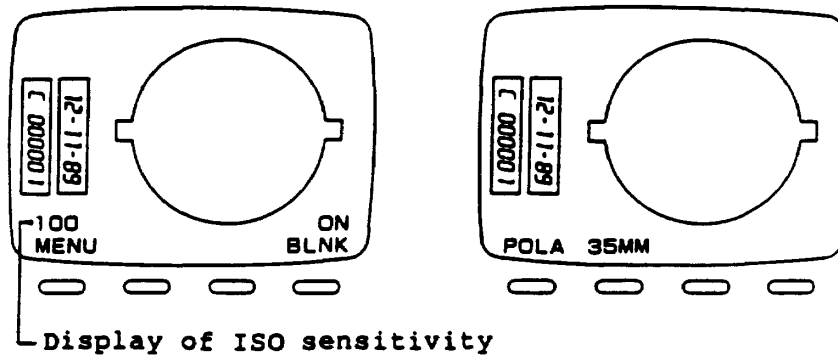
| Note: | When the Polaroid back unit is replaced with the camera back unit while in use, the screen at the right is displayed on the monitor. In this case, press the button below "35mm". |

2. Confirm flash intensity.

● Looking at the screen which appears when the power is first turned on, confirm that the number above "MENU" is the same as ISO sensitivity of the loaded film.
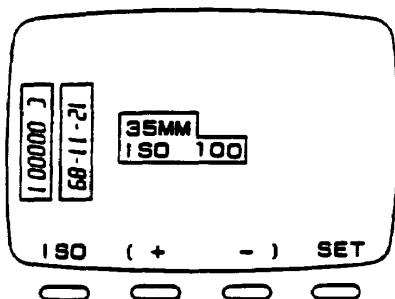
[If ISO sensitivity is different]

① While displaying the above screen, press the button below "MENU".

● The following screen is displayed on the monitor.
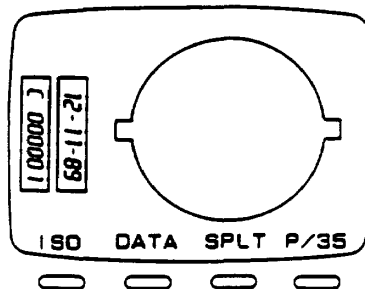
② Press the button below "ISO".

③ Press the button below "ISO".

o The ISO sensitivity changes to 100, 200, 400 and 64
  on the monitor every time the button is pressed.
  Set the ISO sensitivity to that of the film to be
  loaded.

[Flash intensity compensating procedure]

(1) Display the screen shown for step 2 in the
    previous item.

(2) Press the button below "-" to decrease the
    intensity and the button below "+" to increase the
    intensity. In case of ISO 400, the flash intensity
    cannot be compensated.

④ After setting the flash intensity, press the button below "SET".

- The screen which appears when the power is first turned on is displayed and the set flash intensity (ISO sensitivity) blinks at the lower left.
- While the set flash intensity blinks, the power is being charged. When the display lights continuously, then it becomes possible to perform photography. (In the case P600 is displayed on monitor when power is turned on). Follow the procedure below.

  1. Press the button below "MENU".
  2. Press the button below "P/35".
  3. Press the button below "35mm".

3. Follow the steps from 6 to 16 for "Polaroid Photography".

- Chin rest height adjustment, external eye image/retinal image selection, height, forward/backward, left/right adjustment of the main unit, etc.

4. Press the shutter release button.

- The flash lamp lights, 1 frame is exposed, the film is wound up automatically and stops.
- The counter number and the data written on the data card are printed simultaneously.
- On every photography, the number on the counter decreases.

Note: When the shutter release button on the camera back is pressed, the flash lamp does not light and the film is wound up.

Film Rewinding

When the set number of film frames are exposed, the winder frame counter becomes zero and the alarm lamp lights. Although the shutter release button is pressed under this condition, photography is not taken and "CHECK FILM BACK" is displayed on the monitor. In this case, rewind the film by following the procedure below.

1. Press the frame counter reset button.

2. While rotating the rewind set lever in the direction of. the arrow, push it in.
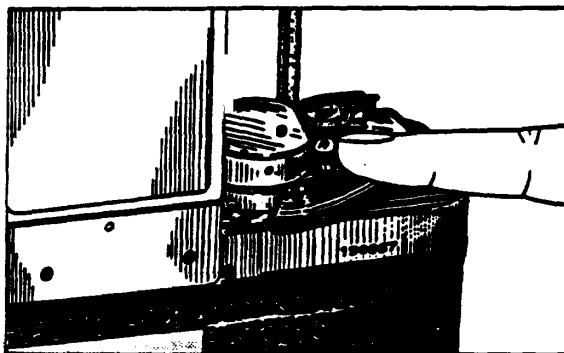
   • The lever is locked in the state of being pushed.

   ┌───┐
   │ Note: When the lever is pushed in by mistake, lightly │
   │   press the shutter release button on the camera │
   │   back. The lever will return.   │
   └───┘

3. Pull up the rewind crank and turn it in the direction of the arrow.

   • Rewinding sound is heard while the film is being rewound. Turn the rewind crank until the rewinding sound is no longer heard.

- The frame counters (on both the camera back and the winder) are not affected by the film rewinding.
- At the same time when the film is taken up by the take-up spool, the winder makes one wind-up operation and the alarm lamp goes out.

> Note: The rewinding can be made without pressing the frame counter. In this case, however, after completing the rewinding, the alarm lamp does not go out.
> To put the alarm lamp out, ① set the mode selector to OFF, ② return the winder counter to S, and ③ return the mode selector to S.

4. Open the back lid of the camera back and take out the exposed film.

- After confirming that the alarm lamp was out, open the back lid.
- If not performing photography continuously, close the back lid.
 For the opening/closing procedure of the back lid, refer to the steps for the film loading.

Data Card Handling

Describe data within the data card frame with thick pencil. Insert the data card into the data card insertion slot with the described side of a card facing the left. The described data is displayed on the left side of the monitor.

- Two of the following data; counter number, description on data card and auto-calendar record are displayed simultaneously on monitor. They are printed on film when the shutter release button is pressed.

When the data card is inserted, the data card description
is displayed on the left data area. Further, to select
either the counter number or the auto calendar record,
display the screen shown for step 3.
● Whenever the button below "DISP CHANGE" is pressed,
either data is displayed alternately on the right data
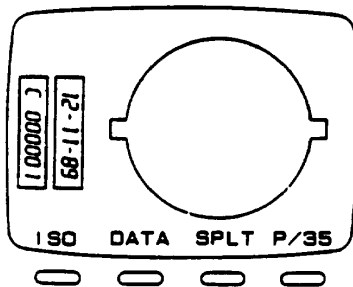area.
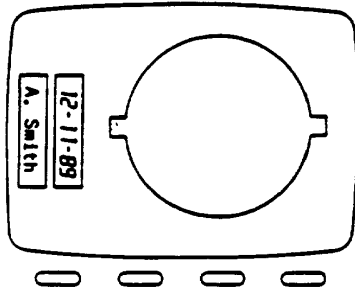
Note: Data on left area is hidden by the data card.

Setting of Counter Number

To change the counter number, follow the procedure below.
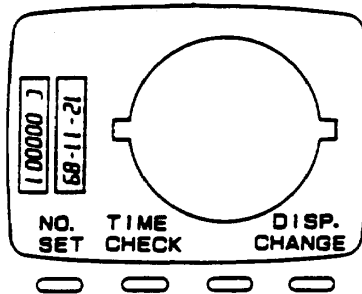
1. Display the screen, which appears when the power is first
   turned on.

2. Press the button below "MENU".

   ● The following screen is displayed on the monitor.

ISO DATA SPLT P/35

3. Press the button below "DATA".
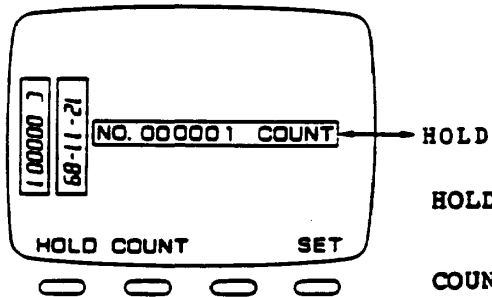
   ● The following screen is displayed on the monitor.

4. Press the button below "NO. SET".

   ● The following screen is displayed on the monitor.
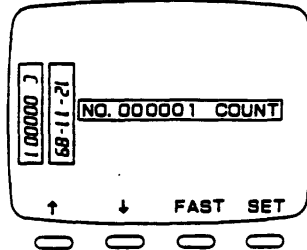

   HOLD : The number will stay as
          it has been set.
   COUNT: The number will increase
          on every photography.

   ● Press either of the buttons below "HOLD" and "COUNT".
   ● The display for the button pressed blinks.

5. When completing the setting, press the button below "SET".

 ● The following picture is displayed on the monitor:

  ● The number is to be set in every two digit from the
    left.
  ● When the first upper two digits blink, set the desired
    number for them and press the button below "SET".
  ● When the number for the first 2 digits is finished
    setting, the next 2 digits will blink. Set the number
    in the same manner as the above successively.
  ● When the button below "↑" is pressed, the number will
    increase and when the button below "FAST" is pressed
    simultaneously, the pace will become fast.
  ● When the button below "↓" is pressed, the number will
    decrease.
  ● The counter figures flash in 2 digits simultaneously
    and they can be changed.
  ● After setting all 6 digits, press the button below
    "SET". The monitor shows the screen, which appears
    when the power is first turned on.

Confirmation of Auto Calendar

To check the auto calendar display, follow the procedure
below.

● Display the screen for the step 3 in the item, "Setting of Counter Number", and press the button below "TIME CHECK".

● The following screen is displayed on the monitor. (To make a change, refer to "Setting of Auto Calendar".)
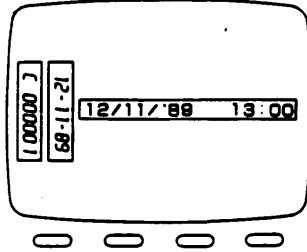
● Confirm the auto calendar display.

● After about 5 seconds, the screen returns automatically to the one which appears when the power is turned on.

Setting of Auto Calendar

To change the date and time, follow the procedure below.

1. While pressing the shutter release button, turn on the
   power.

   ● Continuously press the shutter release button until the
     following screen is displayed on the monitor.
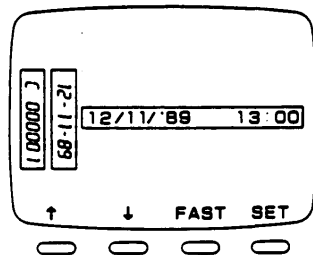
     ● While the first two digits for
       the year blink, determine the
       number and press the button
       below "SET".
     ● Set the month, day, hour and
       minute in the same manner.
     ● If no changes are to be made,
       simply press the button below
       "SET".

   ● When the button below "↑" is pressed, the number will
     increase.
   ● When the button below "↓" is pressed, the number will
     decrease.
   ● When the buttons below "↑" and below "FAST" are pressed
     simultaneously, the pace will become fast.
   ● When the buttons below "↓" and below "FAST" are pressed
     simultaneously, the pace will become fast.
   * Time is displayed in 24-hour system.

2. When the setting is completed, press the SET button.

   ● The buzzer sounds, and the screen on the monitor
     returns to the one, which appears when the power is
     turned on and photography becomes ready.

5. RETINAL OBSERVATION THROUGH VISIBLE LIGHT

Description
Viewfinder Unit CR4-DF

Detachment button
Eyepiece
Diopter compensating ring

External fixation target

Plug (to main unit)

Clamping screw
Attaching fixture

Lens cap

Viewfinder

Field lens B
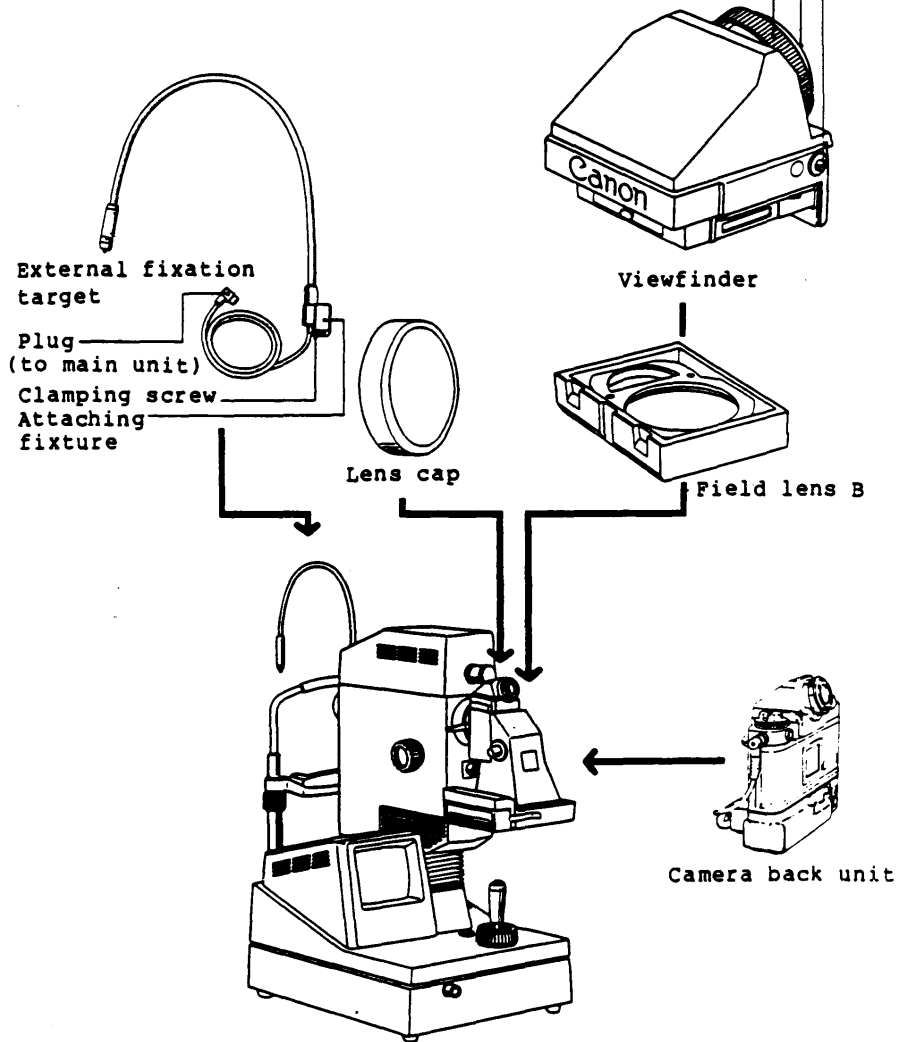
Camera back unit

Retinal observation through visible light can be made on
either the Polaroid back unit or camera back unit.
For the retinal observation it is necessary to attach the
viewfinder (replace with the fixation target box) and the
external fixation target after dilation of the pupil to be
tested.

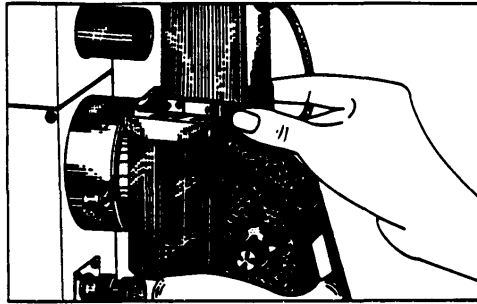**Viewfinder Attachment/Detachment**

1. Turn off the power.

2. Detach the plug of the fixation target box from the
   Polaroid back unit or camera back unit.

   o In case of the camera back unit, detach the camera back
     from the main unit first to perform the operation above.

3. While pressing the detachment buttons at both sides, pull
   the entire fixation target box.

4. Insert the tip of finger nail into the Polaroid or camera
   back unit hollow and raise the field lens.

Note: In removing the field lens, be careful not to give finger prints or scratches.
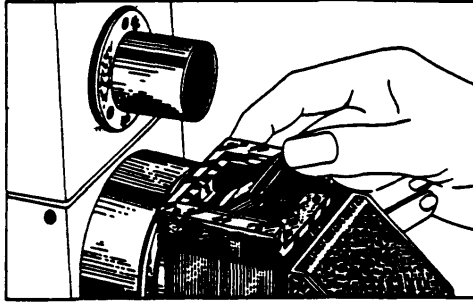
5. Insert one side of the field lens B under the retainer of
    the Polaroid back unit or camera back unit and press it
    down.

6. Remove the viewfinder cap and place it over the CCP
    camera lens of the main unit.
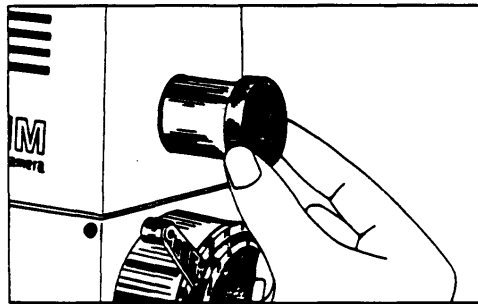
7. Align the rails (at both sides) of the viewfinder with
    the rail supports of the Polaroid back unit or camera
    back unit and press in the viewfinder until a click sound
    is heard.
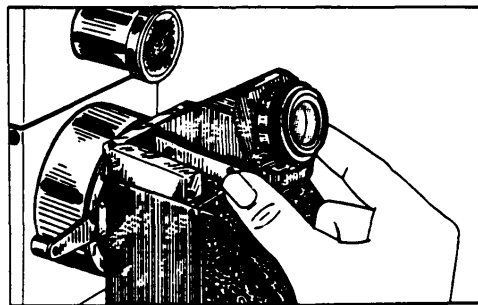
Reattachiment of Fixation Target Box
The attachment method of the fixation target box is the same
as that for the viewfinder. However, the fixation target
cord should be connected with the either back unit.

Cautions after Detachment
If the fixation target box, the viewfinder, or the field
lens, is left uncovered, dust and dirt may get inside the
fixation target box, the viewfinder, as well as the back unit.
Be sure to place supplied caps over the openings and put the
field lens into a vinyl bag or the like.

External Fixation Target Attachment/Detachment

1. Turn off the power.

2. Fit the fixation target fixture to the upper side of the
    pole.

3. Tighten the fixture by rotating the clamping screws
    clockwise.

4. Insert the eye fixation target plug into the receptacle.

5. To detach the lamp, turn off the power and reverse the
    procedure above.

Retinal Observation Procedure

Except for the following operations, the procedure for retinal observation is the same as that for the Polaroid and 35mm photography. For the basic operation of the main unit, refer to the procedure for the Polaroid photography.

1. Turn the infrared filter knob counterclockwise.

   ● The infrared filter gets out of the optical path.

2. Turn off the split function as necessary.

3. Adjust the viewfinder diopter.

   ● Turn the diopter compensating ring from the ⊕ side and stop at a position where the cross hairs are clearly seen. (Diopter compensating range: +2 to -4D) If the viewfinder diopter is not adjusted to the examiner's vision, focusing may become incorrect.)

4. Have the examinee sit after making his pupil dilated with mydriatic drugs.

   ● Ensure that the examinee's pupil has been sufficiently dilated.
   ● Place the examinee's chin and forehead securely on the respective rests.

5. Focus the retinal image.

   ● Turn the focusing knob while looking through the viewfinder.

● Adjust focusing so that the retinal image and cross
  hairs in the view are simultaneously seen clearly.
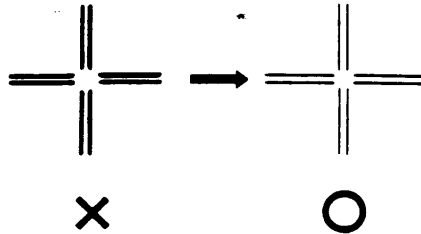
6. Determine the light intensity for observation.

7. When it is desired to perform photography consecutively,
    follow the procedure for the Polaroid or 35mm photography.

6. OTHERS

Handling in Cold Climates

Sudden heating of the room in cold areas will cause condensation to form on the lenses and internal optical system. In this case, leave the CR4-45NM for at least 40 minutes after heating is turned on. Perform photography after condensation disappears.

Objective Lens & Field Lens Cleaning

Use a piece of clean gauze (washed and dried), commercial lens cleaning paper, or a blower-brush.

1. When covered with dust or dirt:

   Wipe the lens surface lightly with a blower-brush.

   > Note: Do not touch the brush to avoid smearing the lens with hand grease.

2. When smeared by fingerprints or grease:

   Brush off the dust or dirt on the lens surface, and wipe the surface lightly with a clean gauze or lens cleaning paper soaked in a mixed solution of 2 parts of absolute alcohol to 8 of ether. Other than the above solution, effective and easy-to-use commercial solutions can be recommended. Contact a Canon representative or distributor.

   > Note 1: If the lens is wiped when covered with dust or rubbed too strongly, it may be scratched. In addition, if soaked excessively, the surface may be unevenly cleaned.

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> 2: Disifecting alcohol contains water. If the lens is wiped with it, the surface will be damaged and therefore, never use it.

- If the infrared filter is out of the optical path when cleaning the objective lens, dust or dirt on the surface of the objective lens can be seen. Clean the objective lens by following the procedure below.

  1. Turn on the power.

  2. Turn the infrared filter knob counterclockwise. (The infrared filter gets out of the optical path.)

  3. When completing the cleaning, turn the infrared filter knob clockwise.

7. SERVICE INFORMATION

For information on overhaul or other services, contact a Canon representative or distributor.

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8. SPECIFICATIONS

Type:	Non-mydriatic type
Picture angle:	45° (at 0 diopter)
Image size:	⌀72mm on a Polaroid film
	⌀22mm on a 35mm film frame
Required pupil diameter:	4.0mm or more
Examinee's diopter compensating range for photography:	-12 to +15D.: without compensating lenses (Applicable range of split line focusing)
	-7 to -33D.: with negative compensating lens
	+11 to +35D.: with positive compensating lens
Positioning of a pupil:	⌀50mm area of the external eye can be observed on TV monitor. Split image system is applied to the ⌀20mm area of the pupil, and working distance preadjustment is possible by aligning split images.
Focusing:	By aligning the split lines on the retinal image (-12D to +15D.); (Split lines can be set off.)
Working distance adjustment:	By using flickering corneal reflection dots
Blink detection system:	Function to prevent flash when the examine blinks. (This system can be switched off.)
Light source:	For observation: 12V 75W Halogen lamp (through infrared filter) For photography: 300V300Ws rated Xenon flash lamp
Fixation target:	Incorporated through the optical system and can be observed on the TV monitor.

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Data printing:	Two of the following data can be printed on 35mm film:
	  Description on exclusive
	  plastic card, 6-digit ID.
	  number, auto-calendar

TV camera and monitor:	CCD camera; 5 in. black & white TV monitor built-in
Film used:	Polaroid High Speed Land Film 600 or Type 779; 35mm film ISO (ASA) 64 to 400
Power supply:	Designed according to the area used. 120V, 60Hz, 240VA

Dimensions & weight:	With a Polaroid back unit
	  324 (W) x 545 (L) x 590 (H) mm
	  27.0 kg approx.
	  (13" x 21" x 23" approx.
	  60 lbs. approx.)
	With a 35mm camera back unit
	  324 (W) x 510 (L) x 590 (H) mm
	  27.0 kg approx.
	  (13" x 20" x 23" approx.
	  60 lbs. approx.)

9. COMPONENTS

```
Main unit ............................................... 1
Power cord ............................................. 1
Data card .............................................. 5
Cap (for objective lens, camera mount) ........... 1 each
Dust cover ............................................ 1
Chin rest paper ..................................... 100
Blower brush ......................................... 1
Spare lamp (for observation illumination) ............ 1
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10. OPTIONAL ACCESSORIES

1. Polaroid color back unit CR4-PC
2. 35mm camera back unit CR4-FR
3. Viewfinder unit CR4-DF (For retinal observation through visible light)
4. External fixation target CR4-FL
5. Chin paper CR4-AP
6. Motorized table
7. Motorized chair
8. Main unit case CR4-MC
9. Data card CR4-DC (A set of plastic cards, 100 pcs.)
10. Slide viewer CR-SV
11. Slide viewer stand CR-VS

● The viewfinder unit CR4-DF includes an external fixation target.

Polaroid is a trademark of Polaroid Corporation.

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Information

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits of ISM equipment in accordance with the specifications in Part 18 of FCC Rules, which are designed to provide reasonable protection against such interference in hospitals or health-care facilities. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

* Reorient the receiving antenna.
* Relocate the equipment with respect to the receiver.
* Move the equipment away from the receiver.
* Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock NO.004-000-00345-4.

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