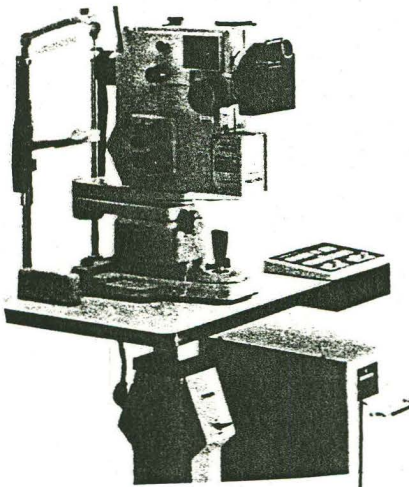
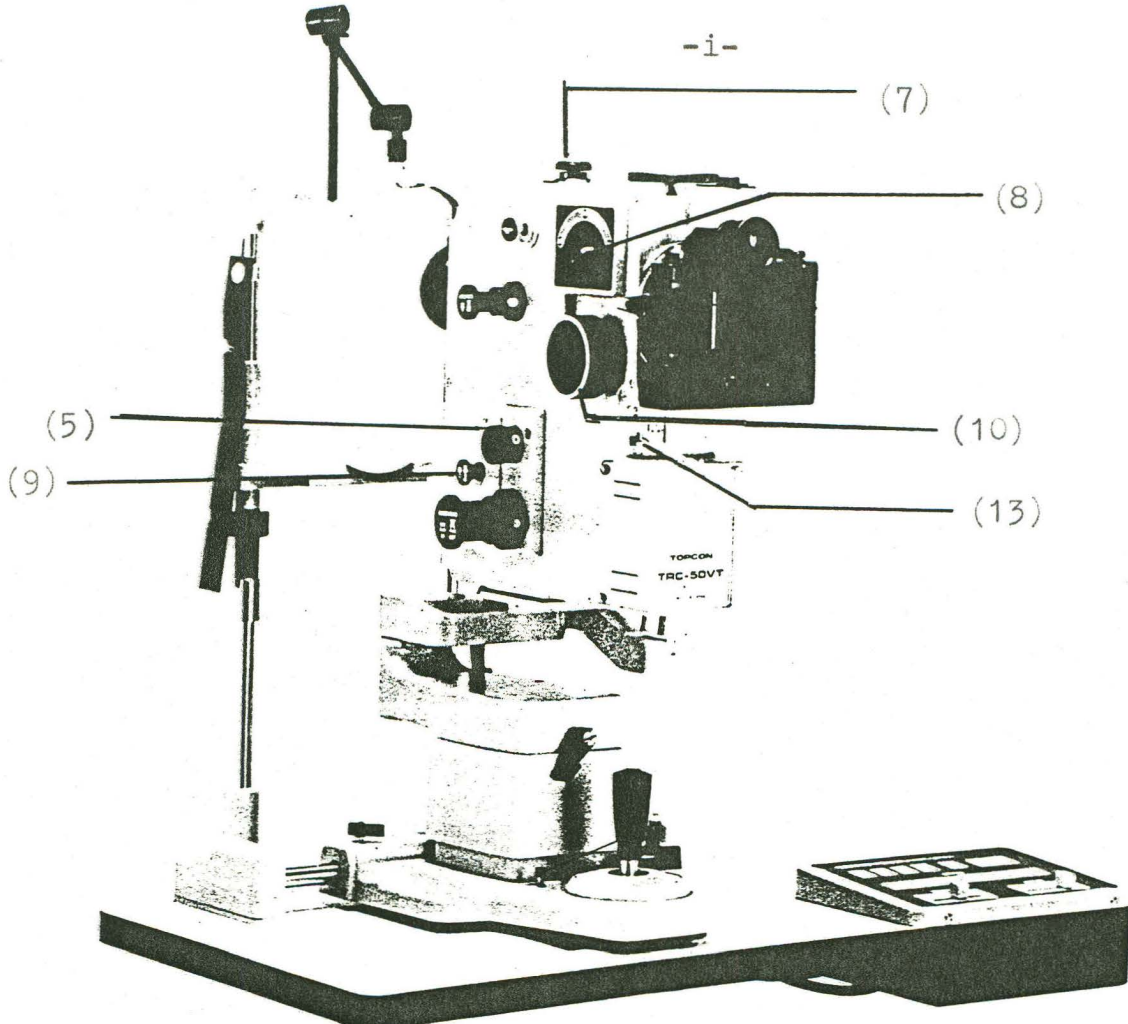


SENIOR PROJECT

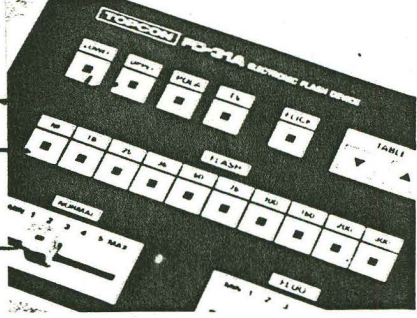
By: Steven Johnson  
Tony Danko  
April 10, 1992

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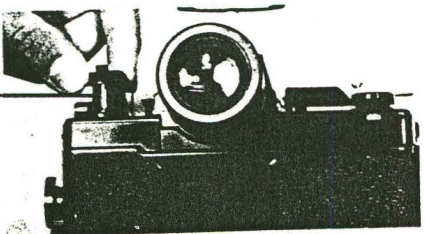
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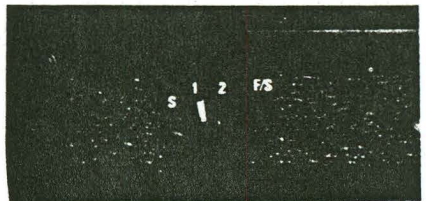
(1)



(2)  
(3)  
(4)



(12)



(6) (11)

Nomenclature and Functions

- (1) On/Off Switch
- (2) Camera Selection Switch - Upper is for polaroid camera and lower is for 35mm.
- (3) Illumination Control - controls background illumination used for focusing the retinal detail.
- (4) Flash Intensity
- (5) Filter Switching Knob - can be changed for different types of photography :
  - N - Normal 35mm
  - FPAG - polaroid fluorescein
  - G - Red Free photography
- (6) Timer Switch
- (7) Astigmatic Knob
- (8) Angle Changing Lever
- (9) Illumination Diaphragm Knob - used only when dilation is 6.5mm or less.
- (10) Focusing Knob
- (11) Motor Drive Switch for 35mm Camera
- (12) Rewind Crank/Back Cover Locking Knob
- (13) Data Plate Insertion Slot - for inserting plastic data plate on which pertinent information in hand written and photographed with the retinal image.



## OPERATION SUMMARY

### 1. Instrument Set-Up

- |   |   |
|---|---|
| A. Turn Fundus Camera on.                       | -On/Off switch (1) is located on the power unit   |
| B. Select Poloroid or 35 mm Camera to be used.  | -Camera selection switch (2) to lower (35mm) or upper (poloroid)  |
| C. Remove lens cap cover off the objective lens |   |
| D. Set illumination control (3)                 | -illumination (I) is used primarily as a background illuminator to help the operator align and assist in focusing on the desired Fundus detail. |
- \*Note: The best range for the I value for both patient comfort and photo clarity has been found to be between 3 and 4 with clear media present. However, if significant media opacification exists, the value may need to be increased in order for the operator to locate and focus Fundus detail.
- |                            |  |
|----------------------------|--|
| E. Set Flash Intensity (4) | -This value is the most important parameter in photo quality. Refer to chart below for flash intensity suggestions for both Posterior Pole and Peripheral shots. |
|----------------------------|--|

Table 1

	<u>Fundus Pigmentation</u>	-Assuming adequate dilation 6.5 mm+
Illumination Level (Determined above in step D.)	<u>Light Fundus</u>	<u>Dark Fundus</u>
I <sub>3</sub>	Flash Intensity: 36	Flash Intensity: 36
I <sub>4</sub>	Flash Intensity: 25	Flash Intensity: 25

- |  |  |
|--|--|
| F. Flash intensity when using red free filter. | -When using red free filter to enhance nerve fiber layer, vessels, and/or hemorrhages the flash setting needs to be increased to 100 for best results regardless of I values or fundus pigmentation. |
| G. Filter switch knob (5)                      | -"N" for normal color photography and Fluorescein photography.<br>-"G" for red free photographs.   |

H. Set firing speed with timer knob. (6)

-for single framephotos set to "s"  
for 1 frame/second set to 1  
for 2 frames/second set to 2

\*(shutter release button must remain pressed for timed exposures)

I. Set Astigmatic Knob (7)

-set to zero

J. Focus Eye Piece

-use white paper by the objective lens  
-turn ocular lens completely counter clockwise to start, then focus cross hairs in a clockwise direction.

K. Set angular view/magnification (8)

-set the angular view lever to the required amount of coverage. refer to Table 2

Table 2

setting	50°	- 1.7x mag.
	35°	- 2.5x mag.
	20°	- 3.7x mag.

-make sure the lever is in the appropriate clickstop position to avoid unwanted distortion of photographs.

-remember: increasing field of view will decrease magnification which will increase the picture resolution.

L. Diaphragm usage and pupil size (9)

-the diaphragm should only be pulled out when the patients pupils are not adequately dilated (6.5 mm or less). When the diaphragm is used it is best to use a smaller angular view and flash intensity. ie: pupils less than 6.5mm use diaphragm and 35° or 20° settings with flash of approximately 25.

2 Patient Set-Up

A. Dilate patient

-the Topcon fundus camera is designed to be used with dilated pupils and works best with maximum dilation (7.5mm or more).

B. Seat the patient

-the power table button can be used to adjust the height of the camera table for maximum comfort.

C. Dim the room lights

-helps patient see fixation light and operator to focus on the fundus.

D. Position patient

-have patient place chin and forehead against the proper rests. Adjust chin level to align outer canthus with marker.

E. Patient instructions

-instruct the patient to fixate on the fixation target and move target to required position in order to view the part of the retina to be photographed.

-the patient should be advised of the importance of the photographs and that they may experience some difficulty focusing after the photographs have been taken.



### 3 Taking the Photographs

- A. Make sure illumination, flash intensity, magnification, diaphragm setting, and desired filter are in place.      -see guidelines outlined for each variable.
- B. Have patient correctly fixating.      -for peripheral photo's have the patient look in the direction of the retinal quadrant to be photographed.  
-for posterior pole photographs the fixation target should be placed directly in front of the eye not being photographed and can be moved from there to bring in to view the desired part of the posterior pole.
- C. Focusing the retina and taking the picture.      -grossly align the objective lens with the eye to be photographed by looking around the camera to the patient.  
-look through the ocular lens and bring the camera toward the patient until the fundus is in clear view.  
-fine focusing can be achieved using the focusing knob (10) remember the target cross-hairs as well as the retinal structure; must be in focus.  
-have patient make small fixational changes to center the desired structure to be photographed.  
-make any final focusing adjustments and be sure there are no peripheral aberrations caused by pupillary frill, this may require moving the camera up, down, left, or right.  
-depress shutter button to take the photograph.



#### 4 Camera Care/Film Loading

##### A. Unloading film (35mm)

- switch the motor drive button (11) on the underside of the camera to the off position
- unfold the rewind crank (12) and turn it in the counter-clockwise direction until tension decreases which indicates that the film has slipped off the take-up spool
- pull the back cover locking knob (12) up fully. The back cover will open.
- pull out the exposed film

##### B. Loading Film (35mm)

- switch the motor drive button on the underside of the camera to the on position
- make sure the camera selection is in the lower 35mm position
- set the flash intensity to NF for no flash
- pull up the back cover locking knob (12) and the back cover will open
- place a fresh cartridge in the film chamber and push the rewind knob back in to engage the film cartridge
- Pull out the leading end of the film and insert it into the slot on the take-up spool. Make sure the film perforations at the top and bottom fully engage the film transport sprocket teeth.
- Close the back cover and set the timer button (6) to S and depress the shutter release button until the exposure counter indicates a #1.

##### C. Logging Photographs

- the patients name, eye being photographed, condition, and photographers name should be placed on the log sheet next to the camera.
- The photographer must be careful and mark exactly how many pictures were taken each time he/she uses the camera.
- The camera comes equipped with an internal logging system. The patients name and eye can be written on a tag which is then inserted into the camera with the writing side up. (13)

C. Logging Photographs (cont.)

-Look into the eyepiece in the extreme superior left position and you should be able to see the tag with the patients name and eye being photographed if a tag is in place. This will be photographed along with the retina and must be legible in order to be useful.

5. Helpful hints for best results:

- A. Illumination level - use  $I_3$  or  $I_4$  for clear media. Slightly higher illumination level may be needed for hazy media.
- B. Flash Intensity
  - 1. When using  $I_3$  light and dark fundi may be photographed with 36. When using  $I_4$  light and dark fundi, use flash intensity of 25.
  - 2. Red Free Photography: Flash intensity must be increased to 100 when using the Red Free Filter.
- C. Small Pupils (less than 6.5mm)
  - 1. use the diaphragm
  - 2. use angular view of  $20^\circ$  or  $35^\circ$
  - 3. use flash intensity of approximately 25 with  $I_3$  or  $I_4$