

































**Nikon**

Nikon Zoom Lens ED

38-140mm Macro

Lite•Touch  
Zoom 140<sup>ED</sup>  
AF



















Lite•Touch  
Zoom 110s  
AF QUARTZ DATE





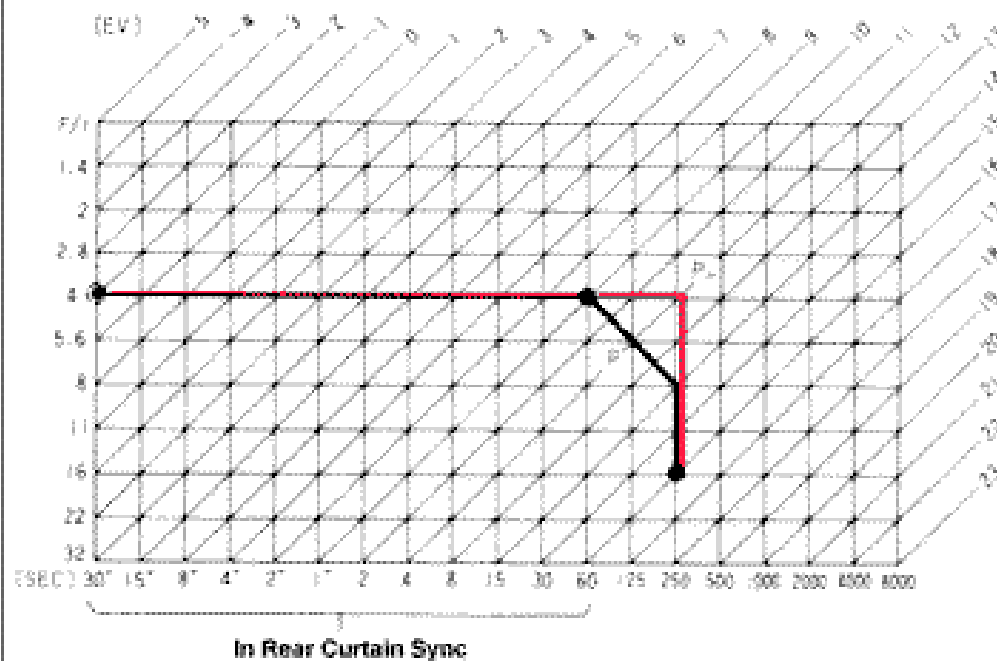




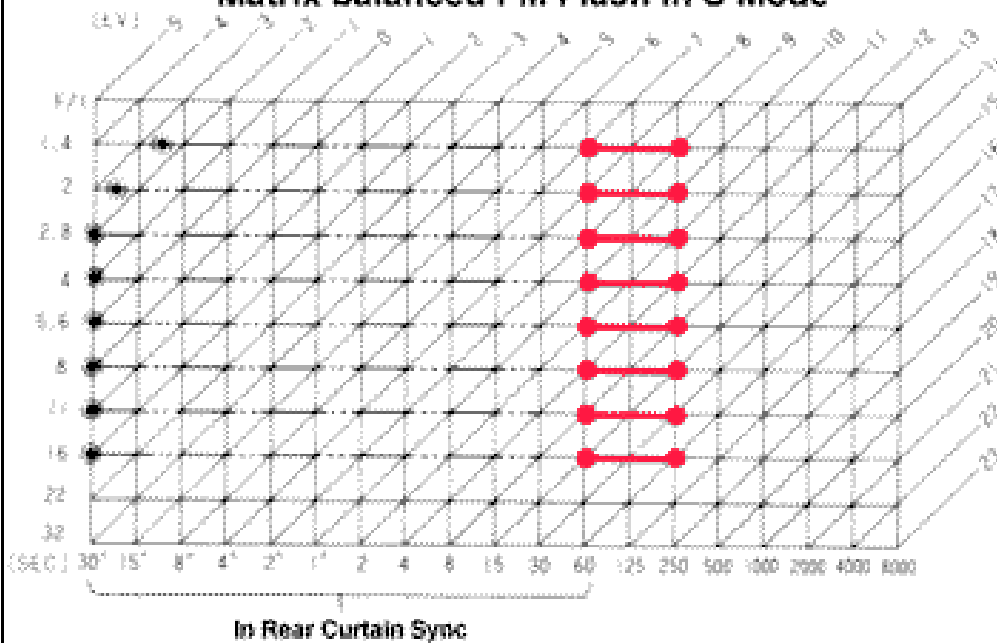




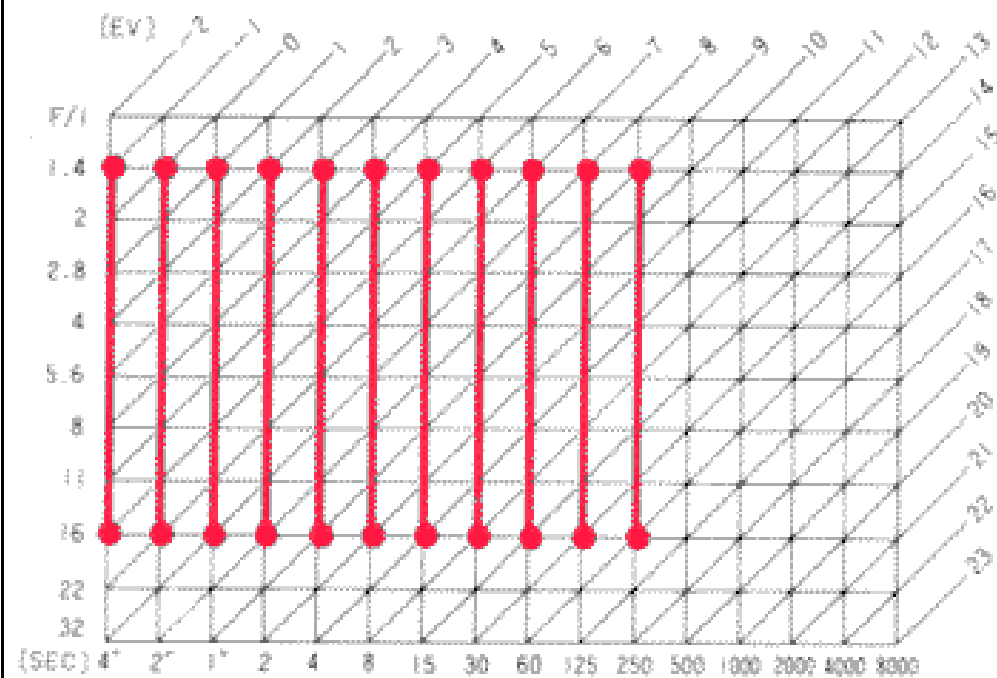
### Matrix balanced Fill Flash in P Mode

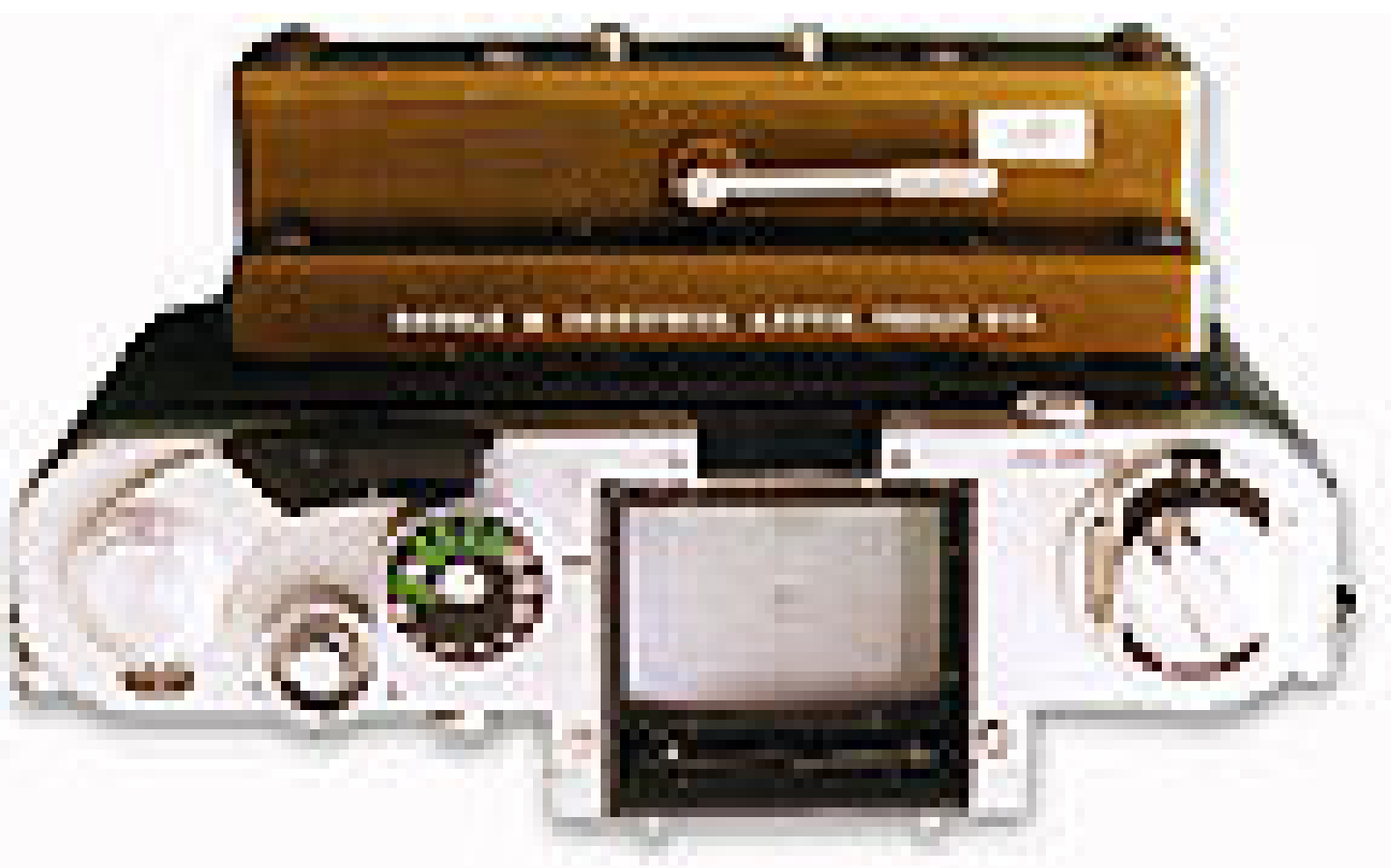


### Matrix balanced Fill Flash in S Mode



### Matrix balanced Fill Flash in A Mode

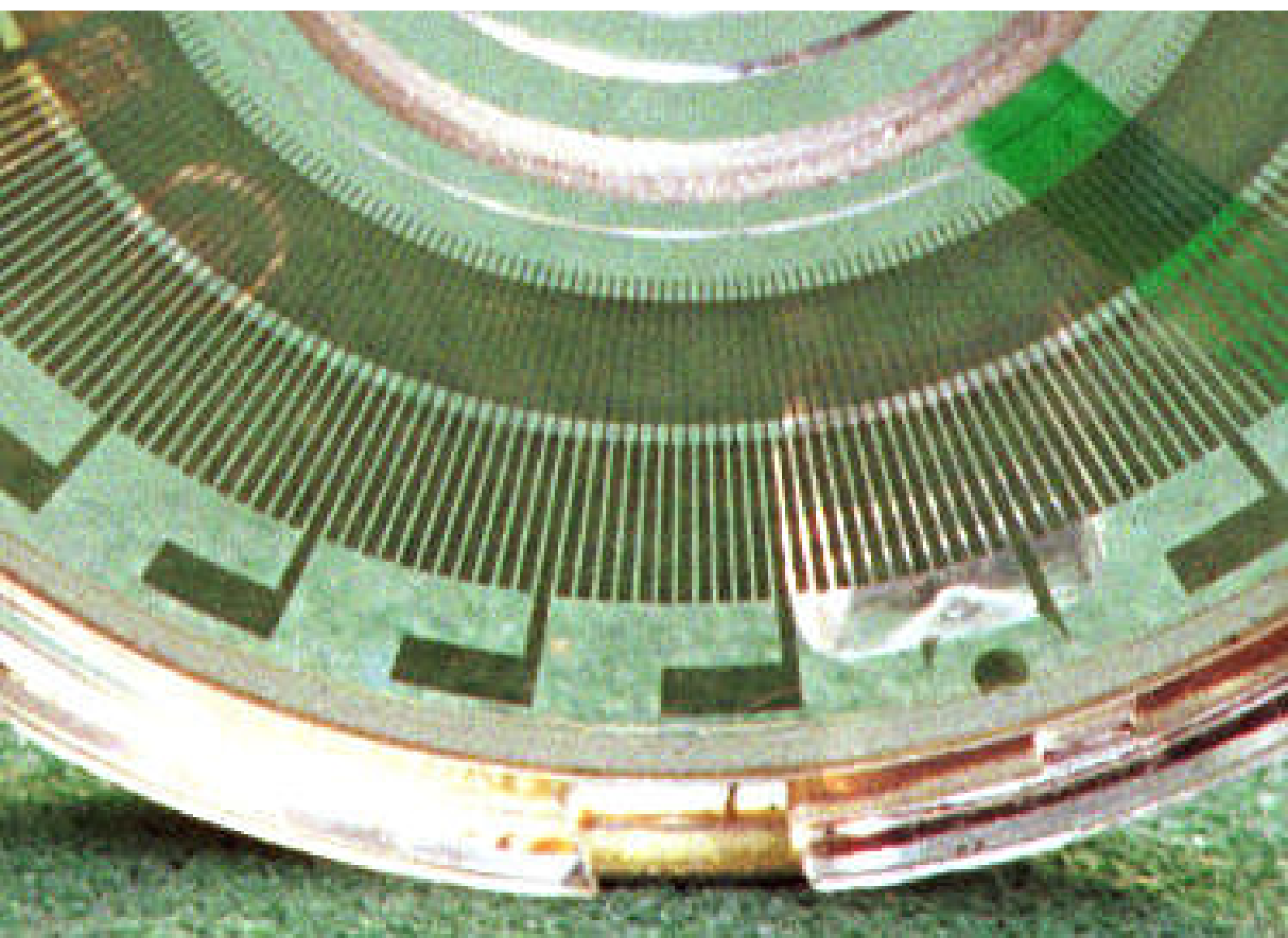


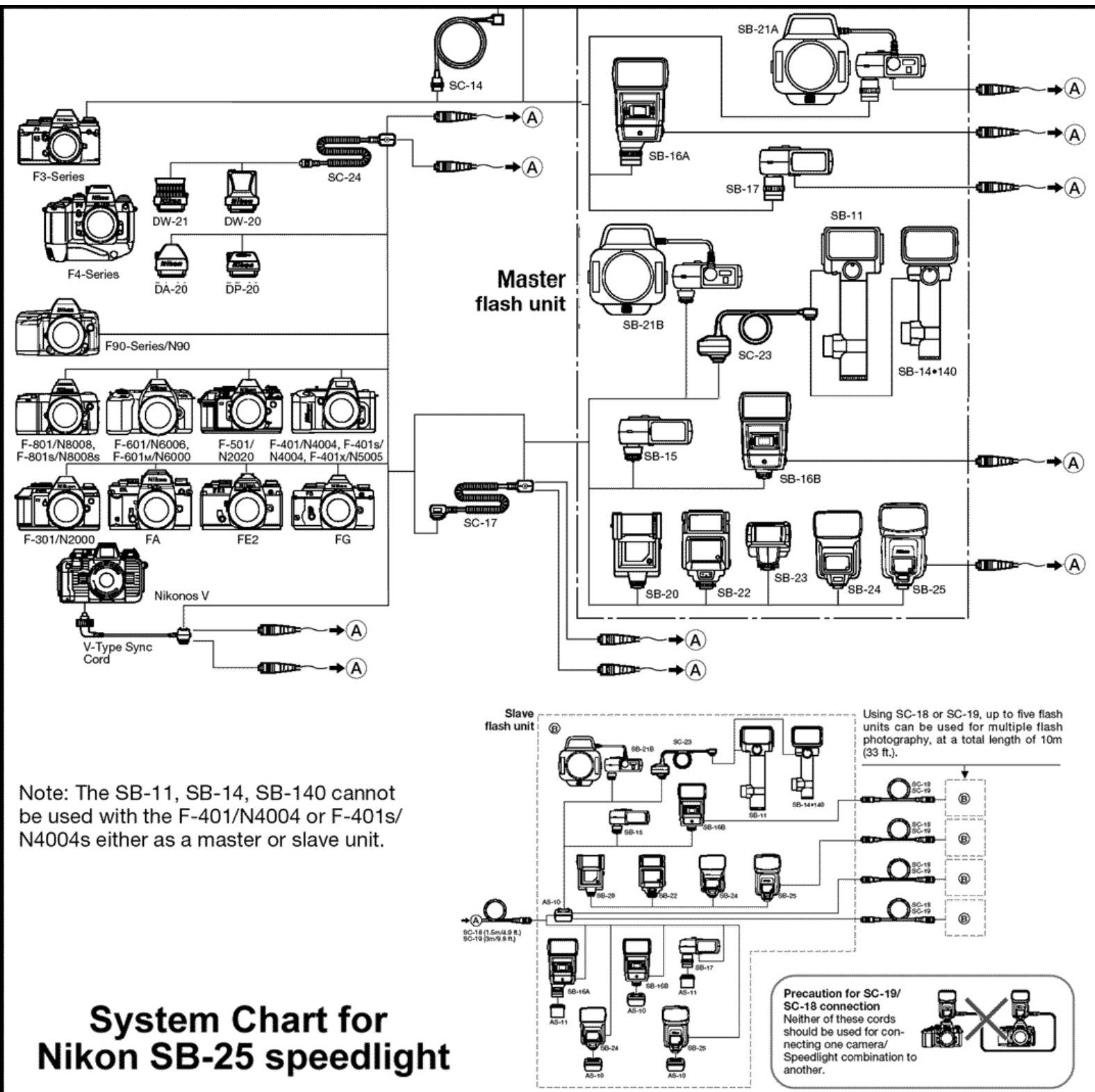


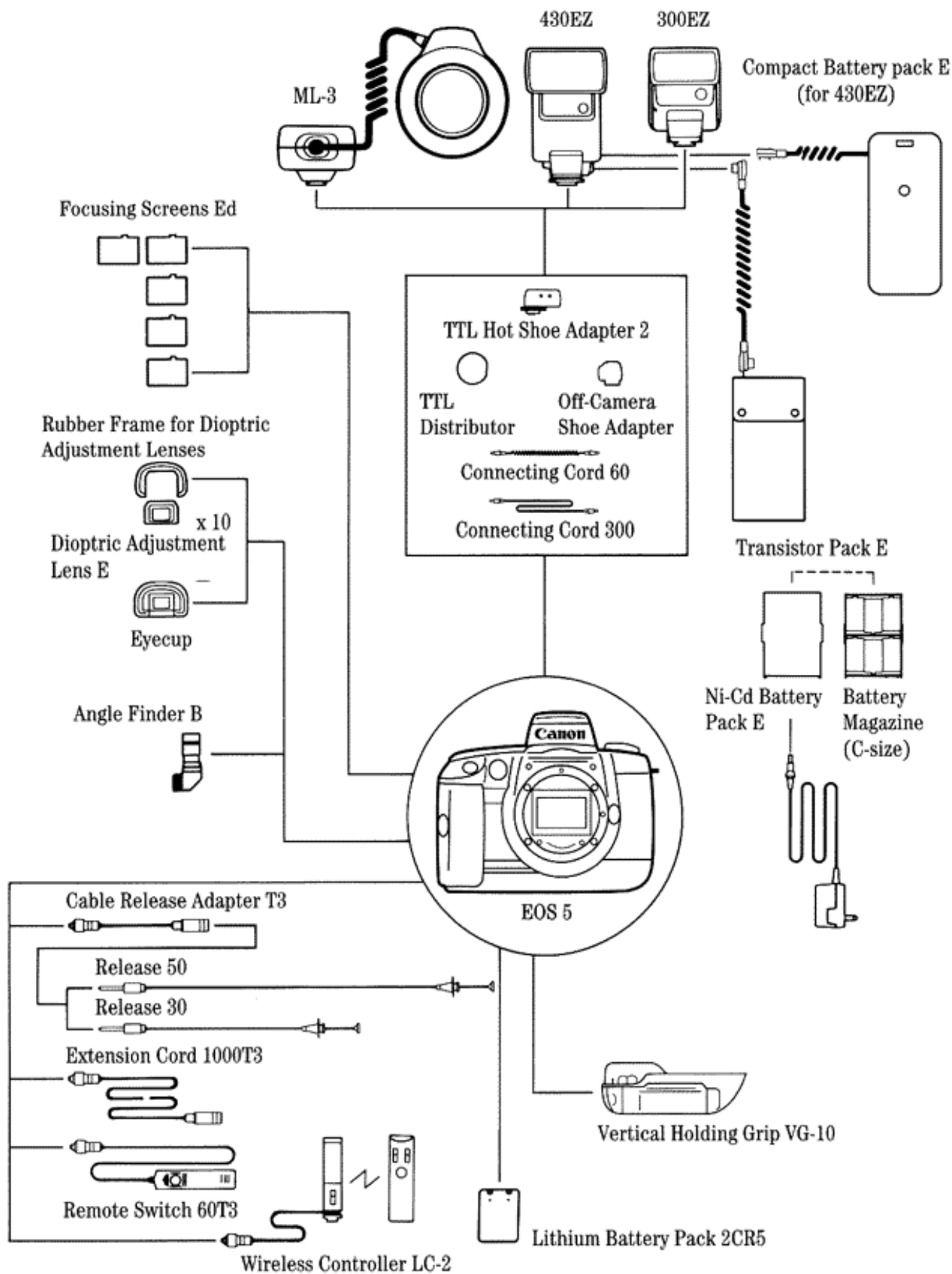
















**Nikon**  
250-Exp. Multi-Control Back  
Multifunktions-Datenrückwand  
für 250 Aufnahmen  
Dos multi-dateur à 250 poses  
Fechador múltiple de 250 exposiciones

**MF-24**



multi-dateur à 250 poses  
Fechador múltiple de 250 exposiciones

MF-24



für 250 Aufnahmen  
Dos multi-dateur à 250 poses  
Fechador múltiple de 250 exposiciones

# MF-24



**Nikon**

250-Exp. Multi-Control Back  
Multifunktions-Datenrückwand  
für 250 Aufnahmen  
Dos multi-dateur à 250 poses  
Fechador múltiple de 250 exposiciones

**MF-24**













INTERVAL  
EXP DELAY  
LONG EXP  
DAILY ALM  
FCS PRIOR  
FILM ALM  
FILM STOP



PSW

SEL

BKT

III

FNC

MOO

SEL

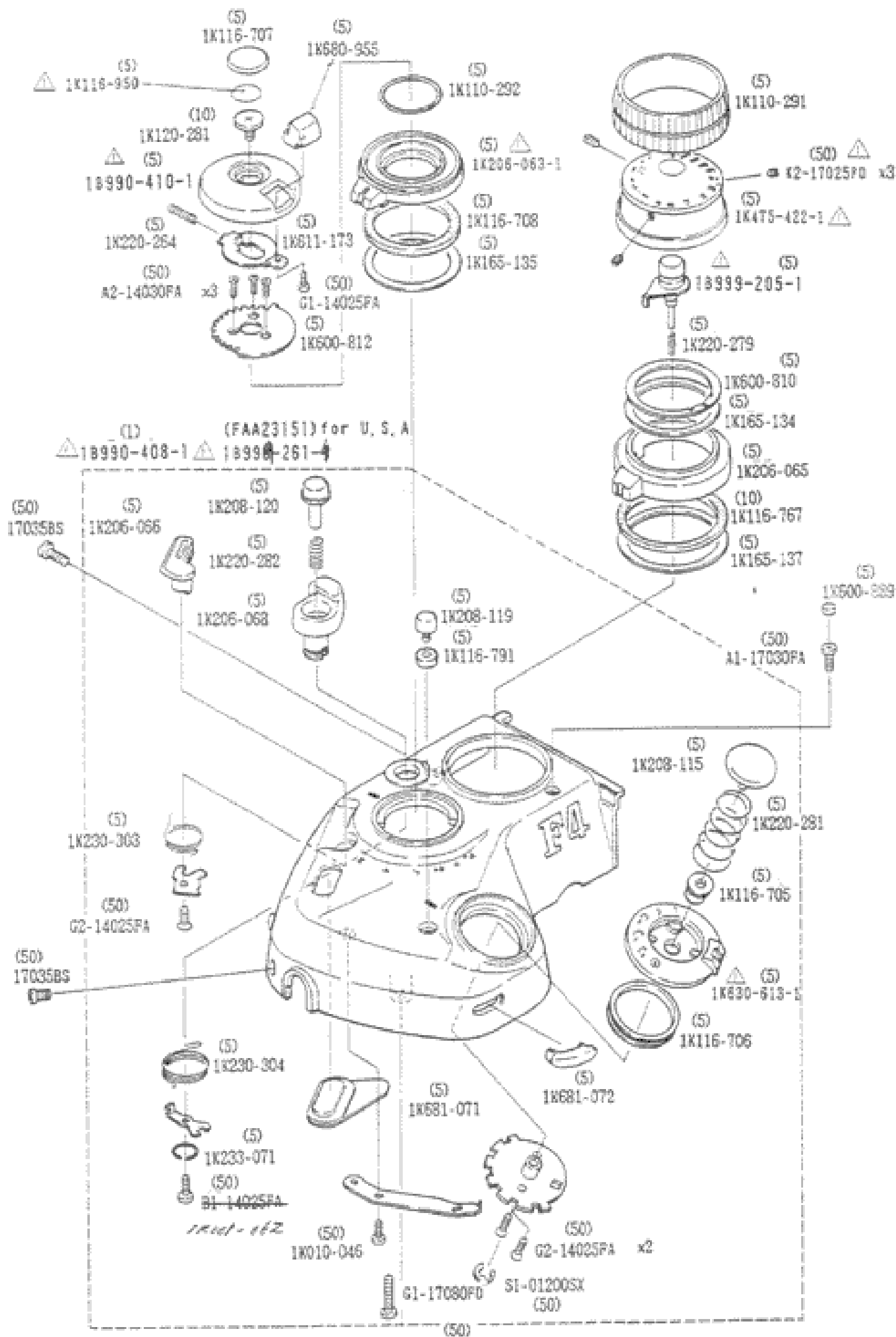
▲

S/R

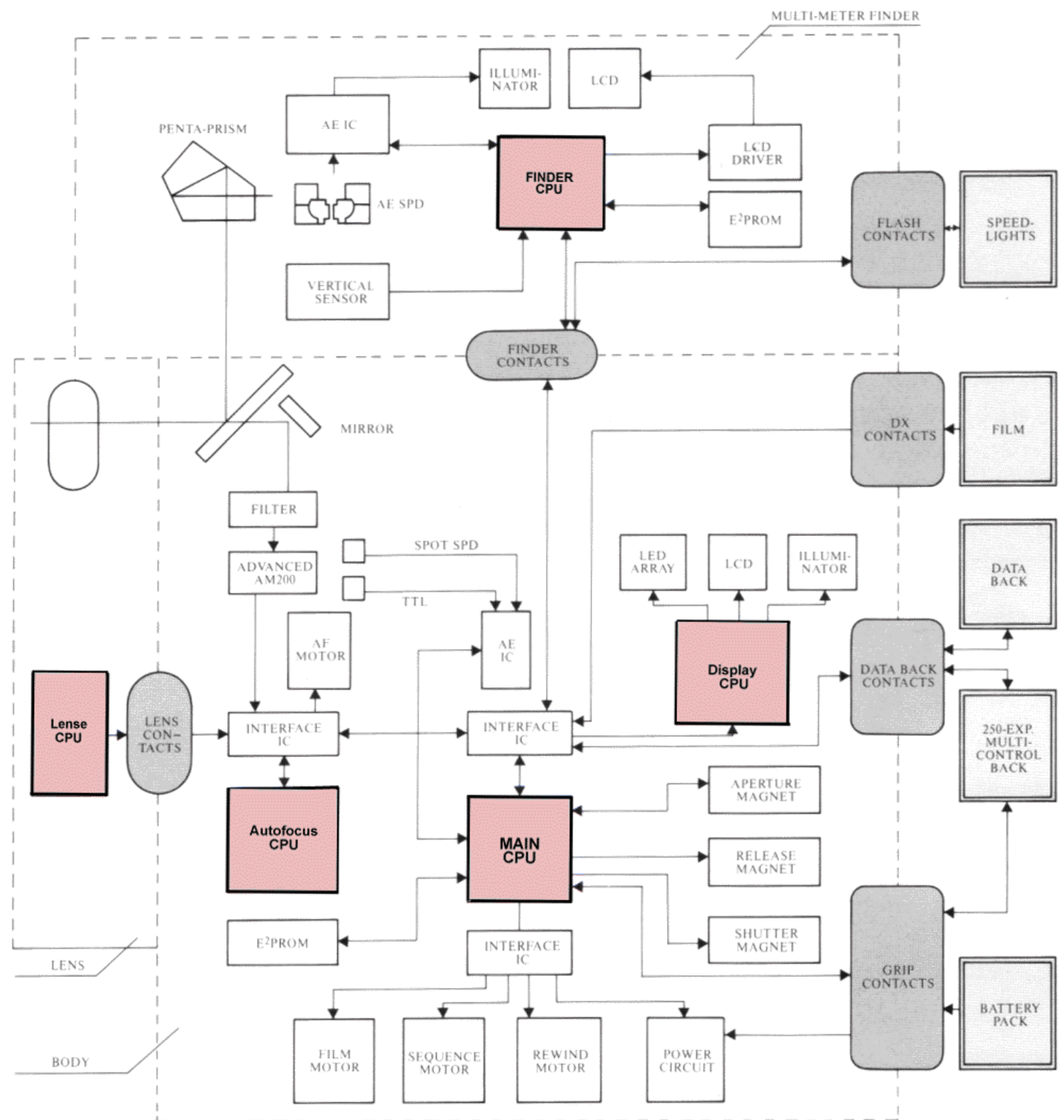
▼

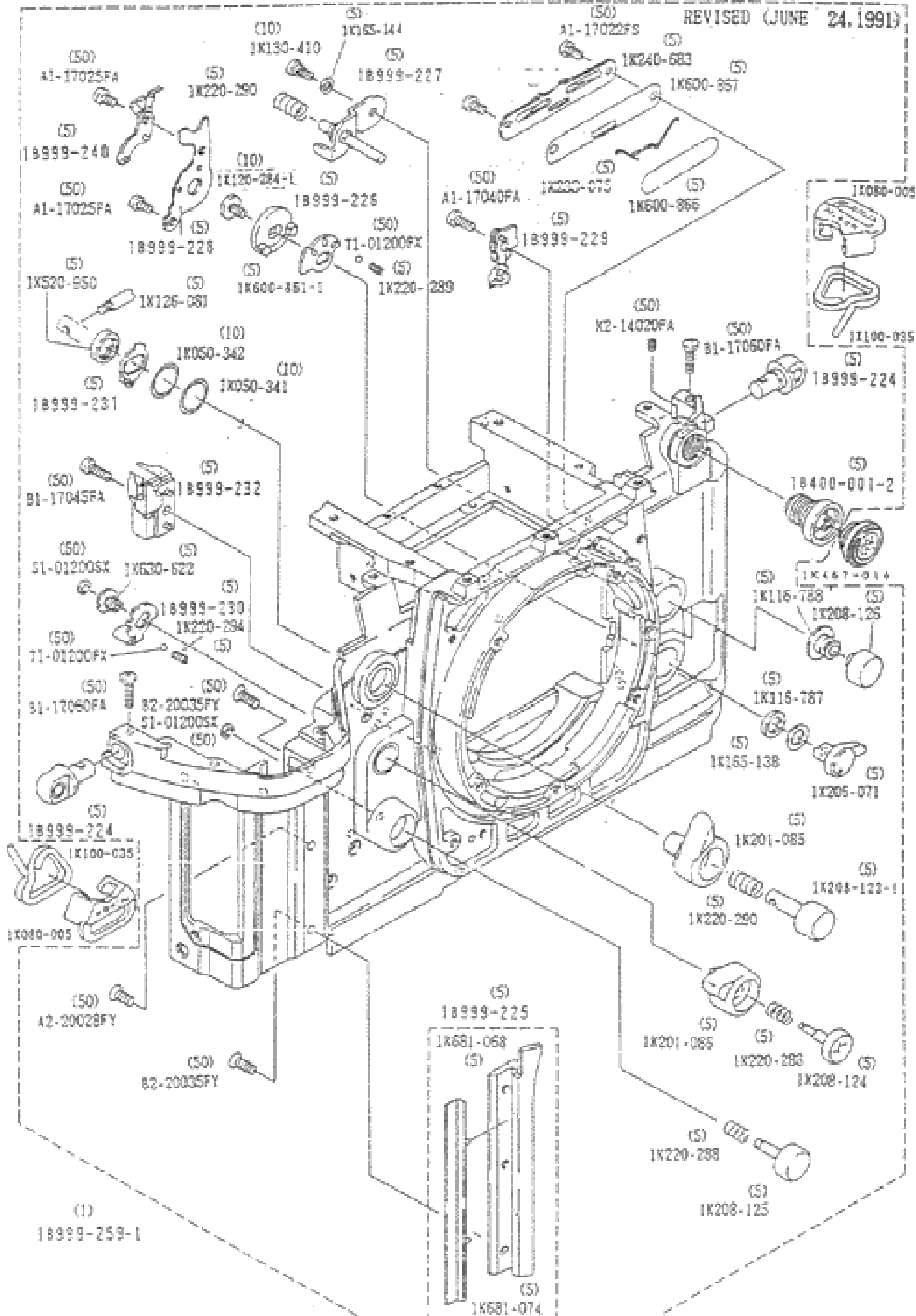
**Nikon**  
MULTI  
CONTROL  
BACK  
MF-24  
JAPAN





# CAMERA OPERATION BLOCK DIAGRAM





## Group I

F5 (with DA-30/DP-30)  
F100  
F90X/N90s  
F90-Series/N90  
F80-Series/N80-Series  
F70-Series/N70

F5 (with DW-30/DW-31)

## Group II

F4-Series  
(with DW-20/DW-21)

F4-Series (DA-20/DP-20)  
F65-Series/N65-Series  
F-801s/N8008s  
F-801/N8008  
Pronea 600i/6i

## Group III

F-601/N6006, F-601M/N6000

## Group IV

F60-Series/N60  
F50-Series/N50  
F-401x/N5005

## Group V

F-501/N2020, F-401s/  
N4004s, F-401/N4004  
F-301/N2000

## Group VI

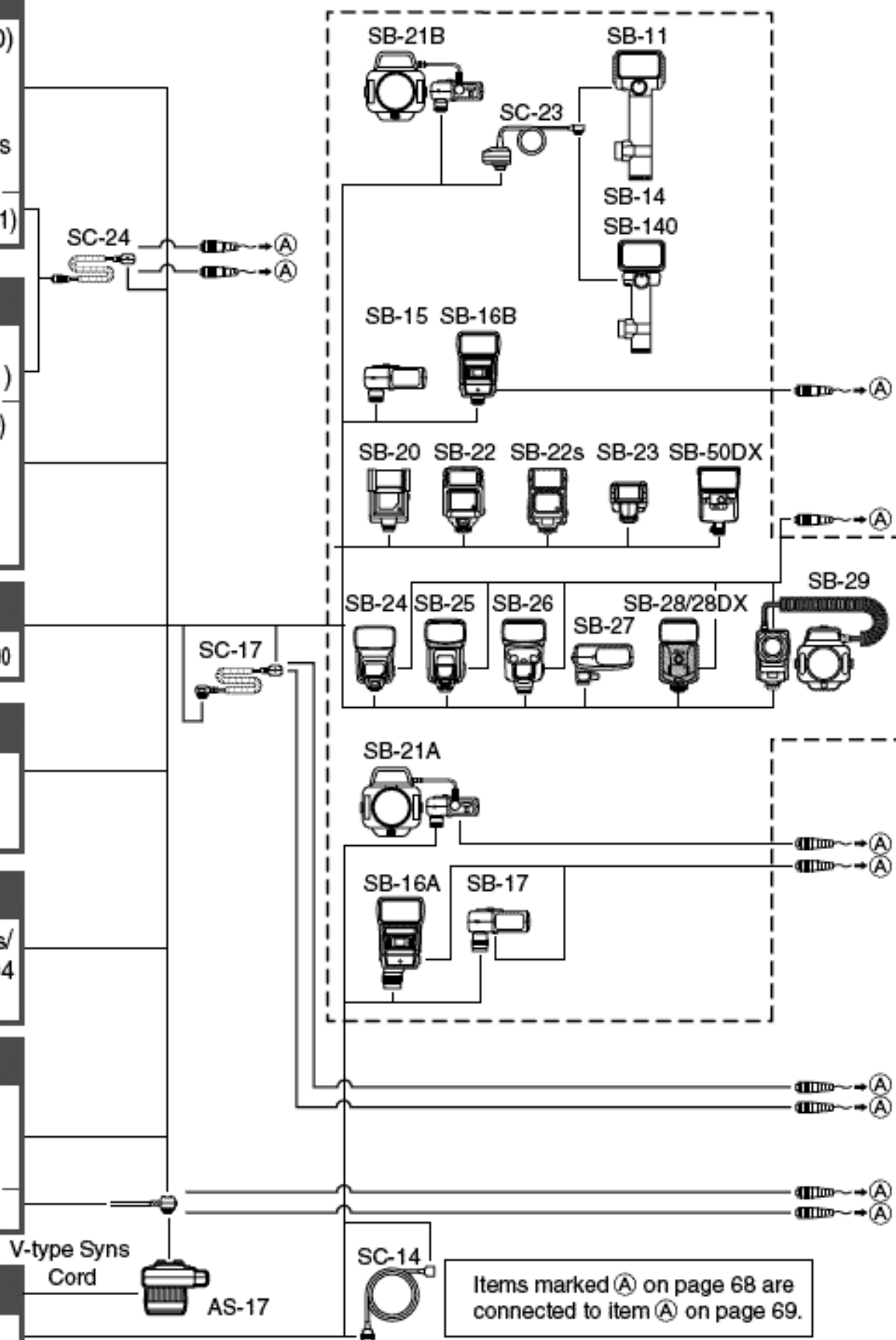
FM3A, FA  
FE2  
FG

Nikonos V

## Group VII

F3-Series

## Main flash unit





# parkson

jan - feb '05

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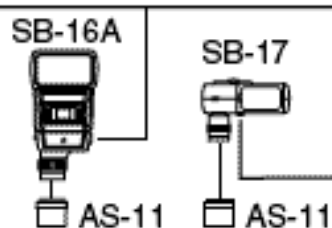
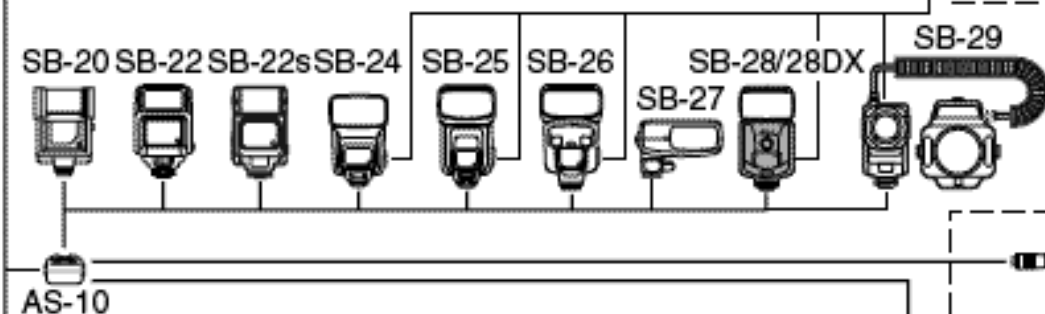
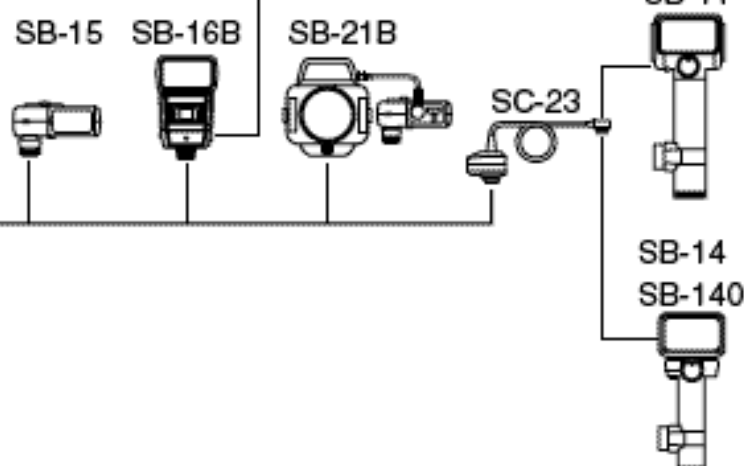
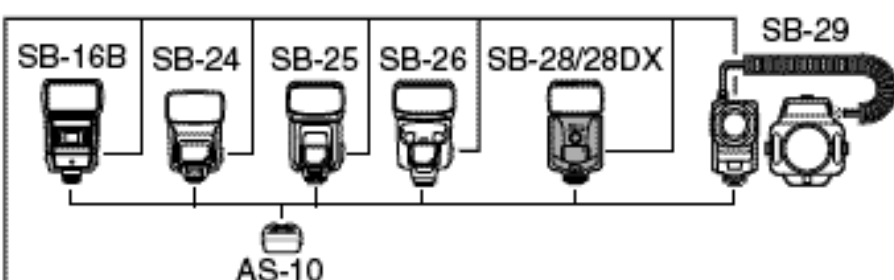


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## Secondary flash unit

(B)



Using SC-18 or SC-19, up to five flash units can be used for multiple flash photography, at a total cable length of 10m (33 ft.).

# Troubleshooting

| Camera Group      | Warning indicator                                                                                                                 | Cause                                                                                                                                                                                                                          |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All camera groups | No  indicator appears.                           | <ul style="list-style-type: none"> <li>• Batteries are not correctly installed.</li> <li>• Battery power is weak.</li> <li>• Standby function is set and operating.</li> </ul>                                                 |
|                   | Ready-light blinks for approx. 3 sec. after shooting.                                                                             | Flash fired at full output but light may have been insufficient.                                                                                                                                                               |
|                   | Power turns off.                                                                                                                  | Batteries are exhausted.                                                                                                                                                                                                       |
|                   | No indicator bars -- appear.                                                                                                      | SB-28's flash head is tilted or rotated from the horizontal/front position.                                                                                                                                                    |
|                   | Indicator bars -- blink.                                                                                                          | Flash head is tilted down -7°.                                                                                                                                                                                                 |
|                   | Zoom-head position indicator blinks.                                                                                              | The <b>(ZOOM)</b> and <b>(SEL)</b> buttons are pressed simultaneously for approx. 4 sec.                                                                                                                                       |
|                   | Small M above ZOOM blinks.                                                                                                        | Zoom-head position is locked.                                                                                                                                                                                                  |
| Group I           | No <b>TTL</b>  indicators light up.            | <ul style="list-style-type: none"> <li>• A Nikkor lens other than one having built-in CPU is mounted.</li> <li>• Flash mode is set to <b>TTL</b>.</li> <li>• F5's or F100's Metering System is set to Spot Metering</li> </ul> |
|                   | Ready-light and  blink after picture is taken. | Light was insufficient for correct exposure.                                                                                                                                                                                   |
|                   | <b>M</b> <b>FP</b> indicators and small M above the ZOOM as well as 18 or 20 blink.                                               | Built-in wide flash adapter is used in FP High-Speed Flash sync.                                                                                                                                                               |
|                   | <b>FP</b> blinks.                                                                                                                 | SB-28 is removed with <b>FP</b> setting.                                                                                                                                                                                       |
| Group II          | No <b>TTL</b>  indicators light up.            | <ul style="list-style-type: none"> <li>• A Nikkor lens without a built-in CPU is mounted.</li> <li>• Flash mode is set to <b>TTL</b>.</li> <li>• F4's Metering System is not set to Spot Metering.</li> </ul>                  |

The SB-28 incorporates a microcomputer to control flash operations. In rare cases, the SB-28 may not work properly even after fresh batteries are properly installed. If this happens, replace the batteries with the SB-28's power turned on.

## Problems with the SB-80DX

| Problem                                                                                                                                                                                                                                                                                                   | Cause                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| The power cannot be turned on.                                                                                                                                                                                                                                                                            | The batteries are not correctly installed.                                                                                             |
| The ready-light does not light up.                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• Battery power is weak.</li> <li>• The standby function is activated and operating.</li> </ul> |
| The power turns off automatically.                                                                                                                                                                                                                                                                        | The batteries are extremely exhausted.                                                                                                 |
| A strange sound can be heard caused by the flash head zooming back and forth even when the SB-80DX is turned off.                                                                                                                                                                                         | The batteries are extremely exhausted.                                                                                                 |
| The flash shooting distance range does not appear.                                                                                                                                                                                                                                                        | The flash head is adjusted to other than the horizontal/front or down -7° position.                                                    |
| No  ,  , or  indicator appears in TTL auto flash mode. | The camera's exposure mode or metering system is not correctly set or a non-CPU lens is mounted.                                       |
| The zoom-head position cannot be adjusted to other than 14mm or 17mm.                                                                                                                                                                                                                                     | The built-in wide-flash adapter is in use or the Nikon Diffusion Dome is attached.                                                     |

## Warning indicators in the SB-80DX

| Problem                                                                                                                                                                                                                                                                                                                     | Cause                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| The ready-light blinks for 3 sec. after firing. The underexposure indicator blinks and the amount of underexposure is displayed, depending on the camera in use.                                                                                                                                                            | Underexposure may have occurred.                                                                                                                      |
| The underbar blinks.                                                                                                                                                                                                                                                                                                        | The flash head is tilted down -7°.                                                                                                                    |
| The zoom-head position indication blinks.                                                                                                                                                                                                                                                                                   | "Emergency mode" is set to ON.                                                                                                                        |
| A small <b>M</b> above the "ZOOM" indication blinks.                                                                                                                                                                                                                                                                        | "Canceling the power zoom function" is set to ON.                                                                                                     |
| The   indicators and the zoom-head position blink.                                                                                                    | The built-in wide-flash adapter is used in the FP High-Speed Flash sync mode.                                                                         |
|  blinks.                                                                                                                                                                                                                                 | The SB-80DX is removed from the camera while the  setting is ON. |
| The aperture indicator displays "FEE" and the shutter cannot be released.                                                                                                                                                                                                                                                   | The aperture on the lens is not set at its minimum.                                                                                                   |
| In the Auto Aperture   flash mode, the aperture and the flash output level compensation value blink and the flash shooting distance range disappears. | The aperture or flash output level compensation value set is out of the usable flash shooting distance range.                                         |
| The zoom-head position displays "- - mm" and blinks.                                                                                                                                                                                                                                                                        | In rare cases, this happens but is not a malfunction. Turn off the power and then turn it back on.                                                    |
| Three beeps sound during wireless multiple flash shooting.                                                                                                                                                                                                                                                                  | The flash has fired at its maximum output and underexposure may have occurred.                                                                        |

| Camera                                                             | Warning indication                                                                                                                                                                                                             | Cause                                                                                                                                                                                                          | Remedy                                                                                                                                     |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| All cameras                                                        | Ready-light does not come on.                                                                                                                                                                                                  | Batteries are not correctly installed.                                                                                                                                                                         | Install batteries correctly.                                                                                                               |
|                                                                    | The SB-50DX is automatically turned off.                                                                                                                                                                                       | Batteries are exhausted.                                                                                                                                                                                       | Replace batteries with new ones.                                                                                                           |
|                                                                    | In close-up flash shooting, the wide-flash adapter indication blinks in the LCD panel.                                                                                                                                         | Wide-flash adapter is not attached or improperly attached.                                                                                                                                                     | Attach the wide-flash adapter correctly.                                                                                                   |
| Cameras other than FE10                                            | Only the camera's (not SB-50DX's) viewfinder ready-light is blinking when the shutter release button is lightly pressed.                                                                                                       | The SB-50DX (in TTL/D-TTL auto flash mode) is not properly attached.                                                                                                                                           | Attach SB-50DX properly.                                                                                                                   |
| Cameras that are compatible with TTL/D-TTL auto flash              | The ready-light blinks for approx. 3 sec. after TTL/D-TTL auto flash shooting.                                                                                                                                                 | The SB-50DX has fired at its maximum output. (This may indicate underexposure has occurred.)                                                                                                                   | Set wider aperture (smaller f-number) or move closer to the subject and shoot again.                                                       |
| Cameras with built-in Speedlight                                   | In close-up flash shooting, the camera built-in Speedlight indication blinks in the LCD panel.                                                                                                                                 | Camera's built-in Speedlight is released.                                                                                                                                                                      | Press the built-in Speedlight down to retract it.                                                                                          |
| Cameras of Group I and Nikon digital SLR cameras                   |  (or  for digital cameras) does not appear in the LCD panel. | Non-CPU lens is attached.                                                                                                                                                                                      | Attach CPU lens. With a non-CPU lens, use flash mode other than Automatic Balanced Fill-Flash with TTL Multi-Sensor.                       |
|                                                                    |                                                                                                                                                                                                                                | Automatic Balanced Fill-Flash with TTL Multi-Sensor is not set.                                                                                                                                                | Set Automatic Balanced Fill-Flash with TTL Multi-Sensor.                                                                                   |
|                                                                    |                                                                                                                                                                                                                                | Spot Metering is set on camera (except when using the F90X/N90s, F90-series/N90 and F70-series/N70).                                                                                                           | Set Matrix Metering or Center-Weighted Metering.                                                                                           |
| Cameras of Group I and Nikon digital SLR cameras                   | Ready-light blinks and  blinks in the LCD panel.                                                                                            | The SB-50DX has fired at its maximum output. (This may indicate underexposure has occurred.)                                                                                                                   | Set wider aperture (smaller f-number) or move closer to the subject and shoot again.                                                       |
| Cameras of Group II                                                |  does not appear in the LCD panel.                                                                                                          | Non-CPU lens is attached (except when using the F4-series).                                                                                                                                                    | Attach CPU lens. With a non-CPU lens, use flash mode other than Matrix Balanced Fill-Flash/Center-Weighted Fill-Flash.                     |
|                                                                    |                                                                                                                                                                                                                                | Matrix Balanced Fill-Flash/Center-Weighted Fill-Flash is not set.                                                                                                                                              | Set Matrix Balanced Fill-Flash/Center-Weighted Fill-Flash.                                                                                 |
|                                                                    |                                                                                                                                                                                                                                | Spot Metering is set (except when using the F-801s).                                                                                                                                                           | Set Matrix Metering or Center-Weighted Metering.                                                                                           |
| Cameras of Group V and VI except for F3-series with AS-17 and FM3a | Camera's viewfinder ready-light blinks when SB-50DX (in TTL auto flash mode) is attached to camera and power is turned on.                                                                                                     | ISO film speed of the film in use or film speed set on the camera exceeds the high-sensitivity side of the usable film speed range. (Same warning appears with the FA camera when the lower side is exceeded.) | Use a film with ISO film speed within the usable film speed range, set the camera's film speed within the range, or set Manual flash mode. |
| Cameras of Group VI except for F3-series with AS-17, FE2 and FG    | Ready-light on the SB-50DX lights up but camera's viewfinder ready-light blinks.                                                                                                                                               | Shutter speed is set at M90, M250 or B in TTL auto flash mode.                                                                                                                                                 | Set shutter speed to another setting.                                                                                                      |
| FM3a and FM2                                                       | Ready-light on the SB-50DX lights up but camera's viewfinder ready-light blinks.                                                                                                                                               | Shutter speed is set at faster speed than the sync shutter speed.                                                                                                                                              | Set shutter speed to flash sync speed or slower.                                                                                           |
| Cameras incompatible with TTL/D-TTL auto flash                     | Ready-light on the SB-50DX lights up but camera's viewfinder ready-light blinks.                                                                                                                                               | TTL auto flash is set on the SB-50DX.                                                                                                                                                                          | Set Manual flash mode.                                                                                                                     |



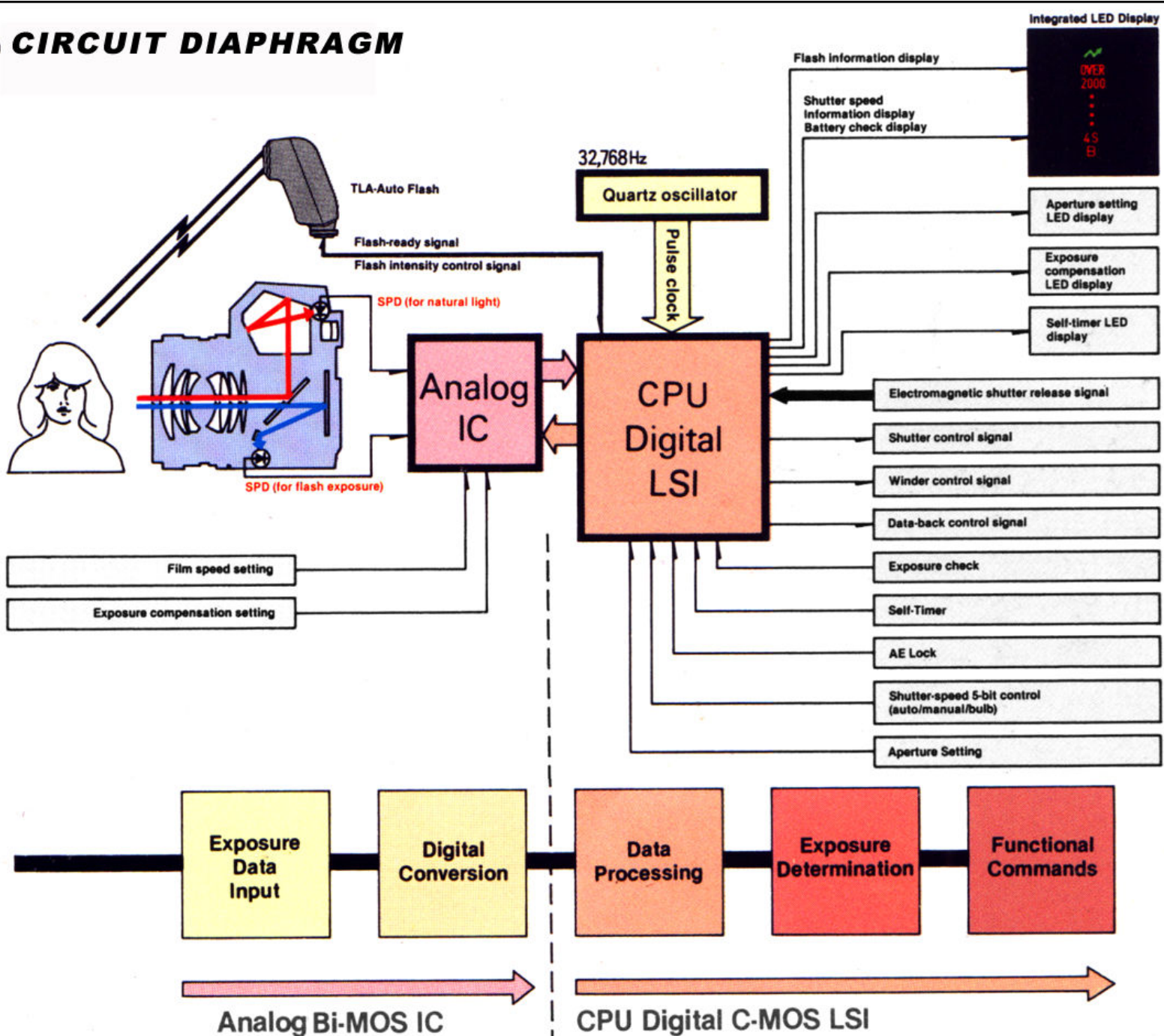




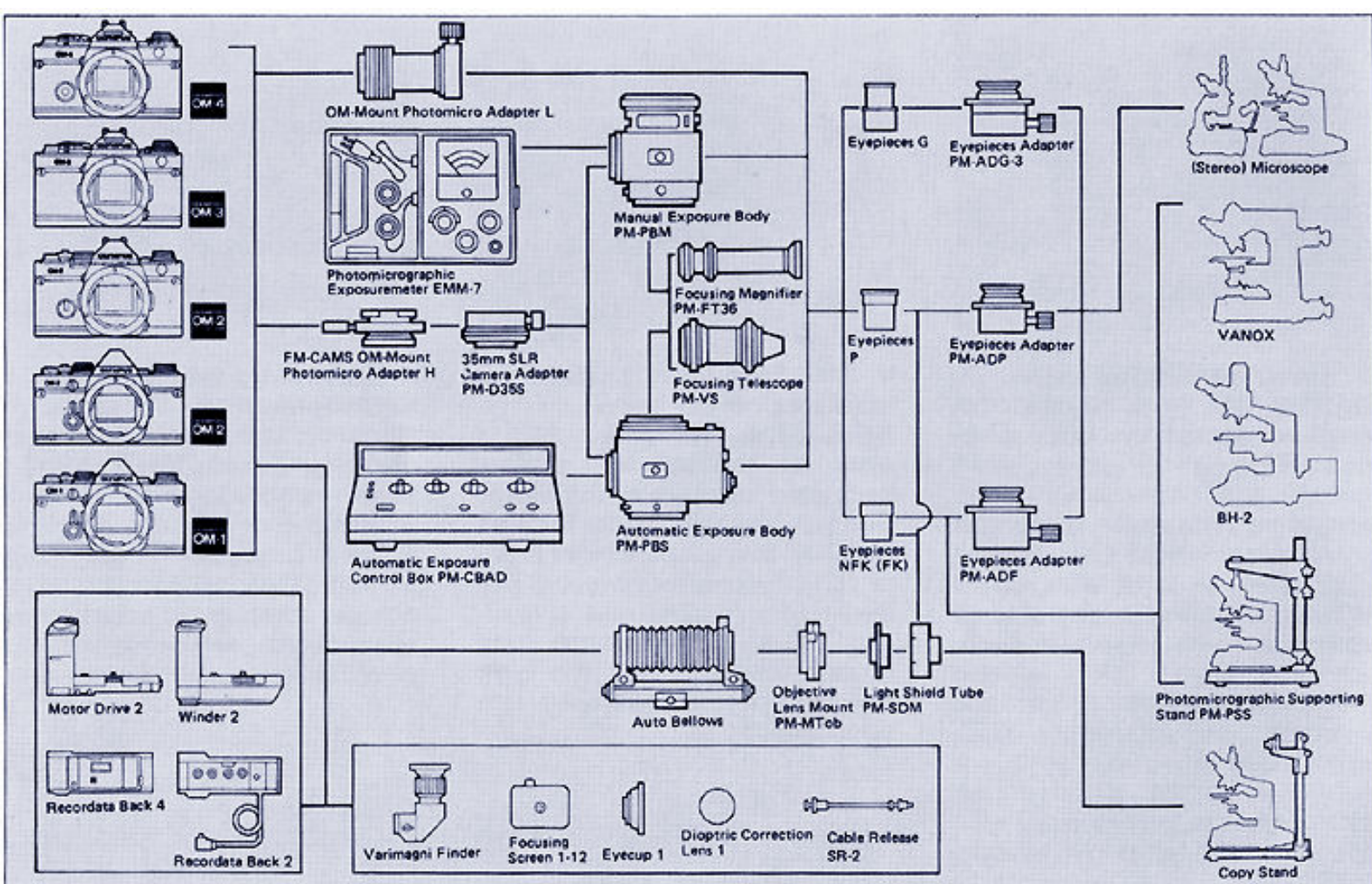




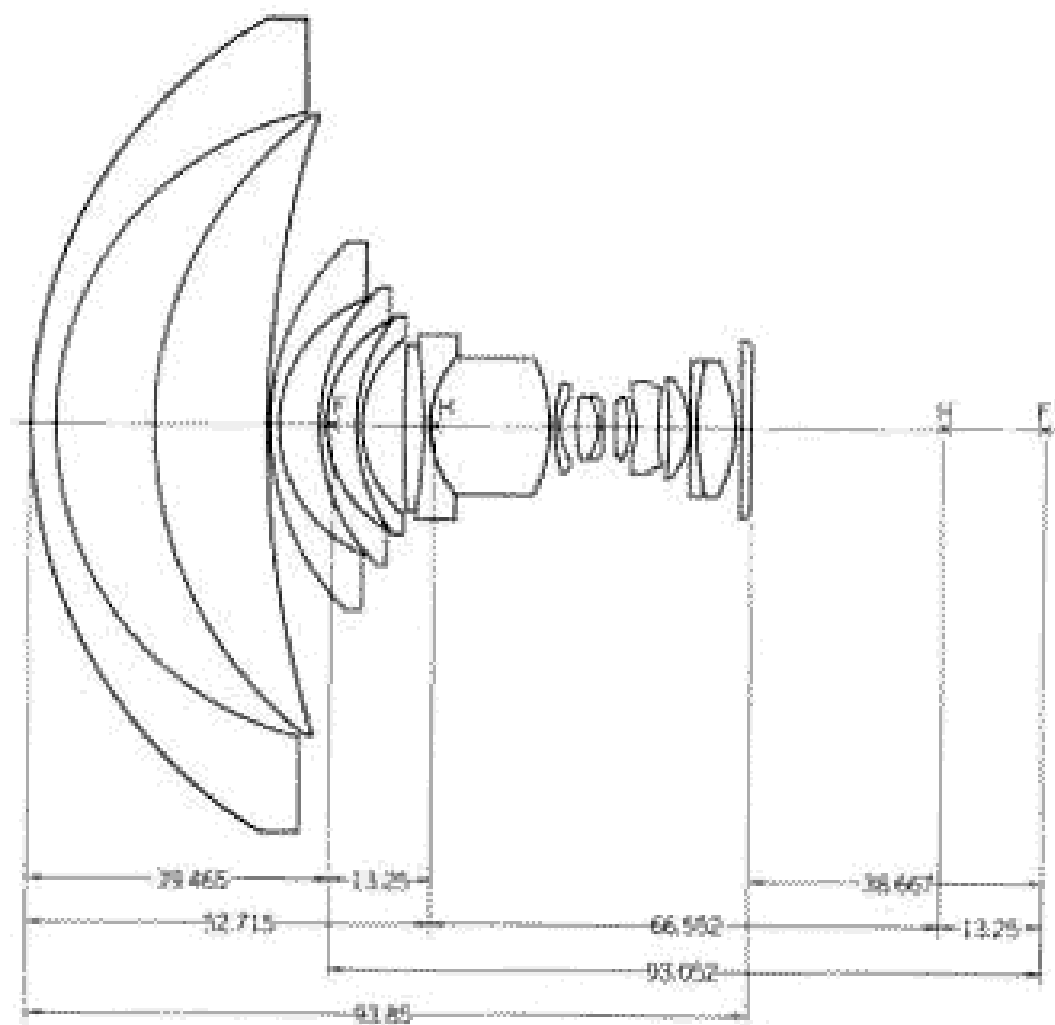
# CIRCUIT DIAPHRAGM



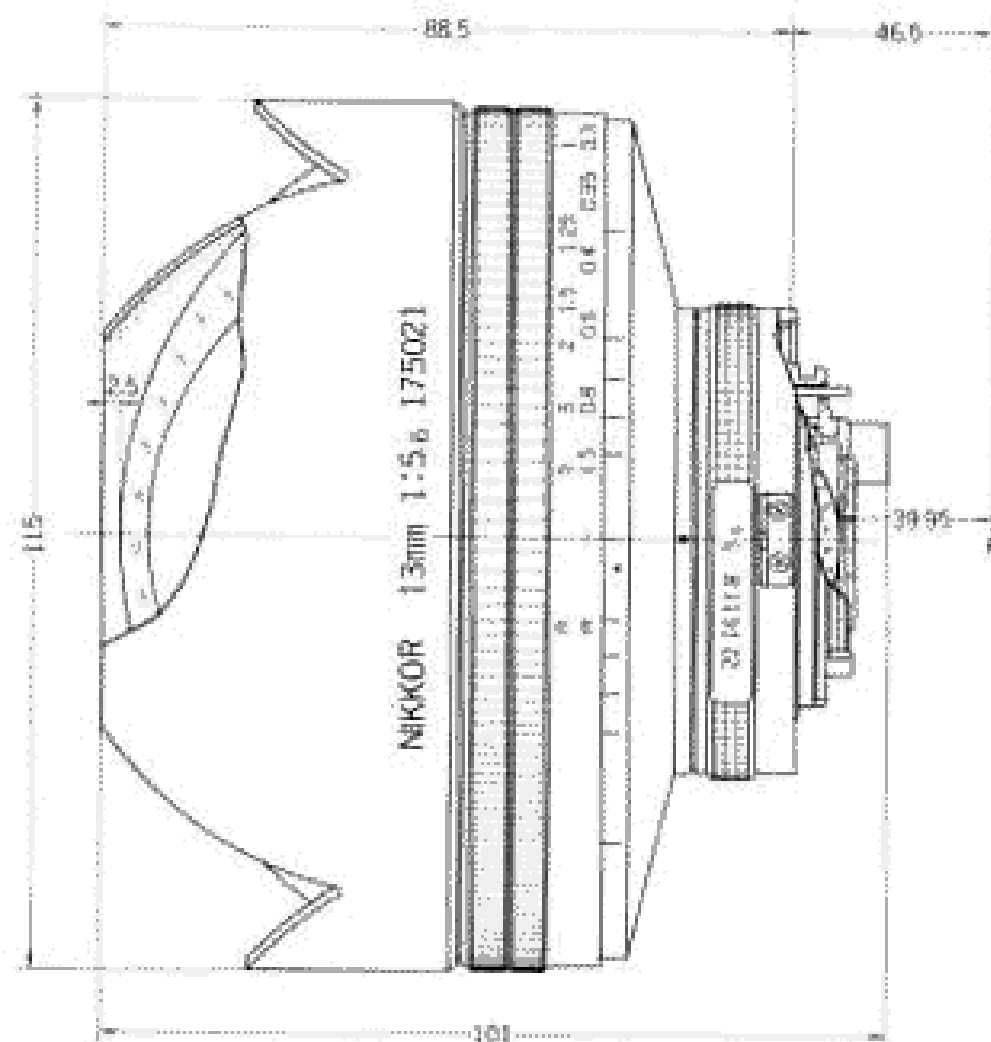








(unit: mm)



## 13mm f/5.6 Nikkor

Extracted from Nikon Sales Manual 1974/1976

### Recommended focusing screens

| Screen<br>Camera | A/L | B | C | D | E | G1 | G2   | G3 | G4 | H1 | H2   | H3 | H4 | J | K/P | M | R |
|------------------|-----|---|---|---|---|----|------|----|----|----|------|----|----|---|-----|---|---|
| F                | ⊙   | ⊙ |   |   | ⊙ |    | ○ -1 |    |    |    | ⊙ -½ |    |    | ⊙ | ⊙   |   | ⊙ |
| F2               | ⊙   | ⊙ |   |   | ⊙ |    | ○ -1 |    |    |    | ⊙ -½ |    |    | ⊙ | ⊙   |   | ⊙ |

⊙ = Excellent focusing

⊙ = Acceptable focusing

The image is brilliant from edge to edge, but the center area (rangefinder, microprism or cross-hair) is dim. Focus on the surrounding matte area.

○ = Acceptable focusing

Slight vignetting (or moire phenomenon, in the case of the microprism) affects the screen image. The image on the film, however, shows no trace of this.

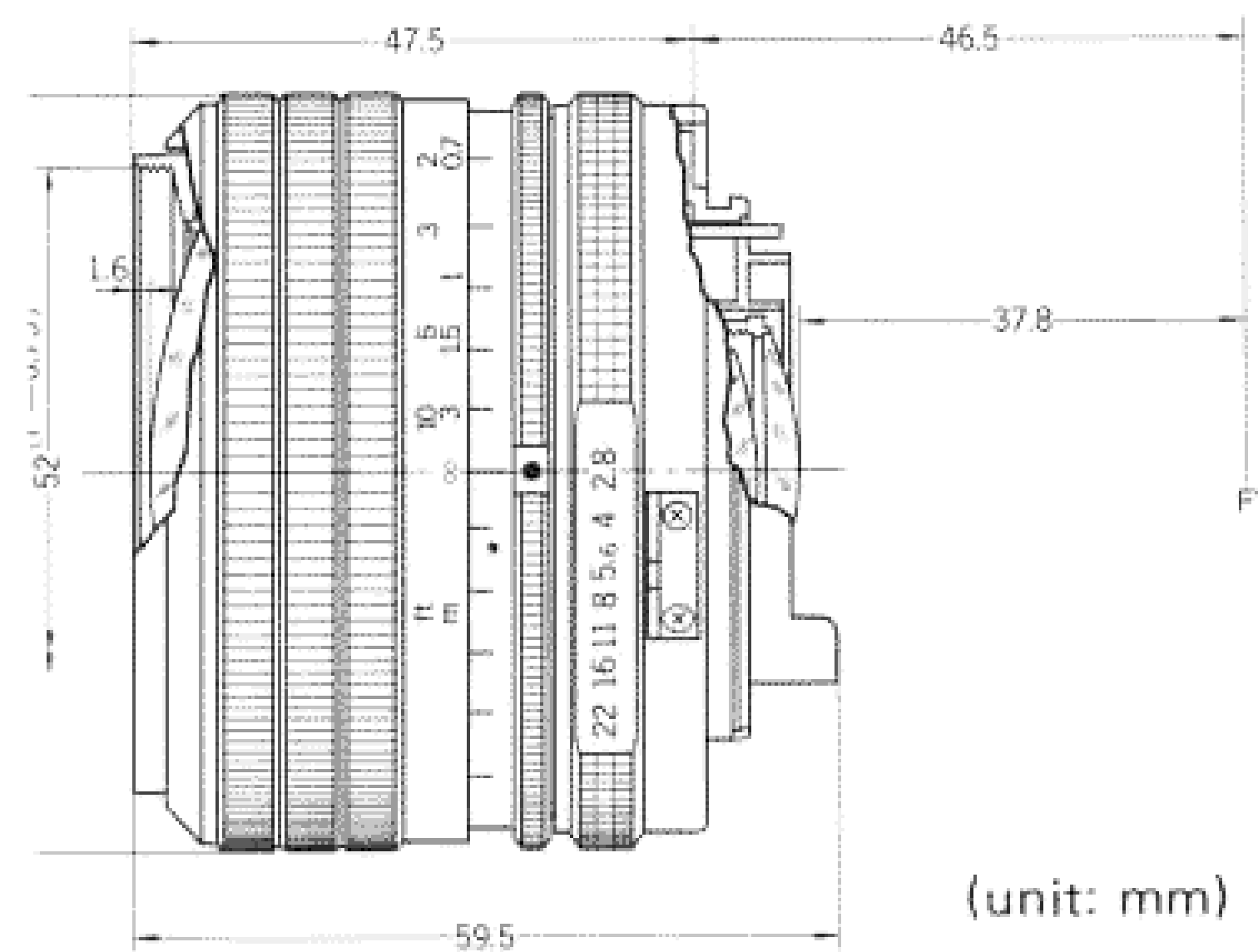
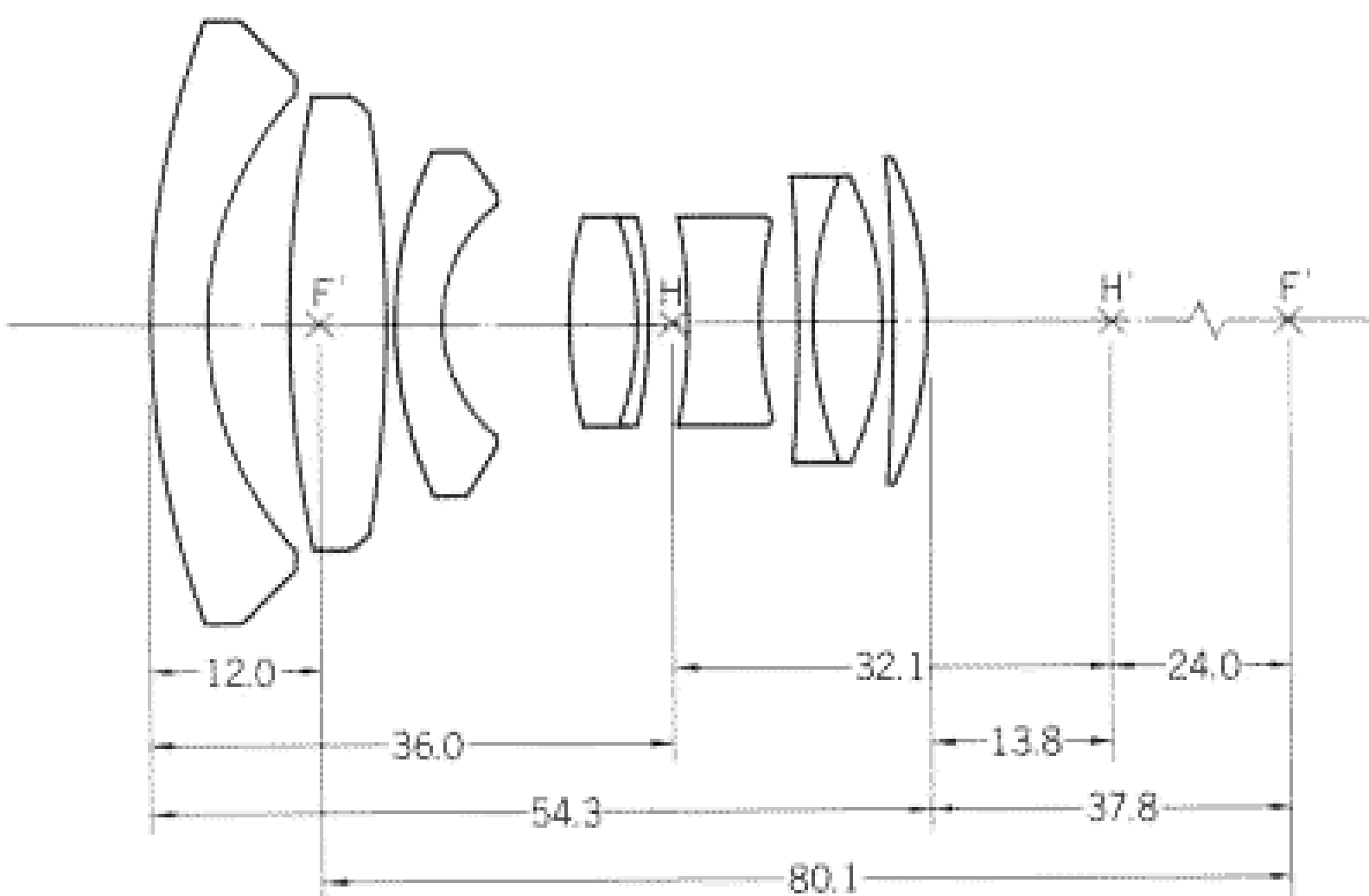
Blank means not usable.

Figures in the table (i.e., -1, -½) denote degree of exposure compensation required for this lens/screen/camera combination.

### Depth of field

(m)

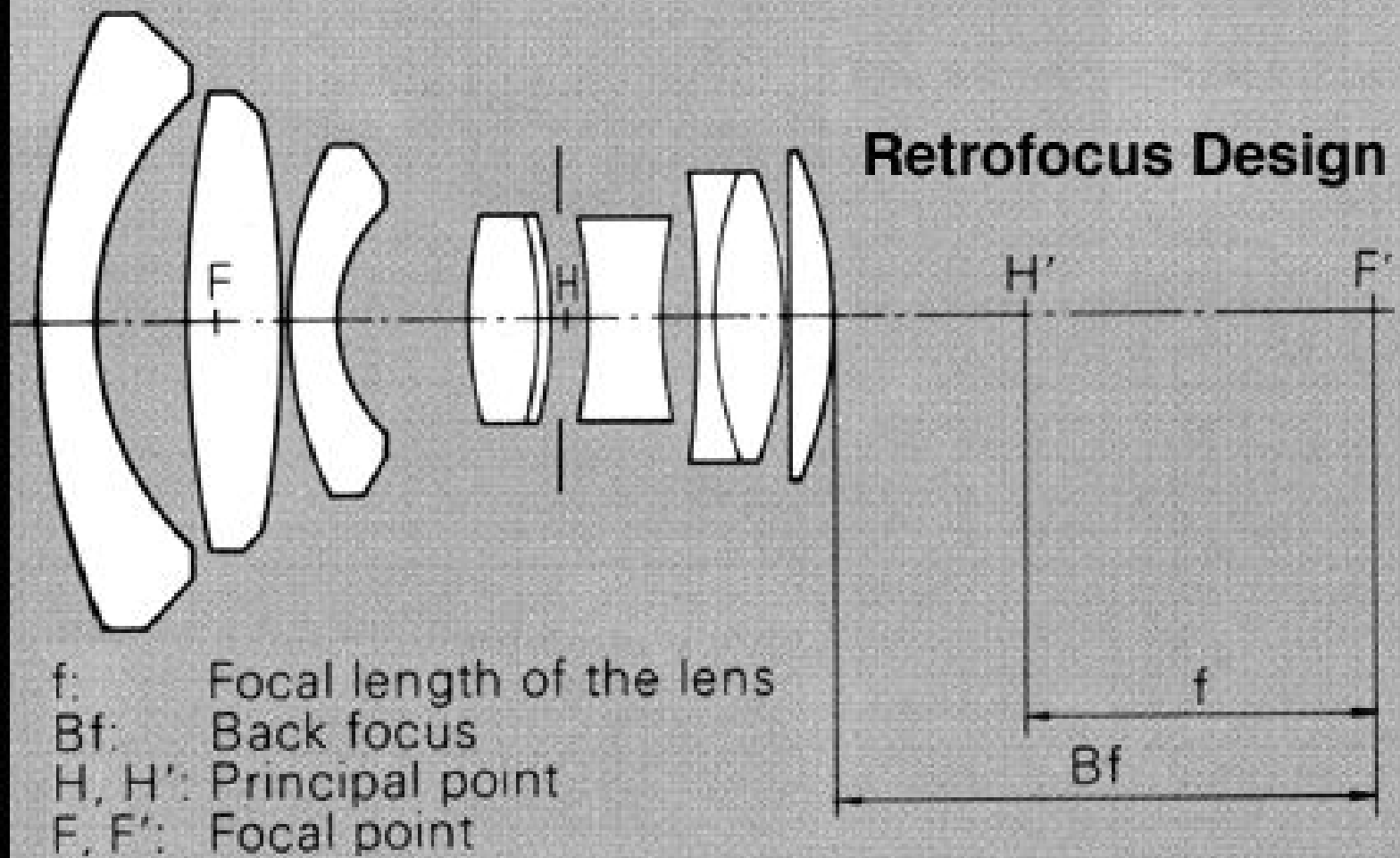
| Focused distance | Depth of field  |                  |                 |                 |                 |
|------------------|-----------------|------------------|-----------------|-----------------|-----------------|
|                  | f/5.6           | 8                | 11              | 16              | 22              |
| 0.3              | 0.28361—0.32212 | 0.27781—0.33416  | 0.27137—0.35226 | 0.26224—0.39356 | 0.25330—0.47794 |
| 0.35             | 0.32021—0.39489 | 0.31031—0.42195  | 0.29966—0.46672 | 0.28516—0.59244 | 0.27161—1.03531 |
| 0.4              | 0.35373—0.47806 | 0.3392—0.53077   | 0.32403—0.62928 | 0.30407—1.01602 | 0.28612—∞       |
| 0.5              | 0.41292—0.68601 | 0.38832—0.85123  | 0.36385—1.30786 | 0.33344—∞       | 0.30767—∞       |
| 0.8              | 0.54559—2.14295 | 0.49034—23.87595 | 0.44069—∞       | 0.38527—∞       | 0.34297—∞       |
| 1.5              | 0.71951—∞       | 0.60937—∞        | 0.52149—∞       | 0.43383—∞       | 0.37327—∞       |
| ∞                | 1.11259—∞       | 0.83041—∞        | 0.65084—∞       | 0.50119—∞       | 0.41141—∞       |



(unit: mm)



## Retrofocus Design



## 24mm f/2.8 Nikkor

Content extracted from Nikon Sales Manual May, 1976

### Recommended focusing screens

| Screen<br>Camera | A/L | B | C | D | E | G1 | G2 | G3 | G4 | H1      | H2 | H3 | H4 | J | K/P | M | R |
|------------------|-----|---|---|---|---|----|----|----|----|---------|----|----|----|---|-----|---|---|
| F                | ⊙   | ⊙ |   |   | ⊙ |    | ⊙  |    |    | ⊙       | ⊙  |    |    | ⊙ | ⊙   |   | △ |
| F2               | ⊙   | ⊙ |   |   | ⊙ |    | ⊙  |    |    | ⊙ + 1/2 | ⊙  |    |    | ⊙ | ⊙   |   | △ |

⊙ = Excellent focusing

△ = Acceptable focusing

The in-focus image in the central spot may prove to be slightly out of focus on the film. Focus on the surrounding matte area.

Blank means not usable.

The figure given in the table (i.e., +1/2) denotes degree of exposure compensation required for this lens/screen/camera combination.

### Photographic ranges with close-up attachments

(cm)

| Close-up attachment                | Lens in normal position |                     |                  | Lens in reverse position |                 |                  |
|------------------------------------|-------------------------|---------------------|------------------|--------------------------|-----------------|------------------|
|                                    | Repro. ratio            | Subject field       | Focused distance | Repro. ratio             | Subject field   | Focused distance |
| E2 Ring                            | 1/1.7–1/1.4             | 4.1x6.2–3.5x5.2     | 13.5–13.1        |                          |                 |                  |
| * K Ring Set                       | 1/4.1–2.1               | 9.9x14.9–1.1x1.7    | 18.5–14.2        |                          |                 |                  |
| Bellows PB-4, PB-5                 |                         |                     |                  | 4.5–10.4                 | 0.5x0.8–0.2x0.3 | 19.3–33.2        |
| * Slide-Copying Adapter PS-4, PS-5 |                         |                     |                  | 4.5–10.4                 | 0.5x0.8–0.2x0.3 | 19.3–33.2        |
| Close-Up Lens No. 0                | 1/59–1/7.9              | 141x212–19.0x28.5   | 151–27.6         |                          |                 |                  |
| Close-Up Lens No. 1                | 1/28–1/7                | 67.2x101–16.9x25.3  | 77.9–25.8        |                          |                 |                  |
| Close-Up Lens No. 2                | 1/14–1/5.8              | 33.8x50.7–13.8x20.7 | 44.2–23.0        |                          |                 |                  |
| * Repro-Copy Outfit PF-2           | 1/22–1/9.1              | 77.0x115–21.7x32.6  | 85.0–30.0        |                          |                 |                  |

\* The first values are for the K1 ring used alone; second values are for all five rings used together.

\*\* The Macro Ring Adapter BR-3 is used to connect the reverse mounted lens to the copying adapter.

\*\*\* The figures shown here represent the ranges obtained with the subject on the baseplate, using the lens without any close-up attachment.

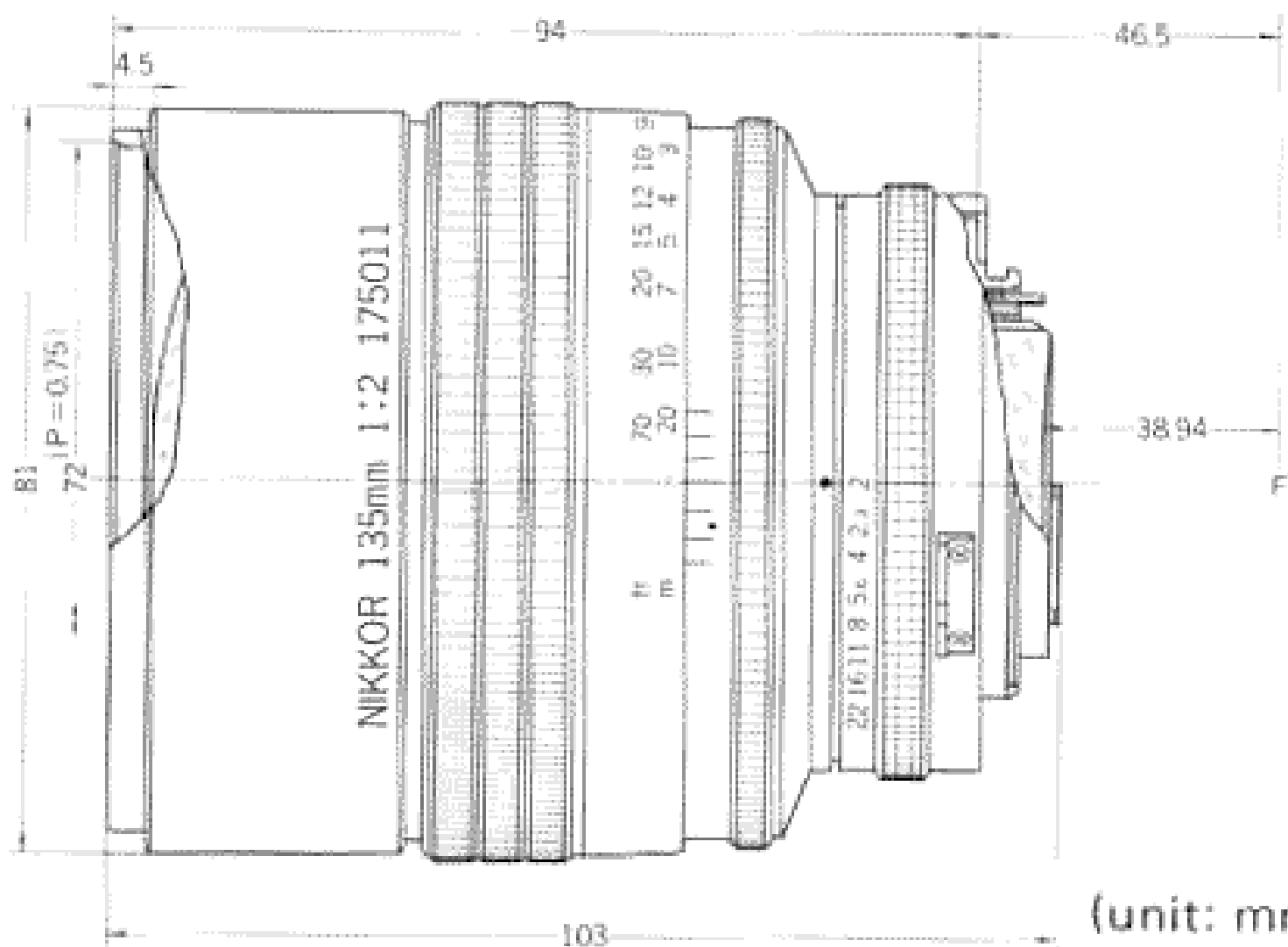
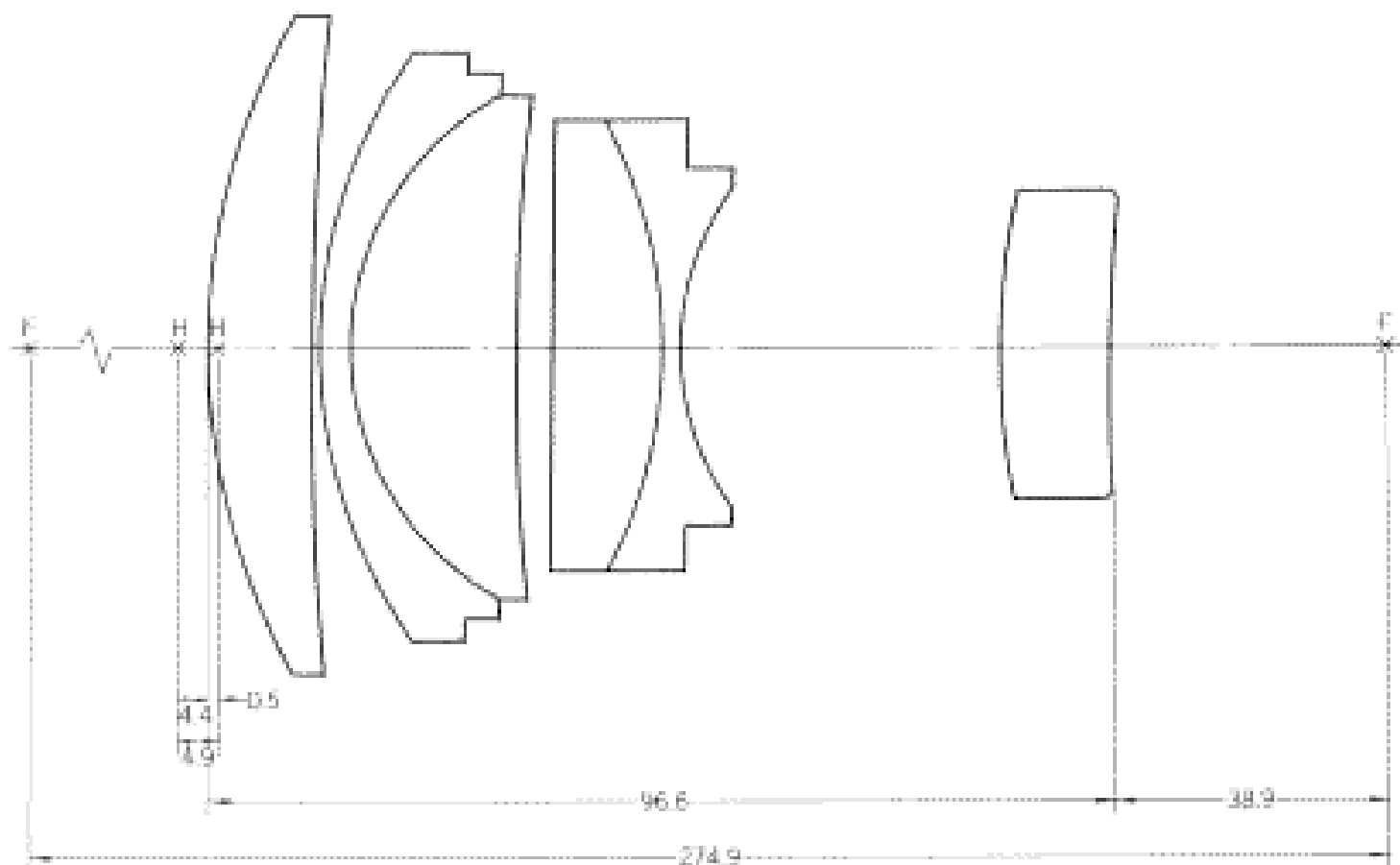
### Depth of field

(m)

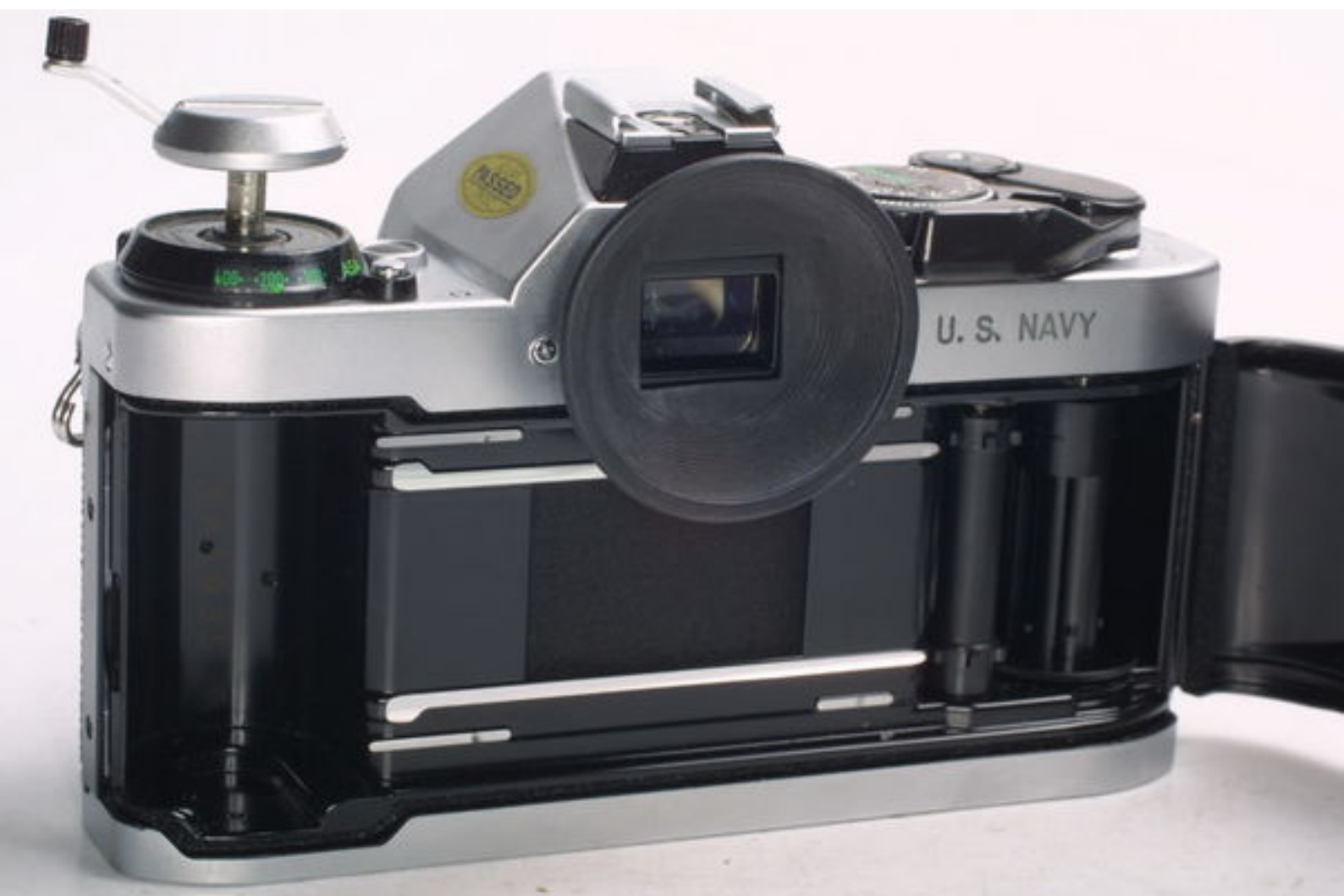
| Focused distance | Depth of field |             |             |             |             |             |             | Repro. ratio |
|------------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                  | f/2.8          | 4           | 5.6         | 8           | 11          | 16          | 22          |              |
| 0.3              | 0.292–0.309    | 0.288–0.313 | 0.284–0.319 | 0.278–0.327 | 0.271–0.340 | 0.260–0.363 | 0.249–0.397 | 1/9.07       |
| 0.35             | 0.338–0.363    | 0.333–0.369 | 0.327–0.378 | 0.318–0.392 | 0.308–0.411 | 0.293–0.450 | 0.277–0.509 | 1/11.2       |
| 0.4              | 0.383–0.419    | 0.377–0.427 | 0.368–0.440 | 0.356–0.460 | 0.343–0.489 | 0.323–0.548 | 0.303–0.647 | 1/13.3       |
| 0.5              | 0.472–0.532    | 0.461–0.548 | 0.447–0.570 | 0.429–0.608 | 0.408–0.665 | 0.378–0.792 | 0.349–1.04  | 1/17.5       |
| 0.7              | 0.641–0.772    | 0.620–0.809 | 0.593–0.864 | 0.558–0.964 | 0.520–1.13  | 0.468–1.62  | 0.421–3.55  | 1/25.8       |
| 1                | 0.878–1.17     | 0.835–1.26  | 0.784–1.41  | 0.720–1.72  | 0.654–2.39  | 0.571–7.54  | 0.498–∞     | 1/38.4       |
| 1.5              | 1.23–1.94      | 1.14–2.22   | 1.05–2.76   | 0.930–4.39  | 0.819–18.4  | 0.687–∞     | 0.579–∞     | 1/59.3       |
| 3                | 2.05–5.68      | 1.81–9.32   | 1.57–68.9   | 1.31–∞      | 1.09–∞      | 0.862–∞     | 0.693–∞     | 1/122        |
| ∞                | 6.23–∞         | 4.38–∞      | 3.15–∞      | 2.23–∞      | 1.65–∞      | 1.16–∞      | 0.863–∞     | 1/∞          |



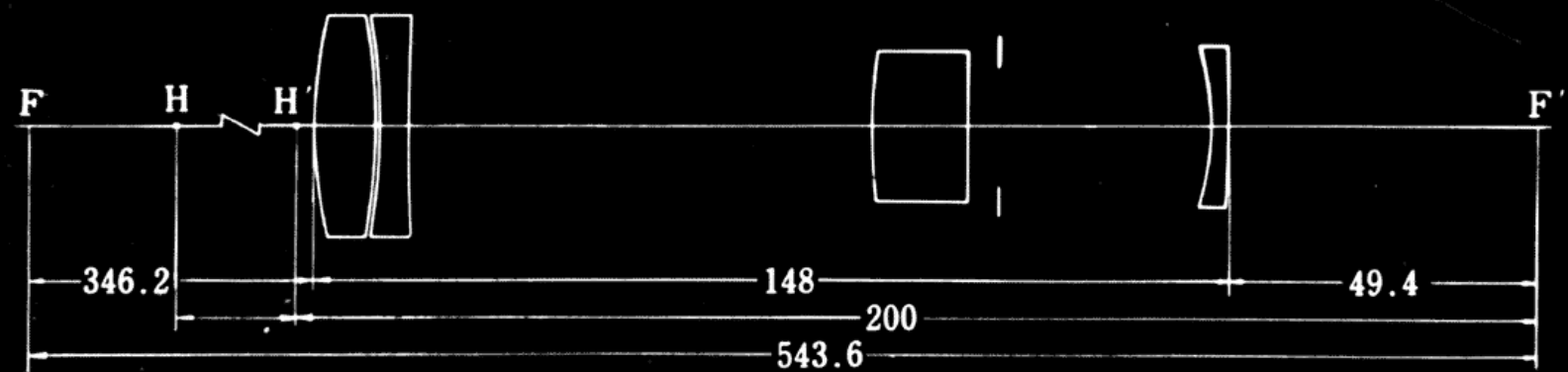
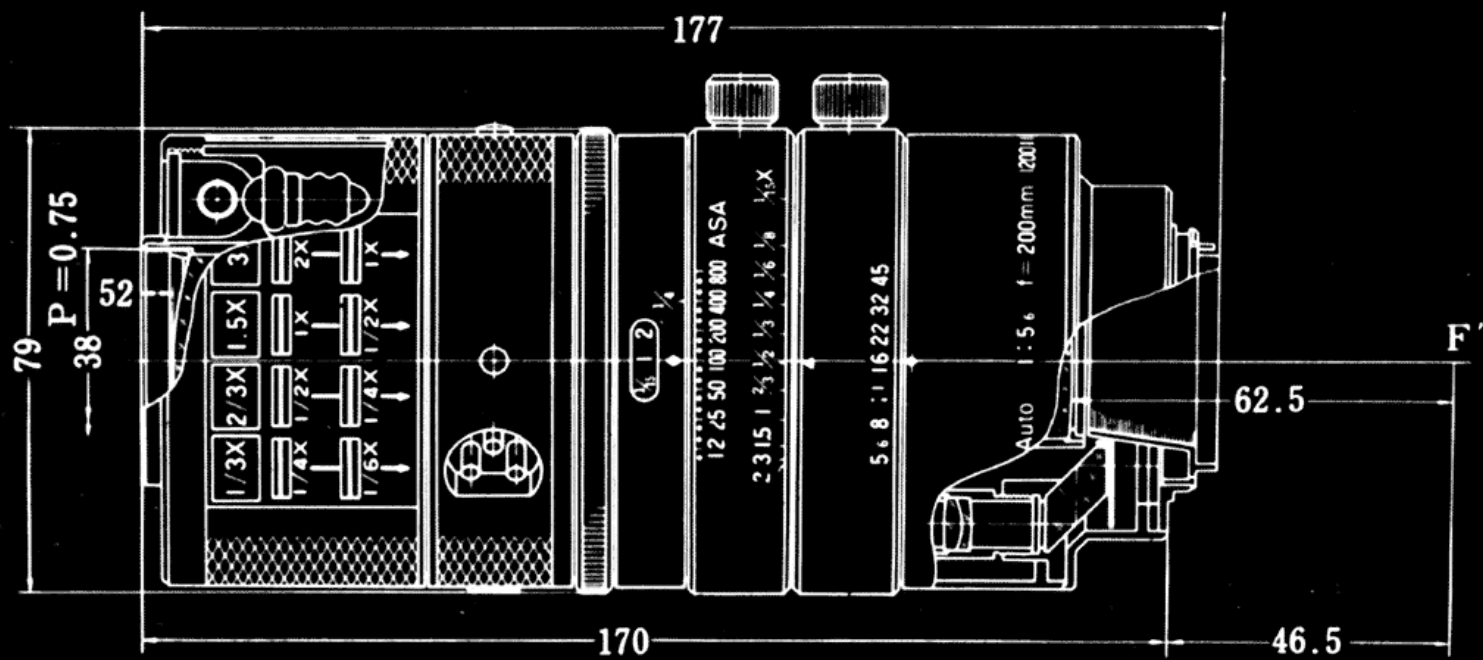




(unit: mm)

















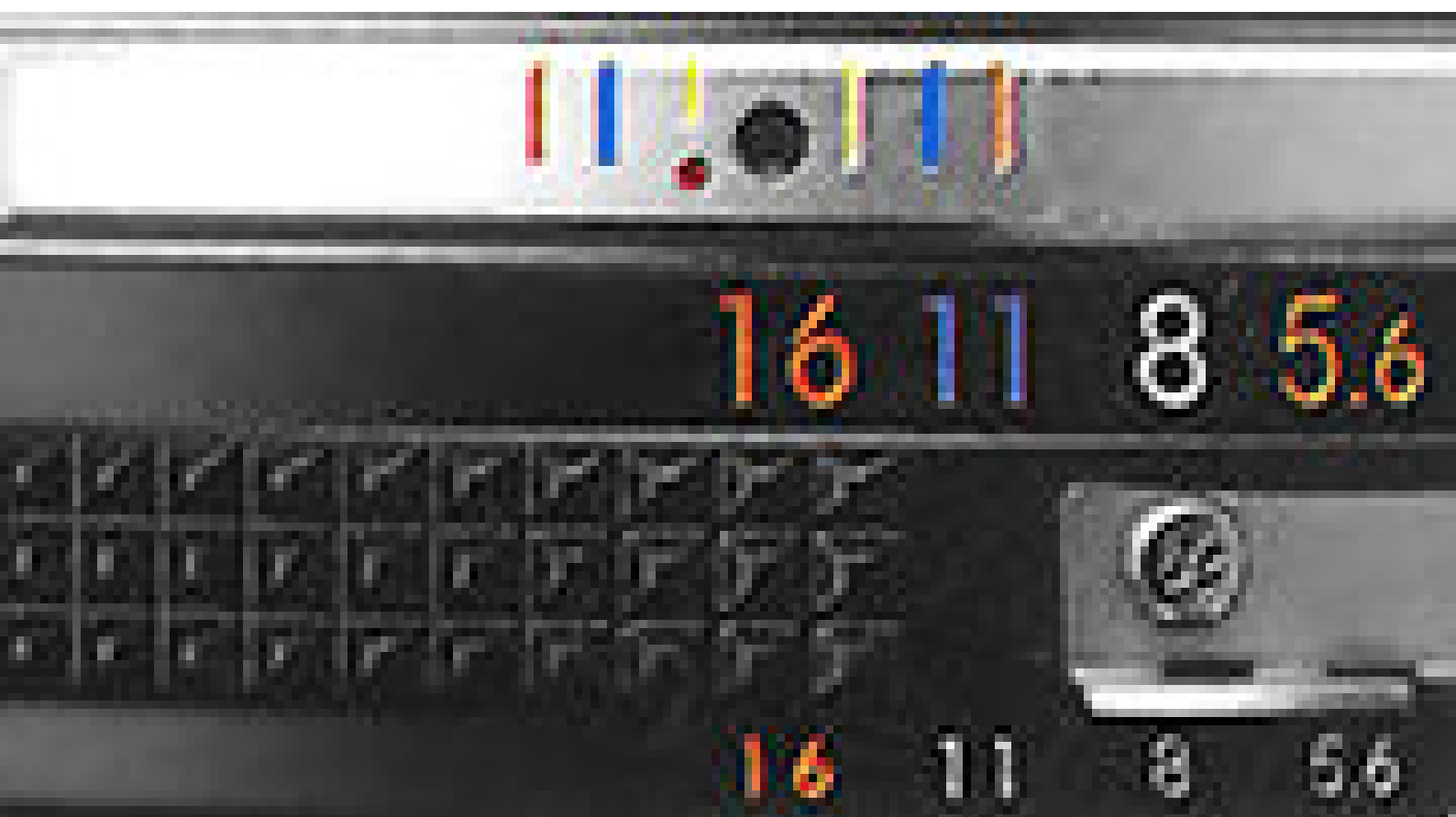


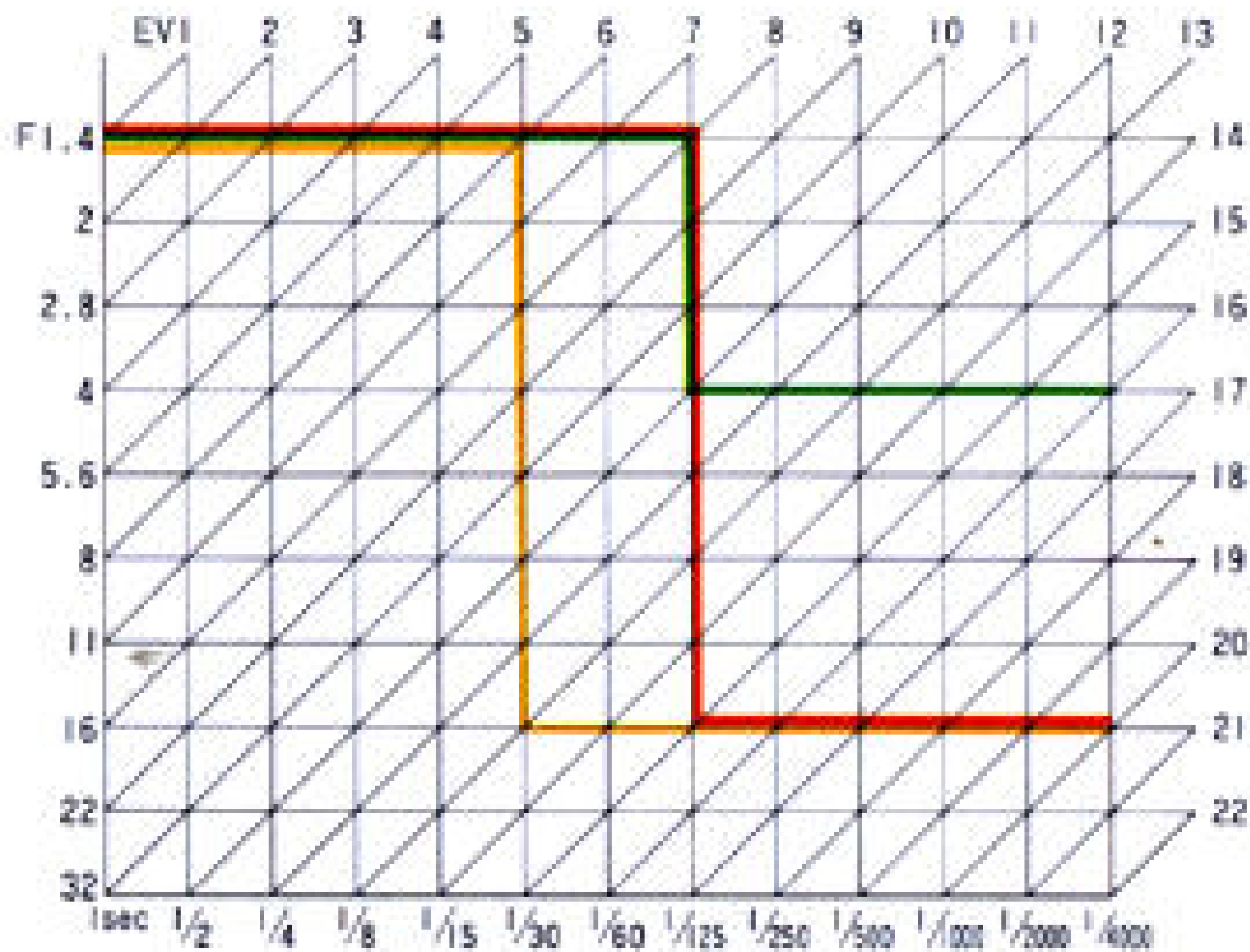






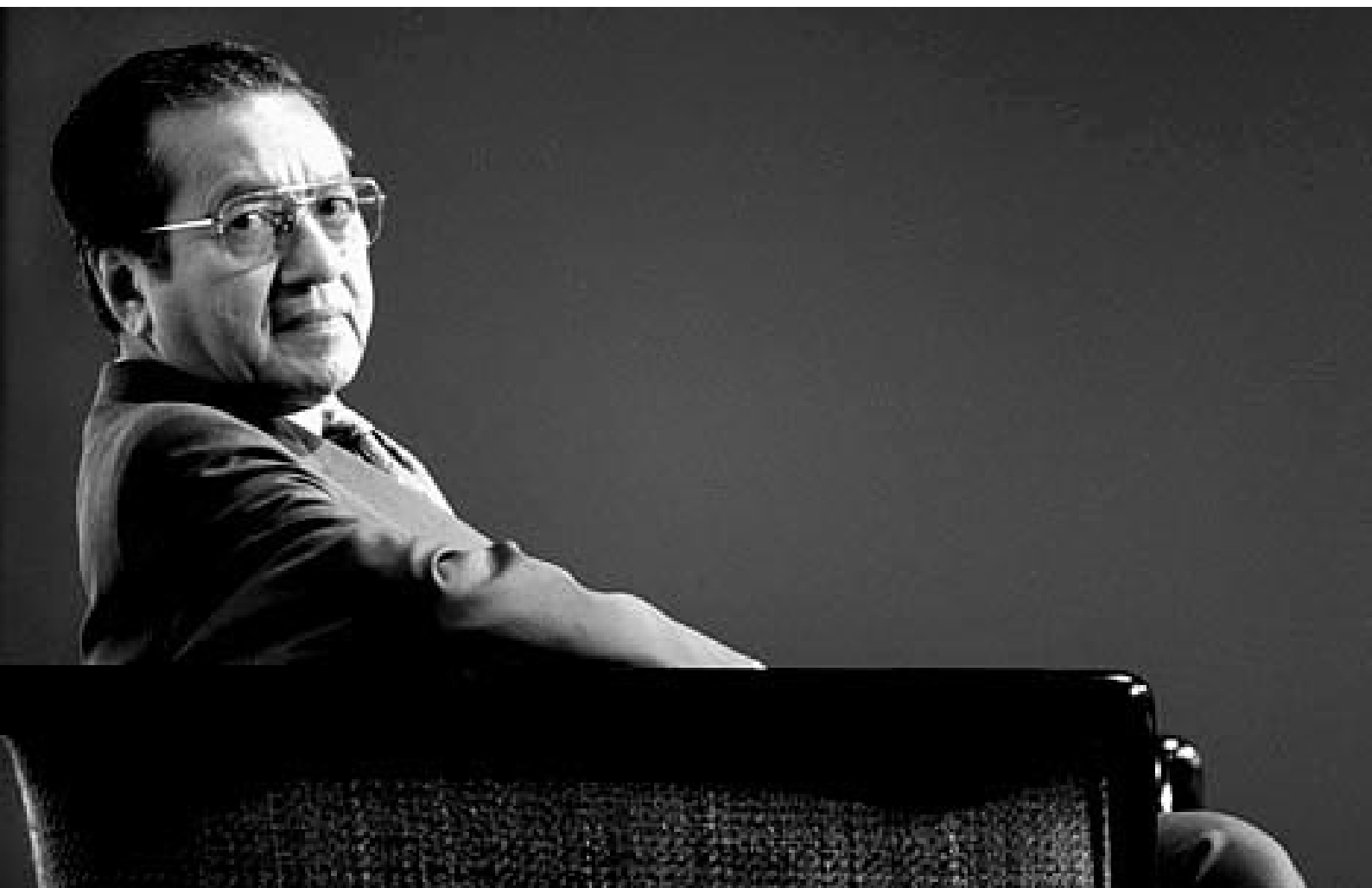


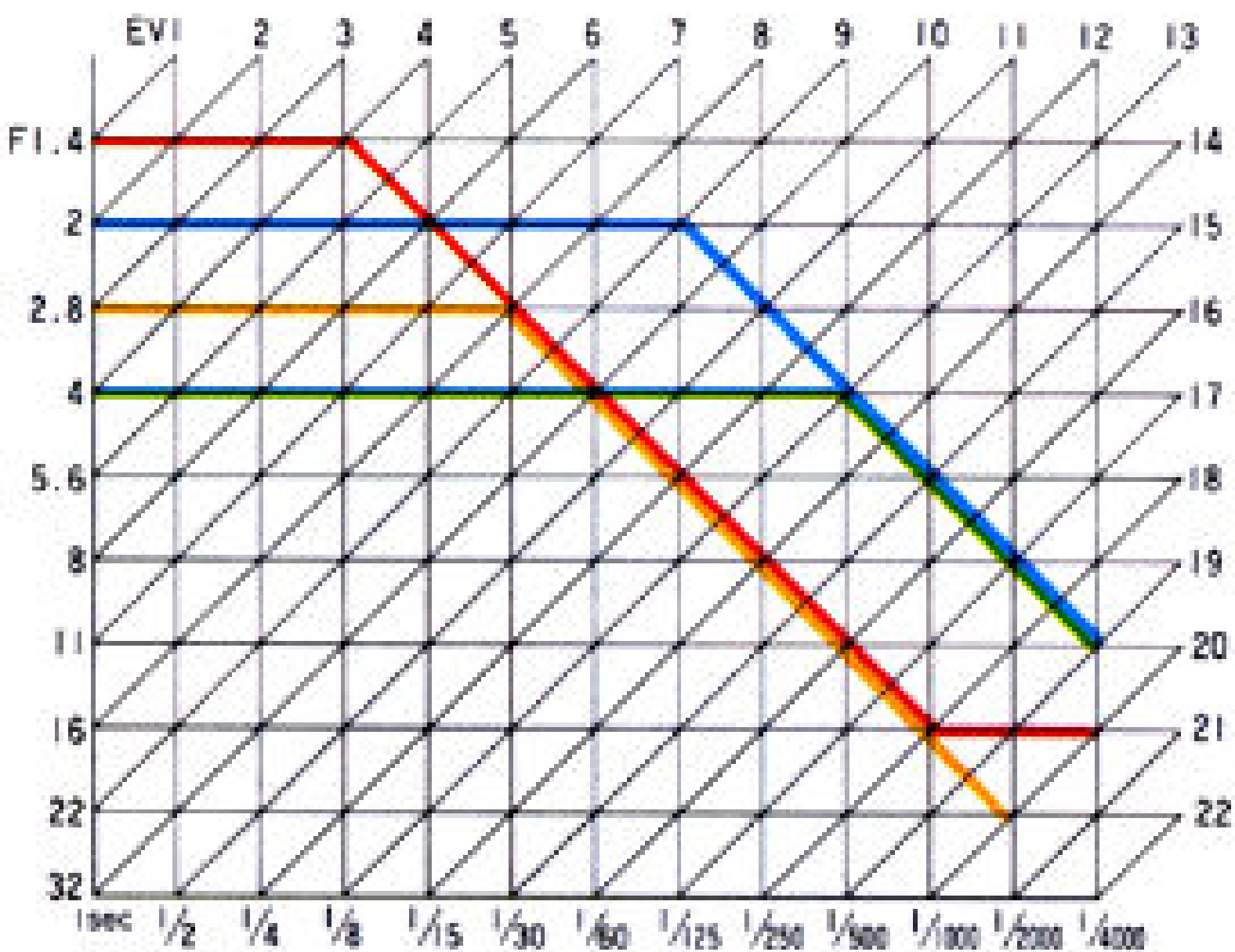




- 50mm f/1.4, set at 1/30 sec., f/16
- 50mm f/1.4, set at 1/125 sec., f/16
- 50mm f/1.4, set at 1/125 sec., f/4





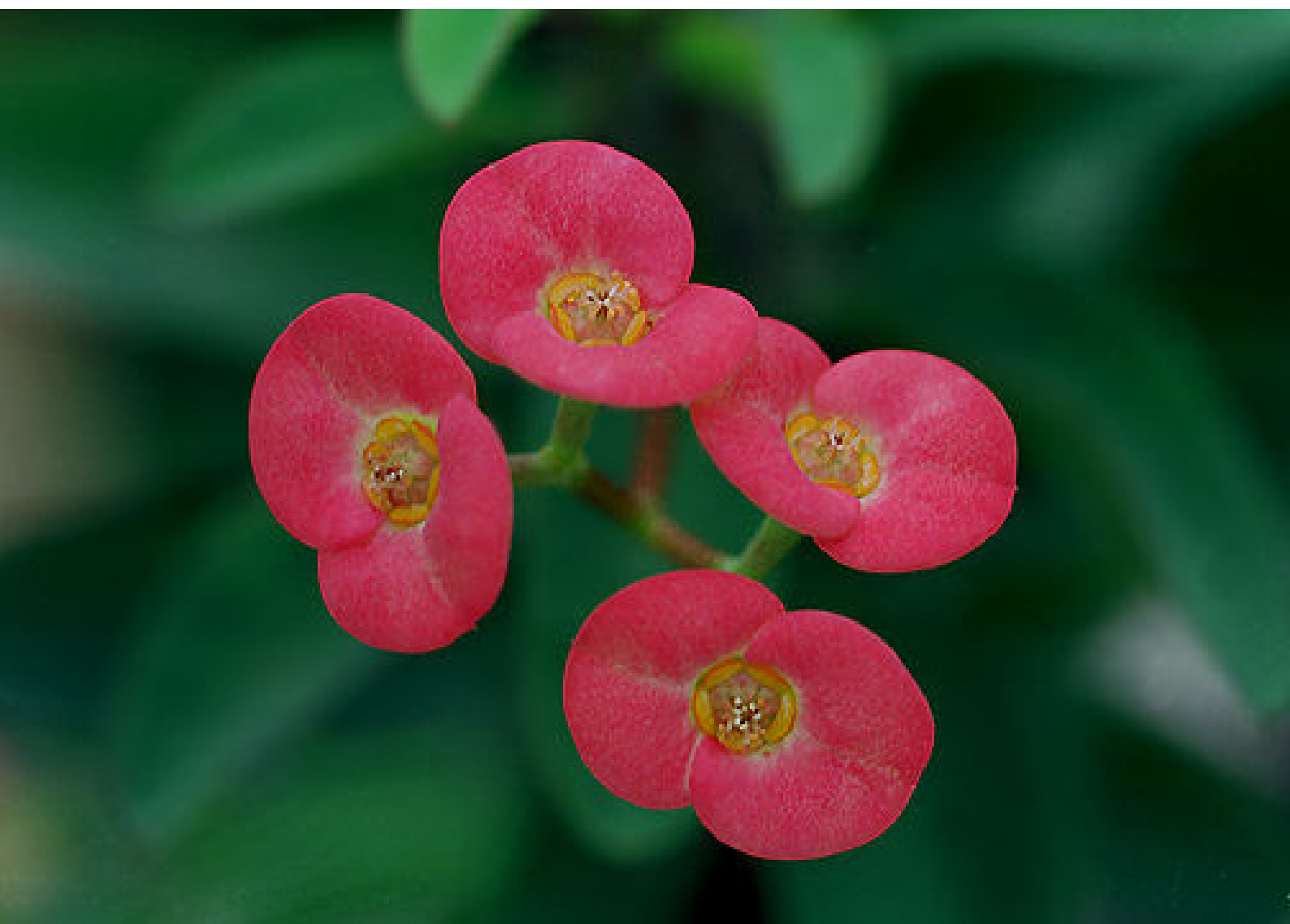


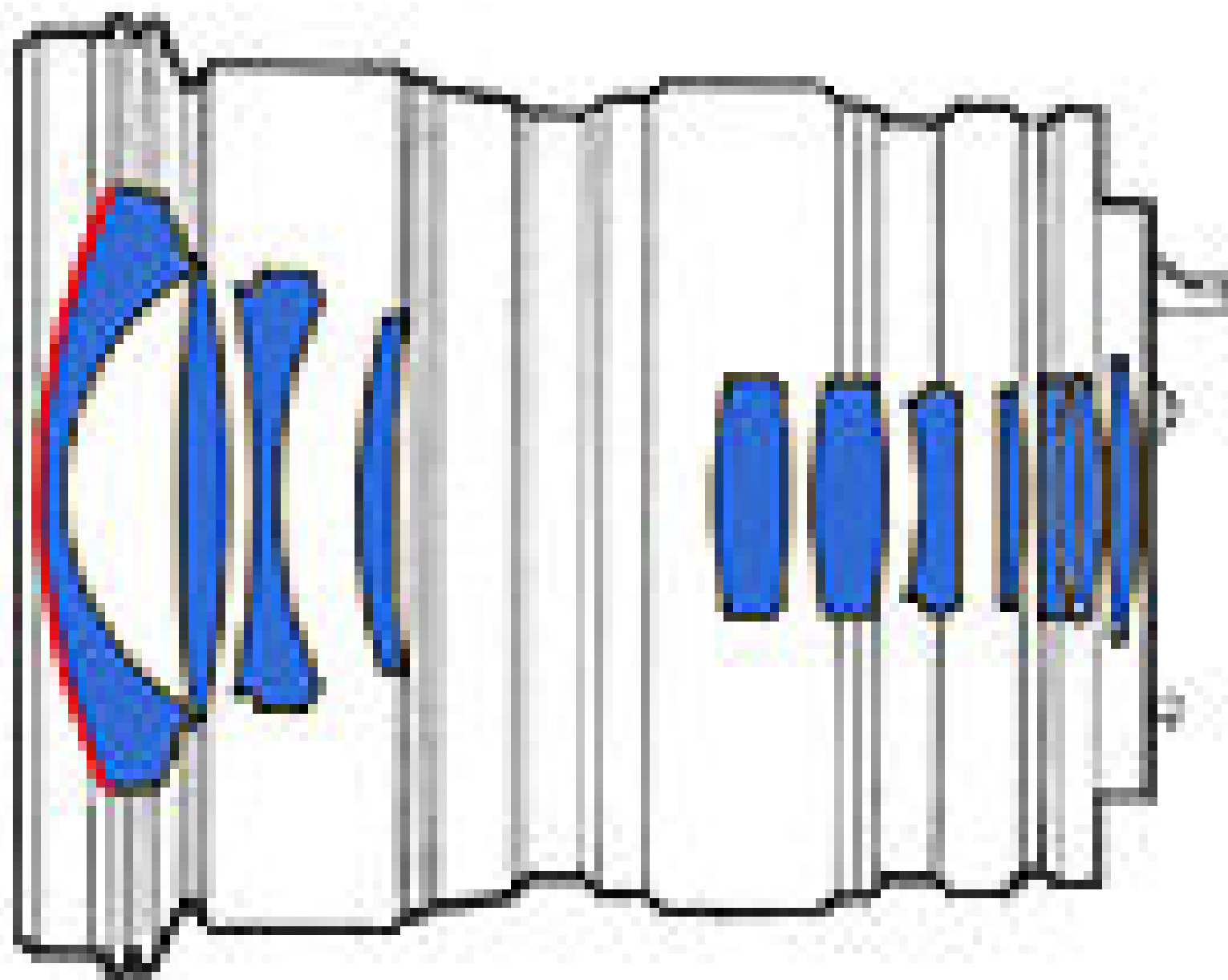
- 50mm *f*/1.4
- 135mm *f*/2
- 24mm *f*/2.8
- 200mm *f*/4









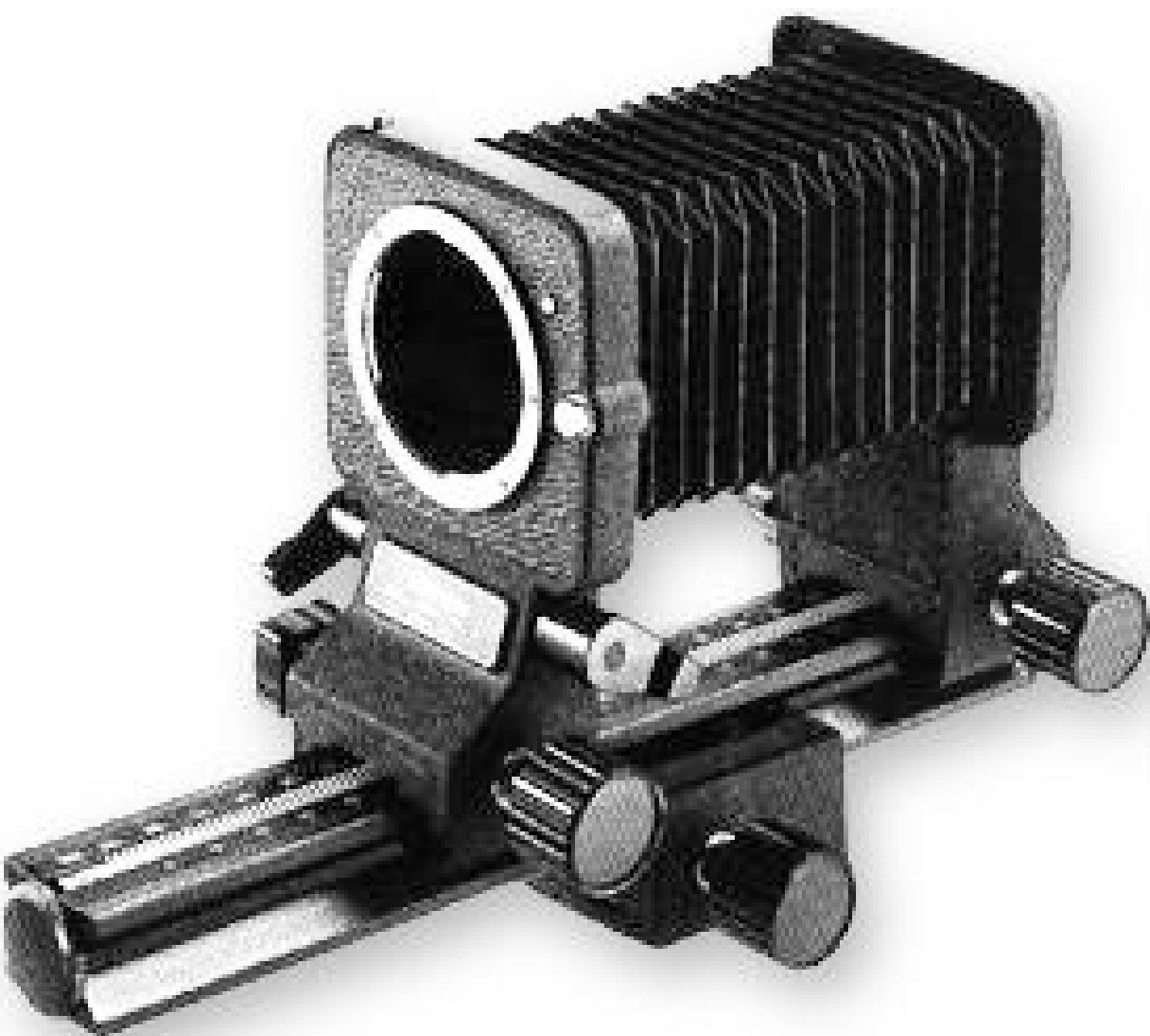






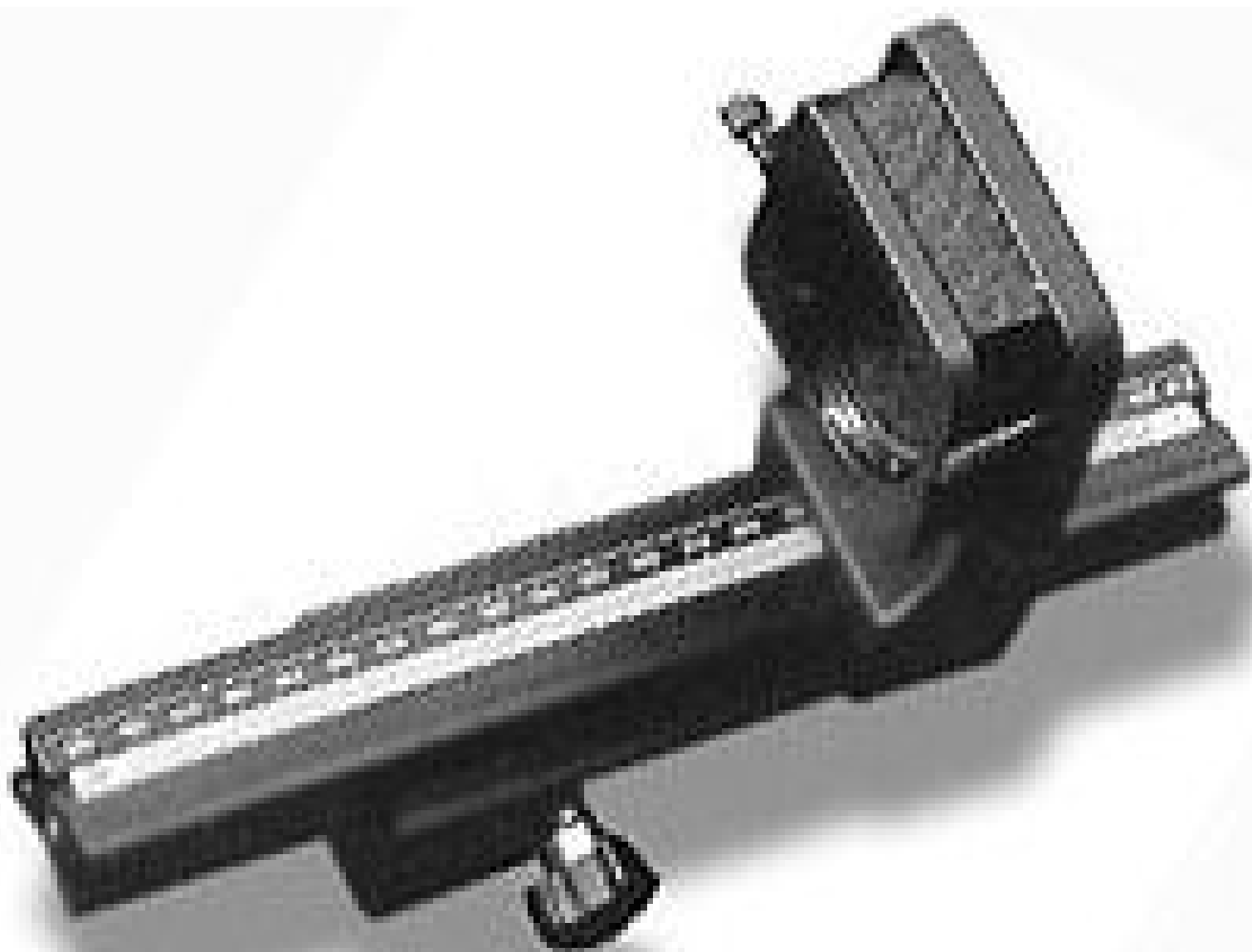


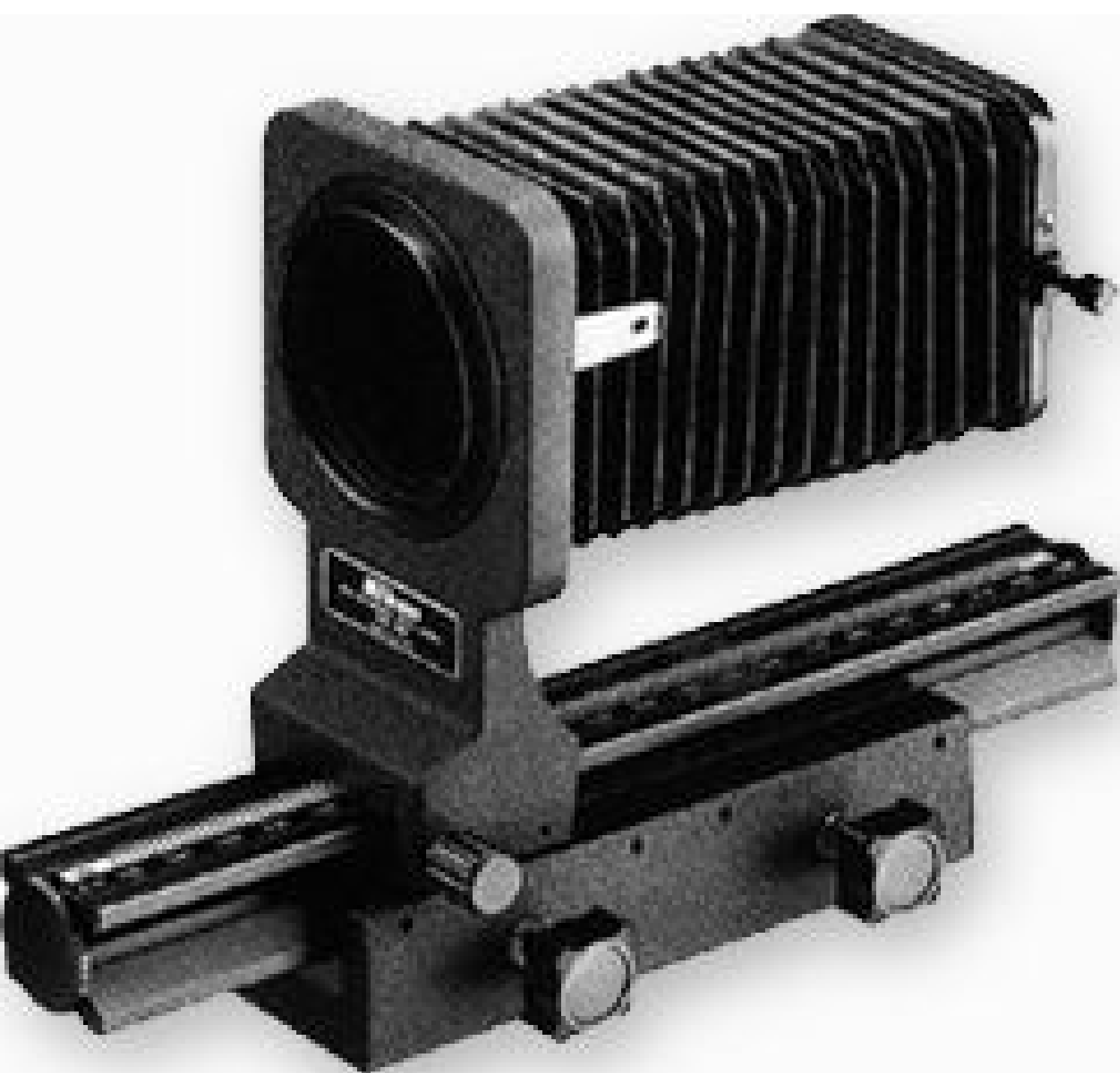
















PS-5









FM2



