the SPT Journal & Service Notes

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Nikon EM

Pentax ES, ESII

Olympus OM-10

Pentax ME Winder

Olympus Auto-S Lens

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All Service Articles in this issue were prepared by Larry Lyells unless noted.

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"I started to fix it myself, then thought: why deprive a professional of his livelihood?"

NIKON EM

Batteries: 2 ea. 1.5V S-76 (negative ground)

Fig. 1 — top cover removed

Fig. 2 — bottom cover removed

Fig. 3 — lens-mounting ring removed

Fig. 4 — front view, mirror box removed

Fig. 5 — mirror box, wind side

Fig. 6 — top view, main flex removed

Fig. 7 — mirror-actuating unit of mirror box removed

Fig. 8 — bottom view of wind seat, timed position

Fig. 9 — flex connector, pictorial and test points

Fig. 10 — flex circuit, wiring

Fig. 11 — IC pin voltages

Fig. 12 — test setup for fast adjustments

ADJUSTMENT LOCATIONS:

Constant voltage, flash	A*
Speeds ratio	B
Speeds level	C
Flash speed and buzzer	D*
Meter readout, ratio	E
Meter readout, level	F
Release-button switch	G
Release overtravel	H
Travel time, second curtain	I
Travel time, first curtain	J
Trigger (timing) switch	K**
Memory switch	L

*requires Nikon Speedlight SB-E, special Nikon tool, or current source to adjust
** do not disturb

ADJUSTMENT VALUES:

Curtain-travel time:	6ms (20mm distance)
Flange-focal distance:	46.67+0.02mm (flange to pressure-plate rails)
	46.44+0.02mm (flange to film-guide rails)

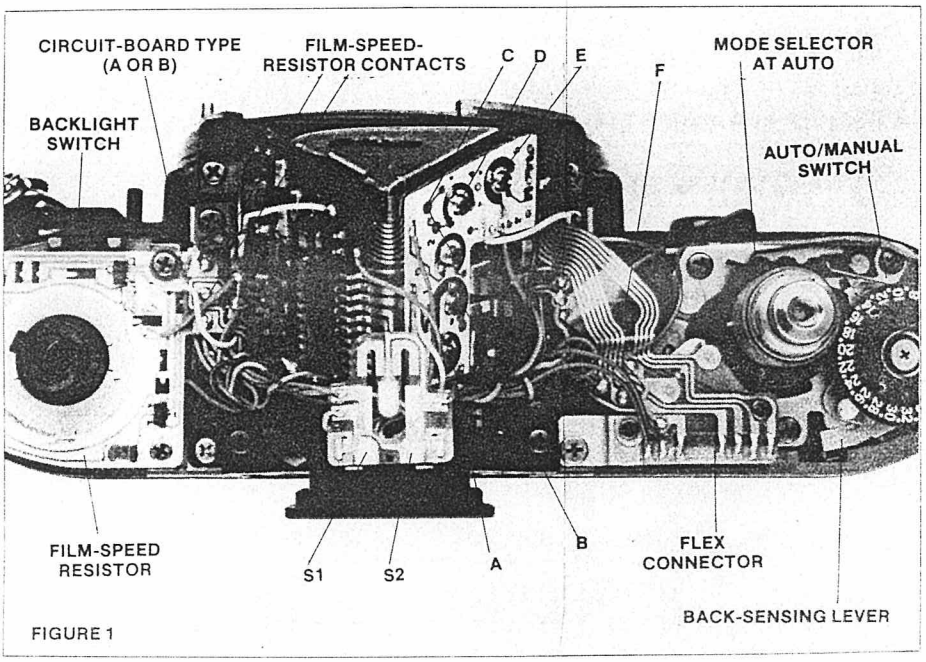

FIGURE 1

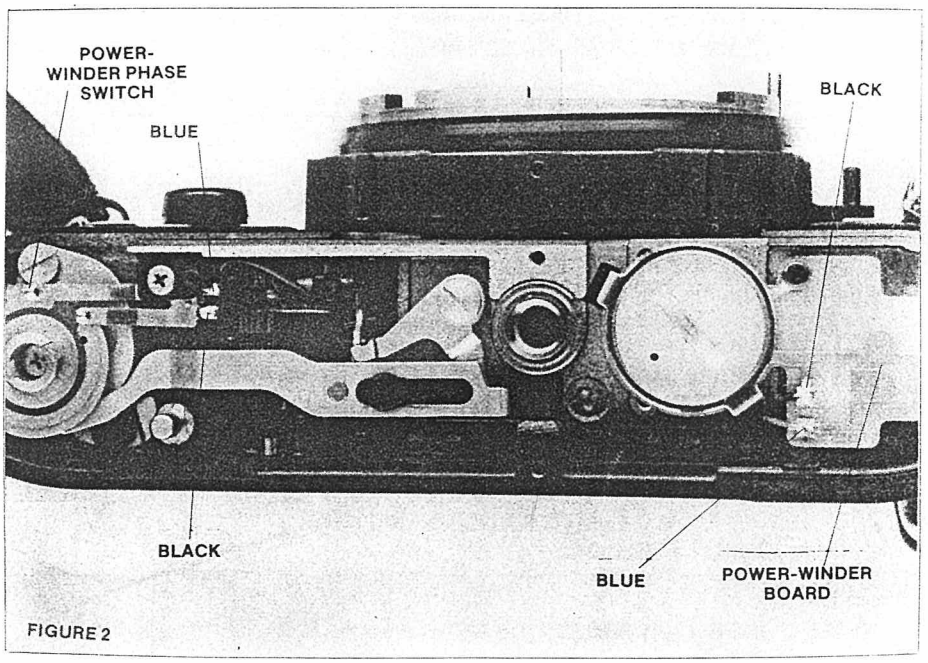

FIGURE 2

Flash speed and mechanical speed: 1/90
Initial tension, spring for aperture-coupling ring: 4 turns
X-sync delay: 0.3 - 1.0ms

Release overtravel: The mirror should release when you depress the release button 1.7mm; the release button should have a slight overtravel after the mirror releases. You can reach the eccentric — H in Fig. 4 — through a clearance hole in the front plate.

Memory switch: The memory switch should close slightly before the mirror starts to rise. To check, charge the mirror box and connect an ohmmeter between the two memory-switch contacts, Fig. 5. Hold the diaphragm-closing lever from the front of the mirror box. Then release the mirror box and allow the

diaphragm-closing lever to move down slowly. When the memory switch closes, there should still be a 1 - 1.4mm space gap between the mirror-lifting lever and the mirror tab, Fig. 5. Adjust with eccentric L.

Shutter release: The shutter should release when the mirror is 1 - 3mm from the porous-plastic light trap at the top of the mirror box. To check, hold the diaphragm-closing lever and allow the mirror to move up slowly. The adjustment (not shown) is the eccentric accessible through a front-plate clearance hole below the self-timer lever.

Continuous release (for power-winder operation): The mirror should release during continuous operation when the transport latch moves half way into the slot in the transport cam, Fig. 6 (visible with the main flex removed). To check, put finger pressure on the sprocket and hold the release button depressed. Then rotate the motor-drive coupler from the bottom of the camera while watching the transport latch. Adjust by shifting the position of the wind seat.

Release-button switch: The release-button switch should close, giving direct continuity between the two blades which connect to the shutter flex, Fig. 4, when the release button moves down 0.6 ± 0.1mm. With the camera assembled, check to see how far you have to depress the release button to turn on the meter. Reach the eccentric — G in Fig. 4 — through a front-plate clearance hole.

Overexposure/slow-speed warning: The piezo buzzer in the top cover should beep if the indicated shutter speed is faster than 1/1000 (needle just above "1000") or slower than 1/25 (needle half way between "30" and "15"). The adjustment — D in Fig. 1 — also affects the flash speed on auto.

Trigger switch: The eccentric provides a fast-speed (high-light-level) adjustment. Avoid disturbing the eccentric; there is no clearance hole in the front plate to provide access with the camera assembled.

Sprocket timing: The center of a sprocket tooth should be 27.6 ± 0.5mm from the lead edge of the aperture.

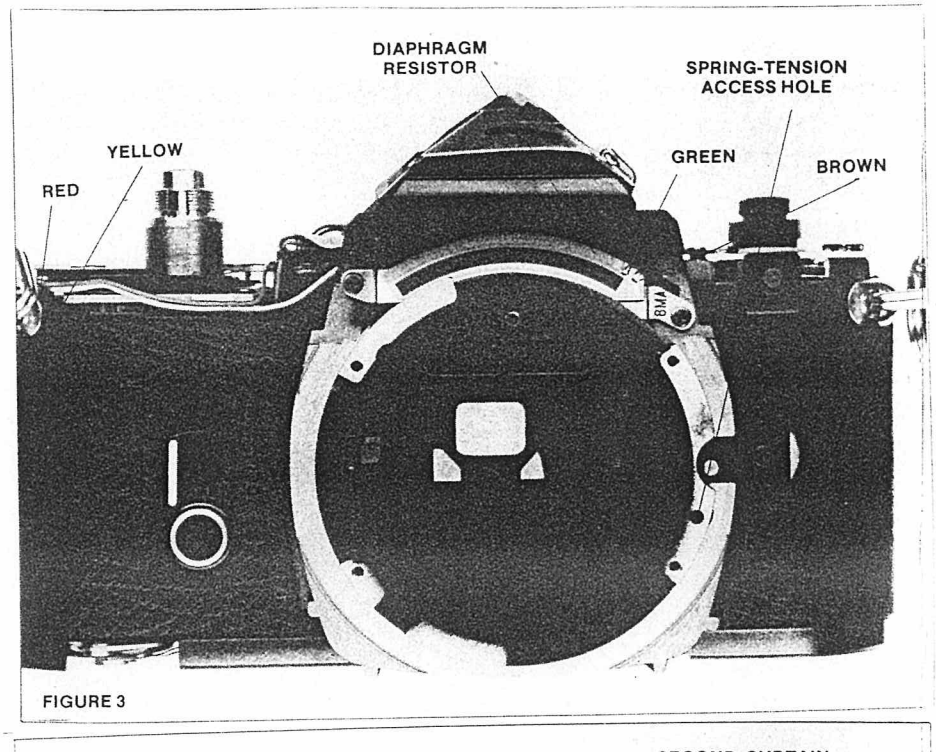

FIGURE 3

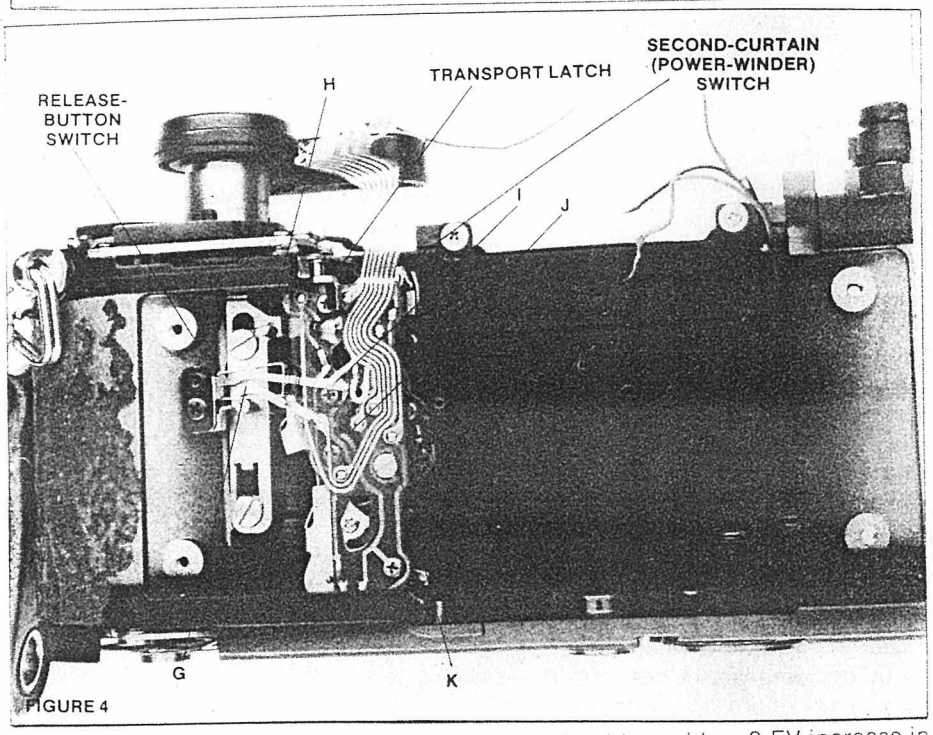

FIGURE 4

ADDITIONAL OPERATION TESTS:

Note: The counter dial must reach the "1" calibration and the mode selector must be at auto before the camera will work electronically. When the counter dial reaches "1," it closes the auto-manual (blank-shot) switch, Fig. 1, if the mode selector is at auto. To operate the camera with the back open, wedge in the back-sensing lever, Fig. 1, and advance the wind lever until the counter reaches "1."

1. The meter readout should remain on for 30 seconds after you let up the release button.
2. Pushing in the backlight button should provide a 2 EV increase in exposure.
3. Pushing in the battery-test button should light the top-cover LED if more than 2.25V is supplied to the battery box. The battery-test LED should not turn on with less than 2V supplied.
4. With the Nikon SB-E Speedlight installed, the auto speed should change to 1/90 and the red LED in the finder should glow. You can check the LED by injecting 0.5ma into the S1 terminal of the hot-shoe connector, Fig. 1 and Fig. 12. The voltage at pin 14 of the IC should go to 1.5V, and the LED

should glow. Changing the diaphragm setting and the film-speed setting affects the flash output.

ADJUSTMENT SEQUENCE:

1. Speeds ratio (resistor #1). Set EV 9, ASA 100. Check the exposure time on auto at the f/16 and f/2 settings. The exposure time at f/16 should be 64 times as slow as the exposure time at f/2. To increase the difference, turn the wiper clockwise.
2. Speeds level (resistor #2). Set EV 9, ASA 100, f/4. Adjust for a 0 EV error or for a shutter speed of 27 - 35ms.

Note: Alternately, you can use the ratio adjustment (B) for high light levels and the level adjustment for low light levels. Work back and forth between the two adjustments.

3. Flash speed (resistor #4). Adjust for an exposure time of 10.3 - 11.5ms with the flash unit installed. Alternately, inject 30μa (+5, -0) into the S1 hot-shoe contact, Fig. 1 and Fig. 12, to simulate the flash signal.
4. Meter readout (resistor #5). Set EV 9, f/4, ASA 100. Adjust for a meter reading of 1/30. Then check the meter readout at other light levels. If necessary, use the hair-spring adjustment (F) as a low-light adjustment and use the variable resistor as a high-light adjustment.
5. Flash voltage (resistor #3). Inject 20μa (+0.25, -0) into the S2 terminal of the hot-shoe connector, Fig. 1 and Fig. 12. Set ASA 100 and f/4. With the release button partially depressed, adjust A for a 1353mv reading at the S2 terminal. Changing the f/stop or the film speed should change the voltage reading.
6. Check the operation of the piezo buzzer. If the buzzer does not turn on at the proper times, adjust variable resistor D (#4). Then re-check the flash speed (step #3).

DISASSEMBLY HIGHLIGHTS:

Locations of left-hand threads; re-

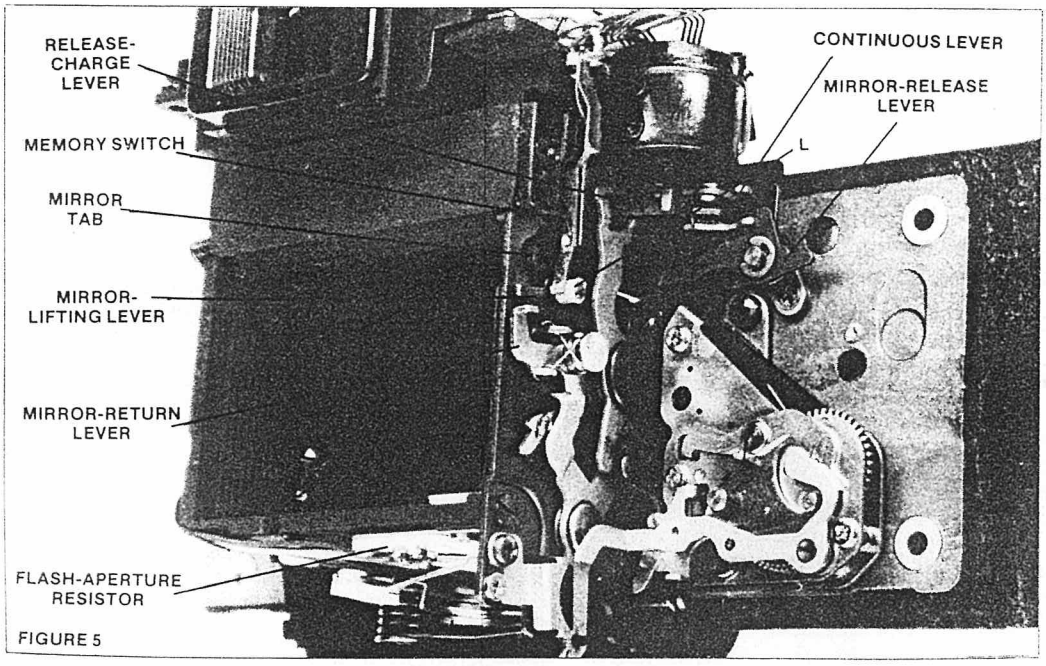

FIGURE 5

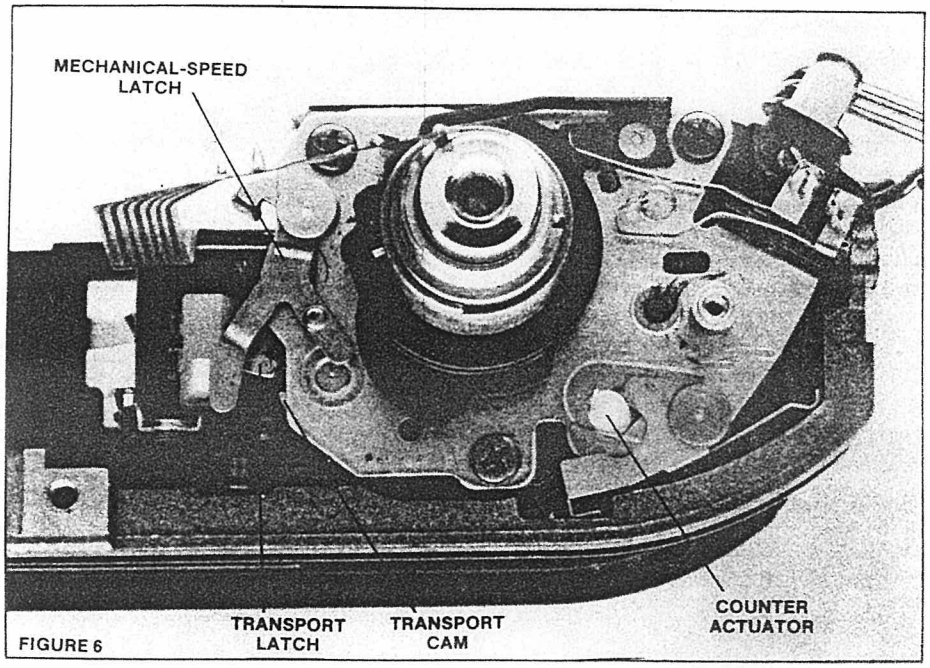

FIGURE 6

tainer holding wind lever; lower wind-shaft bushing

Control positions: unimportant

Precautions:

1. Avoid using strong solvents on plastic parts.
2. Avoid overtightening screws which go into plastic parts.
3. Avoid overtightening screws holding the film-speed board. Overtightening the screws will crack the ceramic board.
4. Remove the batteries before unsoldering wires from the main flex.
5. Use a grounded soldering iron.

Sequence:

1. bottom cover, back cover, top cover
2. pull loose piezo buzzer from top cover (or unsolder piezo wires from circuit board)
3. unsolder from top:
   - blue wire and green wire from flex connector

- red battery wire (connects to 2 lands)
- black wire that comes from power-winder board (connects to 2 lands)
- red wire and yellow wire from auto-manual switch, Fig. 3, or from flex

4. 2 screws holding flex connector, Fig. 1
5. unsolder flex-connector lands to separate 2 sections of flex (main flex from shutter flex)
6. 3 screws holding film-speed board
7. lift film-speed board from rewind-shaft housing (backlight switch loose)
8. 2 upper mirror-box screws, top of camera toward back (1 screw also holds support plate for flex connector)
9. remove rewind-side leatherette
10. peel back wind-side leatherette to uncover 2 screws
11. 4 front-plate screws
12. front-plate/mirror-box assembly

Reassembly highlights:
Cock the shutter and the mirror box before replacing the front-plate/mirror-box assembly.

Sequence to remove shutter:

1. install wind lever to hold tension on wind-lever spring
2. wind seat (3 screws)
3. unsolder connectors from release-button switch at shutter flex, Fig. 4
4. release-button switch (1 screw)
5. unsolder black wire and blue wire from power-winder phase switch, Fig. 2
6. peel loose tape holding battery and power-winder wires, rewind side
7. shutter-retaining screws (1 at back of aperture, 2 at top of shutter)
8. shutter (depress release slide and tilt shutter forward until it clears the body casting — then lift out shutter)

Reassembly highlights:

1. Depress the release slide as you seat the shutter. Also push the Delrin bulb lever from left to right so that the lug on the release slide fits under the bulb-lever pin.
2. The wind seat must be timed to the wind shaft. Before replacing the wind seat:

a. Position the power-winder phase switch so that its hole is on a line running parallel to the front and back of the body casting (the hole points to the center of the body.)

b. Rotate the sprocket until its clearance hole points to the back of the camera; turn the sprocket shaft until the screw is visible through the clearance hole. Push down the sprocket shaft so that the screw engages the groove inside the sprocket. Then rotate the sprocket to the timed position (center of tooth 27.6mm from lead edge of aperture).

c. Set the mode selector to the bulb position.

d. Position the counter actuator, Fig. 6, so that its cutout points toward the release button.

e. Make sure the end of the pawl spring is in the pawl notch, Fig. 8.

To install the wind seat:

a. Advance the wind lever until the transport latch passes into the slot in the transport cam, Fig. 8. Allow the wind lever to return until it's perpendicular to the camera body; hold the wind lever in position, against the pressure of the return spring.

b. Position the cutout in the release shaft, Fig. 8, over the body casting next to the release slide. The release-shaft tab then sits on top of the release slide after reassembly.

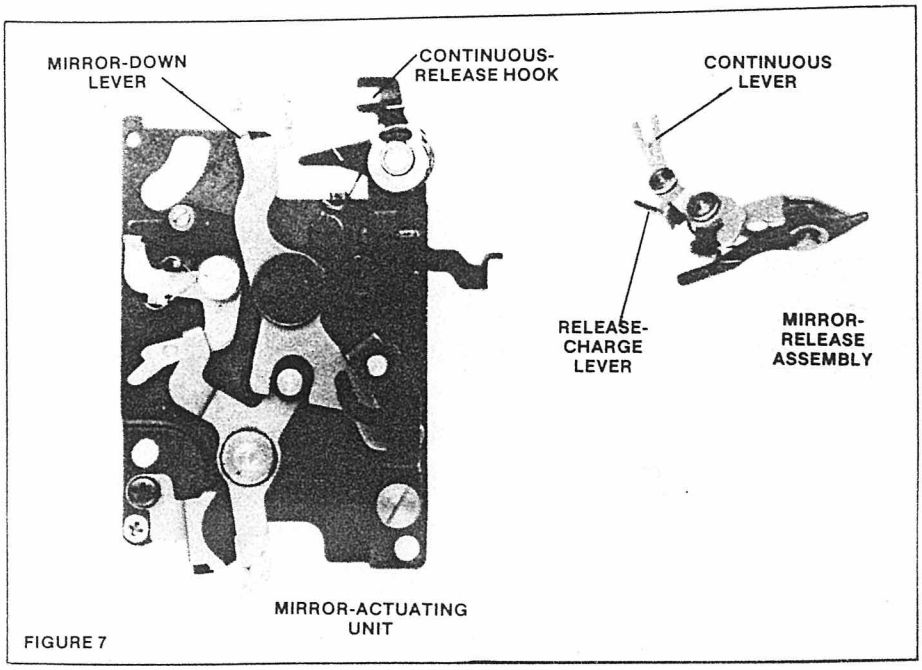

FIGURE 7

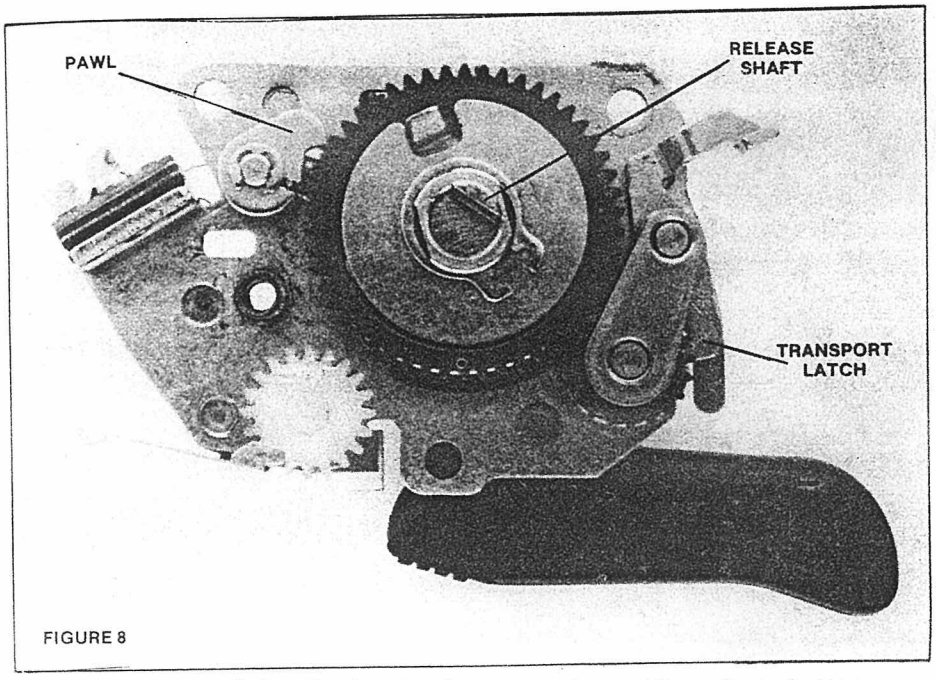

FIGURE 8

c. Seat the wind seat, making sure that the brass mechanical-speed lever passes to the wind-lever side of the Delrin bulb lever.

Sequence to reach diaphragm resistor (not necessary to remove mirror box):
1. lens-mounting ring (4 screws)
2. bayonet spring
3. aperture-coupling ring
4. front-cover plate (lens-release button loose)
5. aperture-brush ring

Reassembly highlights:
1. Seat the aperture-brush ring; turn the ring fully clockwise.
2. Lift the aperture-brush ring high enough to disengage it from the nylon pinion. Then, working through the access hole, Fig. 3, apply 4 turns of initial tension (counterclockwise) to the aperture-coupling spring (the spring is on the rewind side of the mirror box). Hold the spring tension as you reseat the aperture-brush ring.

Sequence to remove main flex (not necessary to remove mirror box):
1. unsolder wires from main flex and from film-speed board (the wires that come from the camera body)
2. unsolder flex-connector terminals and remove 2 flex-connector screws
3. unsolder connections to flash LED, Fig. 10
4. unsolder connections to memory switch, Fig. 10
5. prism springs
6. film-speed board (3 screws)
7. contact holding photodiode (reach screw through slot in hot-shoe contact, Fig. 1)
8. free section of main flex that mounts photodiode
9. main flex and film-speed board
10. pentaprism

Sequence to remove mirror-actuating unit from side of mirror box:
1. self-timer lever
2. self-timer mechanism (2 screws)
3. memory switch (1 screw)
4. mirror-release assembly, Fig. 5 (2 screws)
5. 3 screws holding mirror-actuating unit (1 screw in lower left-hand corner, Fig. 5, and 2 screws accessible through cut-outs in front-plate casting)
6. hold mirror-tensioning spring at bottom of mirror box and lift out mirror-actuating unit

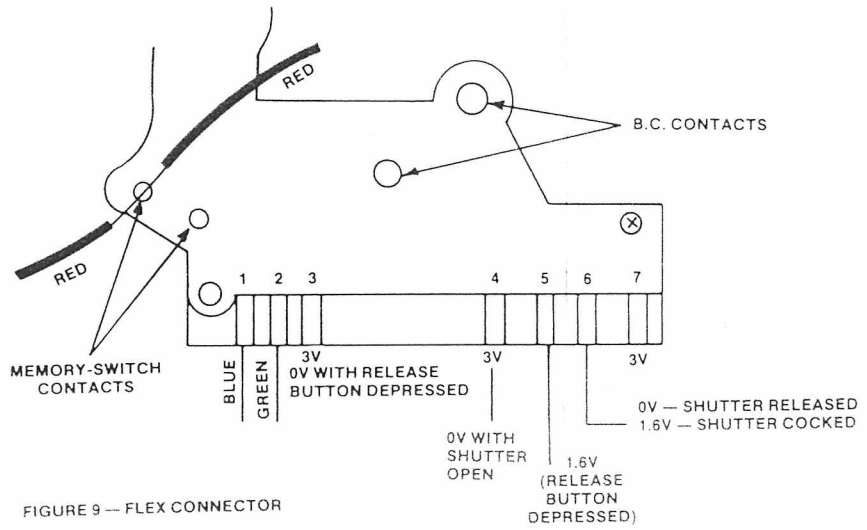

FIGURE 9 — FLEX CONNECTOR

Terminal 1 — second-curtain switch
Terminal 2 — X-sync contact
Terminal 3 — Release-button switch
Terminal 4 — Electromagnet
Terminal 5 — Trigger switch
Terminal 6 — Trigger switch
Terminal 7 — Electromagnet

Reassembly highlights:
1. Connect the mirror-tensioning spring to the hole in the mirror-tensioning lever as you seat the mirror-actuating unit.
2. To replace the mirror-release assembly, pass the end of the release-charge lever, Fig. 7, into the hole of the mirror-down lever. Also seat the forked end of the continuous lever over the forked end of the continuous-release hook, Fig. 7.

TROUBLESHOOTING:
Behavior without batteries: shutter delivers fastest speed only at auto, needle stays at top of scale

Typical current draw (3V supplied):
meter — 1.5 - 2ma
shutter open — 10 - 12ma
piezo buzzer — 2.6ma
battery test — 28ma

Positions and functions of switches:
1. Auto-manual switch: Controlled by mode selector and by counter dial, Fig. 1. Closes at the auto setting when the counter dial has reached the "1" position to connect the control circuit to positive battery. Opens at M90 (mechanical 1/90) and bulb; also opens when the counter dial returns to the start position.
2. Backlight switch: Front of camera, under film-speed board, Fig. 1. Pushing in the backlight button shorts across a resistor on the film-speed board to provide an intentional overexposure.
3. Battery-test switch: In top cover. Pushing the battery-test button engages the two B.C. contacts on the main flex, Fig. 9, to turn on the top-cover LED.
4. Release-button switch: Front of body casting, controlled by the release slide, Fig. 4. Closes when you push the release button half way to turn on the meter readout and the buzzer warning.
5. Memory switch: Side of mirror box, Fig. 5. Closes just before the mirror starts to rise to provide power to the electromagnet and to memorize the exposure.
6. Trigger (timing) switch: In shutter, Fig. 4. Opens as the first curtain starts to move, beginning the timing cycle.
7. Second-curtain switch: In shutter, Fig. 4. Closes with the shutter in the released position, providing direct contact between the black wire and the blue wire at the power-winder board, Fig. 2.
8. Power-winder phase switch: At the bottom of the camera, Fig. 2. Maintains direct continuity

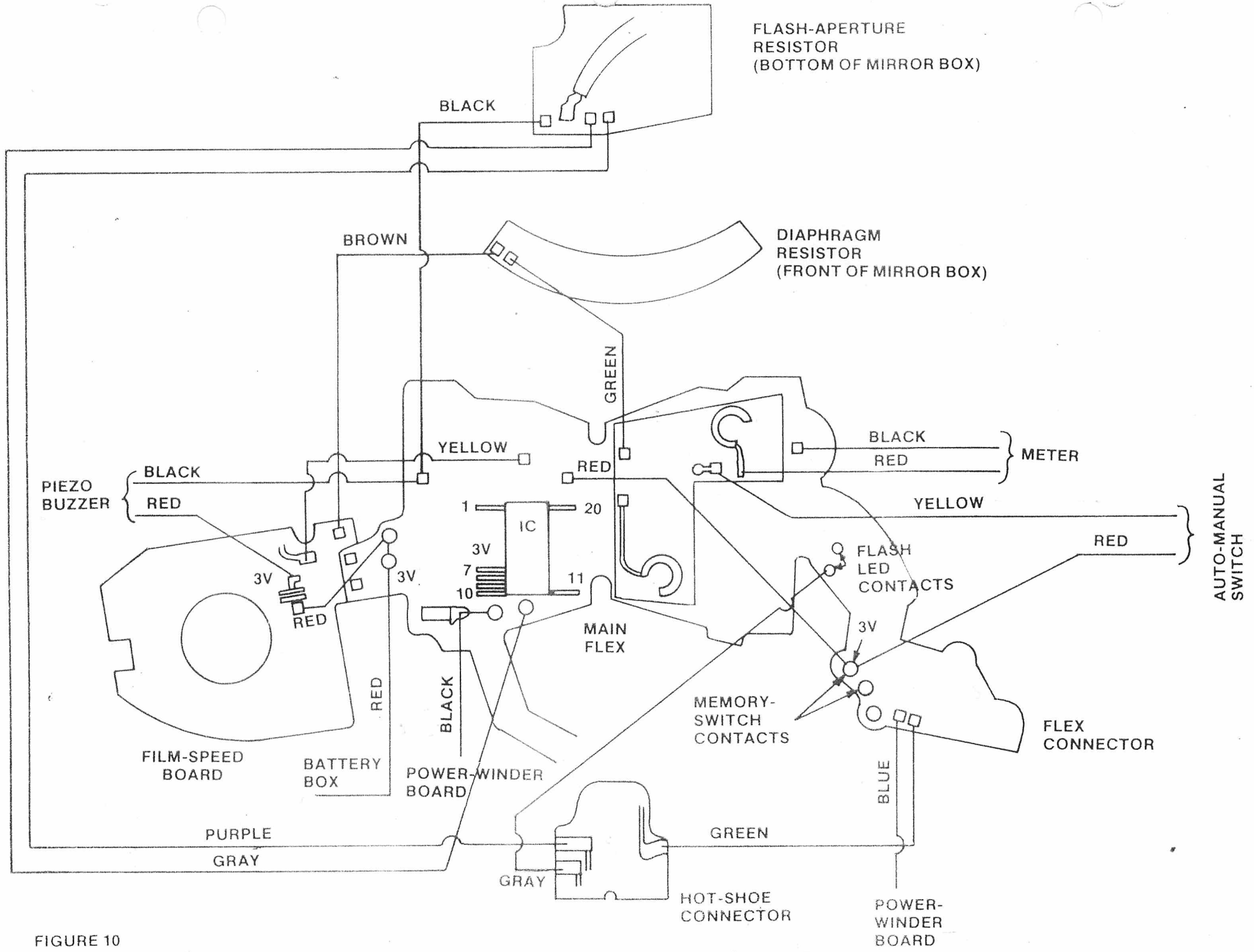
FLASH-APERTURE
RESISTOR
(BOTTOM OF MIRROR BOX)
BLACK
BROWN
DIAPHRAGM
RESISTOR
(FRONT OF MIRROR BOX)
GREEN
YELLOW
RED
BLACK
RED
METER
PIEZO
BUZZER
BLACK
RED
1
20
IC
3V
7
10
11
3V
3V
RED
YELLOW
RED
AUTO-MANUAL
SWITCH
FLASH
LED
CONTACTS
3V
MAIN
FLEX
MEMORY-
SWITCH
CONTACTS
FLEX
CONNECTOR
FILM-SPEED
BOARD
BATTERY
BOX
RED
BLACK
POWER-WINDER
BOARD
BLUE
PURPLE
GRAY
GREEN
GRAY
HOT-SHOE
CONNECTOR
POWER-
WINDER
BOARD

FIGURE 10

between the power-winder terminals during the cocking stroke. With the shutter fully cocked, the rear contact should be off the contact path.

Troubleshooting steps for specific problems:

1. Shutter delivers fastest speed only, meter stays at top of scale
   Batteries
   Battery box or wires
   Check for +3V between ground and the red wire at the flex, Fig. 10. No voltage — battery box or wiring.
   Battery voltage to IC
   You should measure the battery voltage at pin 7, Fig. 11, even if the auto-manual switch is open. No voltage — check red-wire solder connections and ground connections.
   Auto-manual switch
   Check for 3V at the red wire to the auto-manual switch, Fig. 1. No voltage — check the red-wire solder connections. At the auto setting and with the counter dial at the "1" position, you should also get 3V at the yellow wire of the auto-manual switch. No voltage — poor contact or auto-manual switch not closing.

2. No meter readout or buzzer, shutter operates
   Release-button switch, not closing
   Check with an ohmmeter between terminal 3 of the flex connector, Fig. 9, and ground; you should get direct continuity with the release button pushed half way. Alternately, short between terminal 3 and ground. If your short turns on the meter, the release-button switch is the problem.

3. Shutter delivers fastest speed only at auto, meter works
   Memory switch
   Check for 3V at the memory-switch connection that has the red wire, Fig. 10. Then hold open the shutter on bulb. You should now measure 3V at the second memory-switch land. No voltage with shutter open — memory switch not closing.
   Electromagnet
   Check the coil between terminals 4 and 7 of the flex connector, Fig. 9. Approximate coil resistance — 320 ohms. Alternately, short terminal 4 to ground and release the shutter. If the electromagnet is o.k., the shutter will stay open for as long as you maintain the short.
   IC
   Check the voltage at pin 19, Fig. 11. The voltage should drop from 3V to 0V when you release the shutter.
   Trigger switch, poor contact
   Check between terminals 5 and 6 of the flex connector, Fig. 9. You should get direct contact with the shutter cocked, no contact with the shutter released.

4. Shutter delivers only fastest speed, needle stays at top of scale, piezo beeps
   Film-speed resistor, poor contact
   Short between the two contacts shown in Fig. 1 of the film-speed resistor. If the needle then moves downscale, clean the film-speed resistor and improve the brush contact.
   Diaphragm resistor, poor contact
   Check the resistance between the brown wire (film-speed board) and the green wire (variable-resistor board). Approximate resistance range as the aperture-coupling ring rotates counter-clockwise (one wire disconnected): 7.5K - 390 ohms.

5. Shutter hangs open, needle pegs to bottom, piezo beeps
   Poor solder, wires from flash-aperture resistor
   Check the gray wire and the orange wire from the flash-aperture resistor, Fig. 10
   Flash-aperture resistor, poor contact

6. Shutter hangs open, meter works
   Trigger switch, not opening or shorted
   Check between terminals 5 and 6 of the flex connector, Fig. 9. You should get direct continuity with the shutter cocked, no continuity with the shutter released.

7. Camera always draws current
   Memory switch, constantly closed or shorted (current draw around 1.6ma with shutter released and over 10ma with shutter cocked)
   Check between the two memory-switch contacts, Fig. 10. You should get no continuity until the mirror starts to rise.
   Release-button switch, constantly closed (current draw normal)
   Check between terminal 3 of the flex connector and ground. You should get no continuity until you depress the release button.

8. Improper operation with power winder (power winder does not advance, skips, continues running, jams, or causes overlapping frames)
   Second-curtain switch
   Check between the two power-winder terminals, Fig. 2, with an ohmmeter. You should get direct contact with the shutter released and no contact with the shutter cocked.
   Power-winder phase switch
   Clean the conductor of the power-winder phase switch, Fig. 2, and improve the brush contact.
   Mirror-actuating unit
   Check for a bent or broken release hook, Fig. 7. If damaged, replace the complete mirror-actuating unit #FA2.301 (individual parts not available).

9. Improper operation with dedicated flash unit
   Poor contact between hot-shoe connector, Fig. 1, and hot shoe
   Flash-aperture resistor, poor contact or wires
   Check by meauring the voltage to terminal S2, Fig. 1, while injecting 20µa into S2, Fig. 12. The voltage should change as you change the diaphragm setting.

OTHER COMMENTS:

1. The product number for parts orders is 23FB.
2. Early versions of the EM (the first 2000) have three wires going to piezo buzzer.
3. You can remove the focusing screen from inside the mirror box for cleaning. Take out the screw at the top front of the mirror box.
4. The Seiko shutter is only supplied as a complete unit. However, most parts will interchange with those in other Seiko focal-plane shutters.
5. Except for the IC (#104), circuit components are not available individually. A replacement main flex (FPC — A18) comes complete with all components including the silicon photodiode. The film-speed board is separate.
6. The film-speed board comes in two types. Identify the type by the

"A" or "B" in the corner, Fig. 1 (ASA base plate — A14A or A14B). Also match a replacement diaphragm resistor (f-fo base plate — B13A or B13B) to the type of film-speed board.

7. The brushes for the power-winder phase switch (MD contact — A15) have been revised to improve contact. The new-style brushes have multiple contacts.
8. The battery box part number is "battery chamber — 23FB A11."
9. If the aperture-coupling ring does not return under spring tension, the spring may be slipping on the nylon shaft (rewind side of mirror box). Apply super glue to the end of the spring to prevent slipping. It's not necessary to remove the mirror box; you can reach the spring from the front after taking out the aperture-brush ring.
10. In the most recent cameras, a set-screw locks the retainer for the wind lever. If the wind-lever retainer works loose, clean its threads and apply some cement.
11. The self-timer-lever screw has a locking agent on the threads. You can soften the locking agent by heating the screw.

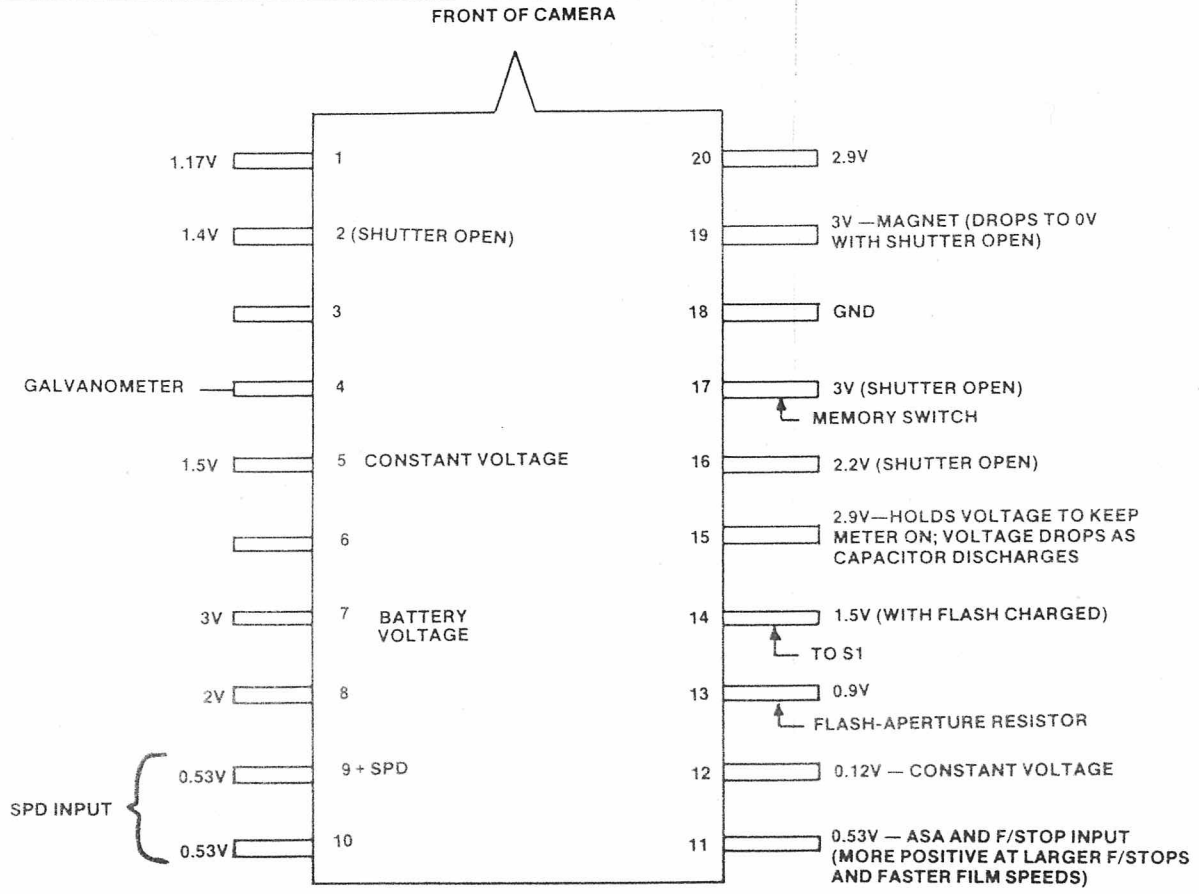

FIGURE 11 — IC pin voltages at ASA 100, f/5.6, auto — release button partially depressed, auto-manual switch on.

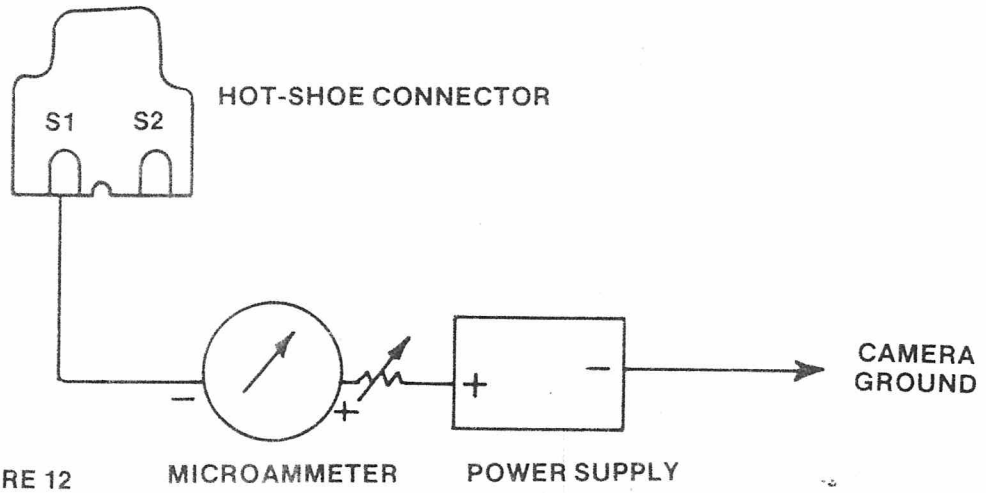

FIGURE 12

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The lowest cost test system available for testing exposure error and shutter speed for all cameras including those with automatic exposure controls. The CE360 still maintains the system compatibility and versatility of all the Spectron Instrument Photo Test Systems even at its low price: CE360 $500. CE360 Package (with light source and sensors for 35mm, 6x6, and Super 8) $1,095.

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This economical, complete test system combines our powerful and versatile CE240 Digital Shutter Tester with our CE360 Exposure (EE) Tester plus T-Stop Measurement. The Duplex offers greater versatility, faster operation, and more useful test functions than more expensive competing systems. It is probably the best value available. The Duplex Package for 35mm horizontal & vertical formats, 6x6, and Super 8, including light source, is $2,895.

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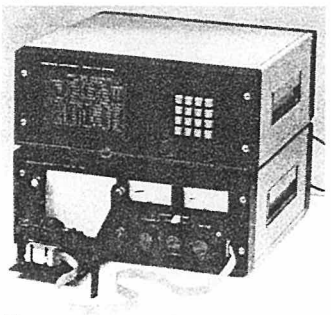
CE400/CE260 AEC—DIGITAL SYSTEM



This combination system with our large color corrected Precision Luminance Standard offers the most complete diagnostics available. Simultaneous multiple tests on nearly all camera formats gives far more efficient testing than any competitive equipment. Our sensor and luminance source designs insure superior accuracy. And yet, compared to the multiple competitive instruments required to perform most of these functions, we deliver this higher performance at lower cost. The CE260 is $3,295. The CE260 AEC Test System with CE378 Light Programmer for automatic light level selection, CE240 Digital Shutter Tester and a long list of sensors and adapters is $5,795.

OUR COMPUTERIZED SYSTEM EVEN PRINTS RESULTS

CE400/CE260 COMPUTERIZED CAMERA TEST SYSTEM



The most sophisticated and versatile camera test system ever offered, our Computerized Test System is practical for progressive repair and test facilities. Peripheral devices such as the printer, are operated by the CE400—Complete printed records of all tests can be done automatically. The system provides analysis and record keeping capabilities otherwise unavailable. The CE400 can be added to your existing CE260 AEC Tester or we can supply the complete system. Please contact us for details.

PENTAX ES, ESII

Similar models: Spotmatic (mechanically similar)

Battery: ES — 1 ea. 6V PX28 or 544; ESII — 4 ea. 1.5V S76. Positive ground.

Fig. 1 — top cover removed, ESII

Fig. 2 — bottom cover removed, ESII (type 3 circuit board)

Fig. 3 — bottom cover removed, ES (type 2 circuit board)

Fig. 4 — type 1 circuit board

Fig. 5 — ESII MD circuit board

Fig. 6 — bottom view, circuit board and tripod socket removed, ESII

Fig. 7 — front plate removed, ESII

Fig. 8 — rear view, ESII

Fig. 9 — needle position for battery-test adjustment

Fig. 10 — wiring, circuit-board connector and memory block, ESII

Fig. 11 — wiring, wind-side components, ESII

Fig. 12 — wiring, rewind-side components, ESII

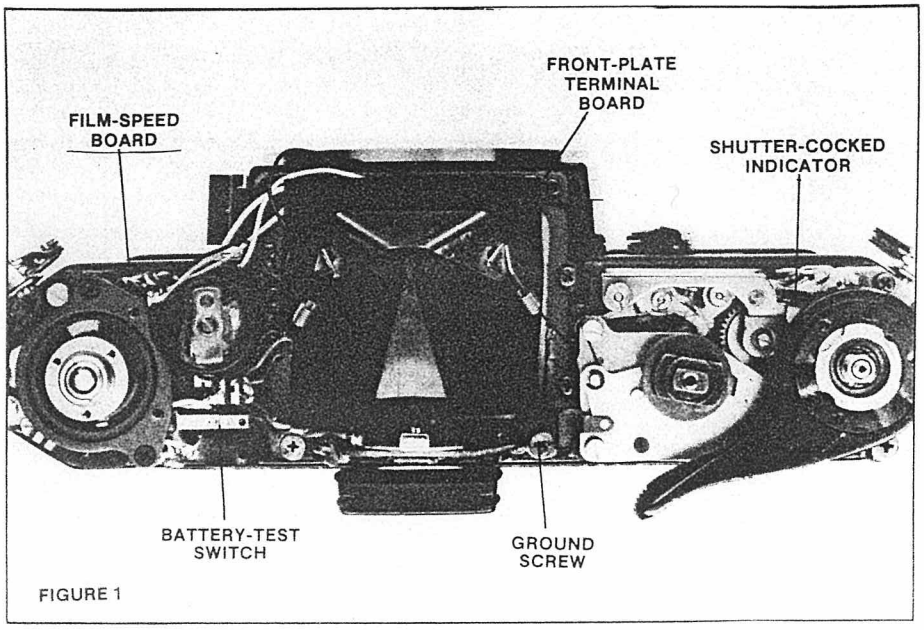


FIGURE 1

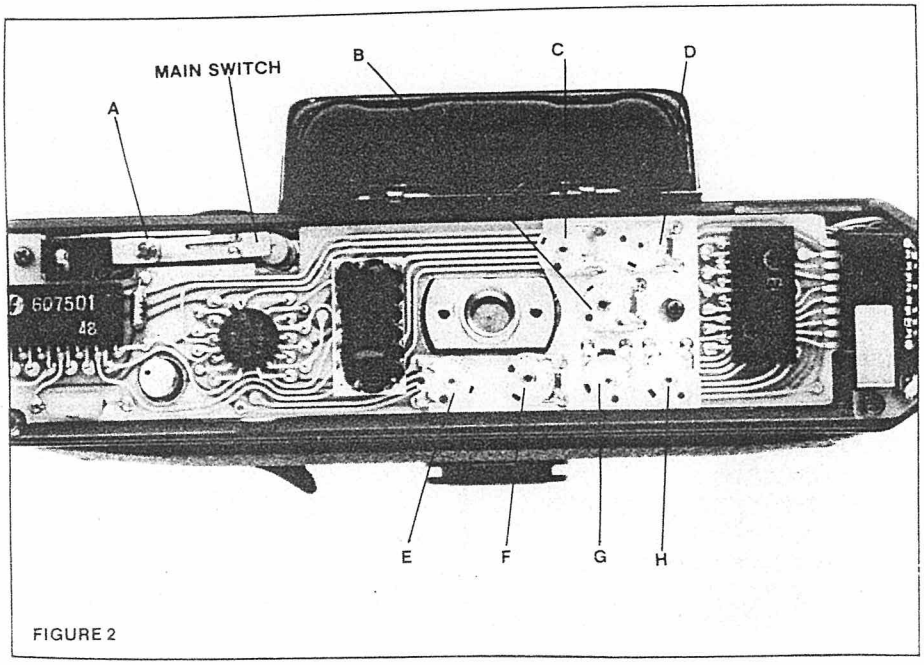


FIGURE 2

ADJUSTMENT POSITIONS:

Main switch	A
Meter readout, 1/1000 second (high light)	B
Fine adj., auto speeds	C
Coarse adj., auto speeds	D
High speed, auto	E
Matching, stopped-down to full-open	F
Meter readout, 1/4 second (low light)	G
Battery test	H
Travel time, second curtain	I
Travel time, first curtain	J
Timing switch (fast speeds)	K
Magnet (fast speeds, linearity)	L
Mechanical 1/1000	M
Release overtravel	N
Self-timer overtravel	O
Brake, first curtain	P
Cocking overtravel	Q
Normally not necessary to disturb:	K and L

ADJUSTMENT VALUES:

Curtain-travel time: 11.5ms (32mm distance)

Flange-focal distance: 45.46mm (flange to film-guide rails)

Memory switch: 1-2mm space gap between the long contact of the memory switch and the insulated post that opens the memory switch, Fig. 6. The memory switch should be closed with the mirror down; it should be open with the mirror up.

Magnet switch: Adjust for a slight space gap, Fig. 6, with the mirror down. The magnet switch closes as the mirror starts to rise. Current flows through the electromagnet when the magnet switch closes. The ES does not have the magnet switch; current flows through the electromagnet as soon as the main switch closes.

Main (power) switch: 0.5mm space gap between the contacts, Fig. 2.

ADJUSTMENT SEQUENCE:

Note: Before adjusting the auto speeds, clean the surfaces of the electromagnet and the armature, Fig. 7. If this interface is sticking, the shutter will overexpose at high light levels or be erratic.

1. Set the curtain-travel times at the mechanical 1/1000 setting.

2. Check the mechanical speeds. Use setscrew M, Fig. 7, to adjust the mechanical 1/1000. Turning in the setscrew provides a faster shutter speed. Relock the adjustment with lacquer.

3. Meter and auto speeds:

Note: Ideally, you should check the auto exposures with two different voltages applied to the battery compartment — 5.7V and 4.4V. The exposures at the two different voltages should match. Also check the exposures both with your finger covering the eyelens and with the eyepiece blinds closed (ESII only). The exposures in both auto positions of the speed knob should match.

a. Set ASA 100, f/8, auto., full-aperture metering.
b. Check the auto exposure at EV 8. In the ESII, Fig. 2, adjust D (coarse) for a 0 EV error or for an exposure time of 1/4 second. Caution: With the type 3 board, Fig. 2, avoid turning the wipers of the variable resistors to the limits of their movements; doing so could damage the variable resistors. If necessary, you can use C to fine-tune the exposure time. On the earlier boards, adjustment D is a fixed resistor, Fig. 3. Use C to adjust the exposure at EV 8. If C does not bring in the 1/4 second, you can make the coarse adjustment by changing fixed resistors. The

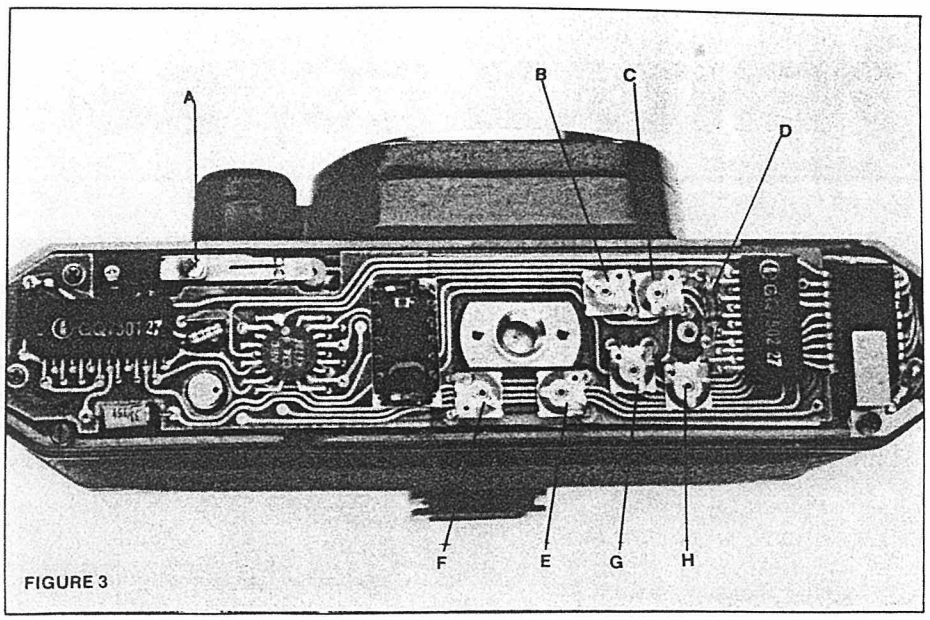


FIGURE 3

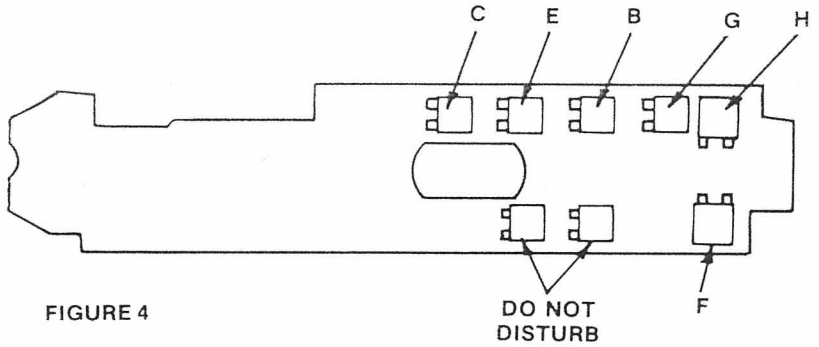


FIGURE 4

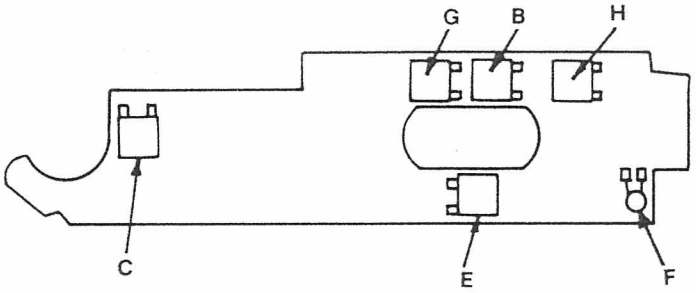


FIGURE 5

fixed resistors have color codes and part numbers as follows:

23111	- 0-T0001-A	none
	- 0-T0001-B	red
	- 0-T0001-C	yellow
	- 0-T0001-D	blue
	- 0-T0001-E	black
	- 0-T0001-F	brown

Reading down the chart, each fixed resistor provides a faster shutter speed of approximately 1 stop. For example, the yellow resistor provides a 1-stop faster exposure time than the red resistor.

c. Check the auto exposure at EV12 and EV 16. Use E at EV 16 to adjust for an exposure time of 1/1000.

d. Adjust G at EV 8 so that the meter reads 1/4 second.

e. Adjust B at EV 16 so that the meter reads 1/1000. Work back and forth between B and G until the meter reads accurately at both light levels.

f. Adjust F so that the meter readout on stop-down metering matches the meter readout on full-aperture metering.

g. Apply 4.4V to the battery compartment. Adjust H so that the needle moves to the position shown in Fig. 9 with the battery-test switch closed.

In most cases, you should not have to make the timing-switch adjustment or the magnet adjustment. Both are only critical at the auto speeds faster than 1/125. If you can't bring in the fast auto speeds, first check the CdS cells. Then you may have to adjust the magnet and the timing switch. If you replace the magnet or the timing switch, set the initial position as follows:

a. Magnet. With the shutter released, set the initial position of the magnet to provide a 0.02mm space gap between the pin of the armature, Fig. 7, and the edge of the second-curtain holding lever (the lever that holds the second-curtain wind gear for electronic speeds). Since it's difficult to see the space gap, you can watch the armature pin as you adjust the setscrew (adjustment L). Turn in the setscrew until you just see the armature pin move. You now know that the armature pin is against the second-curtain holding lever. Then back out the setscrew slightly to provide the space gap. Check to see that the magnet will hold the second curtain by applying 4V across the coil (brown wire and ground). Release the shutter. The shutter should stay open; if not, the space gap is excessive.

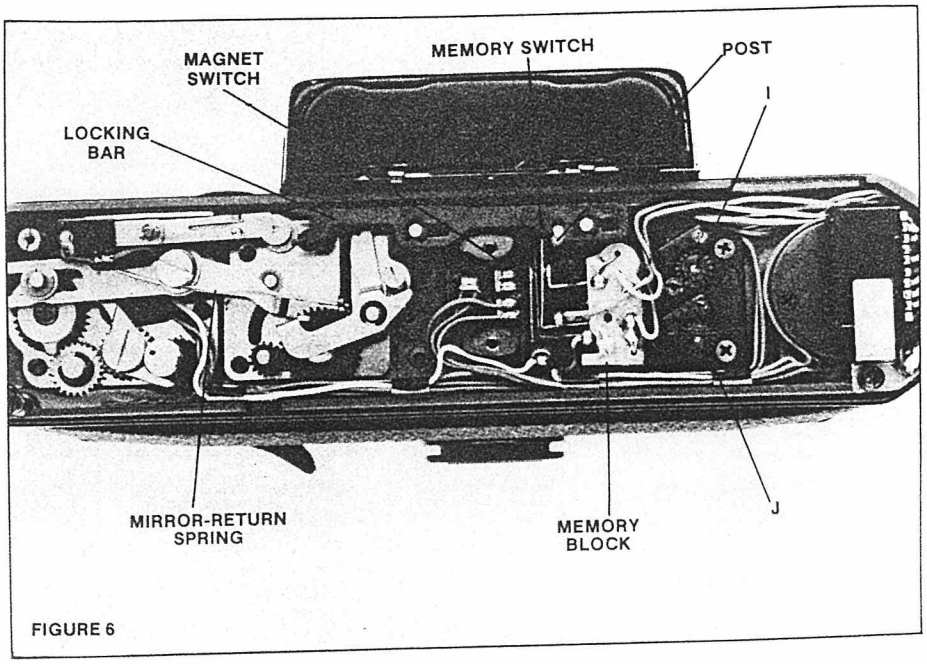


FIGURE 6

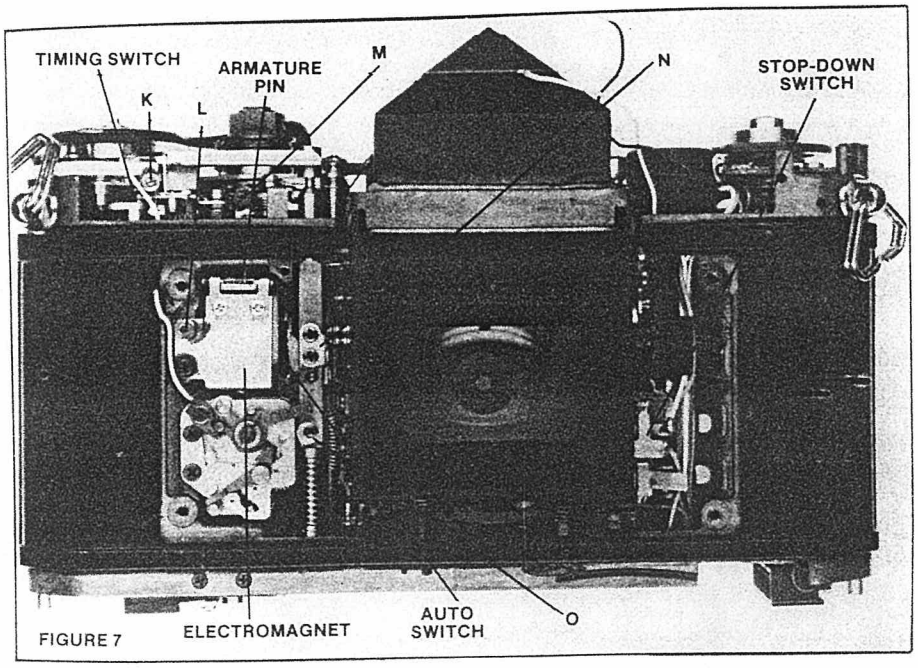


FIGURE 7

b. Timing switch. Cock the shutter to close the timing switch. Then connect an ohmmeter across the timing switch — between the pink wire and ground, Fig. 7. (The ES has a red wire going to the ground connection.) Turn out the setscrew to break continuity. Then turn in the setscrew until you just get continuity. From the point of continuity, turn in the setscrew an additional 1/8 turn.

Make the final adjustments to correct the fast speeds. Adjust the magnet first for linearity. That is, the exposure time at EV 16 should be 1/2 the exposure time at EV 15, and the exposure time at EV 15 should be 1/2 the exposure time at EV 14. You must remove the front plate to adjust the magnet and replace the front plate to check the adjustment. Then use the timing-switch adjustment to correct

the accuracy of the fast auto speeds.

DISASSEMBLY HIGHLIGHTS:

Locations of left-hand threads: screw holding counter dial, retaining ring holding plate under counter dial.

Control positions: unimportant

Sequence:

1. top cover and bottom cover
2. circuit board (remove 3 screws, hold connector to prevent damage as you unplug the circuit board)
3. tripod socket

Note: If you're working on other parts of the camera with the circuit board installed, temporarily replace the bottom cover for protection.

4. front leatherette
5. unsolder yellow wire and black wire from front-plate terminal board (ESII) — only the yellow wire in the ES
6. front plate (4 screws — locking bushings under screws loose) — self-timer coupler loose
7. unsolder red wire and black wire from battery box (ES only)
8. unsolder red and black galvanometer wires from film-speed board
9. unsolder green wire and gray wire from photocell board — free wires from wire clamp
10. pentaprism assembly (4 screws holding prism seat)
11. locking bar at bottom of camera, Fig. 6 (2 E-rings)
12. unscrew support posts for locking bar (lower mirror-box retaining screws)
13. main switch (2 screws, front of camera — do not unsolder wire)
14. insulator that closes main switch
15. mirror-return spring, Fig. 6
16. separate mirror box from body casting
17. unsolder wires from stop-down switch and sync contacts

REASSSEMBLY PRECAUTIONS:

1. Note the routing of the wires to the stop-down switch and sync contacts, Fig. 7. Wire routing is critical.
2. Be sure you do not reverse the positions of the two lower mirror-box screws (support posts for the locking bar). Reversing the screws could damage the mirror housing or the body casting. The screw with the groove around the outer circumference goes on the wind-lever side.
3. If you replace the timing switch, do not overtighten the retaining screws. Overtightening the screws could crack the ceramic block.
4. Make sure all other ground screws are tight. If you tighten the ground screw on the eyelens frame, Fig. 1, retouch the solder connection between the ground tab and the photocell board. Tightening the screw may pull loose the solder.

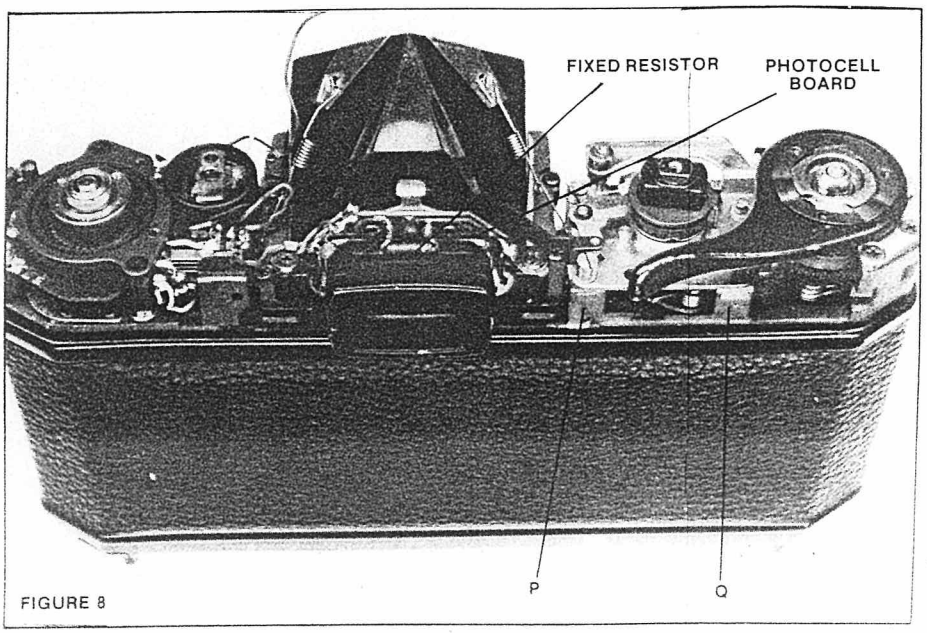


FIGURE 8

TROUBLESHOOTING:

Behavior without batteries: shutter delivers fast speed only (over 1/1000) on auto, needle stays at top of scale; mechanical speeds 1/1000 - 1/60 o.k.

Behavior without lens: shutter stays open on auto, needle pegs to bottom of scale (full-open metering); rotate the diaphragm-metering (AV) ring clockwise or set a mechanical speed to close the shutter.

Typical current draw, shutter open on auto (lens removed), 6V or camera batteries: 32ma

Typical resistance of CdS cells in series, EV 15, lens-mounting ring held against light source (measured across fixed resistor on photocell board): 3K

Note: Electronic malfunctions may be the results of a defective circuit board T-100, poor contact in the

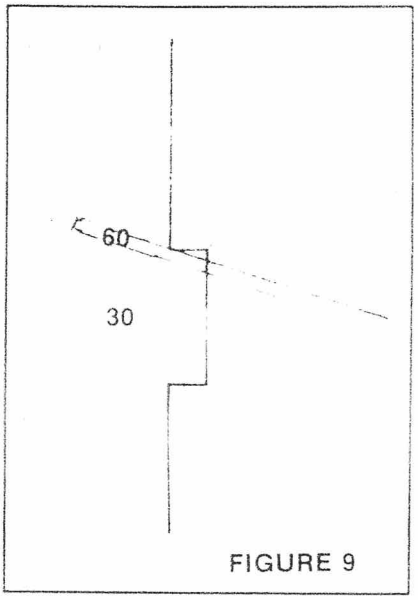


FIGURE 9

circuit-board connector, poor solder connections to the circuit-board connector, or loose ground screws. If you replace the circuit board, specify the type 3 board. The type 3 board provides greater latitude in adjustments. Also be sure to check the operation in both the full-open and stopped-down modes; if the camera works in the stopped-down mode, but not in the full-open mode, suspect the diaphragm resistor or the stop-down switch.

Troubleshooting steps for specific malfunctions:

1. Shutter stays open, meter o.k.

   Timing switch, shorted to ground Check with an ohmmeter between ground and the pink wire to

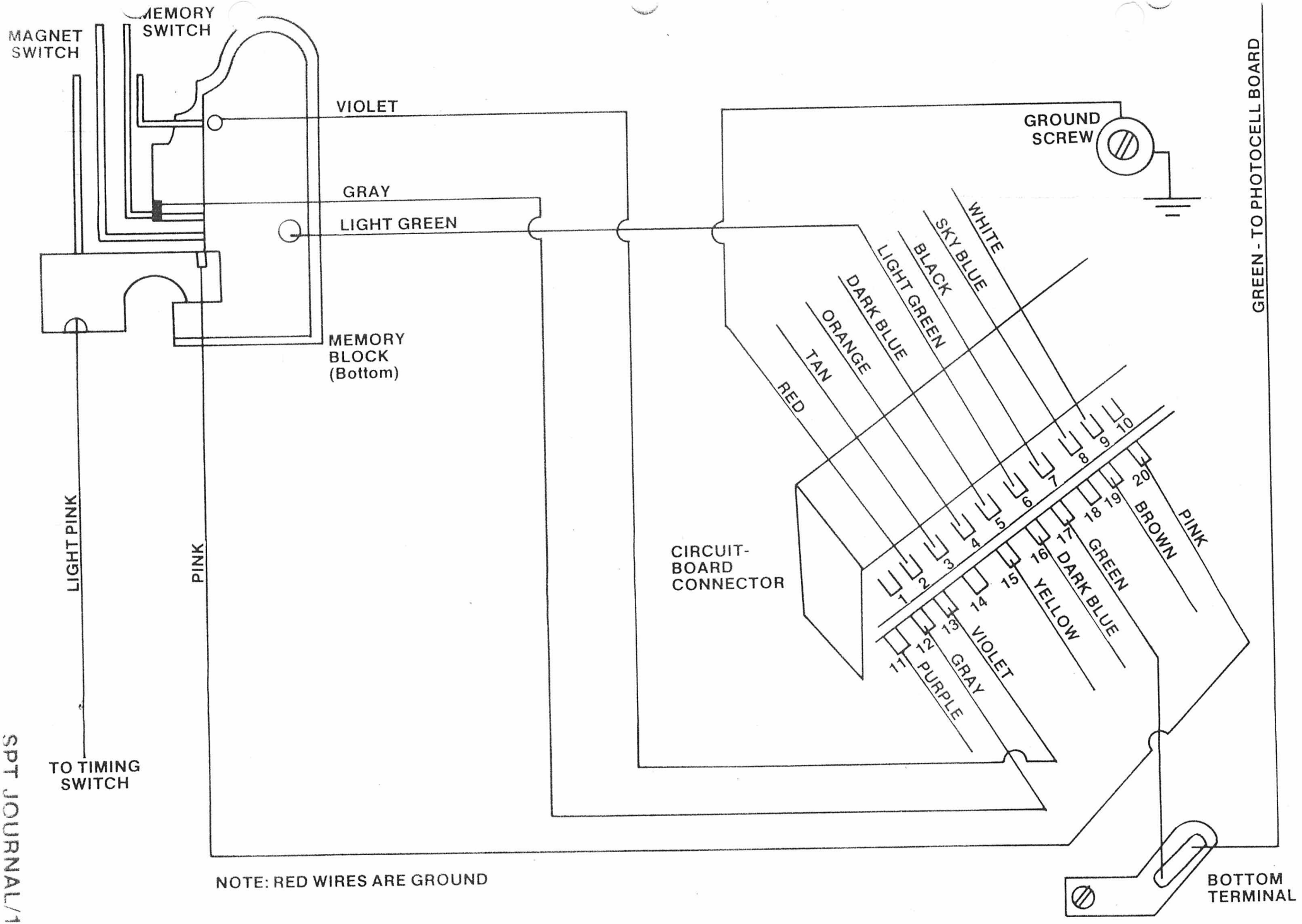

MAGNET SWITCH
MEMORY SWITCH
VIOLET
GRAY
LIGHT GREEN
MEMORY BLOCK (Bottom)
LIGHT PINK
PINK
TO TIMING SWITCH
GROUND SCREW
GREEN - TO PHOTOCELL BOARD
CIRCUIT-BOARD CONNECTOR
RED
TAN
ORANGE
DARK BLUE
LIGHT GREEN
BLACK
SKY BLUE
WHITE
PINK
BROWN
GREEN
DARK BLUE
YELLOW
VIOLET
GRAY
PURPLE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
BOTTOM TERMINAL
NOTE: RED WIRES ARE GROUND

FIGURE 10

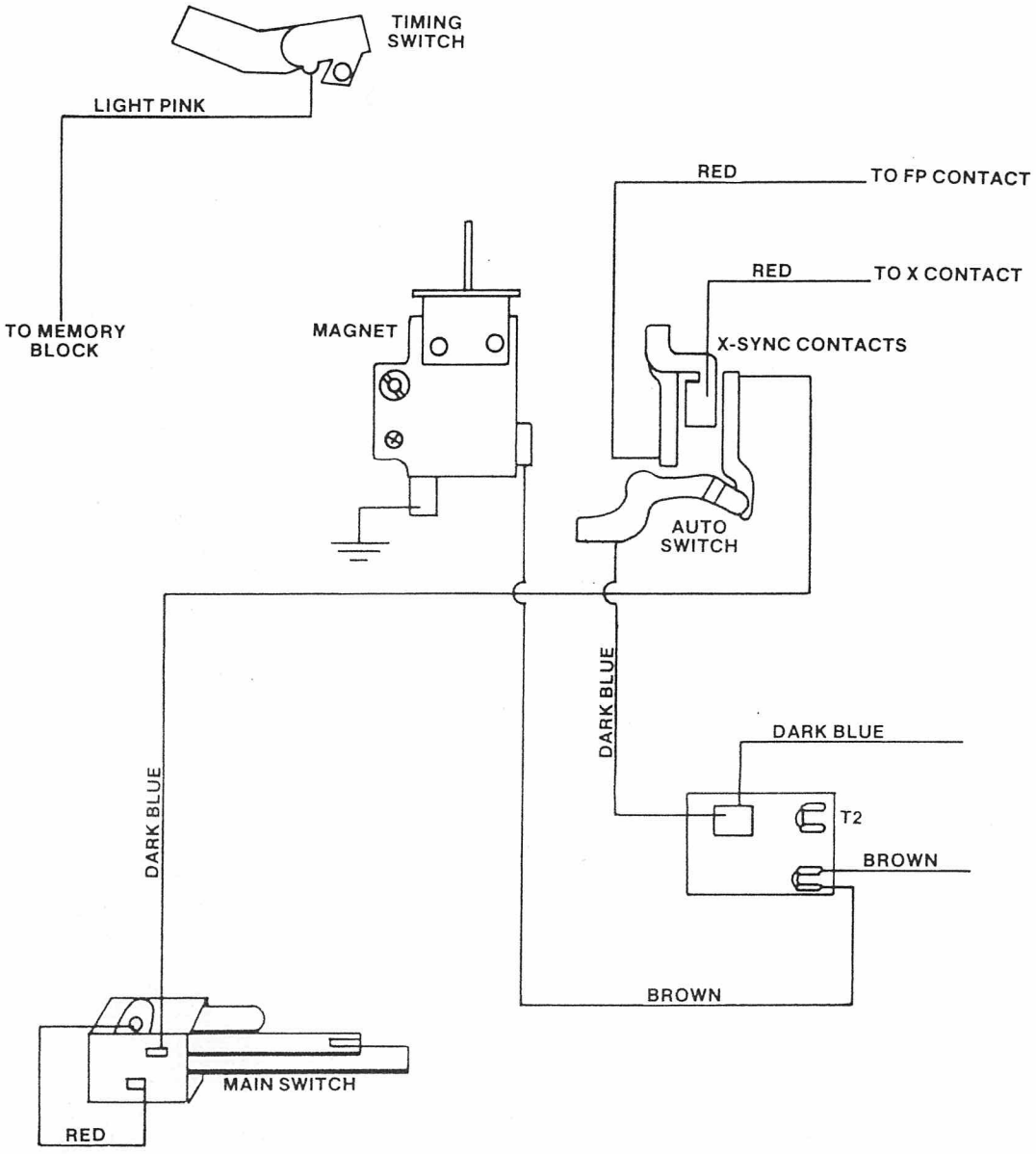


FIGURE 11 NUMBERS SHOW CONNECTIONS TO CIRCUIT-BOARD CONNECTOR

the timing switch, Fig. 7. You should get direct continuity with the shutter cocked, no continuity with the shutter released. If you get a constant ground at the pink wire, check the shutter-cocked indicator, Fig. 1. Make sure the shutter-cocked indicator does not touch the timing switch or the top cover.

Memory switch, poor contact

Memory block cracked or poor solder connections

2. Shutter stays open, meter needle pegs to bottom of scale

Film-speed resistor, shorted

Check the resistance between ground and the yellow wire at the film-speed board. Approximate resistance values: wiper fully clockwise — 6.8K; wiper fully counterclockwise — 2.6K.

Diaphragm resistor, shorted (if the meter works on the stop-down function)
Check the resistance between the white wire at the front-plate terminal board and ground. Approximate resistance values: f/1.4 — 7.5K; f/8 — 89.2K; f/16 — 312K.

Stop-down switch
Check for direct continuity between the violet wire and the yellow wire at the stop-down switch, Fig. 7, in the full-aperture position.

CdS cells or fixed resistor on photocell board

Yellow wire from diaphragm resistor, pinched or open

Purple wire or red wire on memory block, pinched or open

Ground plate on memory block, poor solder

Ground screw on diaphragm resistor loose

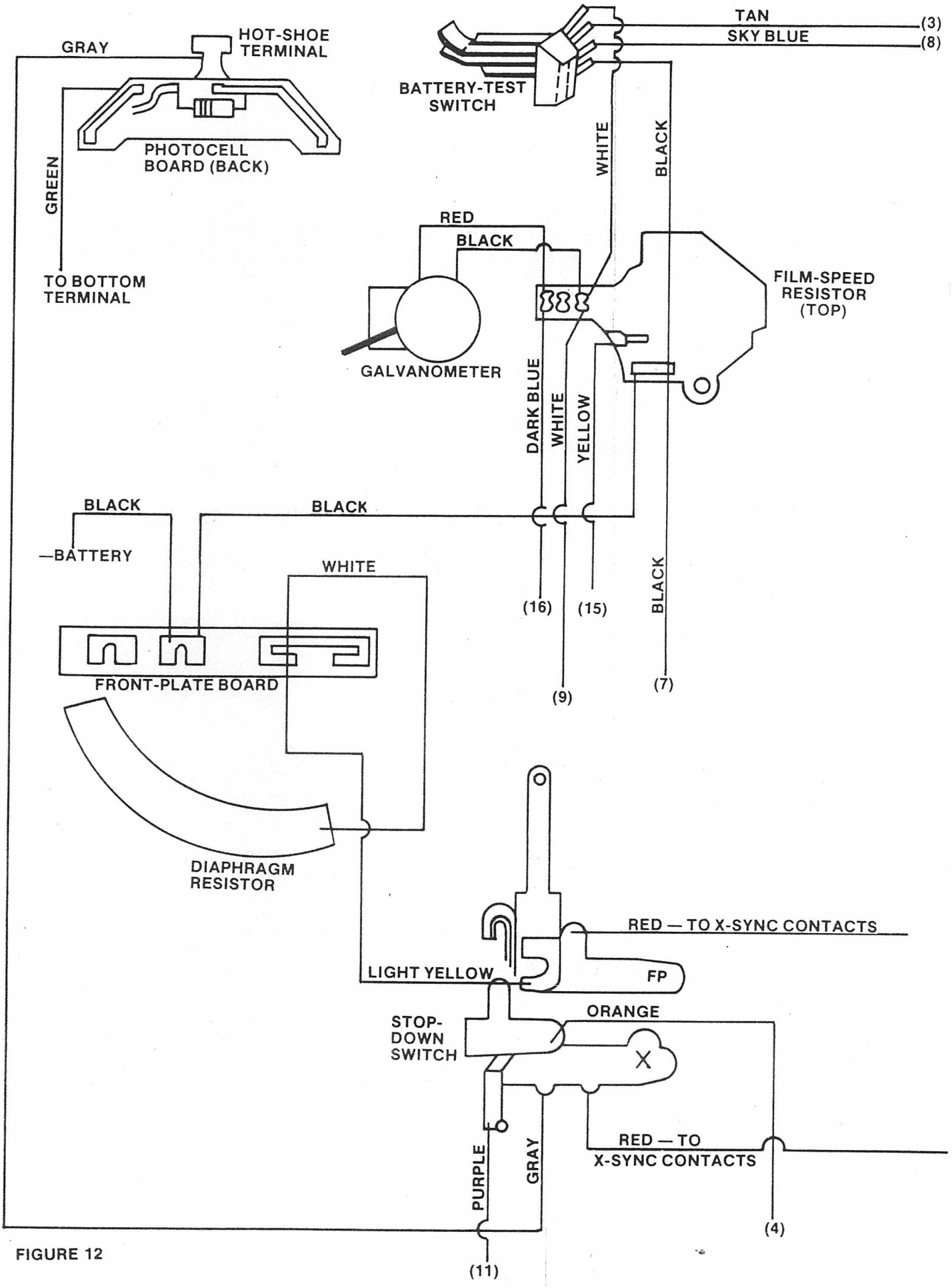

GRAY
HOT-SHOE TERMINAL
PHOTOCELL BOARD (BACK)
GREEN
TO BOTTOM TERMINAL
TAN
(3)
SKY BLUE
(8)
BATTERY-TEST SWITCH
WHITE
BLACK
RED
BLACK
GALVANOMETER
FILM-SPEED RESISTOR (TOP)
DARK BLUE
WHITE
YELLOW
BLACK
BLACK
—BATTERY
BLACK
WHITE
(16)
(15)
BLACK
FRONT-PLATE BOARD
(9)
(7)
DIAPHRAGM RESISTOR
RED — TO X-SYNC CONTACTS
LIGHT YELLOW
FP
ORANGE
STOP-DOWN SWITCH
X
RED — TO X-SYNC CONTACTS
PURPLE
GRAY
(4)
(11)

FIGURE 12

Memory block defective, leaking

3. Shutter delivers fast mechanical speed on auto, meter o.k.

   Auto switch, poor contact

   Check for direct continuity across the auto switch, Fig. 7, at the auto setting. The auto switch opens at the mechanical-speed settings to disconnect the electromagnet.

   Magnet defective or out of adjustment
   Check the continuity of the coil between the brown wire and ground, fig. 7.
   Approximate resistance of coil — 320 ohms.

   Magnet switch, poor contact (ESII only)

   Timing switch, poor contact or pink wire open

   Memory block, light-green wire shorted to body

4. Shutter delivers fast mechanical speed on auto, meter needle pegs to top

   Diaphragm resistor or film-speed resistor, open

   See test procedures under step #2 of troubleshooting.

   Memory switch, shorting to body

   Gray wire on memory block, shorting to body

   Green wire to photocell board, shorting to body

5. Shutter delivers fast mechanical speed on auto, no meter movement

   Battery contact, poor solder
   Check for 6V to the black wire at the front-plate terminal board, Fig. 1.

   Main switch, poor contact

6. Meter always on

   Main switch, out of adjustment or shorting

   Black wire and blue wire to battery-test switch, shorting

   Light green and blue wire on circuit-board connector, shorting

7. Meter inoperative, shutter o.k.

   Galvanometer defective or poor solder (black wire and red wire to film-speed board)

8. Auto speeds erratic, meter o.k.

   Timing-switch block cracked

   Memory block leaking

   Memory switch, poor or weak contact

   Magnet dirty

   Timing switch, poor contact

   Shutter-cocked indicator, binding

OTHER COMMENTS:

1. Individual components for the circuit board T-100 are not available separately.

2. A new timing-switch assembly comes with a tab extending toward the front of the camera. Bend down or break off the tab to make sure the timing switch does not short to the top cover.

3. The shutter curtains, transport parts, diaphragm resistor, and mirror-box parts will interchange with those in the Spotmatic F.

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EPX675BP	Konica Auto Reflex A, T Konica C-35	1.35	1.12	.80	**.56**
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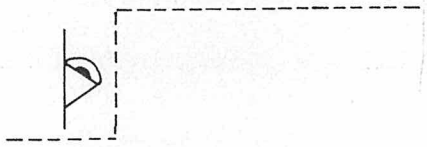
THE SOCIETY OF PHOTO-TECHNOLOGISTS

SERVICE NOTES

MIRANDA SENSOREX II

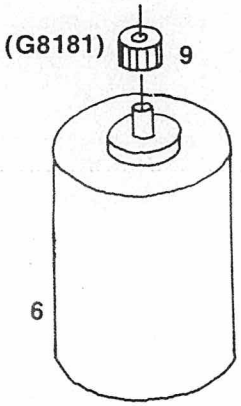
To adjust ASA to wind knob, put lens (normal 1.8/50mm) on camera. Set lens to 1.8, speed 1 sec. and ASA set at 100. At this setting, the following needle should have just moved away from the zero position mark, i.e., it should look like this with prism off. Alternatively, set lens to f/16, speed 1/8 & ASA 100. Then the following needle would be in **middle** of left side of screen.



Arlan Blodgett
Salem, OR

NIKON AW-1 WINDER — PRODUCT CODE: 32FA94

Nylon pinon #9 or #9-1 on the motor shaft is only available with the complete motor assembly. Metal pinon #30FA97-123 for the MD-2 motordrive is the same size and can be substituted. It will be supplied as an individual part by Nikon.

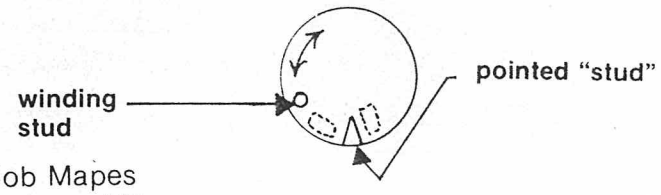


John F. DeLoach
Atlanta, GA

ALPA 10d

Top removal: Remove the left-handed pinface in the rewind knob. Remove the pinface screw in the speed knob-advance lever. Time the speed parts now seen. Remove the C-ring on **top** of the ASA speed disc. Remove the advance lever with speed knob. Remove the three screws in the film compartment — two are near the rewind knob and one is at the takeup spool end. Lift the top assembly (with prism and meter) up and tip forward. The wires are in connectors: a single one on the rewind side and a double connector in a block on the wind side. Disconnect these and th top is free.

Replacing advance lever assembly: The return spring-disc lug goes to the right of the pointed "stud" visible in the opening, AND the lug on the wind lever goes just to the left of the pointed stud and to the right of the winding stud.



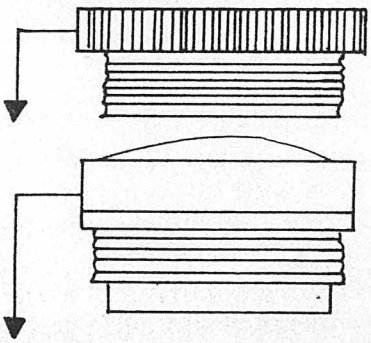
Bob Mapes
Latham, NY

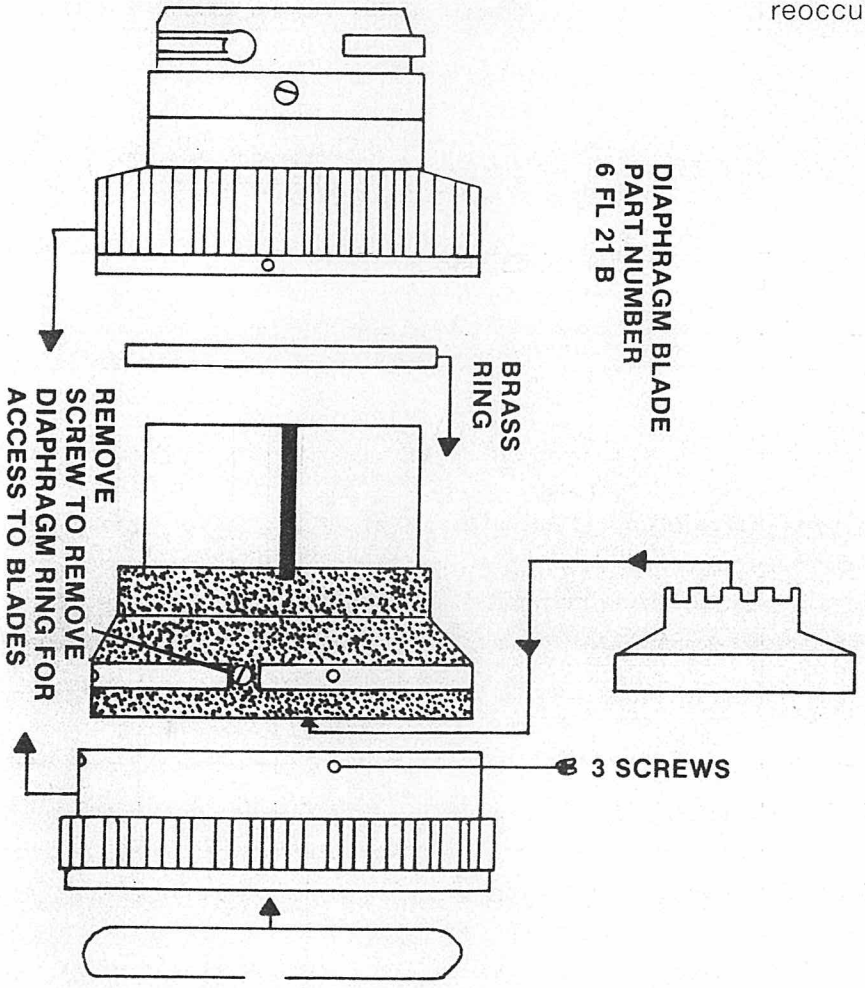
PETRI C.C. AUTO 200mm f/4 LENS

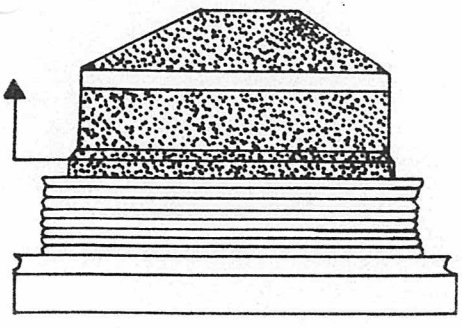
To clean diaphragm. This lens has three lens groups, one set on each side of the diaphragm and one set at front. The front set is in loose form: double cemented lens, spacer and smaller lens. For access to front two sets: undo the setscrew on side of the large filter ring and unscrew. This is a female ring which I found very difficult to get off. However, after wrapping 4 layers of rubber dam material around the filter ring and tapping all around it, it came off very easily. Now you have access to the front sets. The rear lens comes out very easily. To dismantle the back third of the lens, set focus on infinity. Undo 3 large screws on focusing barrel and slide it forward as far as it will go. This movement will expose 4 screws at the back edge of focus barrel, which when undone, will let the back third slide out.

Arlan's Camera Clinic
Salem, OR

NIKKOR - S.C. f1.4 50mm FOR RANGEFINDER MODELS





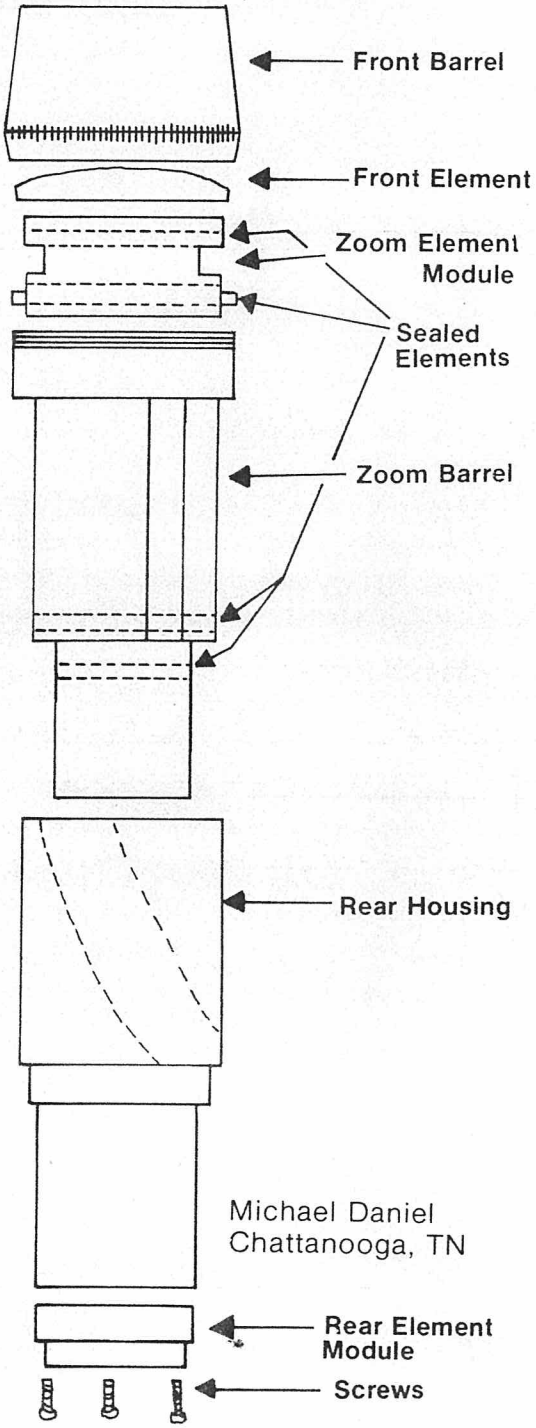


Bob Cohen
Newport News, VA

KODAK ZOOM EKTANAR C 102mm TO 152mm f3.5 PROJECTOR LENS

Remove three screws from rear element module and slip off rear housing. Insert small amount of acetone or MEK between front barrel and zoom barrel (not too much, since you are dealing with plastic). It may help to squeeze the outside of the front barrel to break the glue loose. Grasp the zoom barrel and front barrel and unscrew. The front element and zoom element module are now accessible for cleaning, along with the other outside surfaces of the sealed elements.

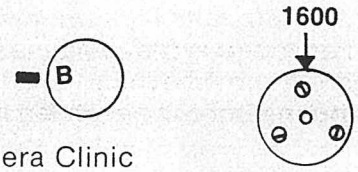
NOTE: I have found that the disassembly of these lenses is necessary due to the lubrication seeping onto the elements. Remove all old lubrication and relube with focus grease. Inform your customer to avoid leaving the lens in extreme heat to avoid reoccurrence of the same problem.



Michael Daniel
Chattanooga, TN

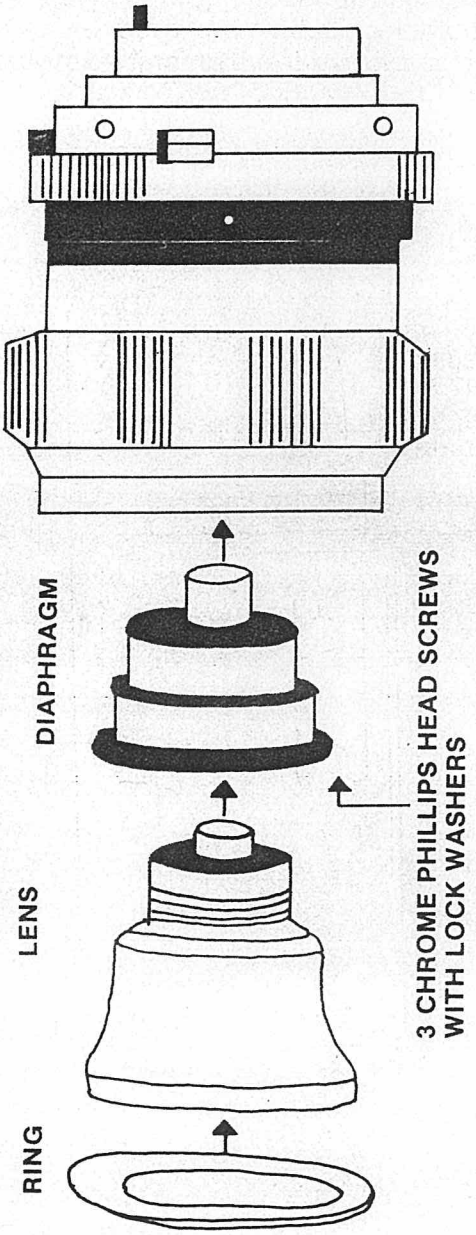
PETRI FT 1000

Top cover removal. ASA 25, speed 1 sec. Take off the following: cap over advance lever, 2 screws, advance lever, 3 screws base of speed dial, speed dial, rewind knob, 3 screws ASA dial, dial, 4 screws around top, top cover. Watch for small shaft in release button. To install ASA dial, place dented dial to top (1600). To install speed dial, set in "B" position.



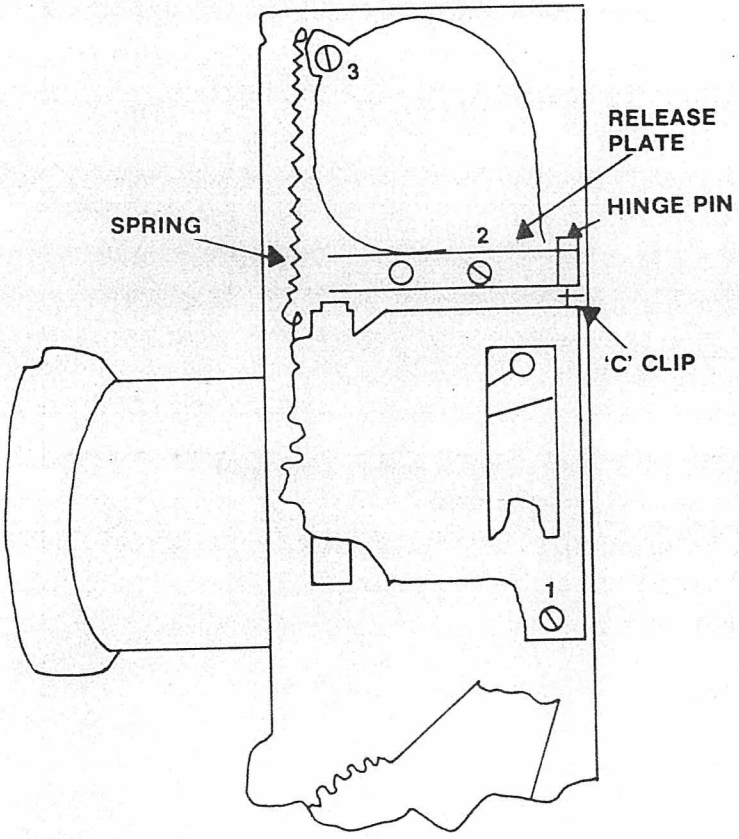
Arlan's Camera Clinic
Salem, OR

MINOLTA MC W. ROKKOR—SE 28mm, f/3.5 LENS



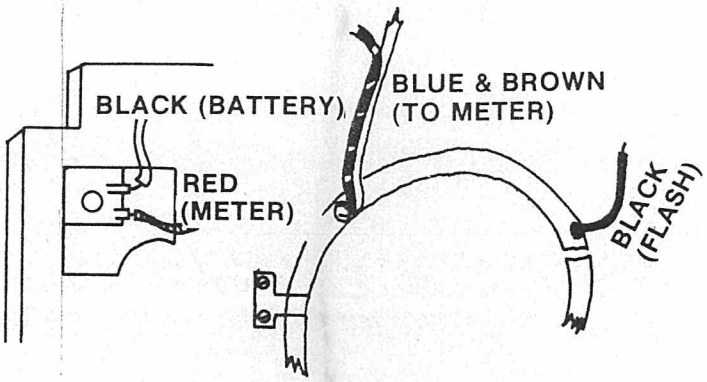
ROLLEI 35

Removing the light meter. The following is a procedure for removing the light meter without removing the camera front. Disconnect the spring at the front of the light meter. Remove the C clip on the hinge pin and then remove the hinge pin. In the event the C clip is on the opposite side shown, don't give up. Remove the C clip and continue with the next step. Remove screws 1, 2 and 3. If the hinge pin is as shown in the sketch, the release plate can easily be removed. If it is opposite that shown, with the screws removed from the light meter, the meter can be moved around enough to remove the hinge pin and the release plate. With the release plate removed, the meter is simply lifted out. CAUTION: Be sure to have removed the battery from its case before removing the meter as described above. Also, when replacing the meter, be sure to get the end of the release plate which is toward the lens in its proper location between two levers. It would be a good idea to look at its location before beginning the above disassembly.

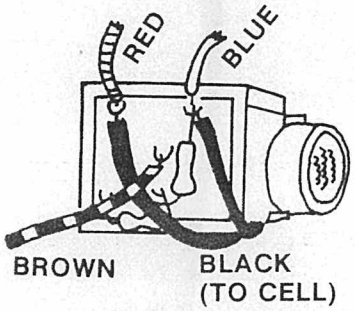


Arnold C. Anderson
Bellevue, WA

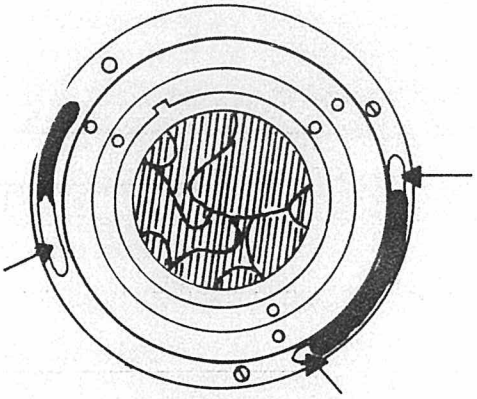
YASHICA LYNX 14 (Copal SVE Shutter)



BACK OF FRONT PLATE



CELL & METER MOVEMENT

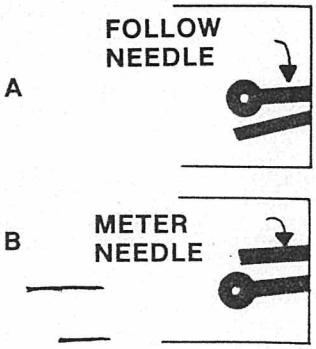


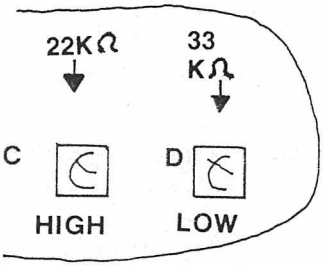
Resistor band shown by arrows under the speed indicator ring.
By loosening screws (3) on shutter speed indicator ring and sliding the resistor band, meter can be adjusted.

Bob Cohen
Newport News, VA

MIRANDA SENSOREX—METER ADJUSTMENT

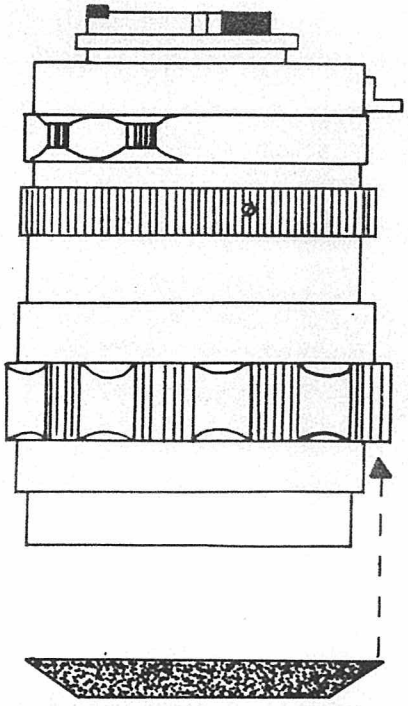
Low Intensity: EV7 speed 1 sec. f/11 — if needle is 'A' fig. replace meter or Cds cell. If needle is like 'B' there is a defect in follow needle mechanism.
Medium Intensity: EV 11, speed 1/15 sec. f/11. If needle is like fig. 'A' move 'D' down, if like 'B' move 'D' up.
High Intensity: EV15, speed 1/250, f/11. If needle is like fig. 'A' move 'C' down. If like 'B' move 'C' up.





Arlan Blodgett
Salem, OR

NIKKOR-S AUTO f1.4 50mm



REMOVE COLLAR FOR ACCESS TO SCREWS ON FOCUS RING

(See SPT notes, page 853 for additional information)

Bob Cohen
Newport News, VA

OLYMPUS OM-10

Similar models: OM-1, OM-2 (mechanically similar)

Batteries: 2 ea. S76 1.5V (positive ground)

Fig. 1 — top cover removed

Fig. 2 — bottom cover removed

Fig. 3 — auto circuit board

Fig. 4 — back of mirror box

Fig. 5 — front view, mirror box removed

Fig. 6 — front view, circuit boards removed

Fig. 7 — wiring pictorial, flex circuit

Fig. 8 — wiring pictorial, auto circuit board

Fig. 9 — IC 102, pin voltages

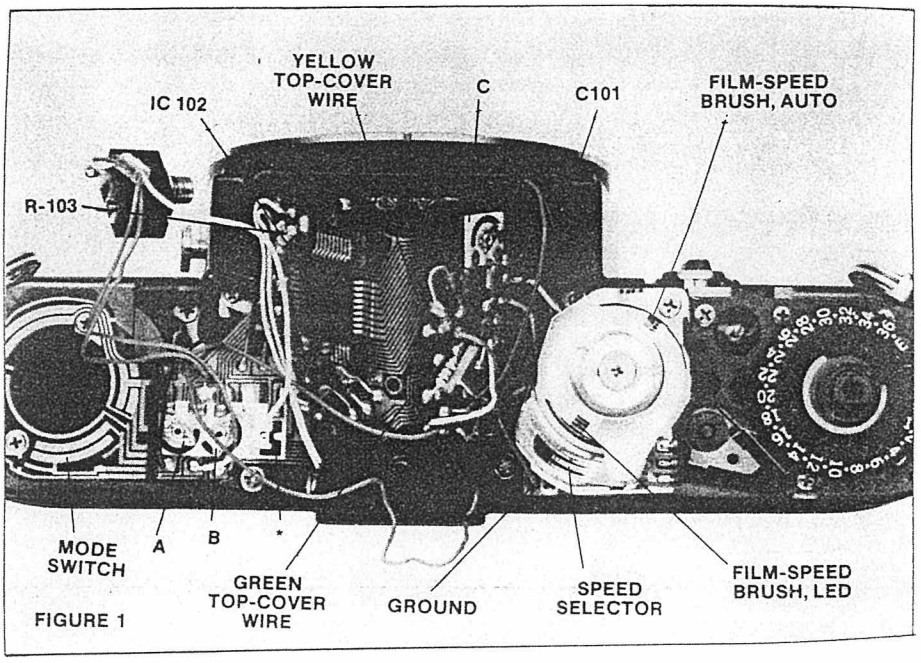


FIGURE 1

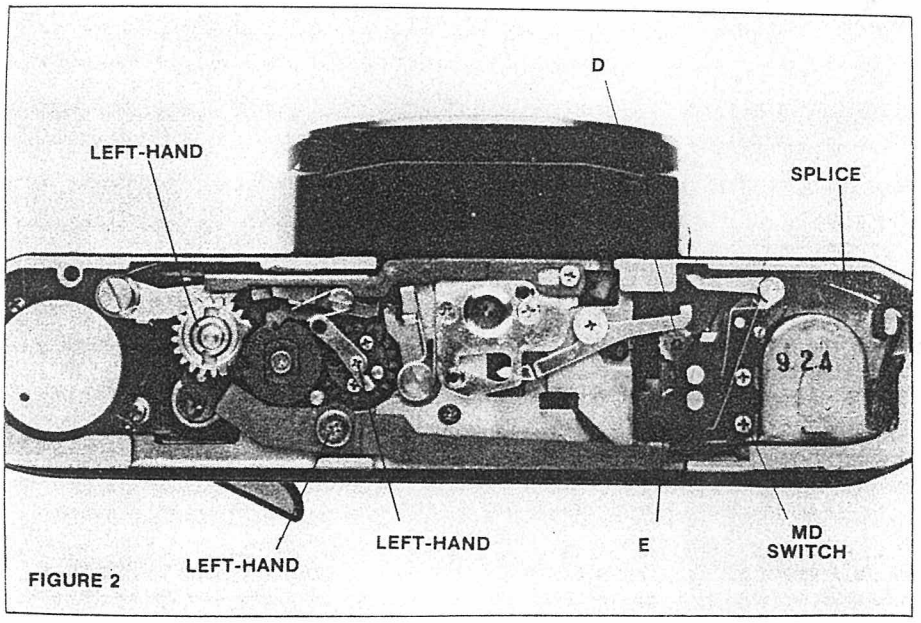


FIGURE 2

ADJUSTMENT LOCATIONS:

Meter readout, level	A
Meter readout, ratio	B
Auto exposure	C
Travel time, second curtain	D
Travel time, first curtain	E
Locking voltage	F
Offset	G
1/1000 second	H
1/500 second	I
Alignment, first curtain	J
Alignment, second curtain	K
Depth of engagement, armature	L
Overtravel, first-curtain latch	M

*Some models have a third variable resistor on the resistor board for matching the LED indication to the diaphragm resistor.

ADJUSTMENT VALUES:

Curtain-travel time: 12ms (32mm distance)

Flange-focal distance: 46.2mm (flange to film-guide rails)

Manual speed: 1/45 second

Locking voltage: mirror locks up (moves part way up and won't release shutter) with 2V supplied to the battery box; mirror completes the release cycle with 2.05V supplied.

ADJUSTMENT PROCEDURES:

1. Locking voltage. Turn the wiper of F, Fig. 3, counterclockwise (to the high end of the resistance band). Apply 2.05V to the battery box; the mirror should lock up when you push the release. Now turn the wiper of F in a clockwise direction until the mirror completes its release travel.

2. Offset. Connect a jumper between the two black wires of the main switch (rewind side of flex), Fig. 7. Connect another jumper across the auto film-speed resistor (between the yellow wire and the orange wire at the speed-selector board. Fig. 1). Apply

3.1V to the battery box. Adjust G, Fig. 3, until the voltage measured between the yellow electromagnet wire, Fig. 8, and ground just switches — from 3V to 0V or from 0V to 3V. Alternately, set the self-timer function and adjust the offset until the tone from the piezo crystal just turns on or just turns off.

3. Exposure readout. Work back and forth between A and B so that the meter reads accurately throughout the range of light levels. Adjust B at a high light level, and adjust A at a low light level.

4. Resistance matching (normally not necessary). If the camera has the third pot on the resistor board, use the adjustment to match the number of f/stop changes to the number of LED changes. The LED indication should change five steps if you change the diaphragm setting five stops. By adjusting the third pot, you can expand or compress the LED range. Note: if the camera does not have the third pot — and if the LED display does not change five steps when you change the diaphragm setting five stops — you can make the adjustment by installing a different diaphragm resistor. See "Other Comments."

5. Auto shutter speeds. The silicon photodiode at the bottom of the camera, Fig. 3, reads the light reflected from the first curtain (fast speeds) or from the film (slow speeds). To check the auto exposures, attach a piece of film or an 18% neutral-gray test card to the front of the format adapter. Adjust C, Fig. 1, for an 0 EV error.

If the fast speeds (high light levels) won't come in — or if you've repaired the shutter assembly — it may be necessary to adjust the armature and the trigger switch. Adjust the armature of the electromagnet (H in Fig. 3) for the manual 1/1000 second. You can get the manual 1/1000 second by using the accessory manual-speeds adapter or by plugging a resistance of 8K into the manual speeds jack. If the adjustment won't bring in 1/1000 second, use the trigger-switch eccentric (adjustment I) to adjust the manual 1/500 second

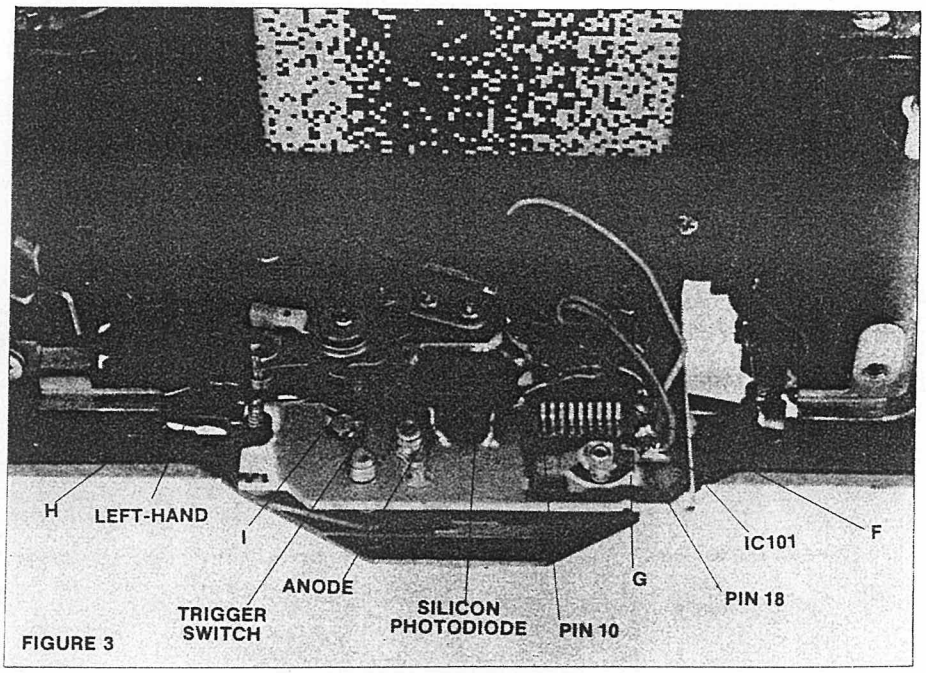


FIGURE 3

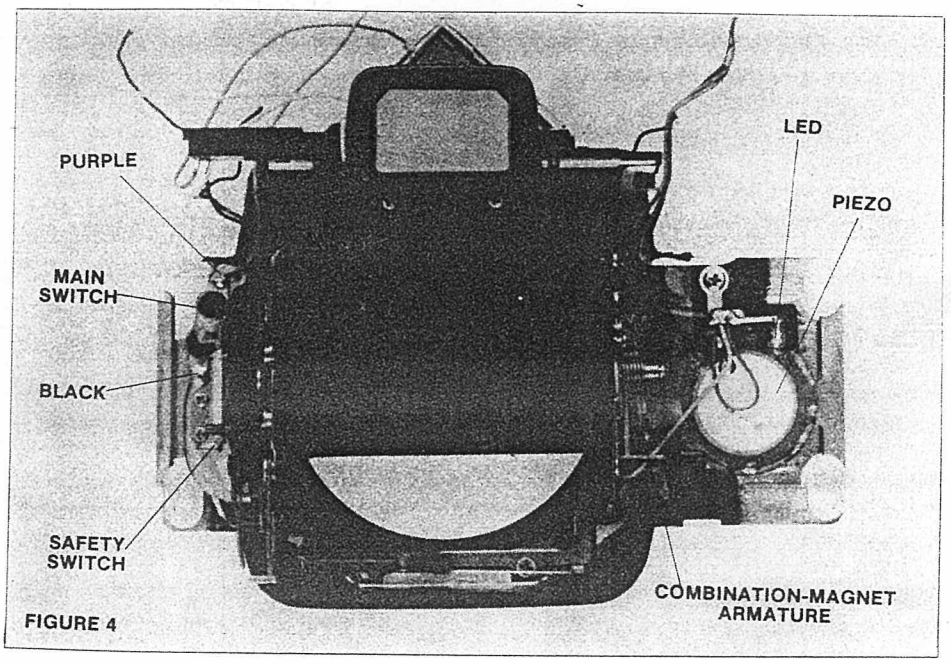


FIGURE 4

(16K plugged into the manual-speeds jack). Alternately, bend the trigger switch; make the trigger switch open sooner for a faster speed. The manual-speeds jack takes a standard 2.5mm mini-plug.

6. Curtain positions: With the shutter cocked, Fig. 6, the right-hand edge of the second-curtain bar should align with the scribe indicated; the right-hand edge of the first-curtain bar should align with the other scribe. Make the rough adjustments by changing the timing between the curtain-wind gears and the rollers. Remove the stopper at the top of the winding rollers; then lift the winding rollers high enough to disengage the gears. Make the fine adjustments by sliding the adjustment cams (J and K, Fig. 6) up or down. Sliding up the adjustment cams moves the curtains closer to the rewind side of the camera.

7. Depth of engagement, electromagnet armature: With the shutter cocked, the depth of engagement between the latching surface of the electromagnet armature and the

lug on the second curtain gear should be 0.3-0.5mm. Adjust by shifting the position of the electromagnet. The overtravel between the latching surface and the gear lug should be 0.05-0.2mm. To adjust the overtravel, Olympus supplies different sizes of the electromagnet armature noted by a number stamped on the white portion of the armature. The Olympus part numbers and lengths of the latching arm of the armature, according to the stamped number, are:

1. 6.65mm (CE243600)
2. 6.95mm (CE243700)
3. 7.25mm (CE243800)
4. 6.8mm (CE245900)
5. 7.1mm (CE246000)

DISASSEMBLY HIGHLIGHTS:

Control positions: auto, ASA 100 (for reassembly reference)
Location of left-hand threads: tension-setting nuts, screw holding bridge on top of wind gears, notched screw holding second transport gear at bottom of camera, screw holding mirror-charge lever at bottom of camera

Sequence:

1. bottom cover
2. top cover: 6 screws, wind lever, rewind knob (screw in top center), snap ring and cover over meter switch. Compression spring (for back latch) and release button loose.
3. unsolder top-cover wires: blue wire from purple wire, yellow and green from flex, Fig. 1, and yellow, blue and red manual-jack wires from flex, Fig. 7

Note: It's possible to leave the manual-jack wires attached and remove the retaining ring holding the manual jack to the top cover as shown in Fig. 1. However, attempting to unscrew the retaining ring may scratch the top cover — the factory cements the retaining ring (use acetone as a solvent).

4. peel off 2 light-trap strips inside mirror box (one on each side of cover plate at bottom of mirror box)
5. cover plate at bottom of mirror box to uncover auto circuit board, Fig. 3

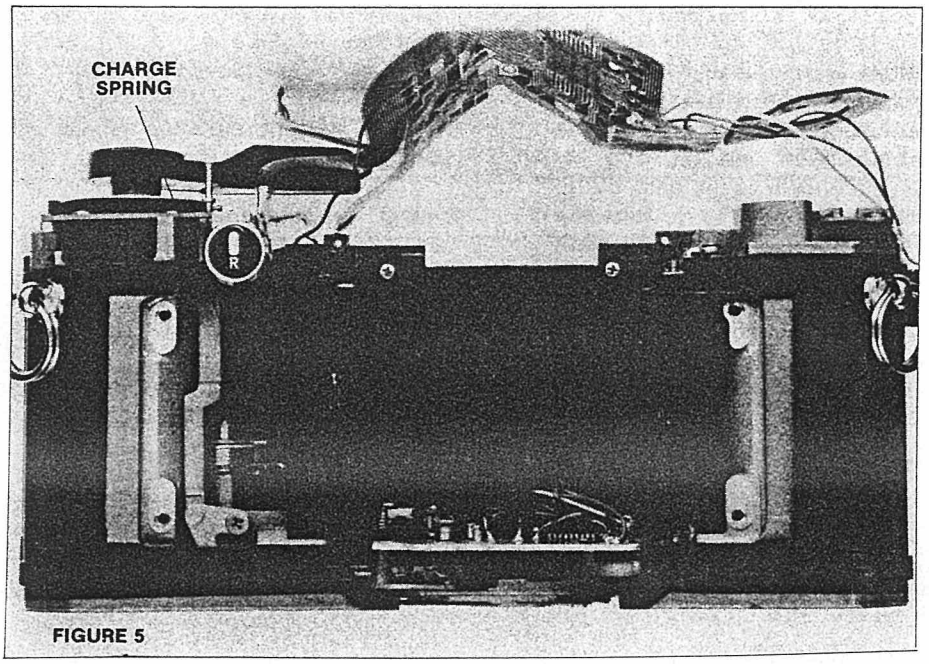


FIGURE 5

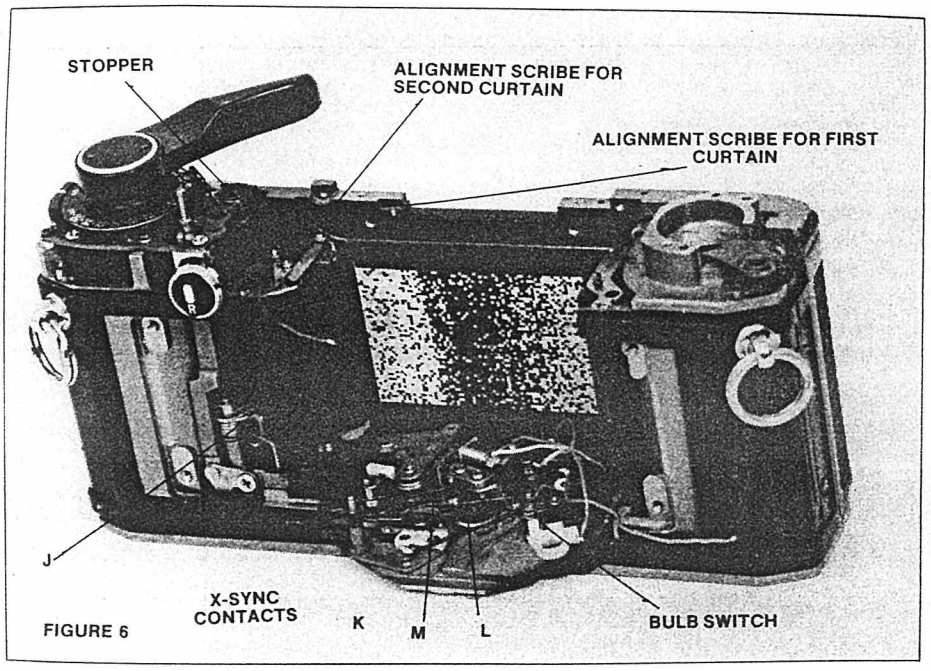


FIGURE 6

6. film-speed brush assembly (center screw)
7. shoulder screw holding film-speed board (toward front of camera)
8. nylon support plate under film-speed board (2 screws)
9. screw holding red-wire ground contact, Fig. 1
10. unsolder wires indicated with a check mark in Fig. 7
11. 3 screws holding circuit board, rewind side of camera
12. rewind-shaft assembly
13. 2 screws holding LED display, wind side (the screws hold the brass support frame at the top edge of the mirror box)
14. slide LED display (attached to end of flex) from slot in mirror box
15. unsolder black safety-switch wire at splice, Fig. 2
16. MD switch, Fig. 2
17. pull black wires loose from cement, top of camera, rewind side
18. pull green, blue, and black wires loose from cement, top of camera, wind side
19. 2 sections, front leatherette
20. 4 front-plate screws
21. front-plate/mirror-box assembly (tilt upper end of front-plate assembly forward; then lift up the lower end, being careful to avoid catching the mirror-box levers)

REASSEMBLY HIGHLIGHTS:

1. When you replace the front-plate/mirror-box assembly, the armature of the mirror-release combination magnet, Fig. 4, must connect to the back of the charge spring, Fig. 5. Seat the lower end of the front-plate assembly first. Then reach under the wind side of the front plate to connect the charge spring to the armature of the mirror-release combination magnet.
2. Slip the LED display through the mirror-box slot before reconnecting the flex-circuit wires. The LED display sits above the shutter-speed scale. Shift the position of the brass support to align the LED display with the shutter-speed scale before you tighten the screws.
3. Be careful when tightening the shoulder screw that holds the film-speed board. The nylon support-plate threads can be easily stripped.
4. To install the top cover:

a. solder the wires from the top cover to the flex
b. set the selector in the top cover to ASA 100 and auto
c. set the film-speed brush and the speed-selector brush to ASA 100 and auto, Fig. 1
d. set the release button on the release rod with the release-button lug pointing to the back of the camera
e. set the compression spring on the back latch
f. seat the top cover

Sequence to remove circuit-board assembly:

1. unsolder black battery-box wire from top of flex (wind side)
2. unsolder wires from auto circuit board, Fig. 8
3. screw holding auto circuit board
4. peel flex loose from focal-plane mask (held by double-sided tape) and from wind-gear bridge

Note: To remove the focal-plane mask, remove the two screws at the top of the mask and loosen the two screws at the bottom. Then lift out the focal-plane mask.

TROUBLESHOOTING:

Typical current draw (3V supplied):
meter — 2.9ma
battery test — 35ma
Self timer — 15ma
shutter open — 13ma

Behavior without batteries: mirror locks up and won't release shutter

Typical resistance of CdS cell, measured between the two pink wires with the lens-mounting ring held against the light source at EV 15: 11.5K

Voltage across silicon photodiode, no power to circuit: OV (no light) - 0.5V (high light). The voltage at the cathode switches to 1V when the main switch closes (measured to ground); the voltage at the anode, Fig. 3, then goes more negative as the light decreases.

Checks:

1. Self-timer. The mirror should remain in the lock-up position for the 12-second delay. During the delay, the LED at the front of the camera should flash on and off; the piezo crystal should beep on and off.
2. Battery test. At the battery-test setting, the LED at the front of the camera should glow steadily and the piezo crystal should emit a steady tone. The LED and the tone should not turn on with less than 2.2V applied to the battery box.
3. LED display. Turning the mode switch to the on position should turn on the LED display (it's not necessary to turn on the mode switch for automatic shutter-speed control). The LEDs should turn out after 1.5 minutes. Touching the collar around the release button (built-in touch switch) should turn on the LEDs for another 1.5 minutes.

Functions of IC's:
1. IC 101. Amplifier for silicon photodiode and auto control circuit for automatic shutter speeds, Fig. 3.
2. IC 102. Amplifier for CdS cell and driver for LEDs, Fig. 1.

Malfunctions resulting from poor solder connections to film-speed board:

yellow LEDs o.k.
shutter hangs open on auto
orange LEDs o.k.
shutter hangs open on auto
brown over LED remains on
shutter o.k.
red over LED remains on
shutter o.k.
blue shutter won't stay open on bulb
green manual setting delivers automatic exposures

Troubleshooting steps for specific problems:

Mirror locks up, no LEDs
Since the readout and exposure metering systems use entirely different circuits, a malfunction in one won't affect the other. If neither the readout nor the auto circuit operates, battery voltage may not be reaching the flex. Check for 3V between the battery wire (black wire) at the wind-lever side of the flex and ground. No voltage — check the battery box and the wiring.

Shutter problems:

1. Mirror locks up with fresh batteries
   Locking-voltage adjustment
   Main switch
   Check by shorting between the two black wires at the rewind side of the camera. If the main switch is the problem, the mirror will then complete its release movement. You should measure 3V at the black-wire contact closer to the front of the camera at all times. You should measure OV at the black-wire contact closer to the back of the camera until the mirror moves to the lock-up position and closes the main switch; the voltage should then switch to 3V.

   Combination magnet
   Check by momentarily connecting a DC power supply between ground and the blue wire, Fig. 7. With an applied voltage of around 0.5V, the combination magnet should free the mirror. If not, the combination magnet may be open. Approximate resistance of coil (measured between the blue wire and ground): 350 ohms.

   IC 101

2. Mirror fails to lock up without batteries, no self-timer

   Charge spring not connected to armature of combination magnet

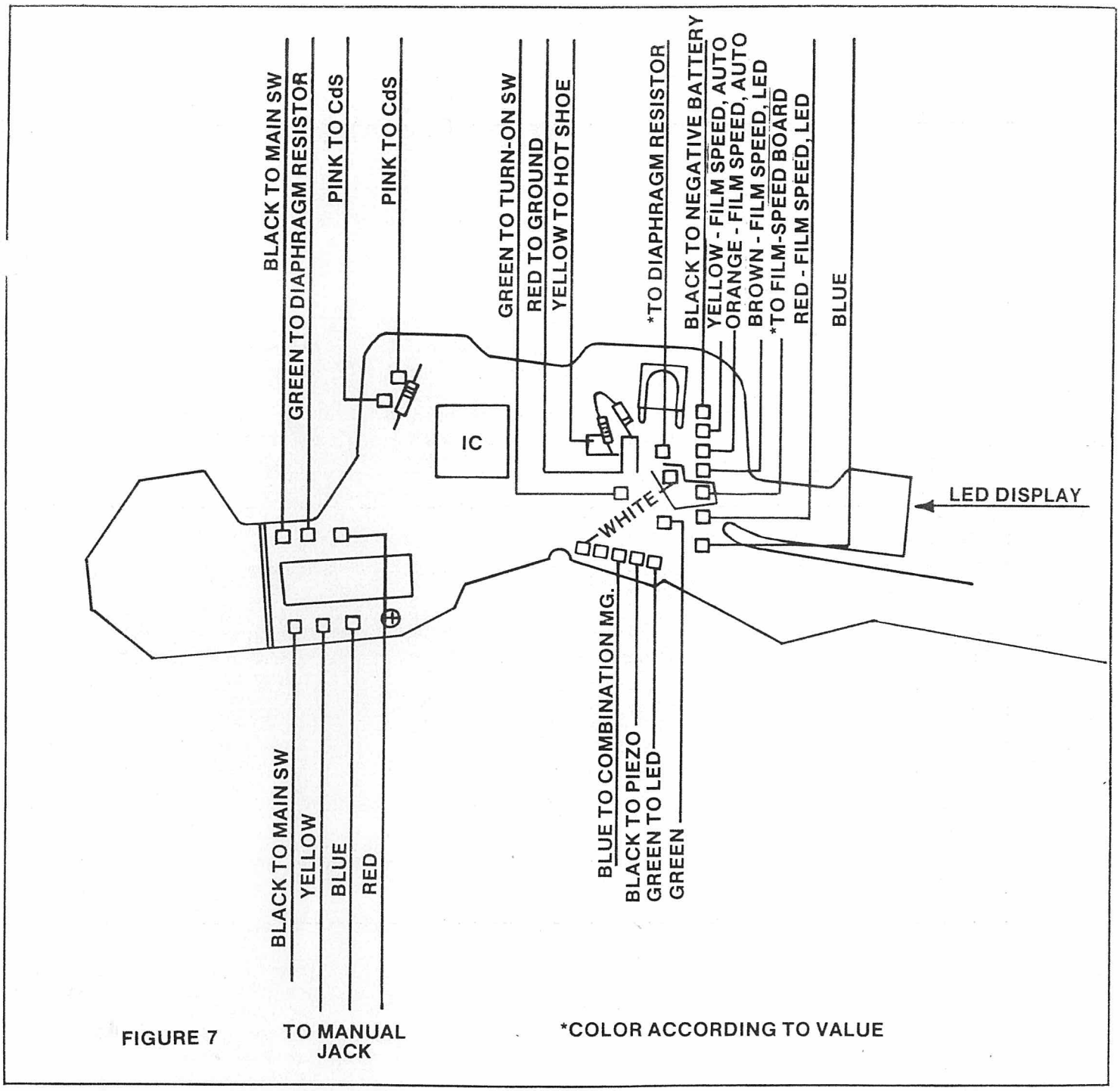


FIGURE 7

Combination magnet

Check to see if the permanent-magnet core will hold the armature magnetically. If not, clean the contact surfaces or replace the combination magnet.

3. Both curtains cross the aperture together, all modes

   Overtravel insufficient

   Electromagnet
   Check the continuity of the coil between the yellow wire, Fig. 8, and ground. Approximate resistance: 400-450 ohms.

4. Shutter hangs open, all modes

   Trigger switch, not opening or shorted

5. Shutter hangs open on manual—auto o.k.

   Manual-speeds jack, open or poor solder connections
   Short between the yellow wire and the blue wire from the manual-speeds jack. If the shutter then closes, the manual-speeds jack has an open.
   Note: If you disconnect the manual-speeds jack wires to remove the top cover, the shutter will hang open at the manual setting.

   Resistor R103 or capacitor C101
   Plug a resistance into the manual-speeds jack. If the shutter then works, R103 may be open or have poor solder connections. If the shutter still hangs open, the manual-speeds timing capacitor C101 may be shorted, Fig. 1.

6. Shutter hangs open at auto—bulb and manual o.k.

   Auto film-speed brush, poor contact

Short the yellow wire to the orange wire at the film-speed resistor board. If the short causes the shutter to close, check the film-speed resistor for poor contact or an open. Approximate resistance values between the yellow wire and the orange wire — fully clockwise, 3.6K; fully counterclockwise, 32K.

Silicon photodiode, open

IC 101

7. No bulb action — other functions o.k.

Bulb switch, poor contact
Check the continuity between the blue wire on the film-speed board and the brown wires on the auto circuit board, Fig. 8. You should measure direct continuity to one brown wire; you should measure direct continuity to the other brown wire when you push down the release rod. No continuity with the release rod depressed — bulb switch not closing. Remove the auto circuit board to repair the bulb switch.

Speed-selector brush, poor contact

8. Auto exposure at manual setting

Speed-selector brush, poor contact

9. Shutter delivers fastest speed only at auto

Silicon photodiode, shorted

IC 101

10. Overexposure at high light levels

Electromagnet, armature and core interface sticking from oil or dirt

Trigger-switch adjustment incorrect

Electromagnet armature, engagement incorrect

Meter-readout problems:

1. Over LED remains on
Indication film-speed resistor, poor contact or open
Short the brown wire to the red wire at the film-speed resistor board. If your short causes the LED indication to move to the 1-second indication, check the indication film-speed resistor for poor contact or an open. Approximate resistance values between the brown wire and the red wire — fully clockwise, 33K; fully counterclockwise, 240 ohms.

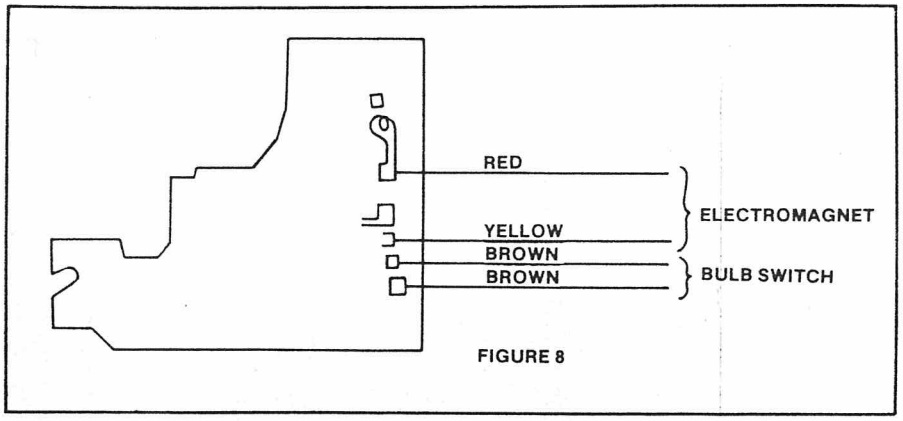


FIGURE 8

Diaphragm resistor, poor contact or open
Short between the leads of the diaphragm resistor, Fig. 7. If the short causes the LED display to change to the 1-second position, check the brush and the resistance band of the diaphragm resistor. Approximate resistance values as the diaphragm-coupling ring rotates clockwise — 100 ohms to 4 K.

IC 102

2. 1-second LED remains on

CdS cell, open or poor solder
Short between the two pink wires at the rewind side of the flex. If the short causes the LED indication to change to overrange, check the CdS cell for an open.

IC 102

Other:

1. No tone from piezo on self-timer or battery test

No voltage to piezo crystal
Check the voltage at the black wire to the piezo crystal, Fig. 7. On the battery-test function, you should measure around 2 VAC peak-to-peak or 1.35V DC. At the self-timer function, you should see a pulsating DC. If not, the problem may be poor contact in the mode switch or a defective IC 101.

Piezo crystal defective or wire disconnected

Disconnect the black wire to the piezo crystal, Fig. 7. Apply an AC voltage between the black wire and ground. At around 600 Hz. and 6V P-P, the piezo crystal should emit the tone. If not, remove the mirror box to check the wiring, Fig. 4.

OTHER COMMENTS:

1. The flex circuit and the auto circuit board are supplied only as a complete unit (part #ZJ132500). There is no exchange program as yet. However, you can obtain the silicon photodiode (part #ZJ132500) and the two IC's separately.
2. You can clean the focusing screen without removing the top cover. First pry off the cemented plate at the top front of the mirror box. Then take out the screw and the clip holding the front edge of the focusing screen. A double-ended spring clip holds the rear edge. Insert your tweezers into the two holes visible at the rear edge of the focusing screen. Push both ends of the spring toward the back of the mirror box and drop out the focusing screen.
3. The diaphragm resistor and the film-speed resistor are each supplied in five values identified by the color of the lead wire, Fig. 7. If you replace either resistor, match the color codes — install a "black" diaphragm resistor if the camera has a "black" film-speed resistor. However, you can mismatch color codes (one step maximum) to expand or compress the LED range if the LED indication changes more or less than five steps with a five-stop change in the diaphragm setting. Installing a diaphragm resistor

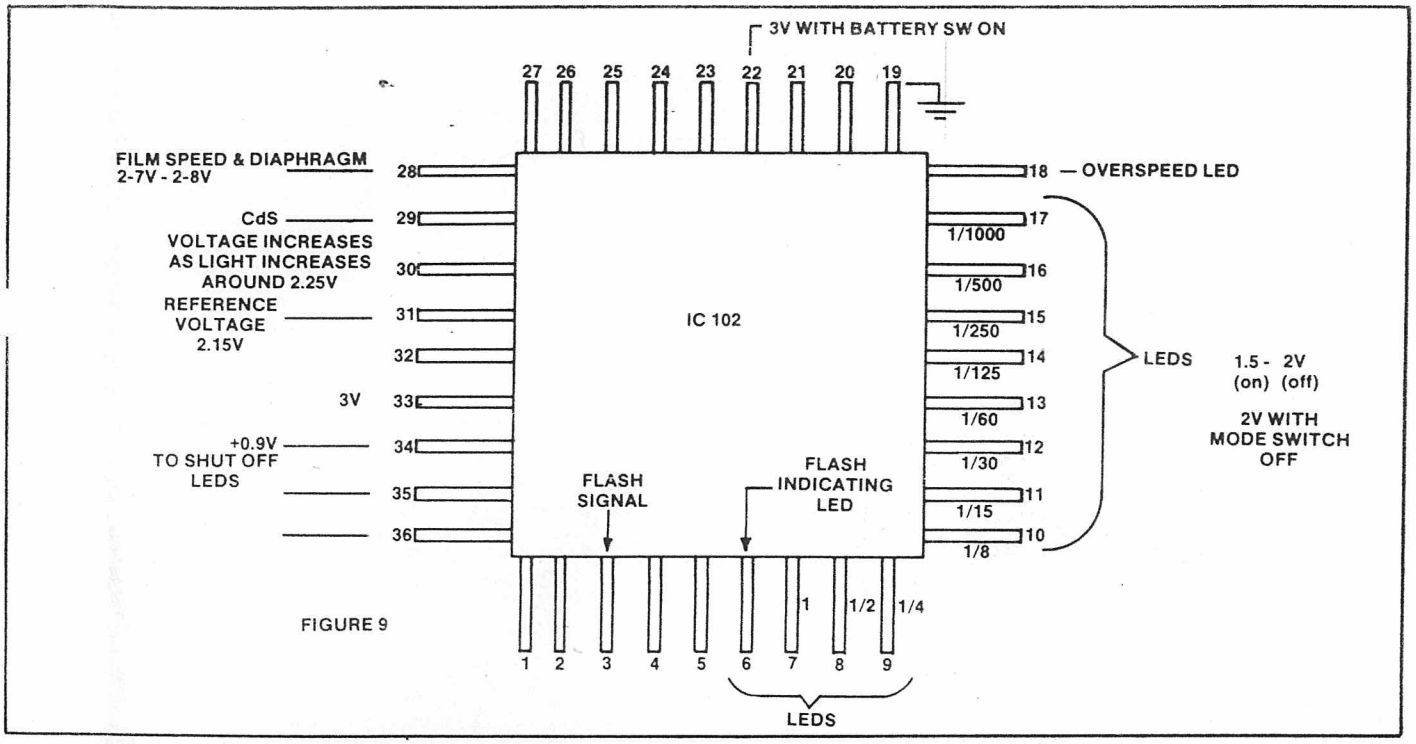


FIGURE 9

with a lower resistance compresses the range; installing a diaphragm resistor with a higher resistance expands the range.

Coding for diaphragm resistors:

orange	3.66 - 3.92K
blue	3.92 - 4.18K
red	4.18 - 4.43 K
green	4.43 - 4.69K
black	4.69 - 4.96K

The film-speed resistor for the LED readout can also be used to match the LED range to the diaphragm change. Coding for film-speed resistors:

orange	2.86 - 3.06K
blue	3.06 - 3.26K
red	3.26 - 3.46K
green	3.46 - 3.66K
black	3.66 - 3.86K

Pentax ME Super and ME Winder II

Sponsored by:

Society of Photo Technologists
National Camera
Pentax

April 5-6, 1981
Miami, Florida
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Camline MODEL A40

$1500 Complete

(916)-777-5222

AUTOMATIC CAMERA TESTER

The CAMLINE MODEL A40 AUTOMATIC CAMERA TESTER is designed to calibrate all automatic and manual still and movie cameras. The A40 features rapid operation, ruggedness, completeness, and simplicity. Recommendations suggested by ANSI sub-committee PH3.3 on photographic test instruments were included.

FEATURES • Digital readout on all functions • ASA capability from 6 to 800 • C Factor capability from 5 to 80 • Fully portable and complete with accessories • Made in USA with standard catalog components • 100% guaranteed • Low cost.

PARTIAL SPECIFICATIONS • Exposure: 000.1 to 999.9 millilux-seconds • Shutter Speed: 000.1 to 999.9 milliseconds • Aperture: f1 to f64 relative readings • Shutter Rate: 00.01 to 99.99 frames per second • Volts: 0.001 to 9.999 volts using the A40 as a digital voltmeter, probe supplied • Light Source: 6, 9, 12, 15Ev light levels selected by turning an indented control. Constant color temp. of 2850°K (Japan Standard). 0.2Ev light screen flatness on each light level. 0.1Ev light output change when varying the input line voltage from 100 to 130 volts ac.

ACCESSORIES SUPPLIED • Accessory case, leather • Digital voltmeter probe • Support stand for still and movie cameras • Super 8 Sensor with FILTER and ASA slides (machined aluminum) • Universal Sensor (machined aluminum) with 110, 126, 135, 6x4.5, 6x6, and 6x7 formats.

ACCESSORIES AVAILABLE • SX70 Sensor with power supply containing 0-10v. and 0-1a. meters • Strobe Calibrator to provide direct reading guide numbers from 00.00 to 99.99 • 2 meter long cable with connectors to allow Super 8 Sensor to calibrate movie projector shutter rate.

ORDERING INFORMATION: UPS, COD shipments deduct 5% cash discount. Credit approved accounts, net 30 days. 20% discount on orders of 5, no drop shipments. All instruments carry 30 day full refund.

CAMLINE INSTRUMENTS INC.
1550 W. TWITCHELL ISLAND RD.
ISLETON, CA 95641

EST: 1969

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SPT Members, watch for detailed brochure in the mail.

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PENTAX ME WINDER

by Ralph Starr

Similar models: MX Winder #65510*

Batteries: 6 ea. AA carbon, AA alkaline, or AA Nicads

Fig. 1 — battery-housing screws

Fig. 2 — mechanism assembly

Fig. 3 — bottom view, mechanism assembly

Fig. 4 — motor gear train

Fig. 5 — circuit-board wiring

Fig. 6 — clutch adjustment

Fig. 7 — wiring pictorial

ADJUSTMENT LOCATIONS:

Clutch-spring tension *	A
Winding torque	B

*Remember—with a vertical shutter, the winder must wind and then return; with horizontal curtains, the winder only needs to wind but not reutrn.

ADJUSTMENT AND OPERATION VALUES:

1. Tension, clutch spring. Usually adjusted by setting the spring on the highest part of the cam, Fig. 6 (only found on early models).
2. Winding torque: 4.0-4.5 kg/cm to declutch (disengage riveted roller of cam-plate assembly, Fig. 6, from clutch lever when C/S dial is switched at S position). Test by operating the winder on a loaded camera. The film should wind completely. After the last exposure, the winder should declutch and the motor should turn freely. Adjust with setscrew B, Fig. 6.
3. Minimum operating voltage: 6V (with 6V supplied, the winder should transport through a 36-exposure roll of color film without stalling).
4. Maximum operating voltage: 9V (with 9V supplied, the winder should transport through a 36-exposure roll of color film without declutching until the end of the roll).

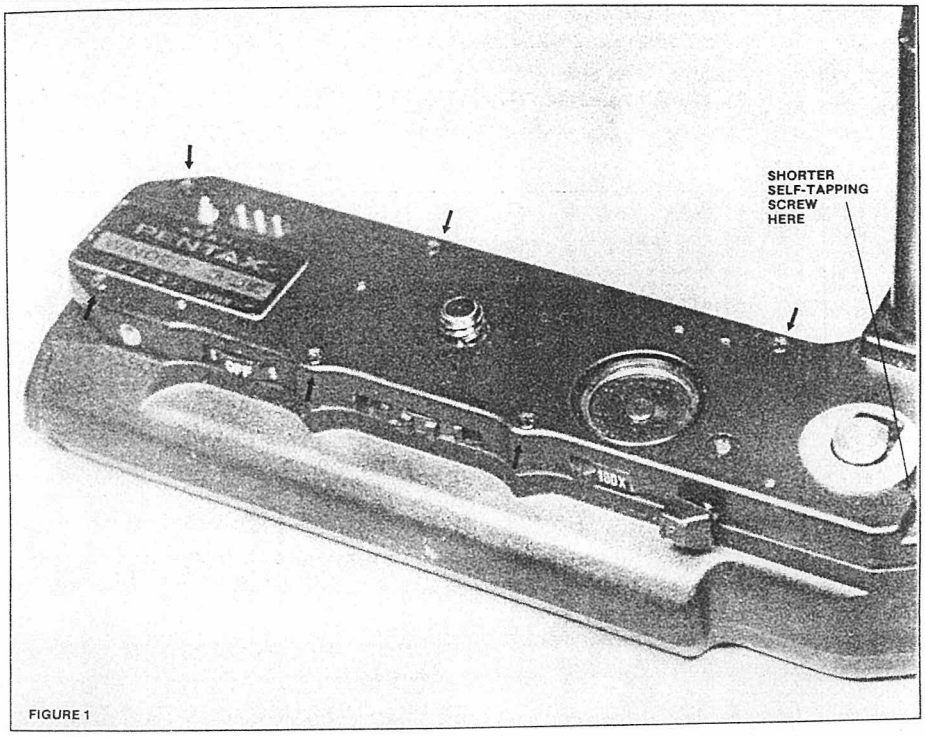
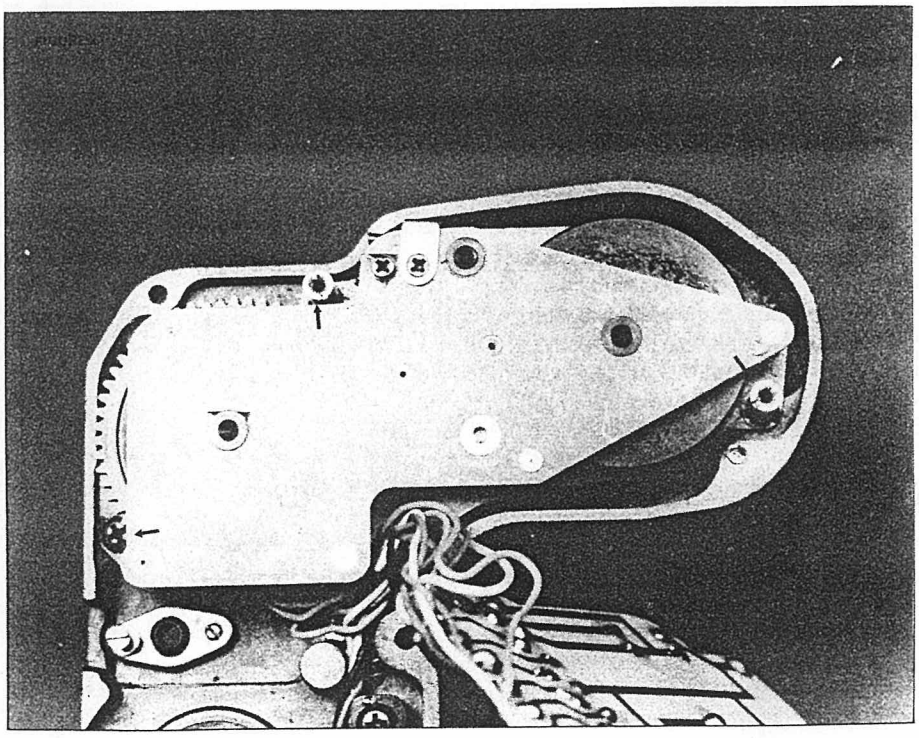


FIGURE 1



Note: If the winder does not pass the maximum-voltage test, check the clutch adjustment (#2). If you can't adjust the clutch so it is satisfactory, disassemble and clean the gears and mechanism. Relube with moly-grease.

5. Speed: 1.5 fps (9V on continuous); 1 fps (6V on continuous).

FUNCTION:

The Pentax ME has four function settings — lock, auto, 100X, and bulb. The winder has two settings — auto

and 100X. Proper operation is with either the camera and winder both on auto or both on 100X (for electronic flash). Although these are the only proper combinations, it is important to know what happens if the customer inadvertently does something else.

Camera Setting	Winder Setting	LEDs (camera)	Shutter Function
auto	auto	work	auto
100X	100X	no	100X
auto	100X	no (blink after shutter released)	auto
100X	auto	work (full range)	auto, but fastest speed is 1/100
bulb	100X	no	stays open*
bulb	auto	work	stays open**

*switch off B to release
**remove winder to release

Note: Depending on where in the wind cycle the end of film causes the camera and winder to stop, the winder may or may not continue to run when removed from the camera with the switch set on S or C. Running is not a cause for concern.

DISASSEMBLY HIGHLIGHTS:

1. To remove battery housing (necessary for most repairs — reach transport and most functions): 7 self-tapping screws from top, Fig. 1, and 1 1.4mm machine screw from bottom (watch for loose spring and pin from rewind button).
2. To remove top of grip (access to release switch): 2 self-tapping screws on top side of grip
3. To remove or test motor:
   a. steps 1 and 2 above
   b. remove circuit board (2 1.4mm screws)
   c. remove mechanism plate (1 1.7x2.8 screw and 2 circuit-board support posts, Fig. 2)
   d. remove motor-drive gears, Fig. 4
   e. remove 4 saucer-head screws holding motor and 2 pan-head screws holding grip
4. To disassemble mechanism plate:
   a. unhook spring, Fig. 3
   b. remove the plate marked in Fig. 3 (3 screws)
   c. remove gear under plate, Fig. 3 — gear has ball bearings top and bottom
   d. lift off levers from post A, Fig. 3

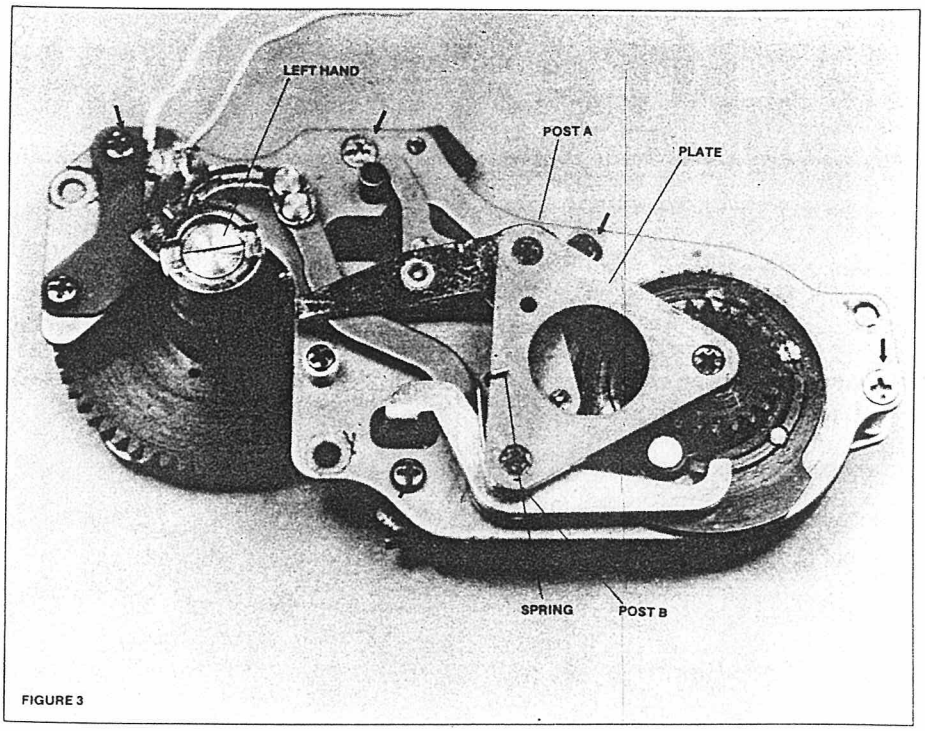


FIGURE 3

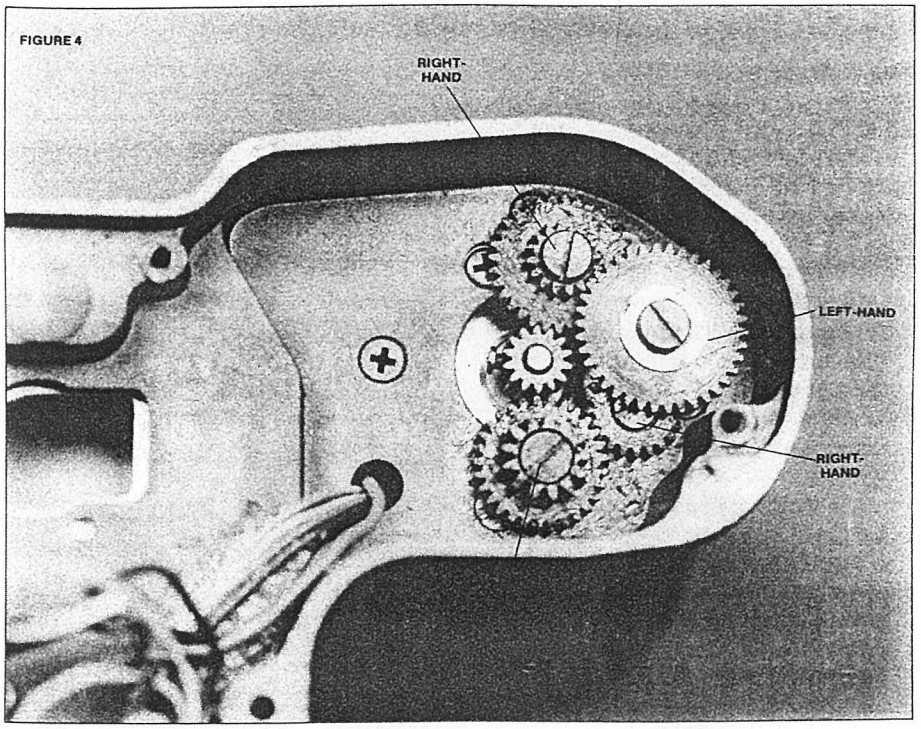


FIGURE 4

   e. pry off levers from post B, Fig. 3 (don't bend)
   f. remove 5 screws marked with arrows in Fig. 3
   g. lift off top mechanism plate

Note: All parts are now accessible. Watch for the ball bearings under the planetary gear.

TROUBLESHOOTING:

Current drain: w/o film — 500-700ma; w/film — 900-1200ma

Expected exposures with a set of batteries:

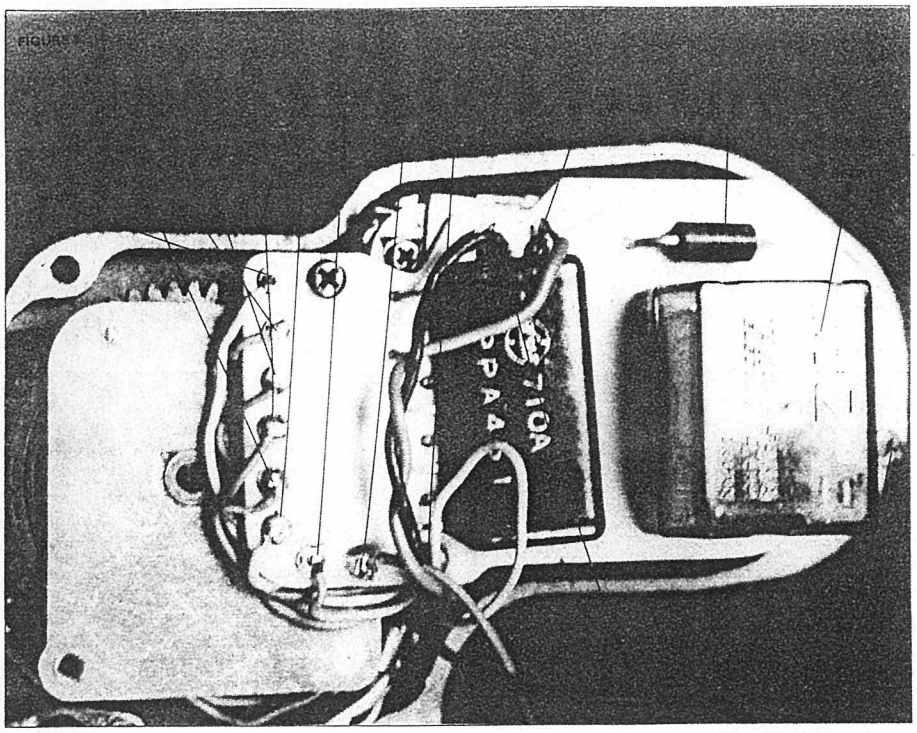
- 1.5V alkaline — more than 40 36-exp. rolls
- 1.5V manganese — at least 30 36-exp. rolls
- 1.2V Nicad — at least 30 36-exp. rolls

Motor test: Unsolder the large red and black wires from the circuit board and connect to 6V power supply (red is

positive, black is negative).

OTHER COMMENTS:

1. There are two different motors. The old style is not available. Installing the new style in an earlier unit also requires replacing the grip (the new-style motor and grip have larger diameters).
2. There are some variations in the circuit board, but all versions are interchangeable.



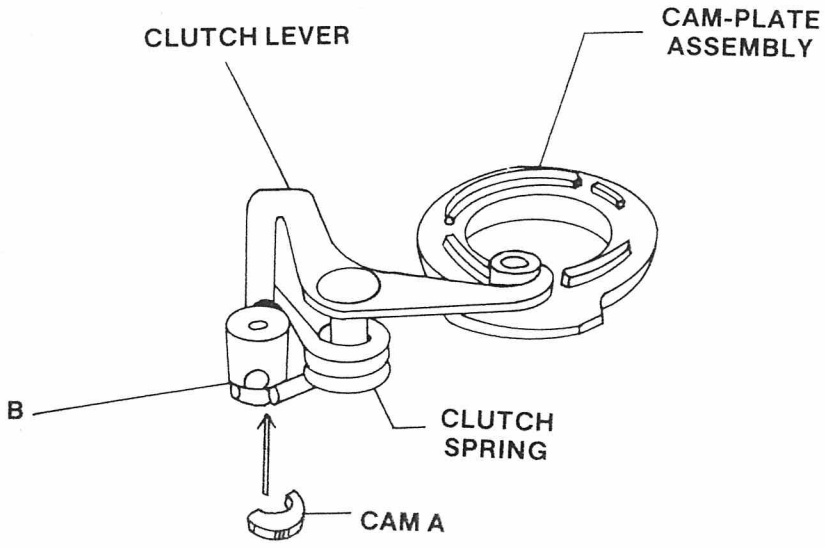
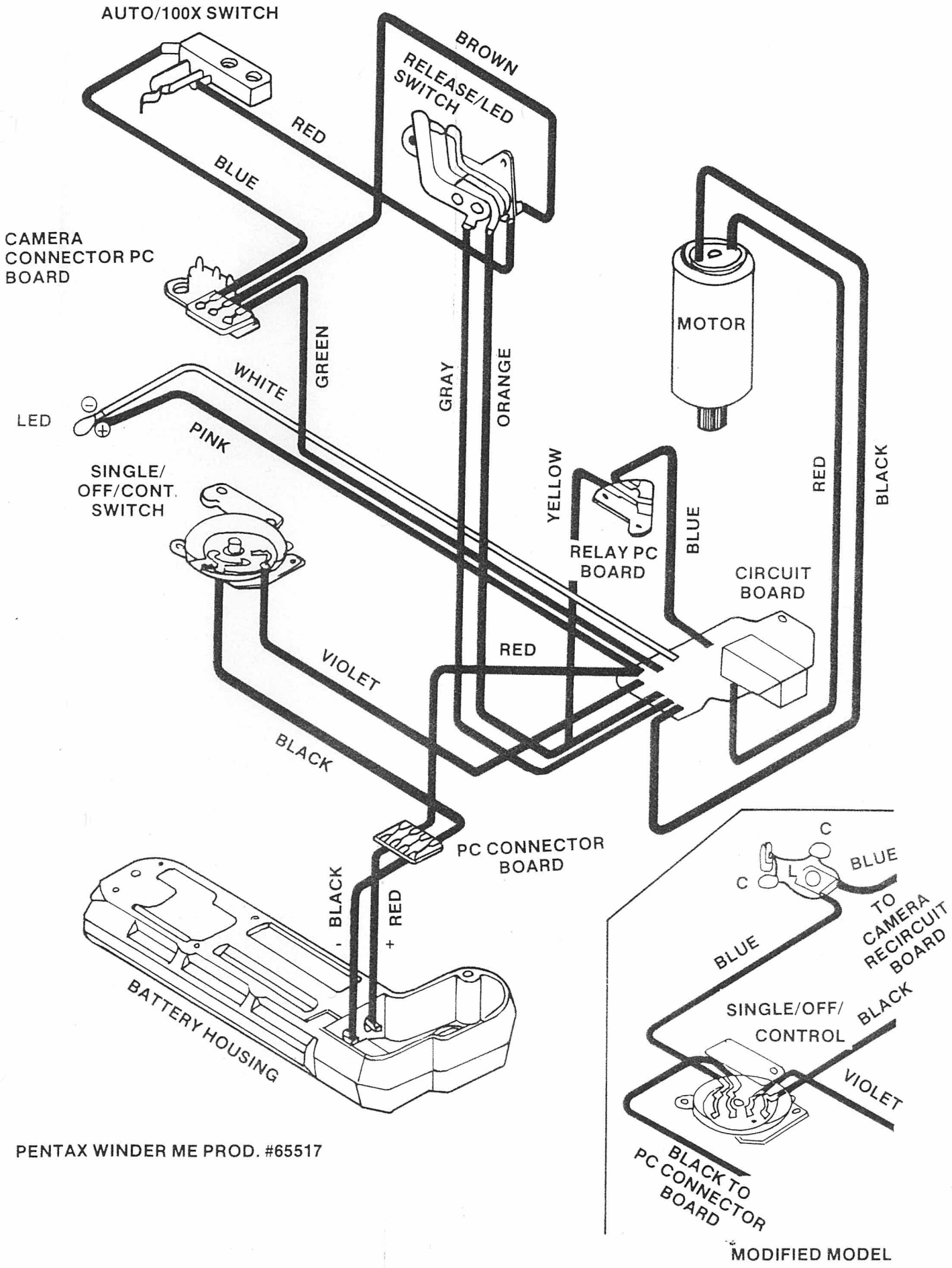


FIGURE 6



PENTAX WINDER ME PROD. #65517

MODIFIED MODEL

OLYMPUS 50mm 1:1.8 AUTO-S LENS

ndard lens for Olympus SLRs)
Fig. 1 — front-lens group removed
Fig. 2 — back of helicoid, infinity setting

ADJUSTMENT LOCATIONS:

Focus	A
Minimum aperture	B

ADJUSTMENT VALUES:

1. Set the minimum aperture by bending the stop lug. Approximate diameter at f/16 — 2mm. Set actual diameter after transmission test.
2. To adjust the focus, remove the rubber fingergrip from the focus ring. Rotate the focus ring to find the point of best infinity focus. Then loosen the three focus-ring setscrews and rotate the focus ring to the infinity stop.

DISASSEMBLY SEQUENCE:

1. unscrew identification ring
2. lift out filter ring and detent ring
3. lift out diaphragm-setting ring with loose detent ball
4. unscrew front lens group
5. cam ring (remove coupling screw through side of barrel)
6. rear mount (3 screws, back of lens)
7. unscrew rear lens group
8. remove 3 screws, back of lens, and drop out diaphragm assembly to front of lens — 3 brass spacers, back of diaphragm assembly, loose
9. diaphragm plate (3 screws, back of diaphragm assembly)
10. diaphragm leaves (reassemble in clockwise rotation)

Sequence to diassemble helicoid:

1. remove rubber fingergrip from focus ring
2. focus ring (loosen 3 setscrews)
3. helical guide, Fig. 2
4. unscrew helical rings

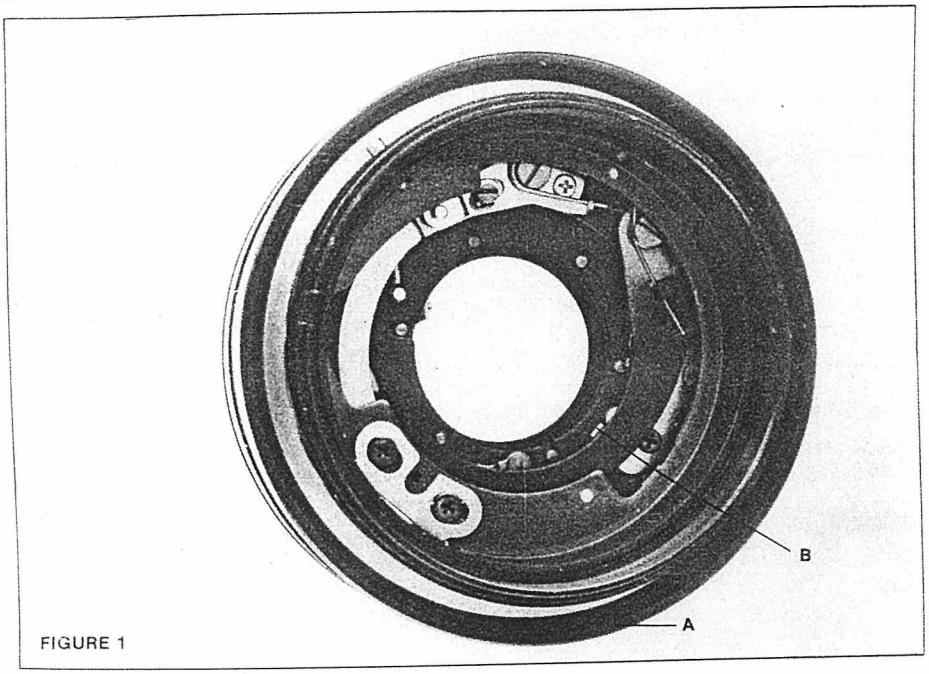


FIGURE 1

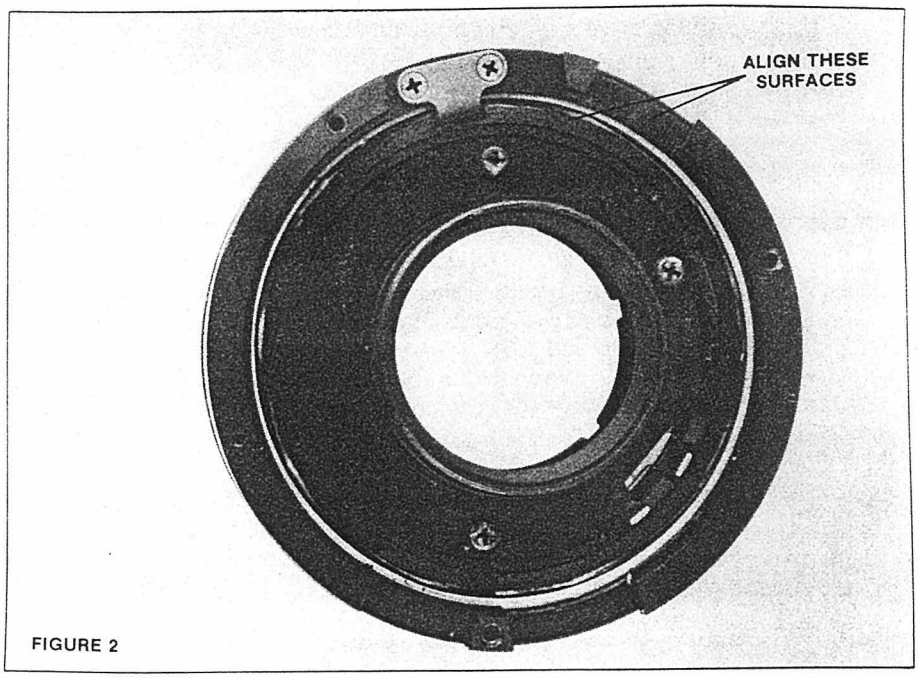


FIGURE 2

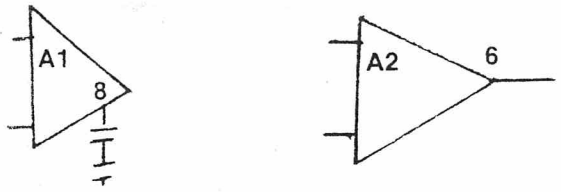
Reassembly of helicoid:

1. Screw the aluminum (female) helical ring into the black fixed helical ring fully clockwise. Then back off the aluminum helical ring 3/4 turn in a counterclockwise direction.
2. Screw the inner (male) helical ring counterclockwise into the aluminum helical ring until the rear surfaces are flush, Fig. 2. The helical-guide slot should now align with the helical-guide screw holes. If not, change the starting thread of the inner helical ring.

Corrections:
BUILD YOUR OWN EE TESTER
(Sept./Oct. 1980)

On page 24, the two line drawings are *not* actual size as I stated in the text. Apparently it was *reduced* in printing to about 80%.

Also, on page 23, the schematic drawing has two minor omissions, pin numbers are missing on the two up-amps. Pin 8 on A1 and pin 6 on A2 as follows:



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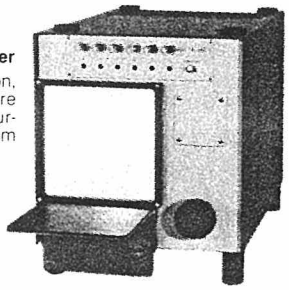

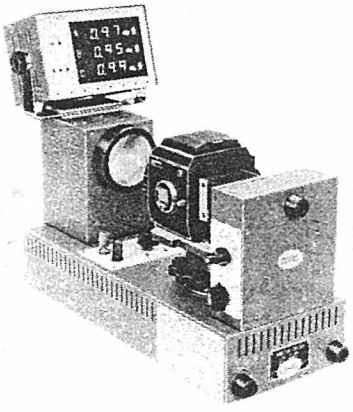

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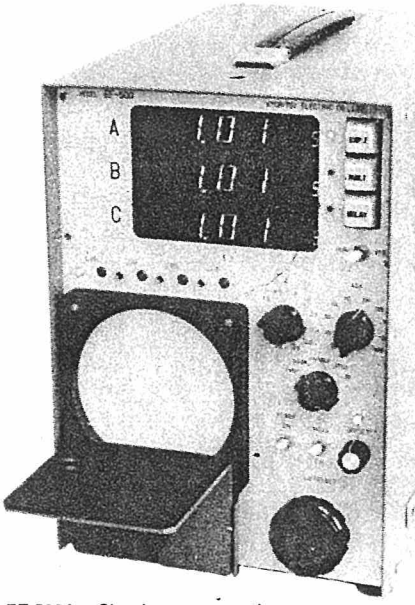

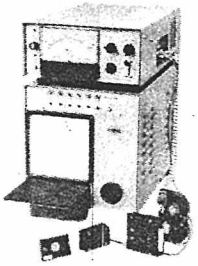

MODEL CEE-1A
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