C & C ASSOCIATES
troubleshooting guides

ELECTRONIC TROUBLESHOOTING THE OLYMPUS OM-2N

1. CIRCUIT DESCRIPTION

Power Circuit

The center contact of the battery compartment connects to the negative battery terminal. The positive terminal is held in contact with the camera body by the cover. Current (battery negative) travels along a black wire to the switch plate at the top between the prism and the rewind shaft. This switch connects power to the exposure meter circuit when set to "Auto" or "Manual," and to the battery test circuit board when in the "Check" position.

From the switch plate, another black wire carries current to pin 18, **IC-103**, located at the bottom of the camera, on the rewind side. **IC-103** is used to switch power to the exposure control circuit as the mirror begins to rise. (Earlier models of the OM-2 do not have **IC-103**. Instead, the black wire connects directly to the main switch, **SW-402**, located on the left side of the mirror box.) As the mirror begins to rise, **SW-402** connects battery negative to the exposure control circuit through another black wire visible at the bottom of the camera.

The main switch, **SW-402**, still exists on the new models; however, instead of switching the power directly, it signals **IC-103** to do so through the blue wire. This system adds reliability to the power supply for the shutter magnet and exposure control.

Battery positive is connected to the meter circuit and exposure control circuit through screws which clamp the respective boards to the chassis.

There is a diode soldered across the battery box terminals with its polarity opposite that of the batteries. If batteries are installed backwards, they will discharge through the diode and not damage circuit components.

Battery requirement: two S-76 silver oxide batteries.

Metering Circuit

The exposure meter has nothing in common with the exposure control circuit, except that both are attached to the camera. When the switch at the top is set to either "Auto" or "Manual," red wires connect battery negative to the **CdS** photocells. Each cell has two parallel conductive elements which connect to the galvanometer's negative terminal through fixed resistors **R-301, R-302,** and **R-306**. These resistors help maintain linearity at low light levels. Two other resistors, **R-303** and **R-304**, connect in parallel with the galvanometer for bright light linearity. This system produces a current through the galvanometer coil which varies with light.

Setting the switch to "Manual" brings a variable resistor, coupled to the shutter speed dial, into parallel with the **CdS** network. The sum of current through the coil is then a function of the light and the shutter speed selected. Aperture and ASA each apply rotational adjustment to the galvanometer coil. When the shutter speed and aperture setting are correct for the light and ASA, the meter needle is centered.

Setting the switch to "Auto" disconnects the shutter speed variable resistor from the system. Now the swing of the coil is a function of light, ASA, and aperture, and the needle points to a number on the scale indicating the correct shutter speed.

An eccentric screw on the ASA cam follower is used for overall adjustment. Aperture coupling is a string and pulley system operated by a tab on the lens.

Exposure Control

The **OM-2N** measures the exposure as it actually happens and needs no memory circuit. Furthermore, since light is measured through a stopped-down lens diaphragm, there's no need to know the aperture setting in advance. In fact, the exposure circuit doesn't even get around to powering itself up until the mirror has started to rise. The circuit is so elegant, that with the exception of the ASA resistor, it all fits on a single board at the bottom of the mirror box.

When the mirror begins to rise, switch **SW-402** closes connecting pin 17, **IC-103** to the body (battery positive). This sets a latch which operates a switching transistor inside the IC and connects battery negative to the exposure board control board. The exposure control circuit now powers up.

At the instant before the first curtain begins to open, when the mirror is up and the aperture closed, the two photodiodes read the light created by the subject's image. This light is reflected to them by the first curtain (painted to approximate the reflectivity of film). The light causes a current to flow through the photodiodes which is then sent to an amplifier inside **IC-102**. The amplified output at pins 1 and 7, **IC-102** is a voltage which varies in proportion to light, taking into account both subject brightness and aperture.

The voltage is sent to an amplifier inside **IC-101** which has an external feedback loop with a capacitor in series. This system is an integrator, producing a voltage on the capacitor that increases with time. The rate of increase is directly related to the voltage created by the light on the photodiodes. So, the longer the time or the brighter the light, the greater the integrated voltage. What we have, then, is an electrical model of the exposure process about to take place on the film. Both time and light are taken into account.

As described so far, the process is interesting, but not too useful since the film hasn't seen any light. To coordinate exposure and shutter timing, a timing switch, **SW-101**, is placed across the capacitor. Until the first curtain starts to move, **SW-101** remains closed and the capacitor cannot begin to charge. As the curtain begins to open, so does **SW-101** and the voltage begins to build on the capacitor — at the same rate as exposure of the film.

In the "Auto" mode, the capacitor is **C-102** and the exposure voltage is sent to the ASA resistor (at the top near the meter) through switch **SW-102b**. The ASA variable resistor forms a voltage divider along with **R-103** and **VR-101**. The resulting voltage (somewhat less than on the capacitor, depending upon the ASA setting) is sent to pin 9, **IC-101** and to one input of comparator **CP-1**. **CP-1**'s other input is a fixed voltage found at pin 2, **IC-101**.

CP-1's output is set low prior to exposure and appears at pin 4, **IC-101**. This is connected to the base of transistor **Q-102** which is then switched on, latching the closing curtain magnet. As integration takes place, the voltage builds until it exceeds the fixed voltage on the (—) input of **CP-1**. **CP-1**'s output then switches high, **Q-102** turns off, and the magnet releases the closing curtain. If the exposure time is short, the light is read mostly off the opening curtain. For long exposures, the photodiodes see the light reflected directly off the film. Because the reflectivity of the first curtain and the film are the same, the photodiodes can tell no difference.

An FET transistor, **Q-101**, is self-biased and maintains a constant voltage to the system through the positive side to balance changes in battery voltage.

Manual Shutter Speeds

Setting switch **SW-102a & b** to manual changes the operation somewhat. The photodiodes are disconnected and a variable resistor, operated by the speed control dial, is placed in the circuit. (This is not the same resistor used by the exposure meter. This VR is located under the exposure control board.) The resistor connects to the input of the same amplifier inside **IC-102**, and the integration process is the same as in the "Auto" mode. A larger capacitor, **C-101**, is used for integration, and the voltage is sent to comparator, **CP-1**, through a fixed resistor instead of the ASA variable resistor. So the rate of integration becomes a function of the speed dial setting instead of subject brightness. The rest of the process is the same as for "Auto."

Flash dedication

To control exposure using a dedicated flash such as the T-20 or T-32, the **OM-2N** operates in the "Auto" mode. The integration process proceeds just as with available light with ambient light integrated as the first curtain opens. When the curtain reaches the end of its travel, the sync switch is triggered firing the flash. As the light of the flash returns from the subject, it is integrated by the circuit until exposure is sufficient. At that point the comparator switches states and that signal is sent to **IC-103** and then to the left side flash dedication contact to quench the tube. In models without **IC-103**, the comparator's signal is read directly by the flash.

When the flash is recharged, there is an LED indication in the viewfinder. The signal originates from the right side dedication contact.

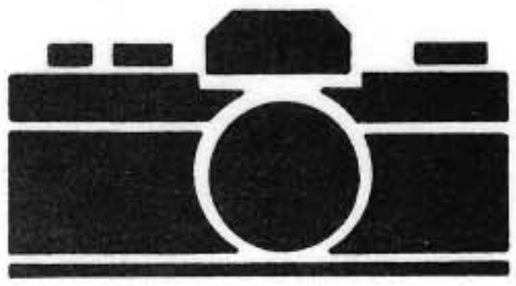
Winder Dedication

Dedication contacts are connected to two switches which operate from the mirror box levers. With the shutter not operating, the two contacts should short together. With the shutter in operation, the rear contact shorts to the body and the front contact is open.

Battery Check

The battery check circuit board is situated near the rewind shaft and is composed of several transistors and related components making up an oscillator and voltage comparison circuit. In the test mode, the LED should be steady above 2.9 volts, flash down to 2.45 volts, and not respond below 2.45 volts.

If the shutter is released with low or no batteries, the mirror will rise, but the shutter will not run. To escape, set the shutter to "B" or on newer models, turn the mode switch to "Reset."



II. EQUIPMENT AND GENERAL INFORMATION

A. Tools and equipment needed to carry out the procedures in this guide:

- Grounded soldering iron
- DC power supply
- DVM
- 1000 ohm test probe
- Zero ohm test probe

B. Typical current and coil resistance:

All measurements made on typical camera using a regulated 2.80v power supply.

All switches off ..... less than 2 microamps
Meter circuit on ..... 85 to 150 microamps
Shutter open 9.7ma
Shutter cycle complete 12.5ma
Battery check ..... 10ma peak
Magnet coil resistance ..... 600 ohms
Meter coil resistance ..... 1600 ohms

C. Preparation for Troubleshooting:

All tests and measurements called for in this guide can be made with the top cover, bottom cover, and circuit board cover (under the mirror) removed. For access to the circuit board, set the shutter to "B" then release using the self timer. When the shutter opens, stop the timer; the mirror will be up with the shutter open and the board can be reached from front or back.

All voltage measurements indicated in this guide were made with the common lead of the DVM connected to the camera body. Because the body is battery positive (+), the voltage numbers are preceded by a (—). The magnitude of the voltage is its difference from battery positive.

For example: The reading 0.00v indicates battery positive. The reading -3.00v indicates battery negative. For this guide, "**B+**" will designate battery positive or body. "**B—**" will be used to indicate battery negative.

The exposure control board ICs are MOS and can be static damaged. Always touch tools and test leads to the strap lug before touching the board. If you leave the work station and return, grasp the camera body to equalize any difference in potential.

To power up the circuits for testing and voltage measurements, short the blue wire near **IC-103** (bottom of camera) to the body. If the camera does not have this IC, connect **B—** or the negative lead of a power supply to the black wire at the bottom which connects to the exposure circuit.

For quick tests with the bottom plate on, hold the diaphragm lever as the shutter is released. Carefully allow the mirror to rise about halfway; the power should be connected to the circuit.

With the bottom cover off, you will need a power supply or external batteries to operate the camera. If you have a scrap bottom cover, cut off the portion which has the battery cap and install it with the single screw.

III. IC CHECKS

Note: Refer to the previous section for techniques on powering up the exposure control board for tests and measurements.

A. IC-101

Pin 1 is the reference input to the integrating amplifier. Access at the wiper of **VR-104**. Typical voltage is near **B—**.

Pin 2 is the reference voltage to comparator **CP-1**. Access at the wind side terminal of the photodiodes. (plus 1.0v See "Adjustment Procedures")

Pin 3 is the output from the integrator. Access at the wind side of the timing switch, **SW-101**. To test, set to "Manual" and 1 second with the shutter released. Short across **SW-101** with DVM probe. The voltage should be about —1.7v. Next, move the probe so it touches only the wind side contact (open **SW-101**) and observe the voltage change. It should rise to about —0.09v in one second.

Pin 4 is comparator **CP-1** output. Access at the red wire to **IC-103** on the bottom (**OM**) **or the purple wire to the shoe contact (OM-2**). Voltage should be **B—** with the shutter open and **B+** when shutter closes.

Pins 6 and **8** are offset adjustment for **CP-1**. Access at **VR-105**. Voltage should be near **B—**.

Pin 7 is **B—**.

Pin 9 is the input to **CP-1**. Access at the white wire to ASA resistor. To test, set "Auto" mode and apply **B—** to the white wire using a 1000 ohm probe. The shutter should stay open. Apply **B+** with a 1000 ohm probe, the shutter should run through. (In some cases it will not latch at all and the operation will be as though there are no batteries.)

Pin 10 is **B+**.

Pin 11 is the input from pin 1, **IC-102**. There is no convenient access, see test for pin 3, **IC-102**.

B. IC-102

Pin 1 is the output to pin 11, **IC-101**. There is no easy access. The best test for both is to verify proper reaction to inputs at pin 3.

Pin 3 is the input to amplifier **A-1**. Access is at the rewind side of the timing switch, **SW-101**. Set to "Auto or Manual." Apply **B+** with a 1000 ohm probe; the shutter should hang open. Apply **B—**, the shutter should run through.

Pin 4 is **B+**.

Pin 5 is the reference voltage input. Measure at the wind side photodiode terminal.

Pin 7 is common to **VR-4**'s wiper. Typical voltage is near **B—**.

Pin 8 is **B—**.

C. **IC-103 (OM-2N** models only).

Pins 1 and **3** have no connection.

Pin 3 is the output to the black wire which supplies **B—** to the other ICs. Voltage should go to **B—** with **SW-402** closed (mirror up) or the blue wire shorted to body.

Pin 4 is the output of the data back contact. Voltage should go more positive with **SW-402** closed or the blue wire shorted to the body.

Pin 5 is the output to the LED which acts as an artificial light source to the photodiode. The voltage goes to **B—** and turns on the LED.

Pin 6 is the input from the A/M switch. Voltage should be **B+** in "Auto" and B— in "Manual."

Pins 7 and **8** are the input from the control signal to the shutter magnet (**CP-1** output). Voltage is near B— with the shutter open and near **B+** with second curtain released.

Pin 9 is the output to the flash dedication contact to end the flash exposure. The voltage should track pin 8.

Pins 10 and **11** are connected to an external capacitor. Voltage goes from **B+** to —1.8v when the blue wire is grounded to the body.

Pin 12 is the input from the right side flash dedication contact.

Pin 13 is **B+**

Pins 14 and **15** are involved with the latch to debounce switch **SW-402**. There is a momentary discharge of the capacitor connected to pin 15 with 40ms recharge time.

Pin 16's voltage changes from near **B+** to near **B—** when the blue wire is shorted to the body.

Pin 17 is the input from **SW-402**. Shorting pin 16 to the body should set pin 3 to **B—** and turn on the circuits.

Pin 18 is **B—**.

IV. MECHANICAL NOTES

1. As with other OM models, if the two shutter charge gears on the bottom of the camera do not recoil freely after winding, the camera may jam on the next wind stroke. Be sure they move freely after the shutter is set.

2. The "X" sync switch and "X" sync safety switch are both located at the bottom of the camera at the side of and beneath the circuit board.

3. If the circuit board is lifted (one screw), be sure to engage the manual speed resistor, A/M switch, and timing switch as it is replaced.

4. The screw which holds the upper ASA wiper is left hand. Also, the wiper is soldered.

VII. ADJUSTMENT PROCEDURES

1. Adjust the curtain travel time to about 12ms.

Check the "1 volt" reference by measuring the voltage on the wiper of **VR-102**. (CONNECT THE COMMON DVM LEAD TO BATTERY NEGATIVE FOR THIS TEST). Adjust **VR-102** for a 1.0v reading.

3. Adjust the manual shutter speed at 1/8 using **VR-103**.

4. Adjust the 1/1000 speed using the eccentric screw which operates the timing switch.

5. Adjust "Auto" shutter speeds using **VR-101**. The surface of the tester sensor will have to be the same reflectivity as film for the test.

6. Adjust the meter using the eccentric screw on the ASA cam follower. If the meter is not linear, check the resistors described in "Meter Circuit" above.

NOTE: You will be touching the board which has MOS ICs as you make adjustments. Touch the tool to the body first and be sure you are in contact with the test equipment as you make adjustments. Consult the service manual for current and offset adjustment procedures.

TROUBLESHOOTING FLOW CHART INDEX

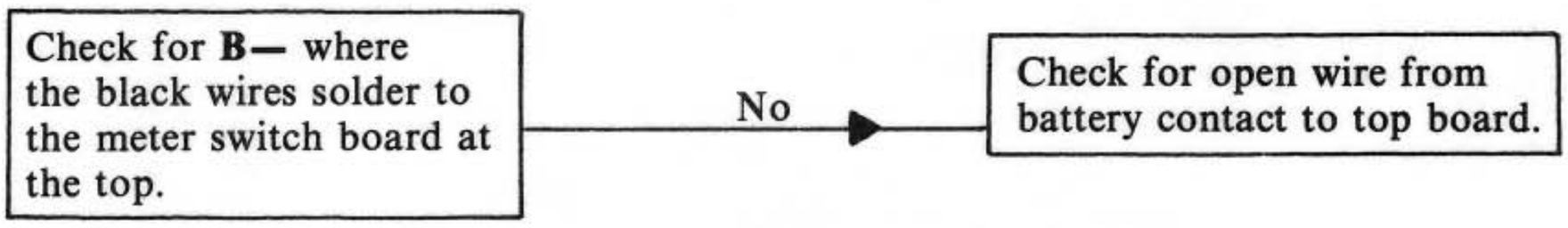
Camera Symptom	Flow Chart
No meter operation No shutter operation	1A
No shutter operation Meter is normal	1B
Excessive battery drain	1C
Shutter hangs open or is slow, auto and manual Meter is normal	2A
Shutter hangs open or is slow in auto Manual speeds normal	2B
Shutter hangs open or is slow in manual Auto speeds normal	2C
Shutter fast in all modes	2D
Shutter fast or "misoperates" in auto Manual speeds normal	2E
Shutter fast or "misoperates" in manual Auto speeds normal	2F
Shutter "misoperates" in auto and manual Meter is normal	2G
Meter will not indicate Shutter is normal	3A
Meter is not accurate	3B

V. TROUBLESHOOTING

1. Power Circuit Malfunctions

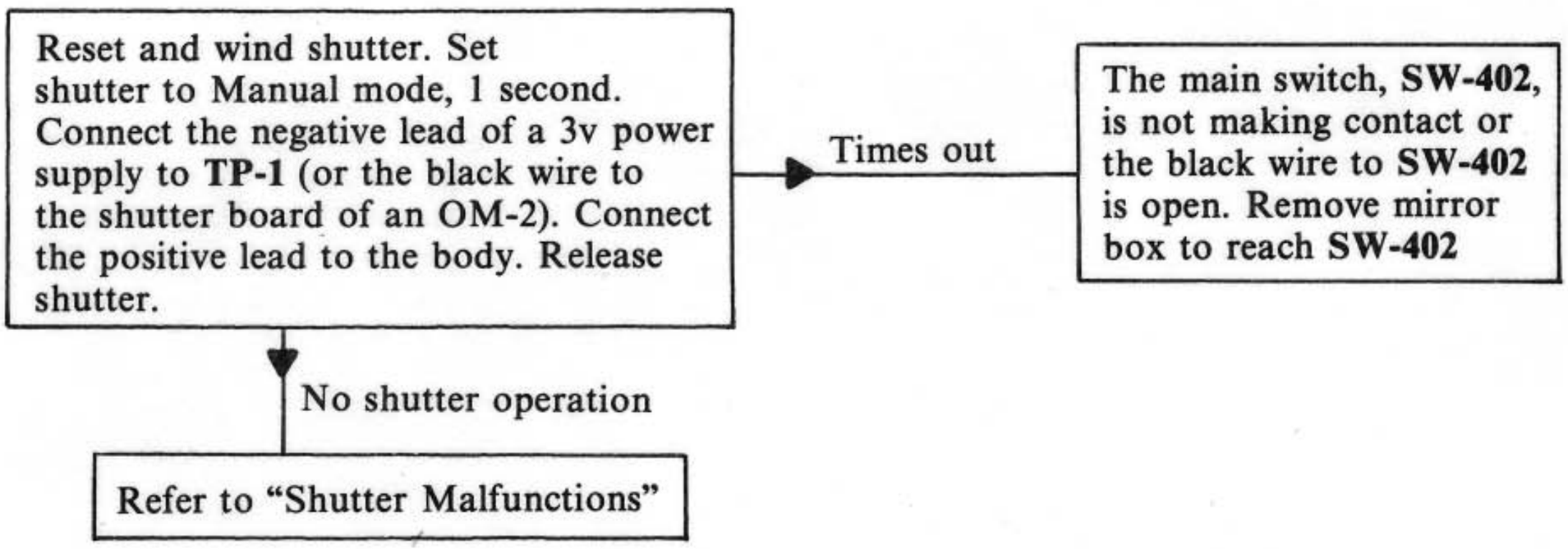
A. External Observations:

No meter activity
Shutter operates only in "B"
No battery check



B. External Observations:

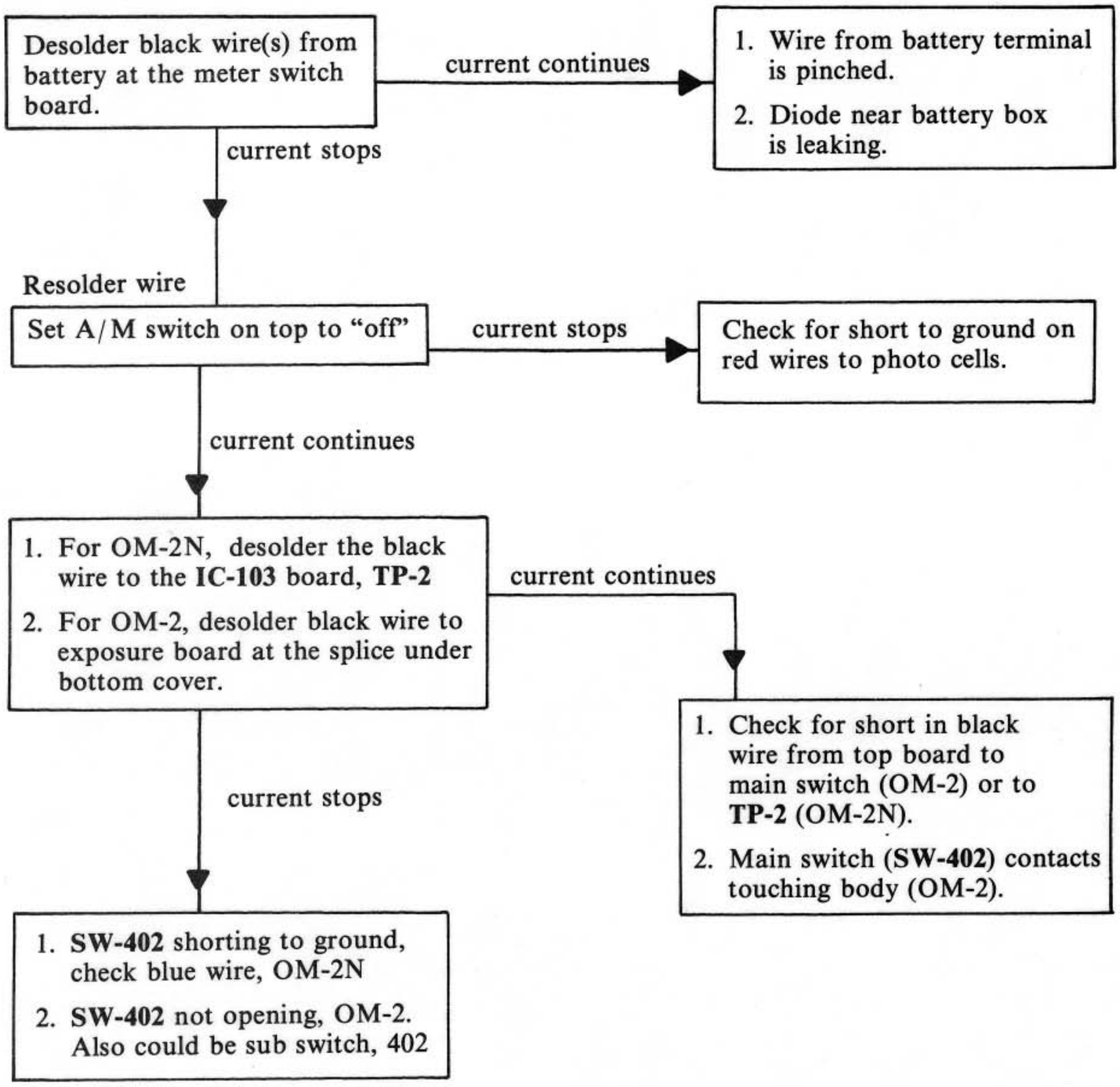
Shutter operates only in "B"
Meter function OK
Battery check OK



Power Circuit Malfunction (cont)

C. External Observations:

Excessive battery drain



Note: If there is excessive current with mirror up (**SW-402** closed), lift the exposure control board under the mirror and check for shorts between IC cans and the body. Also for pinched black wire.

2. Shutter Malfunctions

A. External Observations:

Shutter hangs open or slow in Auto and Manual
Meter indication OK
Battery check OK

Be sure the shutter magnet faces are clean.

> Note: If shutter hangs open at slow speeds only, check comparator offset.

Check the timing switch, **SW-101** to see that it opens with first curtain. Also, clean the board around the switch terminals.

SW-101 OK

Wind shutter; power up exposure board, then check the voltage difference between the wiper of **VR-102** and **B—**. It should be near +1.0 volts.

Low or near B-

Check **VR-102** wiper and solder to board
Check FET (**Q-101**) soldering
Check **B+** to **Q-101** (body)
Adjust **VR-102** for 1.00v

Voltage normal

Set Manual and 1 second. Connect 1000 ohm probe to body and release shutter. Before shutter times out, touch the probe to the white wire from ASA, **TP-3**.

Shutter closes

Check switch contacts and soldering, **SW-102b** common

Stays open

Check **Q-102** for short (c to e)or short to ground near base. IC check, **IC-101** and **IC-102.**

2. Shutter Malfunctions (cont)

B. External Observations:

Auto speeds slow or hang open
Manual speeds normal
Meter indication normal

With shutter released, set to Auto and power up board. Check voltage at **TP-4**. It should be near zero dark and near -0.6v in bright light.

Not typical →

1. Check **SW-102a** contact. Check continuity from **SW-102a** to the **SPD** terminal nearest rewind. (cathode)
2. Check continuity from the wiper of **VR-102** to **SPD** terminal nearest wind side. (anode)

Typical ↓

Remove power, but leave shutter released and set to Auto.
Check ASA resistance between **TP-3** and **TP-5**. Typical 7.0 K ohms for ASA-100.

high or open →

Check **SW-102b**
Check ASA wiper
Check white and yellow wires.

Typical ↓

Check **C-102** (under exposure board) for leak or dirt across terminals.
C-102 is 470 pf.

C. External Observations:

Manual speeds slow or hang open
Auto speed normal
Meter indication normal

With shutter released, set Manual and disconnect power. Measure the resistance between **TP-4** and the wiper of **VR-101**. Typical: 12 K ohm at 1/1000. 400 K ohm at 1/30

High or open →

Check manual speed VR, under the exposure board
Check **SW-102a**

Normal ↓

Power up board, set speed to 1 second. Short across **SW-101** with DVM probe at **TP-5**. Voltage should be about -2.0 v. Remove short, voltage should rise to -1.0 v in 1 second.

Slow or stays -2.0v →

Clean around **C-101**, under exposure board.
C-101 may be shorting
C-101 = 2200 pf

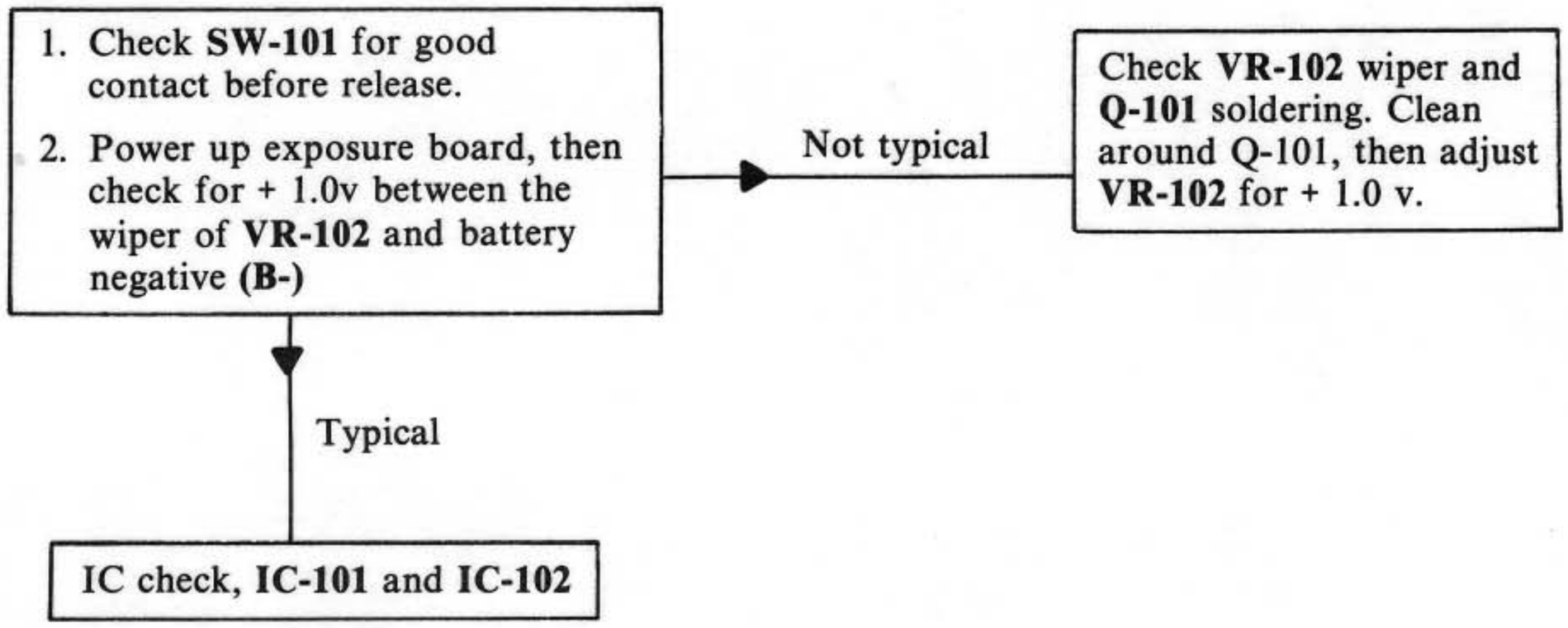
Normal ↓

Clean **SW-102b**. Check **SW-102b** continuity.

2. Shutter Malfunctions

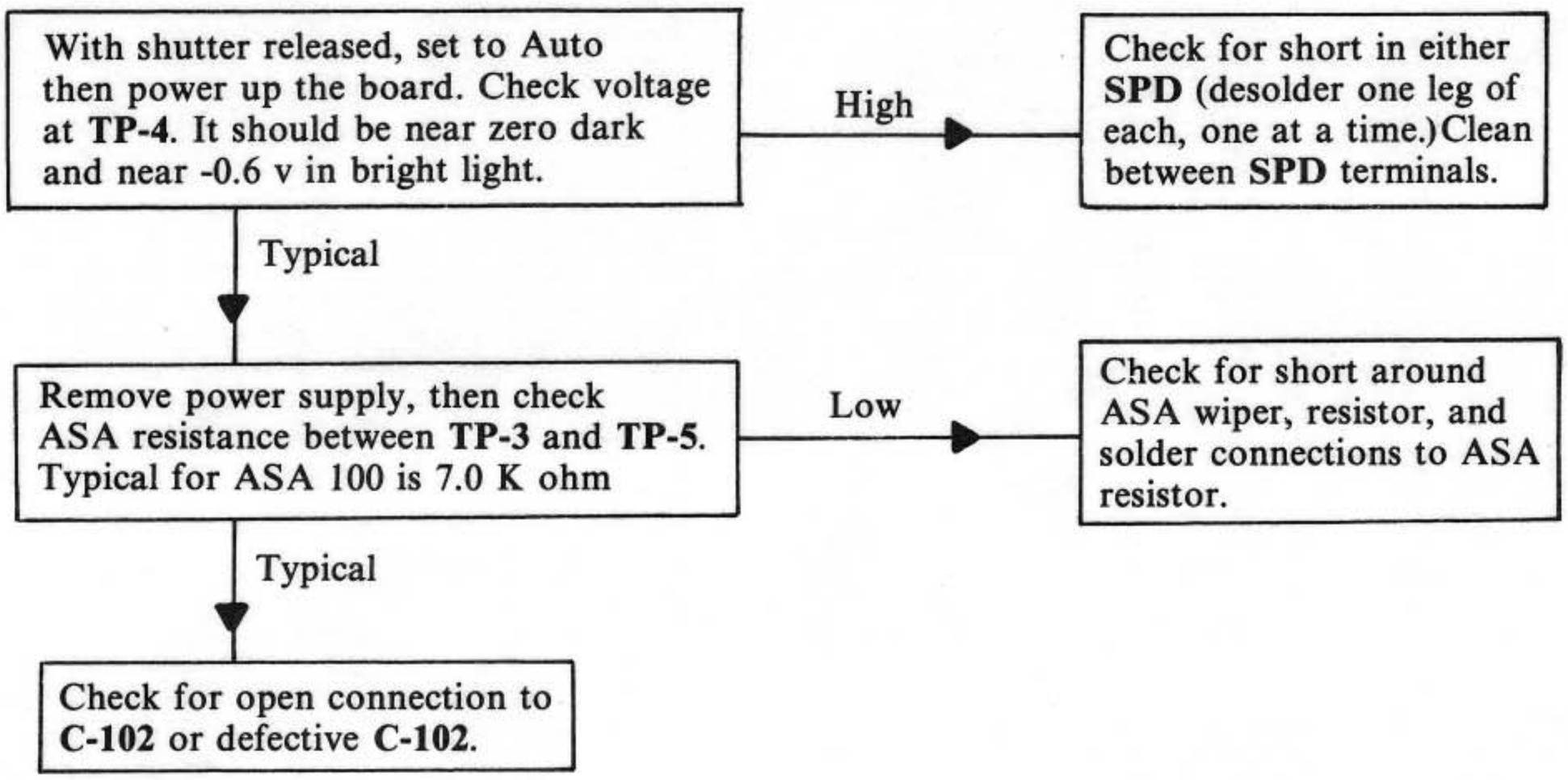
D. External Observations:

Shutter fast in Auto and Manual



E. External Observations:

Auto speeds fast or mirror locks up.
Manual speeds normal



Note: If there are no slow speeds in Auto mode but faster speeds are normal, the **LED** may be lighting (near **SPD**). Desolder the brown wire near **IC-103** to disconnect **LED** and recheck.

2. Shutter Malfunctions

F. External Observations:

Manual speeds fast or mirror locks up.
Auto speeds normal

With shutter released, set mode to manual. Measure the resistance between **TP-4** and the wiper of **VR-101**. Typical is 12 K ohm at 1/1000, 400 K ohm at 1/30

→ Not typical → Check for short around the variable resistor under the board. Clean board near **SW-102a** and **SW-102 b**.

↓ Typical

1. Check wiper contact on **VR-103**.
2. **C-101** may be open.

G. External Observations:

Mirror rises and locks up because shutter does not run.

Reset and wind shutter.
Set to Manual, 1 second.

Connect negative lead of power supply to the black wire feeding the exposure circuit. Check current, typical 8 ma to 9 ma. *

→ Not typical →

1. Less than 8 ma, check for poor connections, poor board ground, open magnet, **Q-102** not on.
2. 11-13 ma, (or rising to that after 1 second) **SW-101** is not closing.
3. Above 14 ma, there is a short or component failure.

↓ Normal current

Release shutter

→ Functions normally → **SW-402** on the side of mirror box is not closing or is dirty.

↓ Mirror locks up and shutter does not run

Check magnet with shutter set to see if faces are seated

→ Not seated → Magnet is dirty. Improper positioning. Check to see that latch plate A is seating on third tooth of plate B (see diagram). If not, reform for proper overtravel.

↓ Faces seated OK

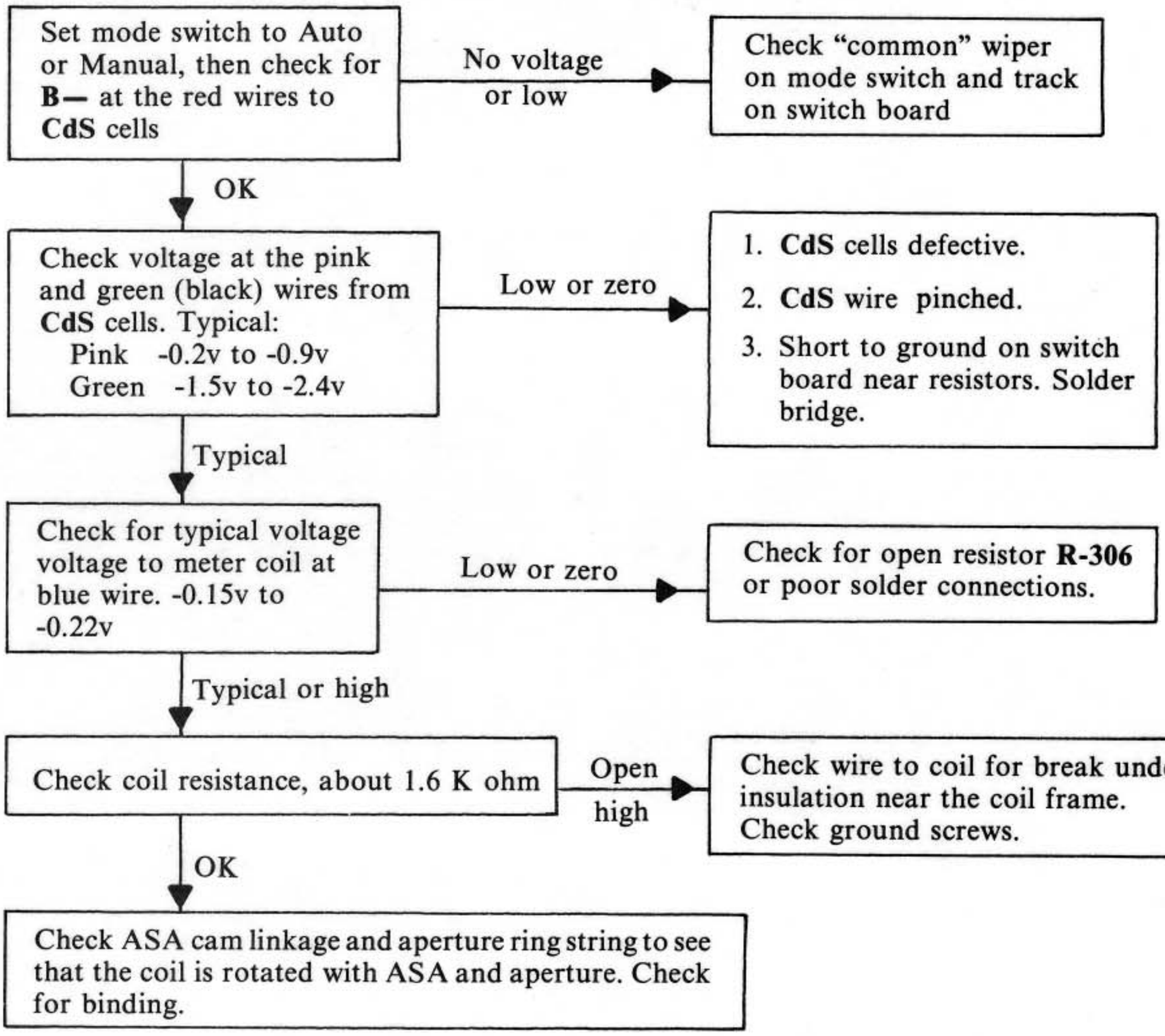
Exposure board may be defective

*OM-2, connect negative lead to the splice OM-2N with IC-103, desolder black wire at **TP-1**

3. Meter Malfunctions

A. External Observations:

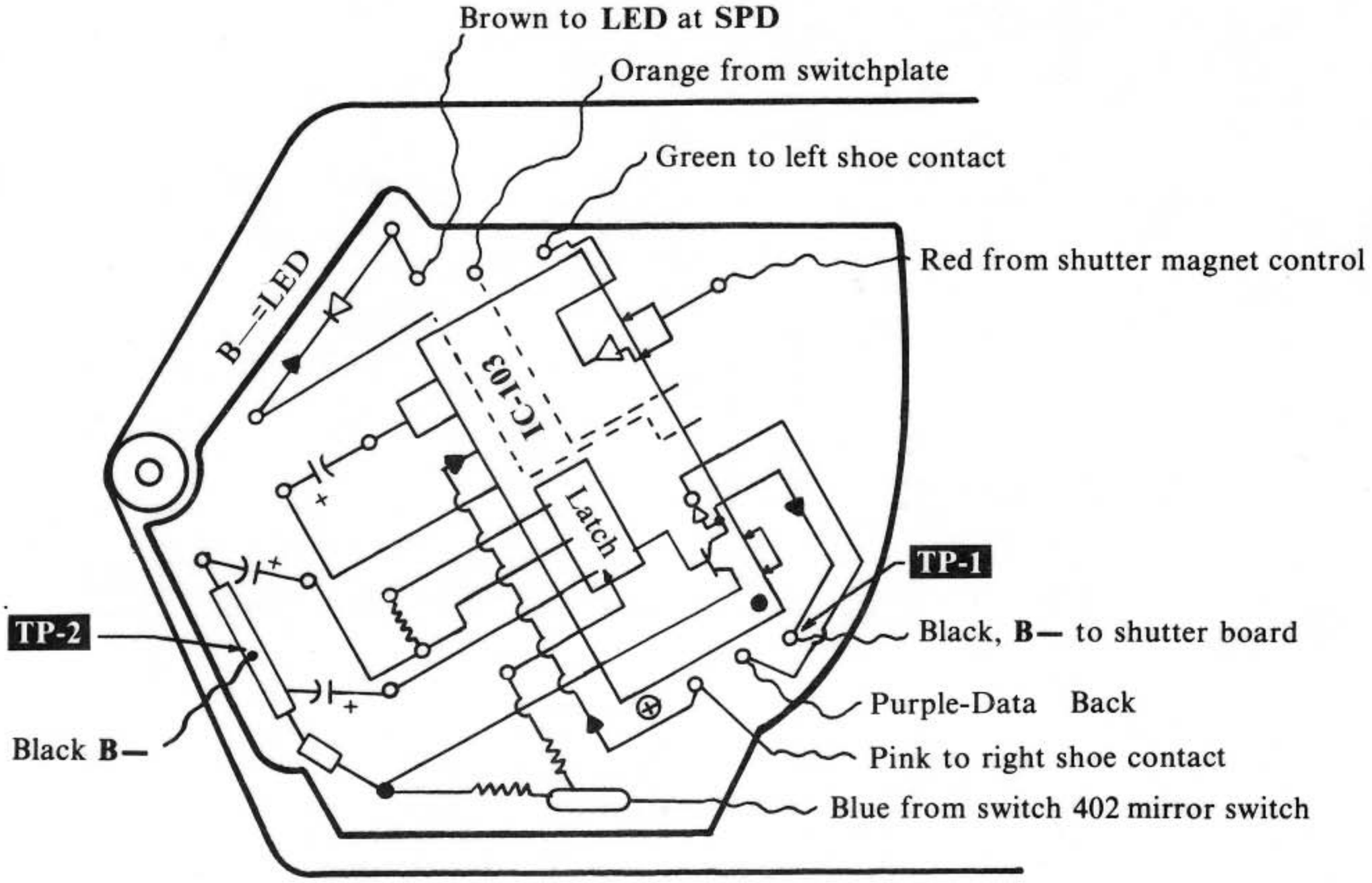
No exposure meter indication
Shutter function normal
Battery check normal

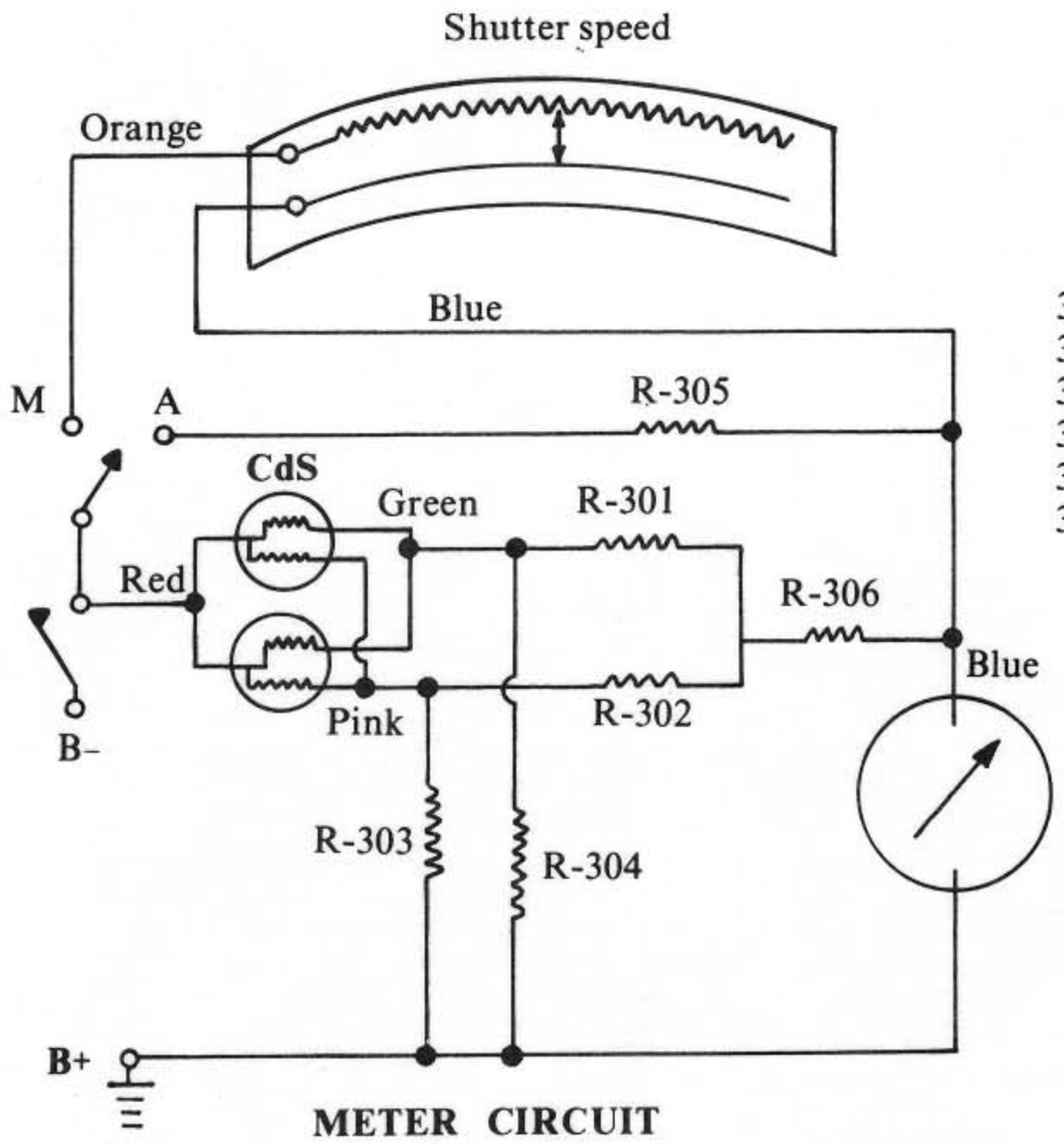


B. External Observations:

Inaccurate meter indication

1. If readings are all low, check for one open **CdS** cell, open resistor **R-301** or **R-302**, or improper meter coil rotation.
2. If readings are high, check for shorted **CdS** cell or open **R-304**.
3. If readings are nonlinear, check **R-303** and **R-304**. Also, **CdS** may be defective.
4. Erratic reading, check solder connections around resistors and meter ground screws.

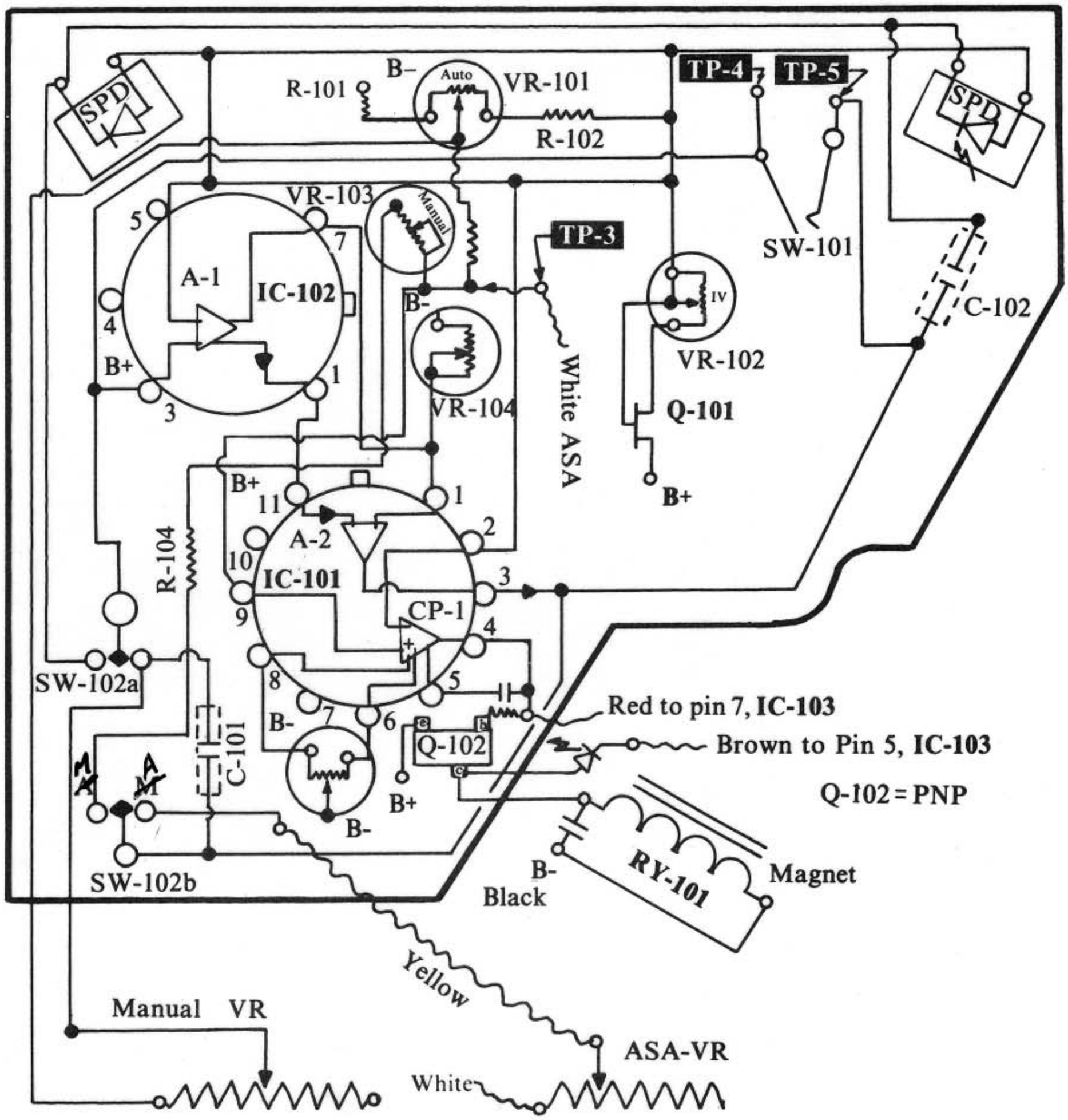




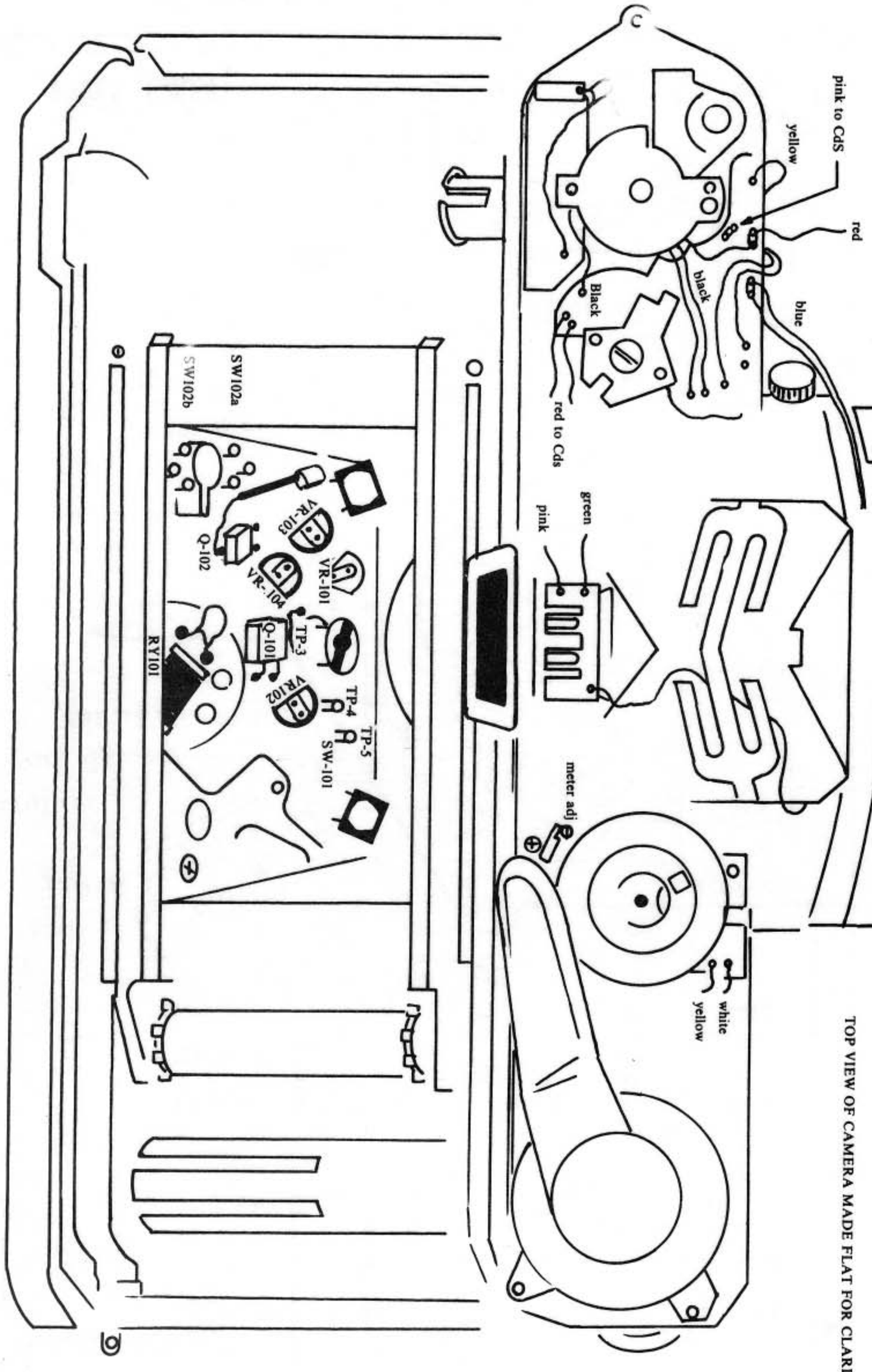
METER CIRCUIT

Typical Resistance	
301	30K
302	27K
303	12K
304	12K
305	68K
306	2.4K

AUTO/MANUAL CONTROL CIRCUIT



EQUIVALENT AUTO CIRCUIT



TOP VIEW OF CAMERA MADE FLAT FOR CLARITY.

PART DESCRIPTION	PART NUMBER
Timer lever	ZC108200
Timer lever screw	CE070400
A/M Switch lever	CEO97600
A/M Switch lever collar	ZC134200
A/M Switch lever screw	PUK1.4-605SO
Rewind knob body	CA872500
Rewind knob body black	CA940300
Rewind lever	ZC134300
Rewind lever black	ZC134400
Wind lever	CA918000
Wind lever screw	CA875200
Dress plate	CA913500
Wind lever black	CA941100
Wind lever screw black	CA941200
Rewind shaft	CA947600
Top cover	ZC104500
Top cover black	ZC109300
Battery cover	CE050500
Battery cover black	CE120400
Winder coupling cover	CA945100

PART DESCRIPTION	PART NUMBER
Mirror cocking lever	ZC104100
Meter galvo	ZC115600
Wind shaft Assy.	ZC132400
Wind ratchet	CA937500
Wind gear	CA937600
Takeup spool	CE051300
Sprocket	ZC132100
Screen	CA950100
Exposure circuit board	ZC112000
Photodiode	ZC111900
CdS cells	ES5003
Left leather	CA968600
Right leather	CA910300
Mirror lever	ZC106700
Mirror lever	ZC112900
Latch lever	CA841900
Magnet	ZC111100
Shutter speed resistor-meter	CEO71900
ASA resistor	CEO64500
Tripod socket	CEO51400

715 Highridge Ave., Greencastle, IN 46135

OLYMPUS OM-2 UPDATES — JUNE 1985

I. EXTERNAL TESTS

1. Turn the mode switch to "Check" to test the battery. The LED should glow brightly if the battery is good.

2. Test power consumption of the exposure control circuit in the following manner:

A. Connect a metered power supply to the battery terminal (—) and strap lug (+). Set mode to "Manual" and speed to 1 second. Remove the lens and hold the diaphragm operating lever down.

B. Press the shutter release, then slowly let up on the control lever until the mirror is about 1/3 up. Power should be about 9ma. If the current is low, the shutter will probably not open. Low current could be caused by switch **SW-101** not making contact, a problem with the circuit board or magnet, or power supply problem.

C. Let the mirror rise and the shutter open, then hold the control lever up. While the shutter times out, current should be about 9 to 10ma. After the shutter closes, current should rise to near 12ma.

3. Replace the lens, then check the manual and auto shutter operation. Remember to use film or similar material for proper reflectance off the film plane while testing auto speeds. Be sure auto speeds vary with changes in ASA and aperture.

4. Compare meter readings with auto exposure. Remember, the two are not electrically related. One may be working correctly while the other is not. Check the meter operation in manual mode.

A. If the meter responds erratically to changes in ASA and aperture, the meter movement ground may be loose or the blue wire to the meter may be cracked.

B. If response is erratic as manual speeds are adjusted, the wiper on the speed resistors at the top is not making good contact.

5. Check for damage to the transport ratchet by winding the shutter ten times while keeping pressure on the sprocket. If the wind lever skips or slips, the pawls or gear may be damaged.

II. TROUBLESHOOTING UPDATES

1. Cameras exposed to salt water spray or mist can sustain damage to the exposure control circuit board. If speeds are slow, try cleaning the board with alcohol and check for contamination on the ceramic.

III. CIRCUIT UPDATES AND CORRECTIONS

1. On page 13, the drawing of the control circuit has the letters **"A"** and **"M"** reversed for switch **SW-102b**.