Nikon FTn meter adjustment and cleaning procedure

About this document:

This document was prepared by a camera repair hobbyist as an aid to other camera repair hobbyists. It was prepared without any information from Nikon, Inc., and is provided without any guarantee as to completeness or accuracy.

How the Nikon FTn lightmeter works:

Refer to the schematic below. In both test and meter modes, the circuit is a voltage divider. The meter movement is centered when it has 0.025 volts across it. When the test button is pressed, current flows from battery negative, through test adjust trimpot, through the switch (green to white, pushbutton down), through the meter adjust trimpot, and then through the meter to case ground to battery positive.

With a 2.7 volt battery this results in a current of about 16 micro-amps ((2.7 - .025)/(160,000 + 6800)). This means the meter movement is about 1560 ohms (.025/.000016), and that the voltage at the switch is about .134 volts (.000016*(6800+1560)).

Note that .025 volts at 16 micro-amps is much less than what an ohmmeter will put out. Be careful not to put an ohmmeter across the meter even indirectly. All potentiometers and the resistor can safely be checked with an ohmmeter if you test with the battery removed and the switch off, and read directly across a single potentiometer. The best way to check the meter for continuity is to check voltage from the meter lead to ground with the battery installed and the meter switch in the battery test position. If the meter is open, full battery voltage will be imposed on the meter with no meter movement.

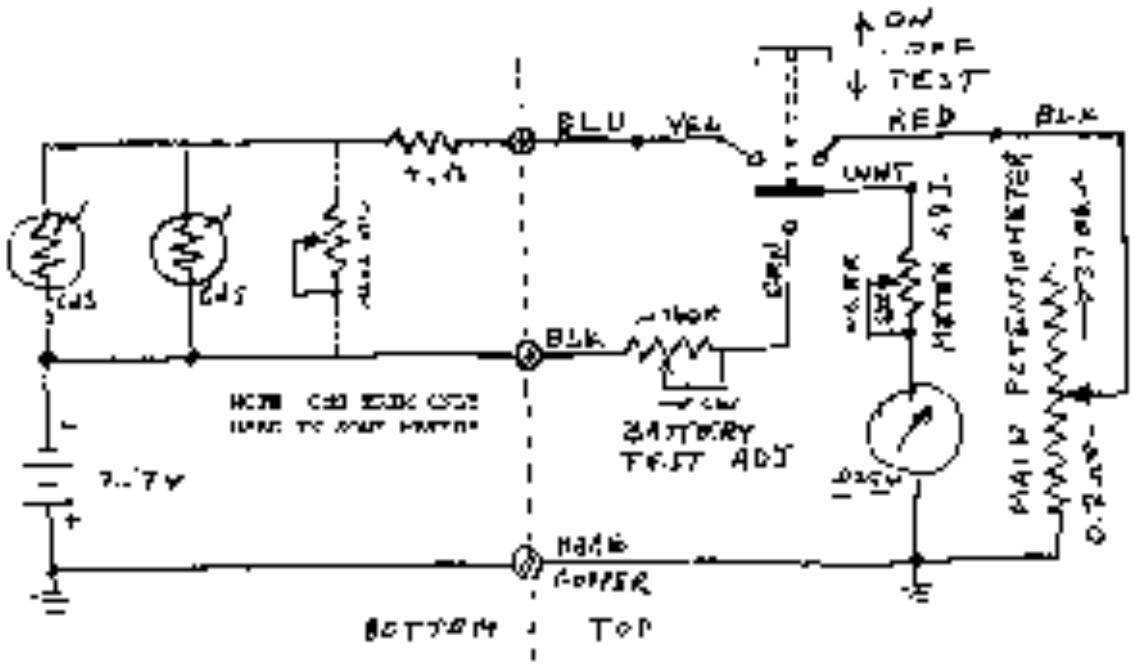
In meter mode, with the pushbutton up, the switch yellow, red, and white leads connected, the voltage divider is the two CdS photocells (60% center and 40% full frame) and the fixed 41 ohm resistor, against the main potentiometer and the meter (with trimpot) in parallel. The meter is centered when there is a voltage of .134 volts at the switch.

The aperture lever, which moves the wiper, and the shutter speed & ASA setting, which turns the potentiometer resistive element, operate the main potentiometer. At somewhere around f/2, 1 sec, ASA 100 it is approx. 370K (maximum), and at around f/16, 1/1000 sec, ASA 40 it is approx. 0.2 ohms (minimum). I'm not sure I got those settings exactly right (with the meter off the camera), but you should be able to see the ends of the potentiometer element easily, and check for maximum and minimum resistance at the crossover.

There are no stops, the potentiometer will wrap around from max to min at long exposures and wide apertures, causing the meter to stop functioning (needle will drop to off position).

The photocell resistance (both cells) varies from over 4 Meg in a fairly dark room to less than 200 ohms when the meter is held about 6 inches from a 60 watt bulb.

The above measurements are from a single working meter. Small variance can be expected from meter to meter.



Nikon FTn Meter Schematic

Troubleshooting:

Check your batteries, they should be about 1.35 volts each.

Meter completely dead - check the contacts of the battery holder first. The positive connection (tab on the side) becomes easily bent to where it will not make contact. With the battery cover off, press the batteries in and against the side contact with your finger, if the meter can be made to work this way (check with test button) then battery contact is the problem. Clean and slightly bend the contact, being careful not to bend it out too far so that it catches the cap and is pushed down too far.

With the cover removed, verify about 2.7 volts between the battery negative terminal (center) and the ground strap (front, accessed through the round hole on the top left of meter).

Test position makes meter needle move only about half way to center position - positive battery contact bent out too far, cap pushes it down too far connecting it to a single cell (shorting the other one out). Disassembly may be required to straighten the contact.

Test function works but meter reads erratically or not at all - bad contact on main potentiometer or poor connection; disassemble, inspect and clean.

Adjustment (meter on camera):

Peel off the leather meter cover and remove the 4 screws exposed. Remove the sheet metal cover. Two trim potentiometers will be accessible, the front trim is for meter sensitivity and the

rear trim is for meter test. The sensitivity adjustment affects the meter test adjustment, but not vice versa, so adjust sensitivity first.

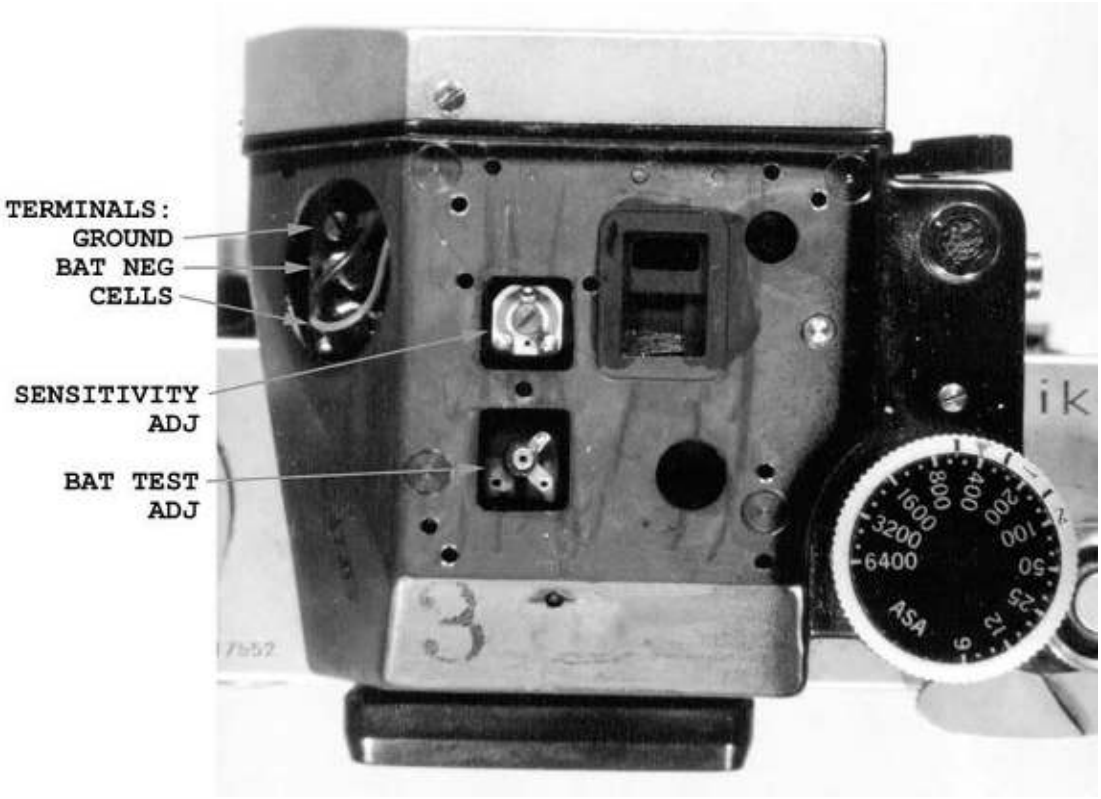


Fig. 1 - FTn with cover removed

Adjustment should preferably be done with fresh batteries.

Focus the camera (full frame) on an evenly illuminated 18% gray card, and adjust the sensitivity to agree with a known accurate meter. If you don't have a known accurate meter, you can make an approximate setting by using a film manufacturers recommended setting for direct sunlight. For example, set the camera to ASA 100, 1/125 sec, f/16, and adjust the meter to center the needle when aimed at a gray card in direct sunlight. You could then make fine adjustments based on test shots, for example, if tests indicate you need 1/2 stop more exposure, set up with the Grey card, center the needle, open up 1/2 stop, and re-center the meter using the sensitivity trim adjustment.

After the sensitivity is adjusted, set the meter test trim so that the needle is centered when the test button is pressed.

If meter cannot be adjusted, disassemble, clean and inspect.

Disassembly:

With meter removed from camera and sheet metal cover removed (see adjustment above):

Remove batteries.

Remove front cover by removing 3 screws, pressing aperture lever inside cover slot, and pulling straight forward.

Disconnect copper strap and 2 wires by loosening screws through round access hole on left side of meter (angled surface). Be sure to note which wire goes where.

Remove 4 black screws from bottom of meter, 2 front screws directly under front latch pins (squeeze pincer lever for straight access) and 2 rear screws in corners next to eyepiece. Separate top and bottom halves carefully. Do not loose the 4 washers between the two halves, they should be glued on to the bottom half but sometimes fall off.

Fig. 2 - FTn bottom view

Cleaning:

Inspect all connections and potentiometers. Clean carefully with brush and gentle blower. Do not use any spray cleaner, especially on the bottom half, there is risk of getting cleaner and dirt on optical surfaces which are difficult to access. Tape head cleaning solution or alcohol and lintless swabs work well on potentiometer surfaces.

If the problem is a bad connection between the main potentiometer wiper and element, it will probably be necessary to remove the brass gear that the wiper is mounted on, and carefully clean the wiper. Mark the position of the gear before removing.

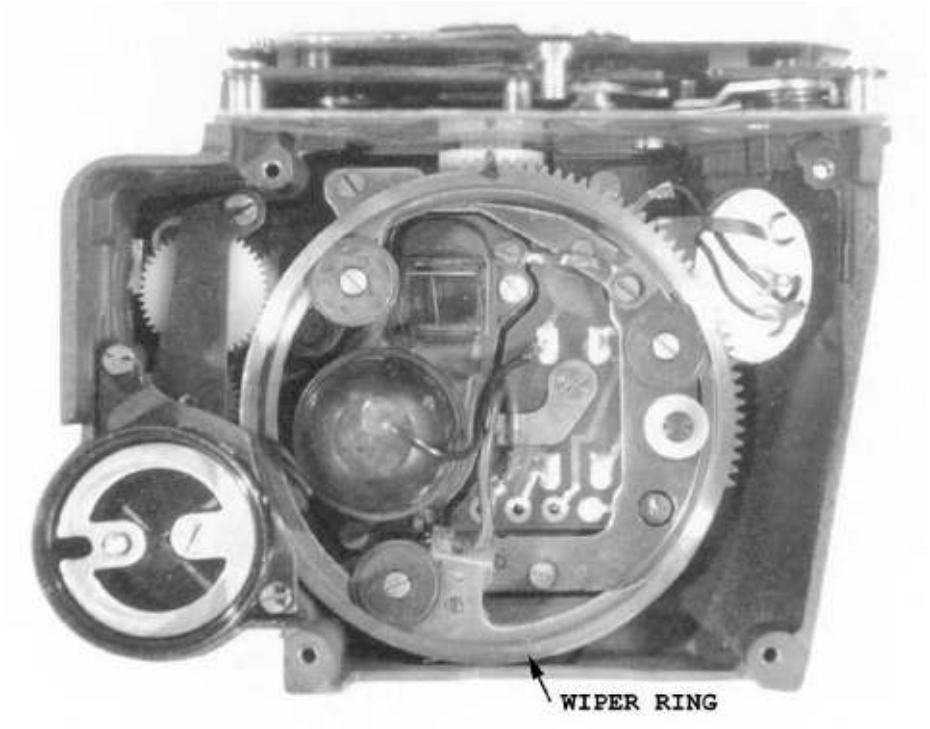


Fig. 3 - FTn top inside

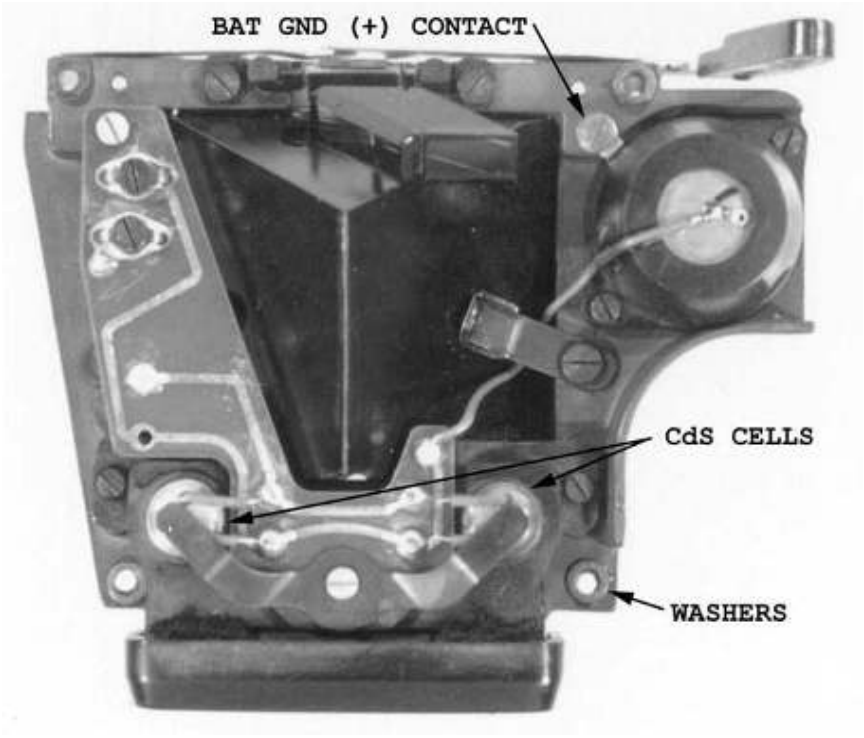


Fig. 4 - FTn bottom inside