

DEMISTIFYING DSLR SENSOR CLEANING

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Agenda

1. Goal of this presentation
2. What's the problem?
3. How do DSLR sensors get dirty?
4. Where is the dirt?
5. How can I see the dirt?
6. Various sensor cleaning methods
7. Recommended sensor cleaning methods
8. Cleaning demonstration
9. View *your* sensor with a sensor scope

Goal of This Presentation

- ***Demystify*** sensor cleaning
 - Worthwhile if you do it yourself, or if you send it out to be cleaned

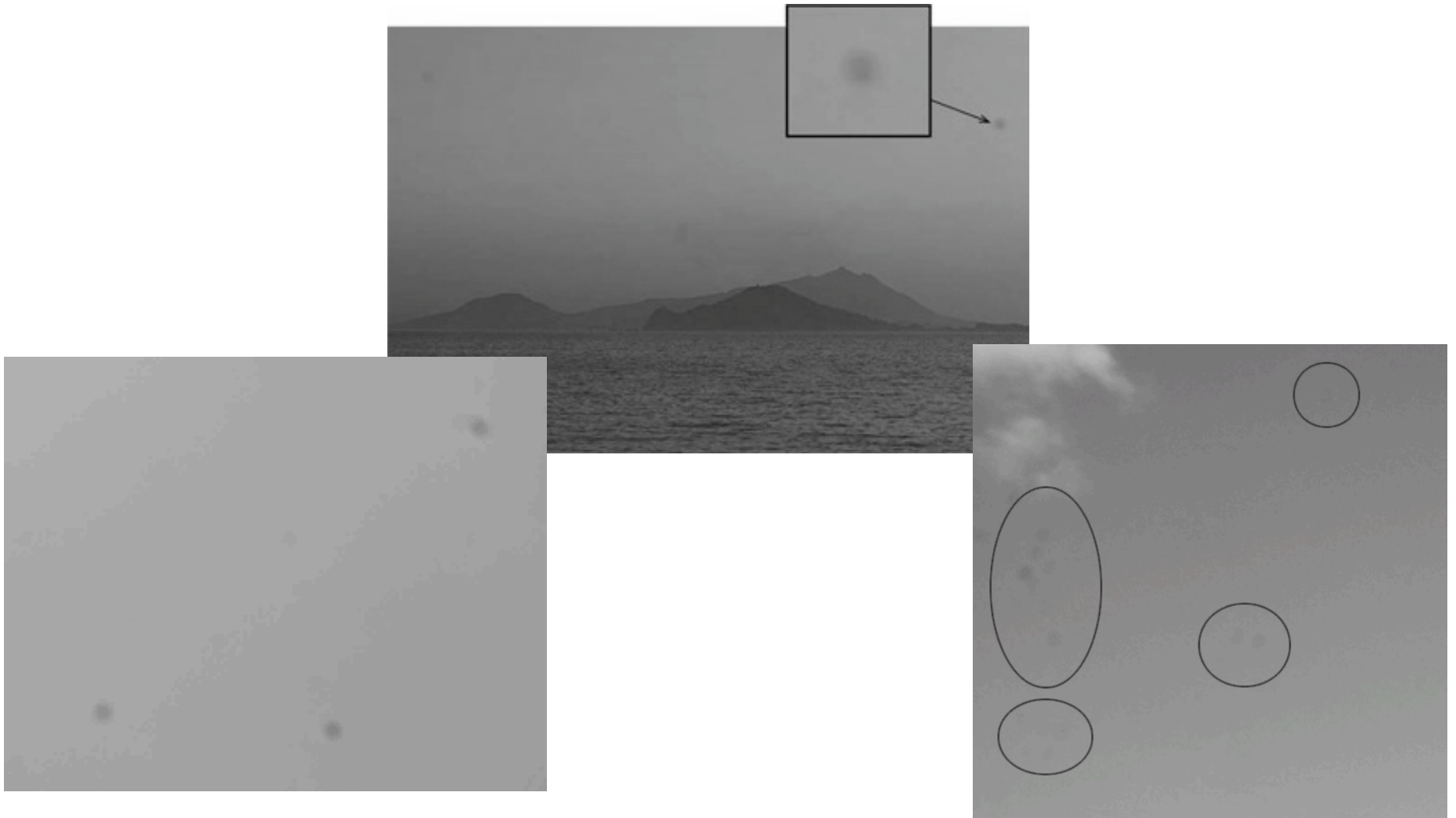
DISCLAIMER

- **The information presented here within has been assembled in good faith. Use of the information is *AT YOUR OWN RISK*.**
- **The presenter is NOT responsible for any damage to camera bodies, lens, or others accessories before, during, or after the cleaning process, whether done by the presenter, yourself or others.**

Is “Do-it-Yourself” Sensor Cleaning for Everyone?

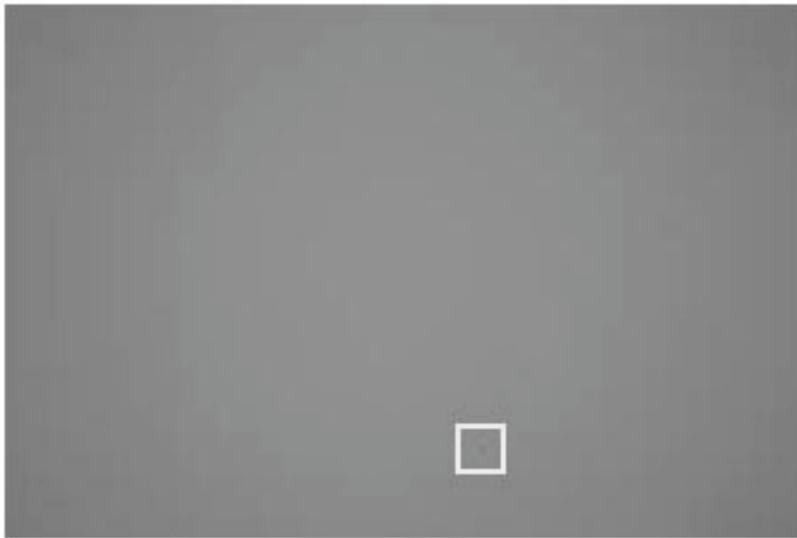
- Most find it simple, BUT if you have
 - Shaky hands
 - Poor eyesight
- You might want to have someone else do it
- Also – the equipment is somewhat expensive
 - So consider the trade-offs of do-it-yourself versus sending it out to be cleaned

What's the Problem?



Sensor dust as seen on photographed images

Oil Spots On Sensor



Image



Image magnified

Oil spots are nowhere near as common as dust

Seeing Dust Versus Oil

- On a very dirty sensor it can be difficult to tell the difference between dust and oil

How Do DSLR Sensors Get Dirty?

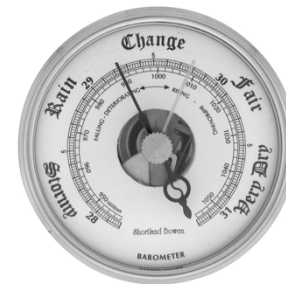
- Changing lenses



- Zooming, focusing lenses
 - Creates air velocities in the lens



- Normal changes in atmospheric pressure draws dust in



- Oil from camera mechanisms

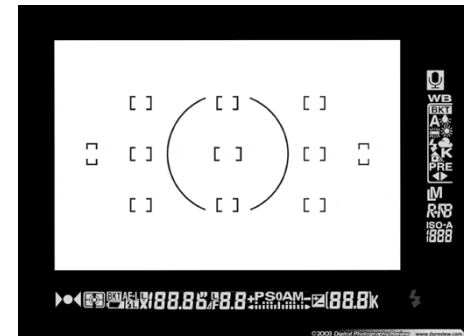


In other words, it comes from everywhere!

***You can minimize it
but can't stop it from happening.***

Where *IS* the Dirt?

- If you see it **in the viewfinder**
 - Its NOT on the sensor
 - Cleaning the viewfinder is more complex and best left to a professional
- *When taking a picture the mirror flips up.*
Anything visible in the viewfinder is NOT in the image path to the sensor!



Where *IS* the Dirt?

- If seen **in the image**
 - Dirt is **on the sensor**
 - Dirt and smudges on the lens are **NOT** visible in images

Even lenses damaged like this are barely noticeable in the image



Proper Way to Change a Lens

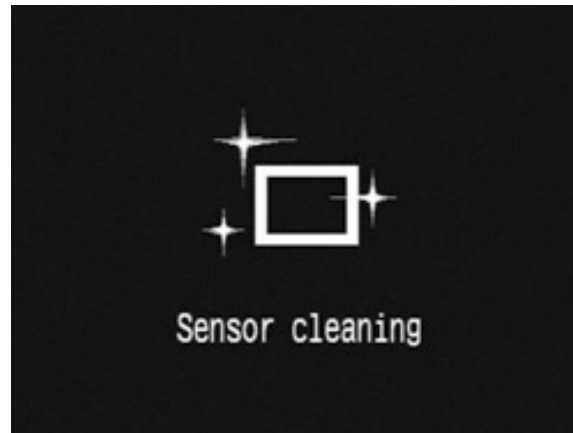
- Change lens with camera ***power turned off***
 - When power is on, sensor holds an electrostatic charge
- Change in ***clean environment***
 - Tilt camera so that ***lens opening points downwards*** to minimize dust entry



This might not always be possible

What About *Auto Sensor Cleaning?*

- It delays and minimizes, but does not eliminate the problem



What About *Film* Cameras?

- In a film camera, there is a new sensor with every shot
 - *What is this sensor?*
- Any dirt on the film is moved out as the film is advanced



What About Digital *Point and Shoot* Cameras?

- Non-removable lens
 - So dust normally does not enter
- No way for user to clean sensor



How Can You See the Dirt?

- 1. Shoot a image** of a *featureless*, light-colored background at a **small aperture, like $f/22$**
 - Blue sky, uniformly colored wall or ceiling, etc.
 - Then view image on computer at 100%

OR

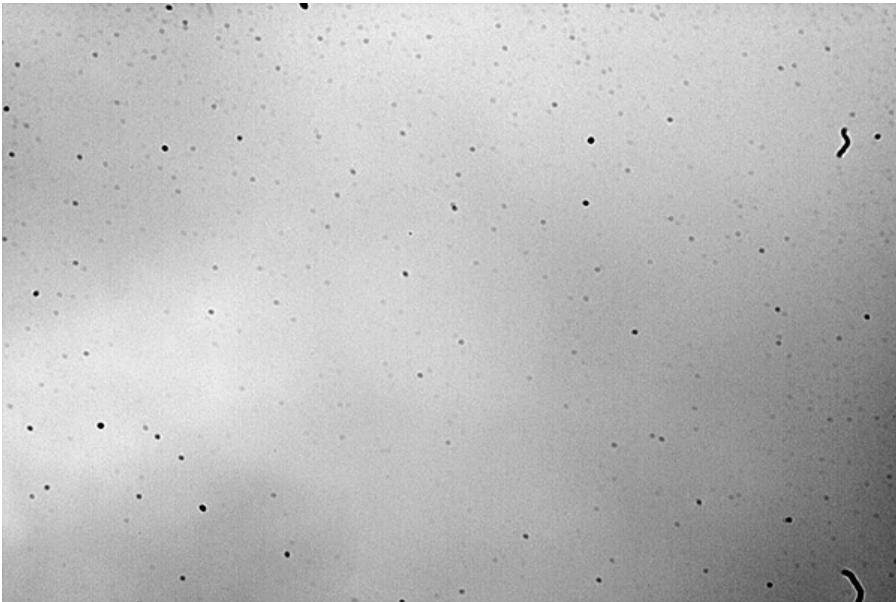
- 2. Use a sensor scope**



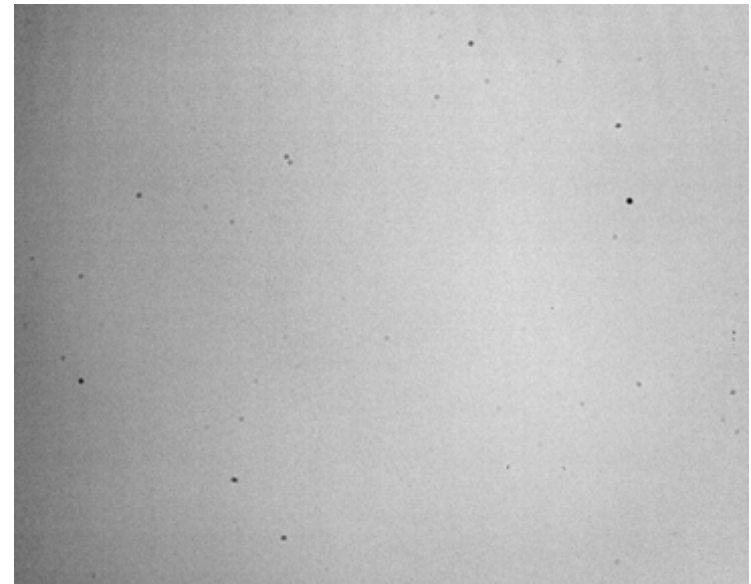
Why a Sensor Scope is *Faster, Easier and Better*

- Taking photo, transferring it onto computer
 - Takes time
 - So scope is *faster*
- Dust on image is in different place on sensor
 - Reversed
 - So scope is *easier*
- Scope can see oil and grease smears, differentiate types of dirt
 - So scope is *better*

Dust Seen Through a Sensor Scope



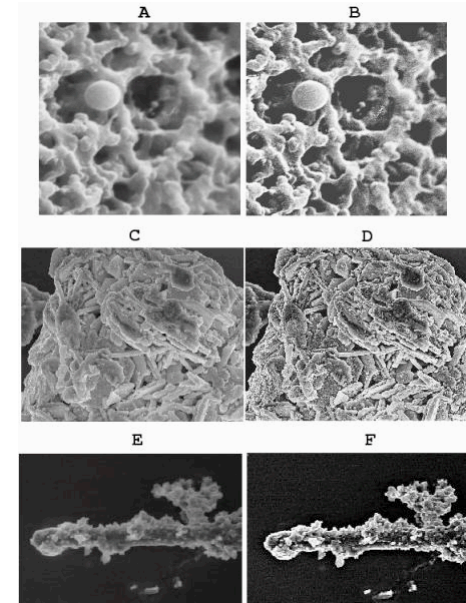
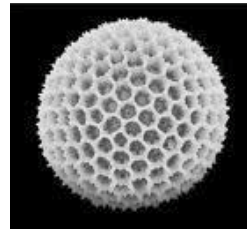
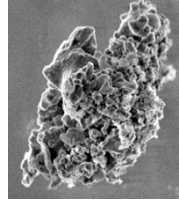
Really dirty sensor



Not too unusual

Types of Foreign Objects

- Dust
- Lint
- Dirt
- Pollen
- Oil and grease
 - From camera mechanisms



Various Sensor Cleaning Methods

1. Dry methods

2. Wet methods

3. Miscellaneous methods

Dry Methods

- ***Rocket Blower***
 - Can get loose particles
 - Generally ineffective on most sensor dust



Dry Methods (cont.)

- ***Sensor Brushes***

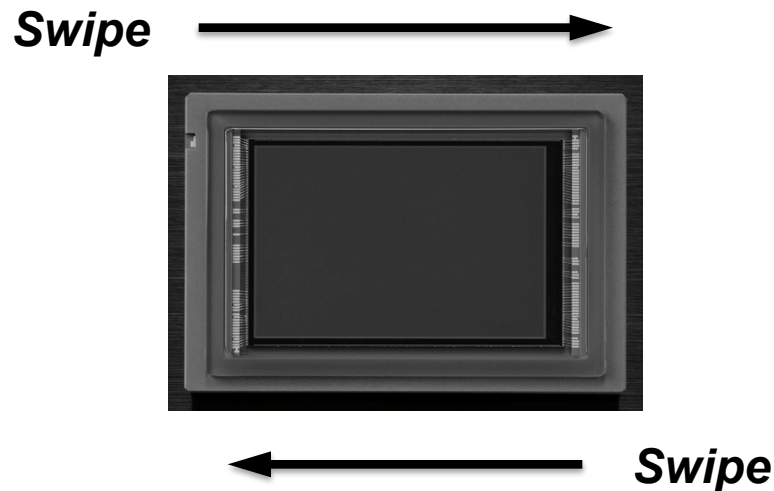
- Worked on all dust particles I have encountered
- Works via brushing action and electrostatic charge
- NOT effective on grease and oil



Sensor brushes are not ordinary brushes. They are made of special oil-free synthetic bristles that will retain a static charge when agitated.

Using a Sensor Brush

- Brush across the sensor in the long direction
- Use similar force as if painting
 - Not gingery, but don't push too hard
- Swipe in one direction, agitate brush, swipe in other direction



Dry Methods (cont.)

- ***SensorPen***



I have not tried this method.

- ***BrushOff***



I have not tried this method.

Wet Methods

- *I recommend dry method* for removal of dry particles
 - But wet is *required for oil / grease removal*
- “Swabs” available for full frame and crop sensor sizes
- Wet method can *leave streaks* if not careful



Wet Methods – Some Details

- **Don't use Q-Tips**
 - They have *fibers* that can be left behind
 - Because the tip of a Q-Tip is small, it is *time consuming* to wipe with
 - It is much less work and cleaner to *use a device that covers the full width of the sensor*



Miscellaneous Methods

- ***Sucking***
 - GreenClean USA



- ***Sticky***
 - DustAid
 - SpeckGRABBER
 - Scotch Tape
 - My concern is ***gunk*** left behind
 - And what if you ***remove some of the sensor coating?***



My Recommended Cleaning Method

- ***Sensor Scope and Brush***
 - Fast, easy
 - Effective on particles but not for grease and oil



Uses canned air to agitate the bristles

Newer Version

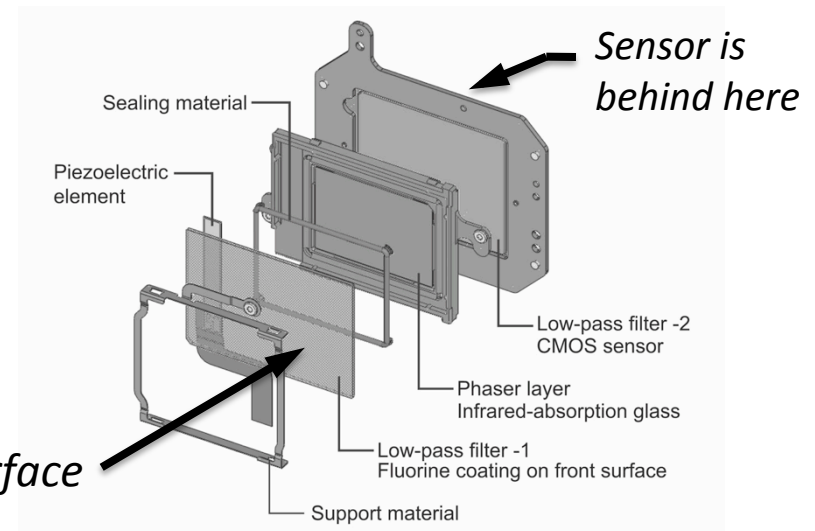
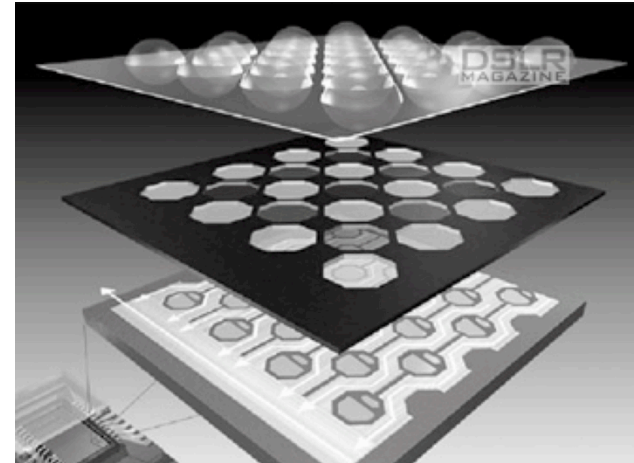
- Canned air not legal on airplanes
- This one “spins” to create static charge



ArcticButterfly by VisibleDust

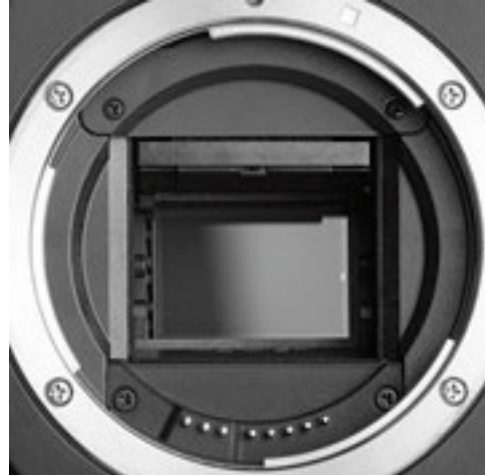
But Can't I Damage the Sensor?

- ***Not touching sensor***
 - Nor the colored filter array (CFA) on top of the sensor
 - Nor the MEMS microlenses on top of the CFA
- But the ***top layer of coating on the low-pass filter*** on top of all of this



Can Dust Get Inside The Sensor Assembly?

- Sensor assembly is sealed, so dust cannot get between the layers



Cleaning *Watch-Outs*

- Make sure ***battery is fully charged***
 - So shutter does not close while cleaning
- When using brush, ***keep brush away from camera internal parts***
 - Oil and grease inside the camera
 - Sticky material – a part of the sensor cleaning system
 - You DON'T want to get that on the brush and then the sensor

My Favorite Cleaning Products

- ***My favorite sensor cleaning products***
 - *VisibleDust*
 - <http://www.visibledust.com/>
- Also available through K&R (Kentucky) and B&H
 - VisibleDust products are expensive
 - My experience is that you get what you pay for

Sensors with Oil Spots or Smears

- Need to use a ***wet method***
- ***Use a sensor scope*** and follow the manufacturer's recommendations
- I have used
 - VisibleDust *SmearAway*
 - Gets rid of the oil, but leaves a streak
 - Followed by VisibleDust *VDust Plus*
 - Gets rid of the streak



Sensor Cleaning Procedure

Using a Scope & Brush

1. Remove the lens
2. Turn the camera “on”
3. Select ***sensor clean mode*** (see camera manual)
 - This locks the mirror up and opens the shutter
4. Position camera so lens opening is facing up (on a table or desk)
5. Use ***sensor scope*** (& turn on LED lights) to view sensor & note dust location
 - **DO NOT** use a brush if lubricant smears are visible
 - Use a wet cleaning method instead

NEVER blow canned air into the camera!

Sensor Cleaning Procedure

Using a Brush (cont.)

6. Blow canned air through the ***brush bristles***
 - Generates an electrostatic charge on the brush bristles
7. Use one gentle stroke motion from left to right across the sensor (long direction) ***once*** using *slight* pressure (as if painting)
 - Have someone demonstrate first
8. Look at sensor with scope
9. If not clean, blow canned air through ***brush bristles*** to clean bristles and regenerate the electrostatic charge
10. Swipe the sensor again
11. Look at with scope. Repeat until clean.

I have used this method successfully on dozens of cameras. On one or two where dust particles were solidly attached I needed to use the bristle tips to dislodge the particles.

Streaks

- If you clean the sensor with a brush and see a streak, it means you have smeared oil onto the sensor
- If this happens
 - Do a wet clean of the sensor
 - Clean the brush with VisibleSensor *Brush Clean* and ***distilled water***

Sensor Cleaning Demonstration



View *Your* Sensor Through the Scope



