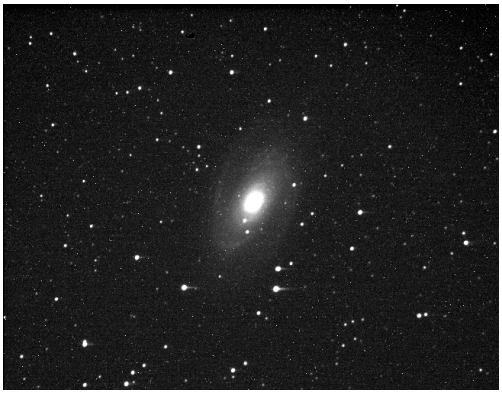
What went wrong with my image???

Problem

- I don't see anything!
- You mean that little fuzzy spot and those faint dots is all there is?
- It looks all black to me!

Solution/Reason

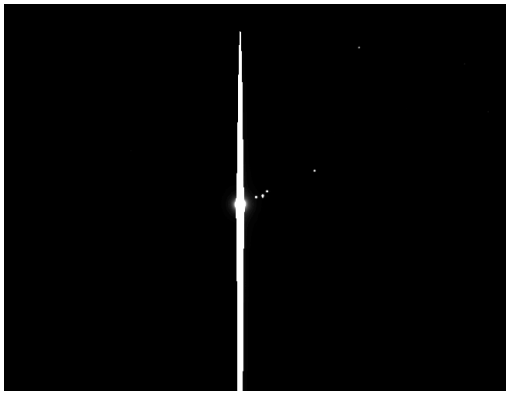
All the information is there!
We are just viewing too much of it.
The contrast between the brightest and dimmest features is low. Since the image is mostly dark, use image processing to display the interesting faint information by viewing only those fainter brightness features.



- It's all black!
- Where's the Moon?
- I don't see anything! Not even dots.

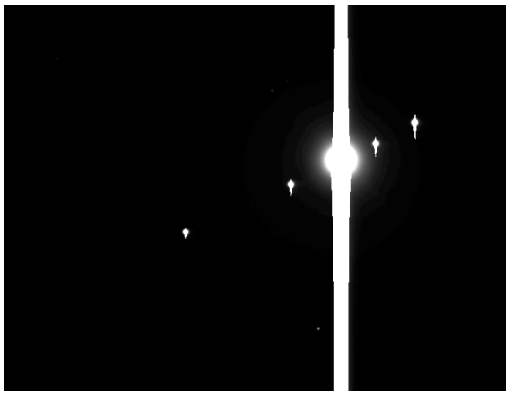
There could be several reasons why no information was recorded.

- Poor weather. It could be too cloudy, raining or even snowing when the image was taken.
  Can't look through the clouds!
- Too short of an exposure. Not enough or any light fell on the detector to record information.
- Too much light recorded by detector. Saturates or overexposes the device, results in an all black image.
- The opaque (black) filter used. No light made it to the detector.
- Mechanical shutter failure.



- Why are there long spikes in the image?
- What are all these vertical white streaks?

Some objects in the night sky are bright and neighboring objects are faint, similar to Jupiter and its faint satellite moons. The detector requires more light to image the faint objects but that means too much light coming from the bright object. This excess light from the bright object spills over on the detector to create bright spikes or flares. Use less exposure time to image the object or ignore the spikes and investigate the faint features.



- The image is all black but there are a few white dots here and there.
- There are a lot of white dots on the black sky. Are these stars?

White dots are not stars but noise created by the detector. This noise can be removed by image processing methods. There are a few causes for this image.

- Poor weather and very dark. Too cloudy, raining or even snowing when the image was taken.
  Can't look through the clouds!
- Much too short of an exposure. Not enough light fell on the detector to record information.
- The opaque (black) filter used. No light made it to the detector.
- Mechanical shutter stuck closed.

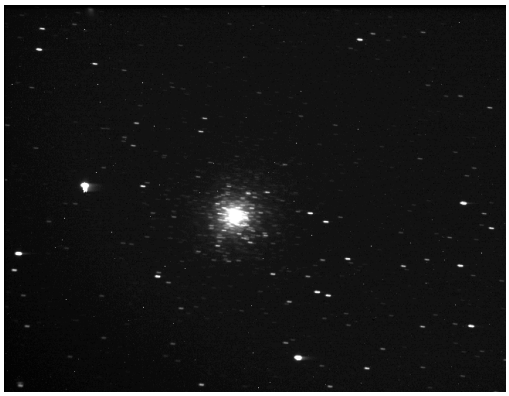
- Why is the moon is darker.
- The moon has dark patches on it and there weren't there yesterday!
- A lunar eclipse!
- Everything is fuzzy and blurry.

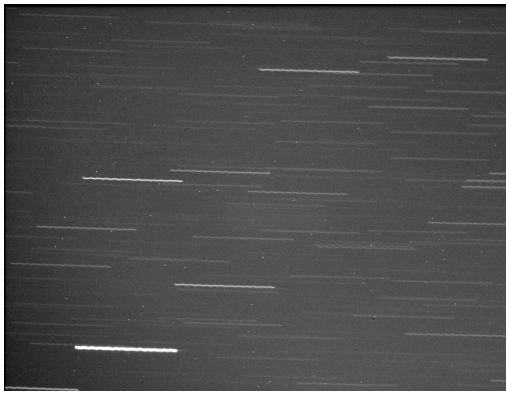
Those infernal clouds!
The bane of every astronomer.
Dark patches, hazy skies, smoky images,
even no image, can all be traced to
cloudy sky conditions.

But sometimes, those clouds form
interesting images too!

A lunar seahorse!

- Why are there little dashes or streaks?
- All the stars are oblong and smeared!



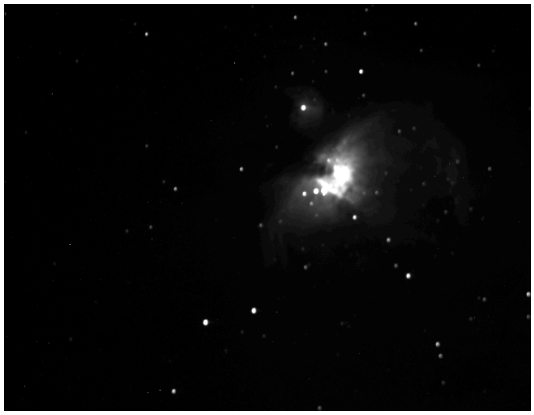


Occasionally the telescopes motion tracking system slips or even just stops. If the telescope does not track the object's motion across the sky while its detector is recording its light, all the stars appear as little streaks. Note how fast the Earth rotates in such a short time!

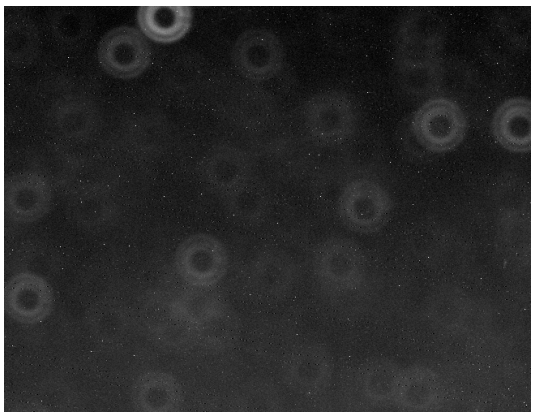
- Why all the vertical streaks?
- Did I record a meteor shower?
- Is the sky falling?!?!

Occasionally, the telescopes mechanical shutter malfunctions. The shutter sticks slightly open so that a small amount of light continually falls onto the detector. The vertical streaks record the motion of the sky as the telescope stops tracking the object to transmit the image information to the computer storage area.

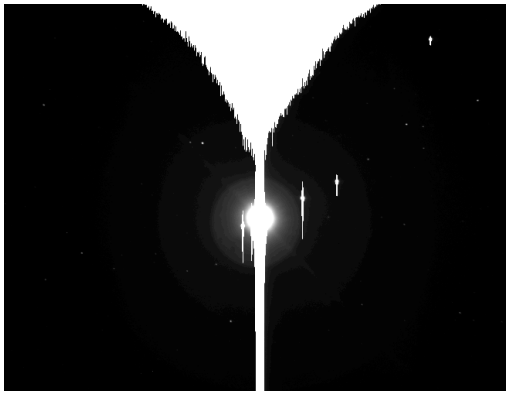
- The image looks fuzzy & blurry.
- The stars are not pinpoints.
- Why are little donuts or circles on the image?

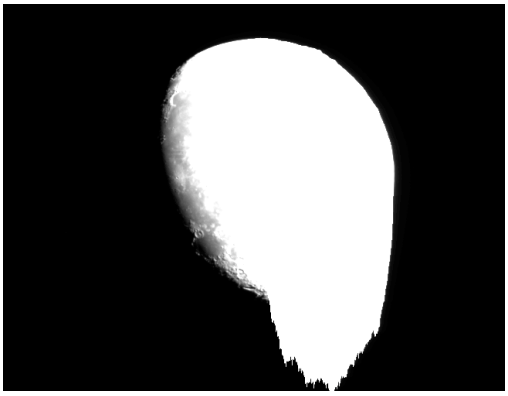


The telescope optics are not in focus. An incorrect focus position is requested, which creates large circles of out-of-focus stars.
Other times, when the temperature at the telescope changes greatly, the precise focus position on the detector also changes, resulting in slightly out-of-focus stars, an overall blurry image or even small donuts.



- The Moon is spilling over!
- Why does Jupiter have a cone cap?
- This is very weird. What is going on?





Too much light.
For very bright objects like
the Moon and Jupiter,
a little more light falling on the
detector can overwhelm its ability
to record all the information.
The detector becomes saturated with
light and the excess spills over to
adjacent parts of the detector.
Even more light causes odd images.

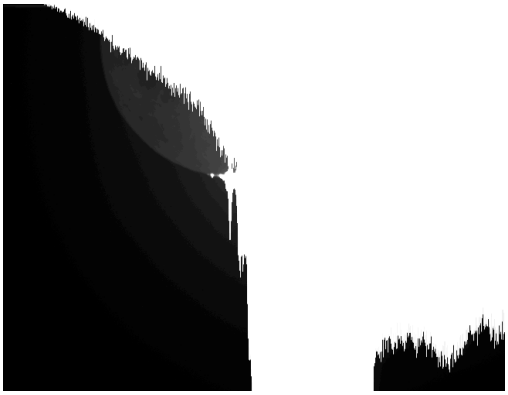
The following sequence of Moon images shows what just a little more light on the detector can do to the final image.

1. 

2. 

3. 

4. 

5. 

6.