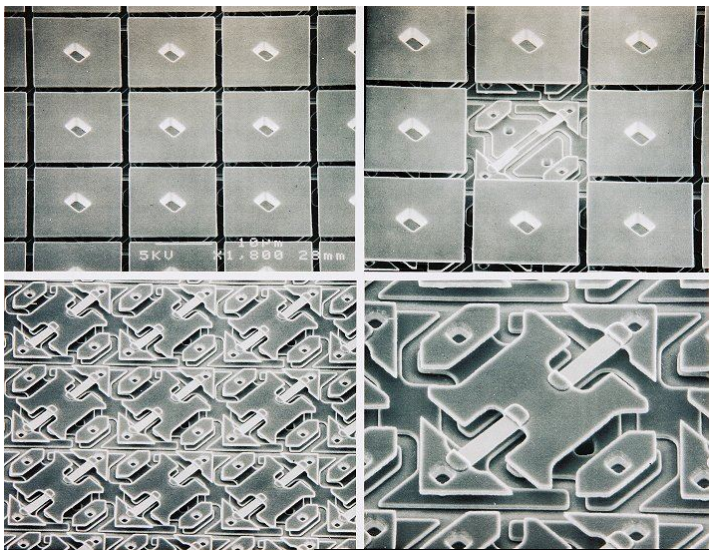
The Texas Instrument DLP Chip

Illustration

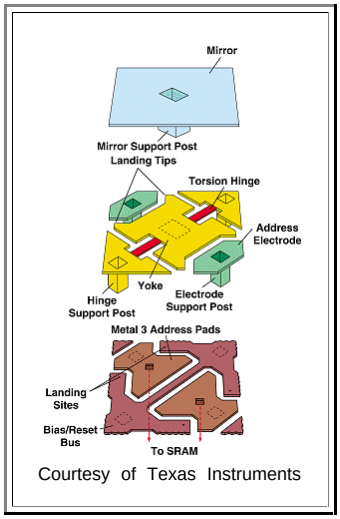
- The pictures below show some of the **> 900 000** to more then **2 000 000** micromirrors of a DLP chip and what is below.



Courtesy of Texas Instruments

  - What you see are the "hinges" of individual mirrors. What you don't see is that below the hinges is an array of transistors etc. that allow to address an individual mirror to "do its thing".
- It looks pretty complicated because it is pretty complex. But still rather coarse if you look at the size of the smallest entities - about **1 µm** or larger, so there is room for much improvement in years to come.
- How does it work? The basic principle is shown below

- The **DLP** chip's micromirrors are mounted on tiny hinges that enable them to swivel around a defined axis in two defined positions called "ON" and "OFF".
  - Any mirror can be addressed individually and the time for being in an ON or OFF position is individually adjustable.
  - The system is driven electrostatically at some **kHz** swivel frequency; a ***SRAM*** memory cell contains the pixel information for the long time - tens of milliseconds! - the pixel is held at some intensity value.
  - The light from the lamp is reflected by any mirror either into the the optical system that projects it on the screen or wall (ON position), or into a light sink (OFF position). The intensity you see on the screen for every pixel depends on the ratio of ON to OFF times for the mirror processing that pixel.



Courtesy of Texas Instruments

- Now we can form a grey scale image. How about color?
  - Simple. Illuminate through a revolving filter wheel with red-green-blue in succession, and have you individual mirror project the right red-green-blue intensity synchronously.
  - Of course, you loose intensity. So have three **DLP** chips, one for each primary color, and superimpose the thee images. But that makes the beamer more expensive.
  - OK - now we are talking product diversity and the **R&D** that goes with constant product improvement. How about a beamer for a big cinema screen? What kind of **DLP** chip would that need?

You get the idea. Digital light processing may still have a long and very rewarding (Dollar wise) career ahead. TI already made more than **10^9 $** with it by now (2007). Or it may not - because something better may come up.