

The Big Eye



The Newsletter of the Friends of Palomar Observatory December 2011

A Life in Balance: A Tribute to Bill McLellan by Dan McKenna

If I could turn back time, I wish that all of you would have had the opportunity to meet Bill McLellan, who recently passed on. I suspect that you, like Bill, have an inextinguishable passion for Palomar Observatory and, in particular, for the Hale 200-inch telescope. All of Bill's work with the Hale was carried out with a combination of precision and dedication.

Bill McLellan was a part of old school Palomar Observatory, when Palomar ruled astronomy with its unmatched performance and resources. One of Bill's many accomplishments was a procedure that increased our ability to keep the 200-inch telescope in balance.

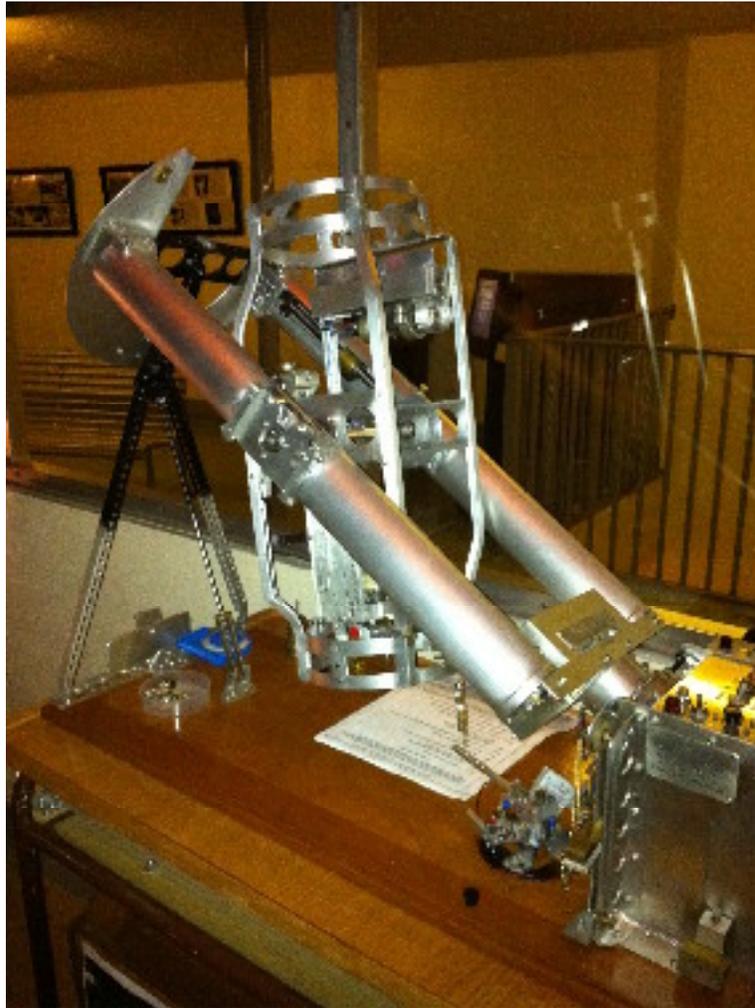
As you may know, the 200-inch has several different configurations of instruments and focal lengths. Each configuration requires a balance adjustment so that we do not either 1) exceed the maximum allowable gear load or 2) "float" the pre-load. In our operation, a fixed "pre-load" force provided by weight and cable (called a "moment") keeps the drive and tracking gears on one side of the gear tooth. An out of balance force in one direction would result in a heavier load to the gears. An out of balance force in the other direction could cause the gear engagement to change to the other side, called a "floating" gear. We try to balance the telescope in a way that keeps the forces constant and independent of sky position.

To accomplish an all sky balance, Bill McLellan came up with a procedure that uses a lightweight chain connecting the telescope and balance cart. The balance cart has an electric displacement indicator that displays changes in telescope position. The crew has a balance sheet providing them with the counter weight moment values they should expect. [A "moment" is a force exerted on a lever arm, which results in a torque about an axis. The 200-inch Hale Telescope uses weights that are driven to and from an axis centerline to produce a variable torque on the axis being adjusted.]

If the setup is routine, the crew simply sets the dials for the expected moment. If it is necessary to check the balance, the crew uses the balance cart and watches the displacement indicator. When a displacement jump is observed, the crew knows that they have passed through balance. By reading a dial on the balance console, they can find out how much torque was applied to compensate for the configuration, and can adjust the

final settings to keep the telescope in balance. Thanks to Bill's procedure, this critical balancing is much easier to accomplish and maintain.

As a balance teaching tool, Bill designed and built a 1/40 scale model of the Hale 200-inch telescope, complete with electrically driven counter weights, mirror cover, preload, and a displacement indicator.

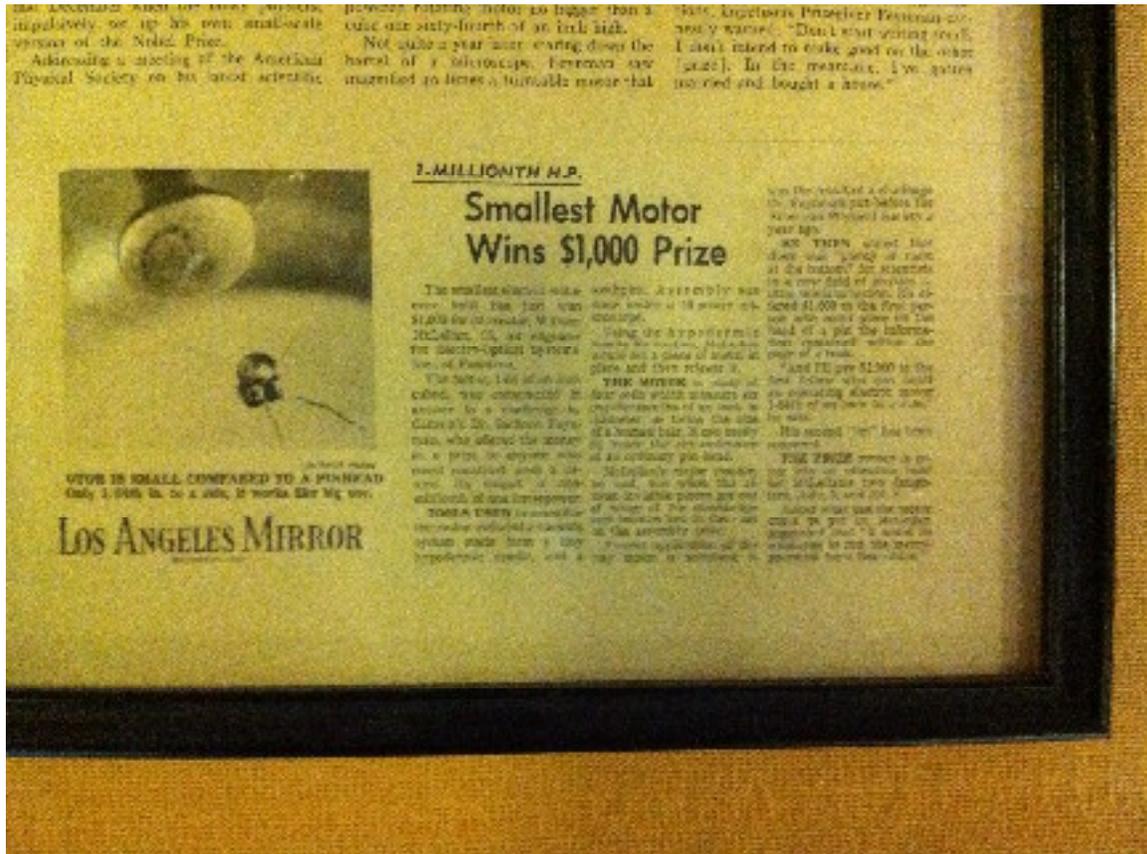


Bill McLellan's Balance Model now displayed at the 200-inch visitors gallery

Bill McLellan was known as an Engineer's Engineer. During his memorial service at Caltech on December 2nd, many spoke of Bill's ability to design things that worked. A few from the Apollo space program who were at the memorial stated that if Bill had not helped them, we would not of made it to the moon!

The well-known physicist Richard Feynman offered a prize for the world smallest working electric motor that would fit into a 1/64-inch cube. Bill McLellan not only made

the prize-winning motor, but also devised a method to hand make the wire used to wind the coils that drive the rotor.



The LA Mirror article about Bill's prize-winning motor (1960)

The Hale 200 inch telescope is a world-class accomplishment requiring the minds and skills of many who have since passed on. Bill McLellan knew many of those who contributed to building the Hale telescope, and could tell their stories.

Before I came to Palomar, I was on the design team for the Large Binocular Telescope (Mt. Graham, Arizona), a behemoth instrument with two 8.4-meter mirrors that, in the mount, span about 22 meters across. Even so, I will never forget the first day I arrived at Palomar Observatory and gazed at the Hale. It appeared larger than life and far more beautiful than any telescope I had ever laid eyes on. I am sure Bill McLellan felt, to his last days with us, that the Hale was the best telescope that would ever be built, and that he felt 1000 feet tall when he expressed this point of view. I'm sure Bill would agree with me that, for all its size, the mighty LBT is not nearly as magnificent an instrument as our own Hale 200-inch telescope.

Bill, you will be sorely missed by all of us.



Bill McLellan with a model of his motor

THE PALOMAR OBSERVATORY DOCENT CORNER

by Kin Searcy

In the popular musical *Camelot*, there is a scene in which a dejected young Arthur (then called Wart) asked Merlin what to do, and Merlin told him that whenever he was sad the best approach was to “learn something.” This notion stuck with me, and I became Wart when my mother died. The “learn something” was astronomy. I already had some knowledge of astronomy through academic courses in celestial navigation at the US Naval Academy and actual practical application at sea. But to “learn something” at that time, I bought a very nice telescope and joined the local astronomy group, NOVAC, Northern Virginia Astronomy Club. Learning something worked for me.

Wart needed another boost when my job relocated to San Diego. Astronomy was the answer again. In San Diego, the skies were better, the amateur groups were larger, and there were major research observatories within a short drive. I became very active in the San Diego Astronomy Association (SDAA) and this has been a constant source of challenge, learning and friendship. The SDAA outreach volunteers are some of the finest people one can meet.

I followed this trajectory into another life change - retirement. On several occasions, I had promised Scott Kardel that I would come to Palomar Observatory and help with the outreach program as soon as I retired. It happened that the retirement date coincided with one of Scott's talks at SDAA. Susan Vergara was at Scott's talk and handed me the docent manual and set me up with an interview with Scott.

At Palomar, the learning continued. I really enjoyed the docent training, interaction with the observatory staff, and the opportunity to talk to the public about the history, technology, and scientific discoveries of Palomar Observatory. The program is well rounded, with regular public and special group tours. I especially enjoy the Scout tours. In addition to the tour program, we support the Friends of Palomar. There have been great lectures, wonderful star parties, and magic nights at the 60-inch with the Friends of Palomar.

My continuing experience at Palomar Observatory has been challenging and rewarding. Being a small part of the mission of a major astronomical research institution is very interesting and fulfilling. It is always a thrill to be “on the mountain” and “in the dome.” My fellow docents are fine people, intelligent and outgoing, and our camaraderie is outstanding. There is always a challenge – improve the tours, keep up with the science, research the history, stay away from the dreaded Left Ascension (which must have been coined by a docent named Murphy.) It is an exceptional gift to be able to keep on learning.